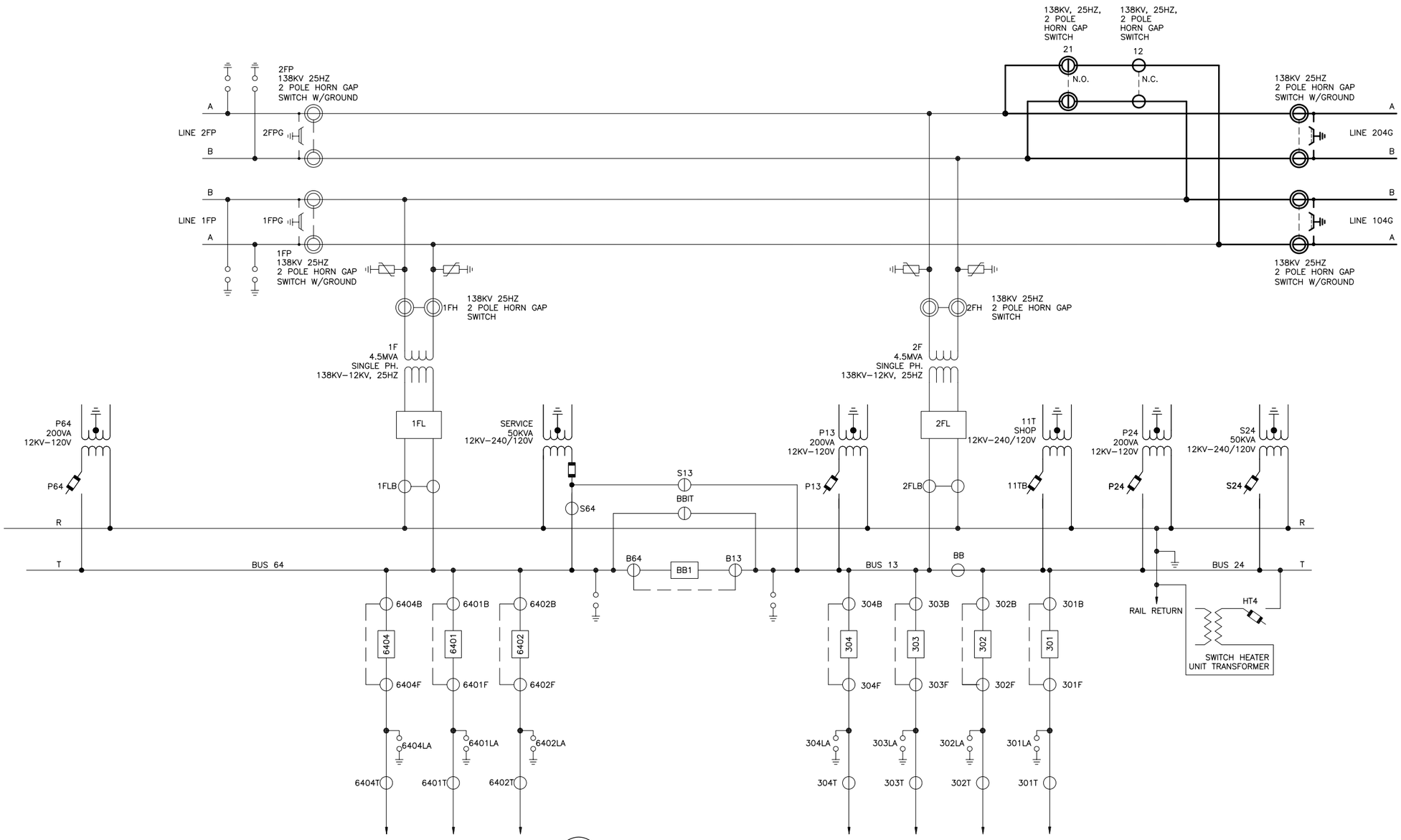
TO HARRISBURG

TO PHILADELPHIA

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–2301 PROPOSED 25 HZ TWO–LINE DIAGRAM
SCALE: NONE

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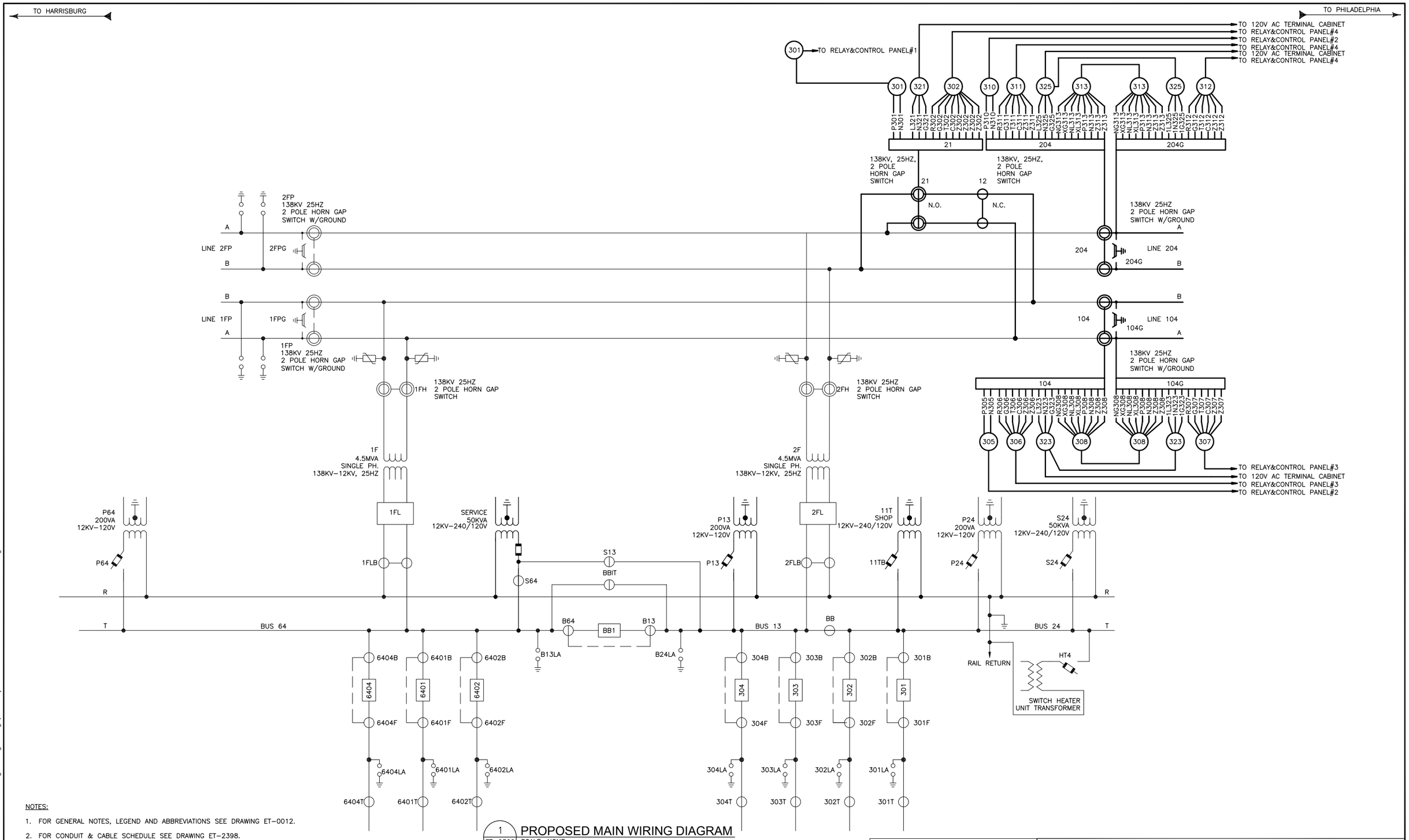
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED 25 HZ TWO–LINE DIAGRAM

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2301.DWG
Ref. No.:	2011–059
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ET–2301

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR CONDUIT & CABLE SCHEDULE SEE DRAWING ET–2398.

1 / ET–2302 PROPOSED MAIN WIRING DIAGRAM
SCALE: NONE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED MAIN WIRING DIAGRAM

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

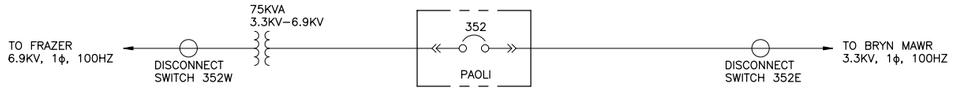
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Ref. No.:	2011–059
Sheet No:	378 OF 565

ET–2302

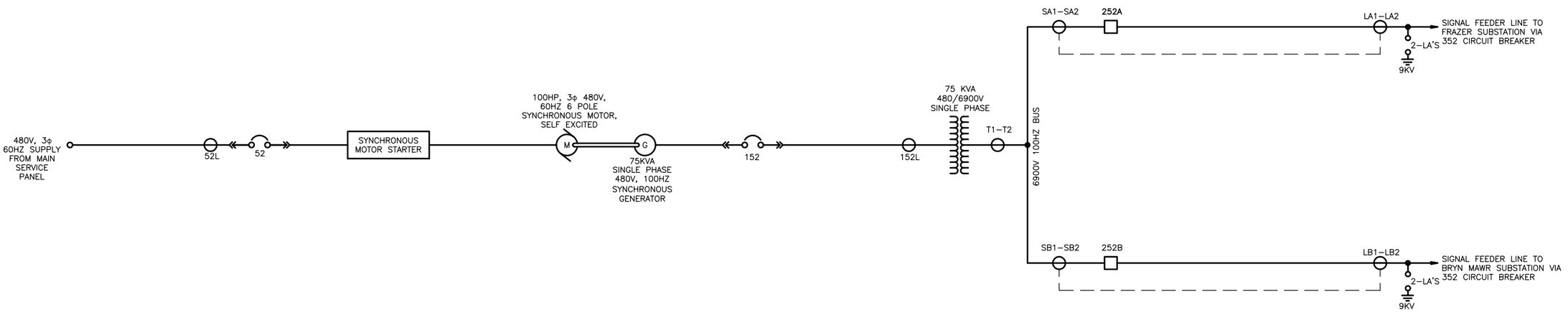
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR OVERALL SYSTEM OPERATING DIAGRAM – 100HZ SIGNAL POWER (EXISTING) SEE DRAWING ET–0024.
3. FOR 60HZ AC STAGING – SINGLE LINE DIAGRAMS SEE DRAWING ET–2354.
4. FOR SIGNAL POWER STAGING SEE DRAWINGS ET–0050 THROUGH ET–0052.
5. FOR SECTIONALIZING 352 CIRCUIT BREAKER INSTALLATION SEE DRAWING ET–3200.



1 ET–2305 EXISTING SINGLE-LINE DIAGRAM
SCALE: NONE



2 ET–2305 PROPOSED SINGLE-LINE DIAGRAM
SCALE: NONE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION – EXISTING & PROPOSED 100 HZ SIGNAL POWER SINGLE–LINE DIAGRAMS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

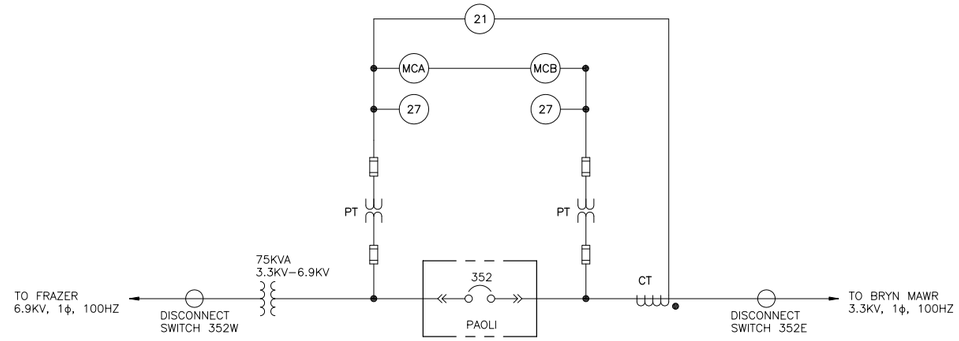
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Ref. No.:	2011–059
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ET–2305

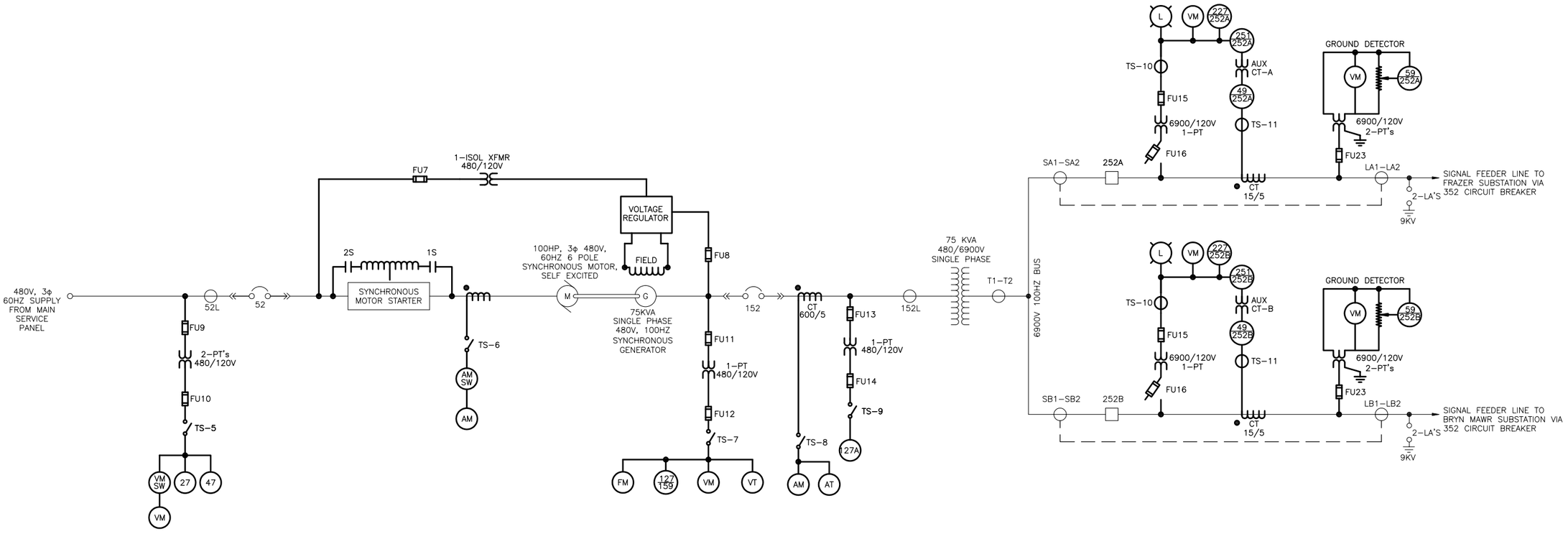
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR OVERALL SYSTEM OPERATING DIAGRAM – 100HZ SIGNAL POWER (EXISTING) SEE DRAWING ET–0024.
3. FOR 60HZ AC STAGING – SINGLE LINE DIAGRAMS SEE DRAWING ET–2354.
4. FOR SIGNAL POWER STAGING SEE DRAWINGS ET–0050 THROUGH ET–0052.
5. FOR SECTIONALIZING 352 CIRCUIT BREAKER INSTALLATION SEE DRAWING ET–3200.



1 ET–2306 EXISTING RELAYING DIAGRAM
SCALE: NONE



2 ET–2306 PROPOSED 100HZ SIGNAL POWER RELAYING DIAGRAM
SCALE: NONE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – STET PROPOSED 100 HZ SIGNAL POWER RELAYING DIAGRAMS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–2306.DWG
Ref. No.:	2011–059
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TO HARRISBURG

TO PHILADELPHIA

TO 120V AC TERMINAL CABINET
TO RELAY&CONTROL PANEL#4
TO RELAY&CONTROL PANEL#2
TO RELAY&CONTROL PANEL#4
TO 120V AC TERMINAL CABINET
TO RELAY&CONTROL PANEL#4

301 TO RELAY&CONTROL PANEL#1

301 321 302 310 311 325 313 313 325 312

P301 N301 L321 N321 G321 G302 T302 C302 Z302 Z302 P310 N310 R311 T311 C311 Z311 N325 G325 NG313 XG313 NL313 XL313 P313 N313 Z313 Z313 NG313 XG313 NL313 XL313 P313 N313 Z313 NL325 IG325 R312 G312 T312 C312 Z312

21 | 204 | 204G

138KV, 25HZ, 2 POLE HORN GAP SWITCH

21 12 N.O. N.C.

138KV, 25HZ, 2 POLE HORN GAP SWITCH

2FP 138KV 25HZ 2 POLE HORN GAP SWITCH W/GROUND

A
LINE 2FP 2FPG
B

138KV 25HZ 2 POLE HORN GAP SWITCH W/GROUND

A
204 LINE 204
204G
B

B
LINE 1FP 1FPG
A

B
104 LINE 104
104G
A

1FP 138KV 25HZ 2 POLE HORN GAP SWITCH W/GROUND

138KV 25HZ 2 POLE HORN GAP SWITCH W/GROUND

104 | 104G

P305 N305 R306 T306 C306 Z306 N323 G323 NG308 XG308 NL308 XL308 P308 N308 Z308 Z308 NG308 XG308 NL308 XL308 P308 N308 Z308 NL323 IG323 R307 G307 T307 C307 Z307

305 306 323 308 308 323 307

1FH 138KV 25HZ 2 POLE HORN GAP SWITCH

2FH 138KV 25HZ 2 POLE HORN GAP SWITCH

TO RELAY&CONTROL PANEL#3
TO 120V AC TERMINAL CABINET
TO RELAY&CONTROL PANEL#3
TO RELAY&CONTROL PANEL#2

1F 4.5MVA SINGLE PH. 138KV–12KV, 25HZ

2F 4.5MVA SINGLE PH. 138KV–12KV, 25HZ

P64 200VA 12KV–120V

1FL

SERVICE 50KVA 12KV–240/120V

P13 200VA 12KV–120V

2FL

11T SHOP 12KV–240/120V

P24 200VA 12KV–120V

S24 50KVA 12KV–240/120V

P64 1FLB S64 S13 BBIT P13 2FLB 11TB P24 S24

R

T BUS 64 B64 BB1 B13 BUS 13 BB BUS 24 T

B13LA B24LA

RAIL RETURN

HT4

SWITCH HEATER UNIT TRANSFORMER

6404B 6401B 6402B 304B 303B 302B 301B

6404 6401 6402 304 303 302 301

6404F 6401F 6402F 304F 303F 302F 301F

6404LA 6401LA 6402LA 304LA 303LA 302LA 301LA

6404T 6401T 6402T 304T 303T 302T 301T

1 PROPOSED MAIN WIRING DIAGRAM
ET–2309 SCALE: NONE

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED MAIN WIRING DIAGRAM

Recommended:	JAS	Drawn:	JAS	Checked:	MJM	Date:	03/17/16

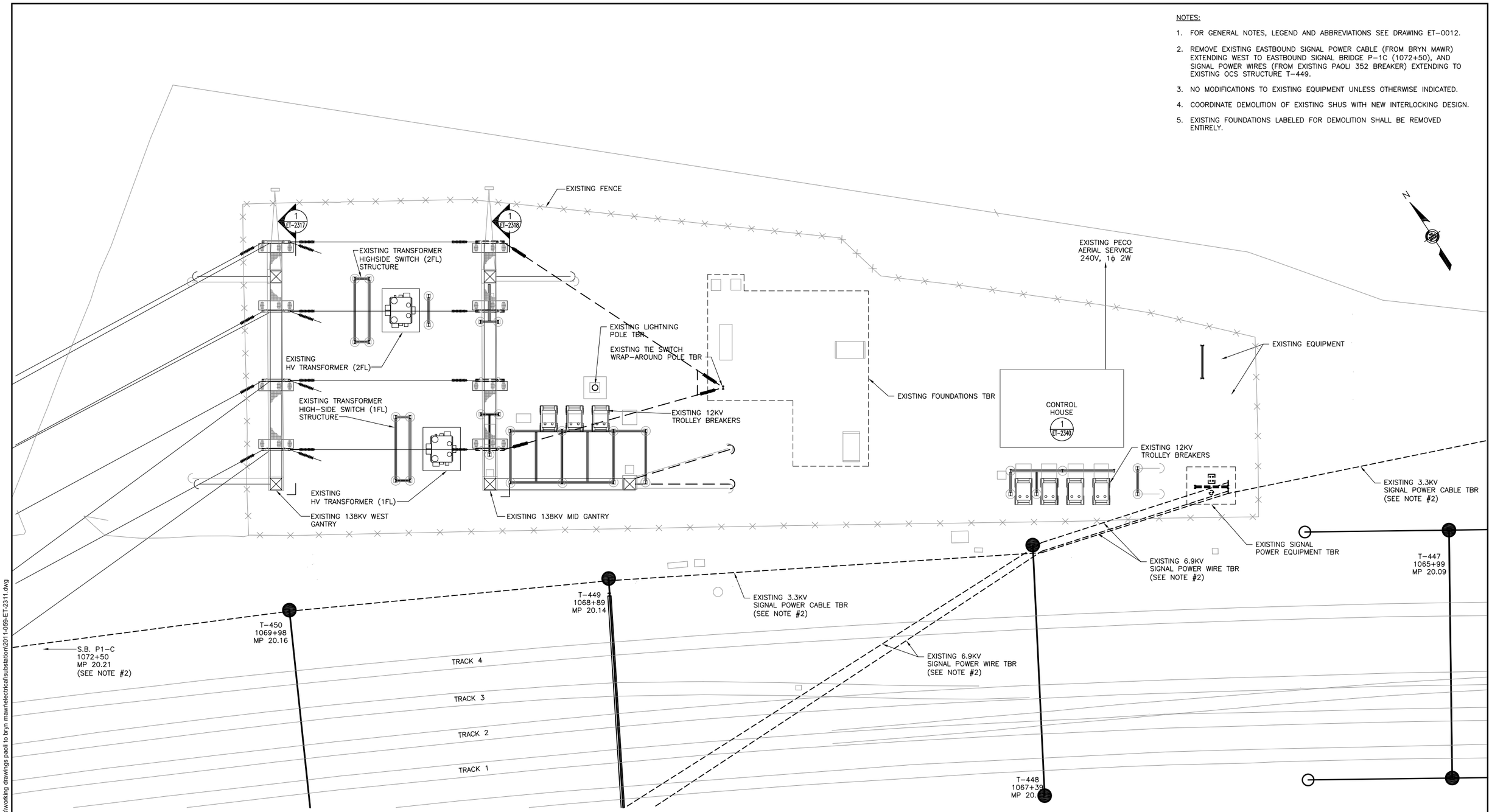
File No.:	
Ref. No.:	2011–059
Sheet No:	OF 565

ET–2309

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. REMOVE EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDING WEST TO EASTBOUND SIGNAL BRIDGE P–1C (1072+50), AND SIGNAL POWER WIRES (FROM EXISTING PAOLI 352 BREAKER) EXTENDING TO EXISTING OCS STRUCTURE T–449.
3. NO MODIFICATIONS TO EXISTING EQUIPMENT UNLESS OTHERWISE INDICATED.
4. COORDINATE DEMOLITION OF EXISTING SHUS WITH NEW INTERLOCKING DESIGN.
5. EXISTING FOUNDATIONS LABELED FOR DEMOLITION SHALL BE REMOVED ENTIRELY.



1 ET–2311 PAOLI SUBSTATION - DEMOLITION SITE PLAN

16' 8' 0 16'

SCALE:1/16"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
DEMOLITION SITE PLAN

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–2311.DWG
Ref. No.:	2011–059
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ET–2311

3/14/2016 2:14:43 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2311.dwg

BILL OF MATERIALS (ET-2312 TO ET-2319)

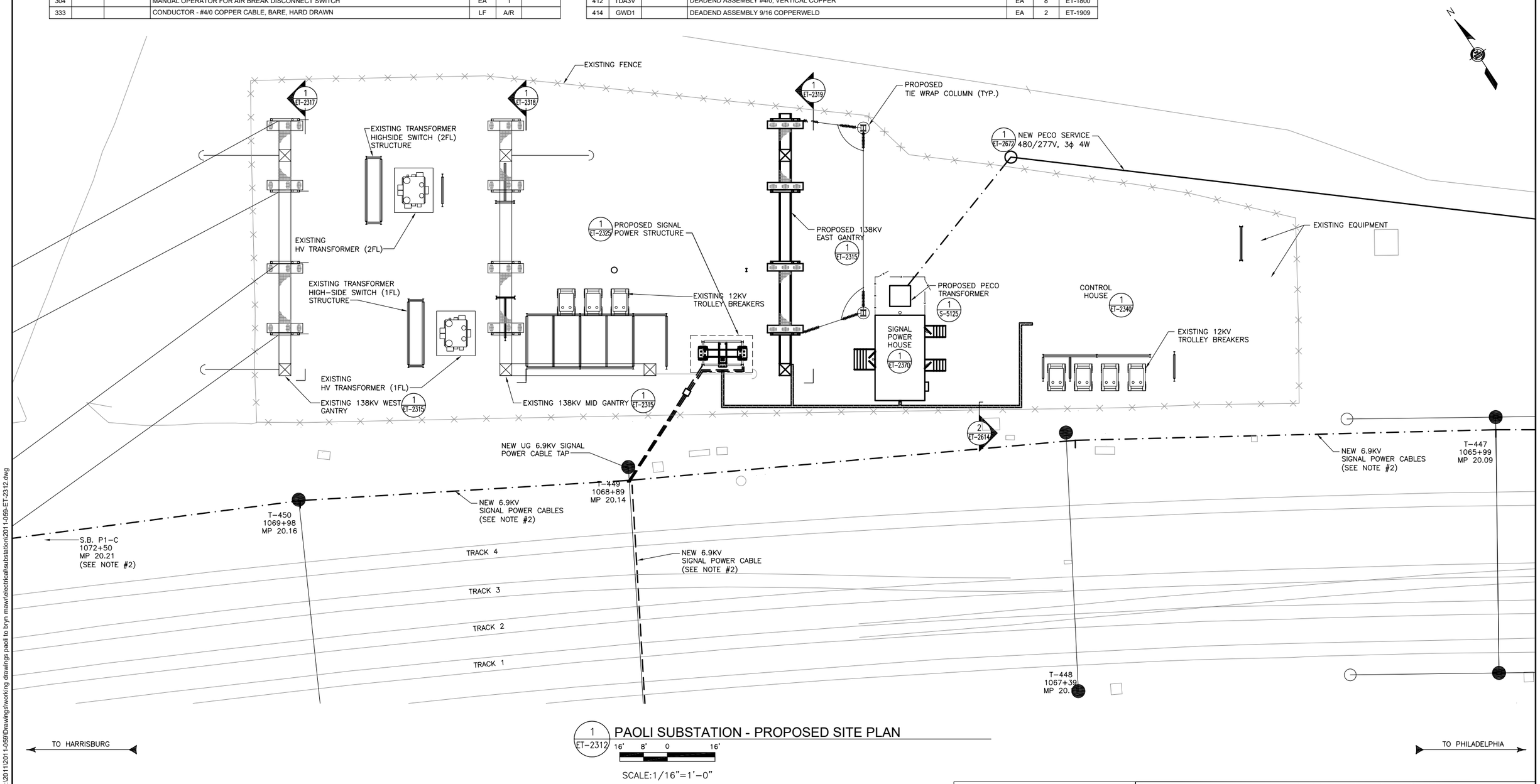
ID	MARK	AMMES	DESCRIPTION	UNIT	QTY	REF. DWG.
286			COMPRESSION LUG 4/0 COPPER, BURNDY YA28-2N	EA	20	
301			AIR BREAK DISCONNECT SWITCH WITH GROUND, 161kV RATING, 2 POLE	EA	2	
302			AIR BREAK DISCONNECT SWITCH, 161kV RATING, 2 POLE	EA	2	
303			MOTOR OPERATOR FOR AIR BREAK DISCONNECT SWITCH	EA	3	
304			MANUAL OPERATOR FOR AIR BREAK DISCONNECT SWITCH	EA	1	
333			CONDUCTOR - #4/0 COPPER CABLE, BARE, HARD DRAWN	LF	A/R	

BILL OF MATERIALS (ET-2312 TO ET-2319) (CONT.)

ID	MARK	AMMES	DESCRIPTION	UNIT	QTY	REF. DWG.
336			CONDUCTOR - 9/16 COPPERWELD	LF	A/R	
350			LIGHTNING MAST	EA	11	
354			SIGNAL POWER HOUSE	EA	1	
411	TDA3C		DEADEND ASSEMBLY #4/0, COPPER	EA	16	ET-1800
412	TDA3V		DEADEND ASSEMBLY #4/0, VERTICAL COPPER	EA	8	ET-1800
414	GWD1		DEADEND ASSEMBLY 9/16 COPPERWELD	EA	2	ET-1909

NOTES:

1. REFER TO DRAWING S-5401 FOR 138 KV GANTRY FRAMING ELEVATIONS.
2. NEW EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P-1C (1072+50) AND SIGNAL POWER CABLES (FROM NEW PAOLI SIGNAL POWER STRUCTURE) EXTENT TO NEW OCS STRUCTURE T-449.
3. SUBSTATION CONTAINS EXISTING GROUND GRID. MODIFY EXISTING GROUND GRID FOR GANTRY AND SIGNAL POWER HOUSE LOCATIONS AND PROVIDE CADWELD CONNECTIONS FROM STRUCTURES TO THE GROUND GRID.



1 ET-2312 PAOLI SUBSTATION - PROPOSED SITE PLAN

16' 8' 0 16'

SCALE:1/16"=1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED SITE PLAN

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

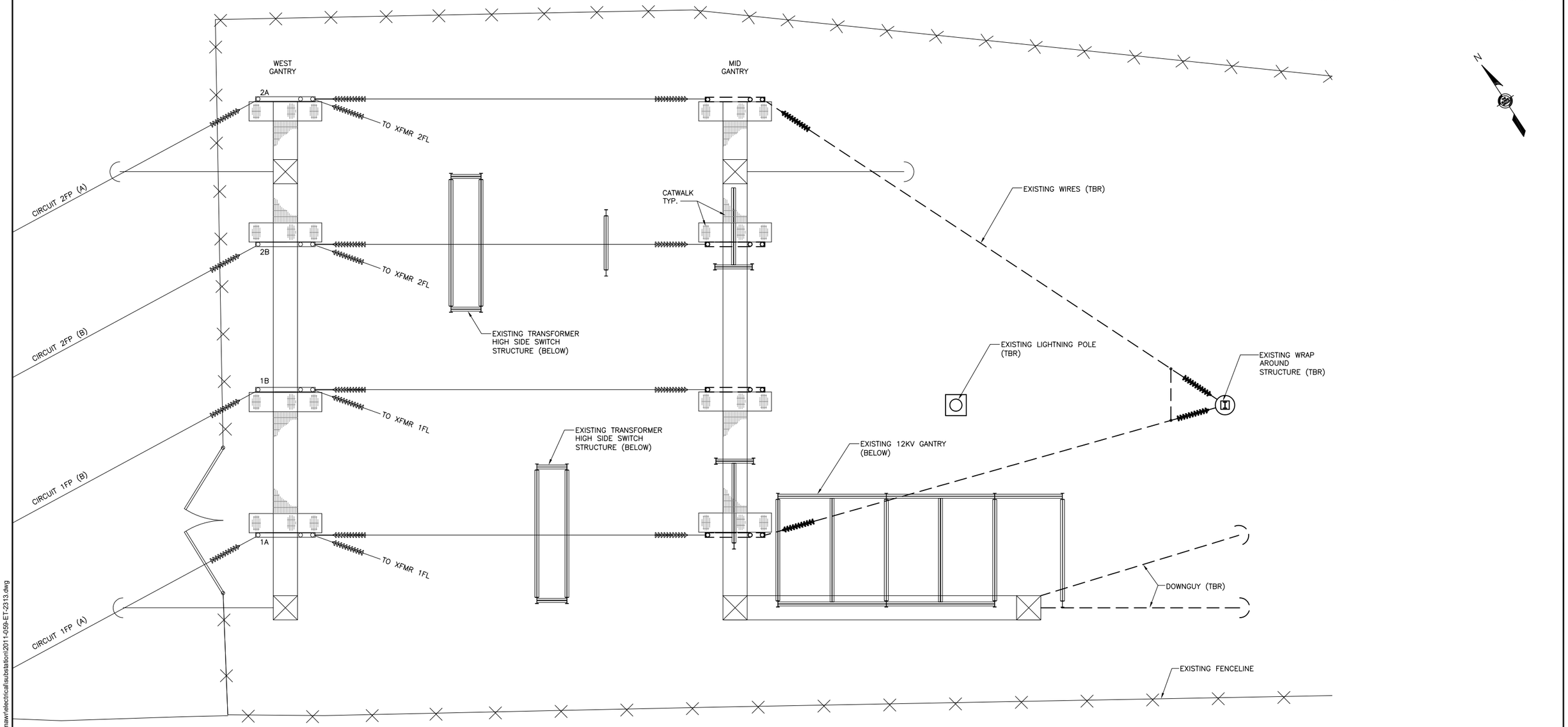
File No.:	2011-059-ET-2312.DWG
Ref. No.:	2011-059
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ET-2312

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NOTES:

1. REFER TO DRAWING S-5401 FOR 138 KV GANTRY FRAMING ELEVATIONS.



1 ET-2313 PAOLI SUBSTATION - EXISTING138kV GANTRY (ELEVATION 85')

8' 4' 0 8'

SCALE:1/8"=1'-0"

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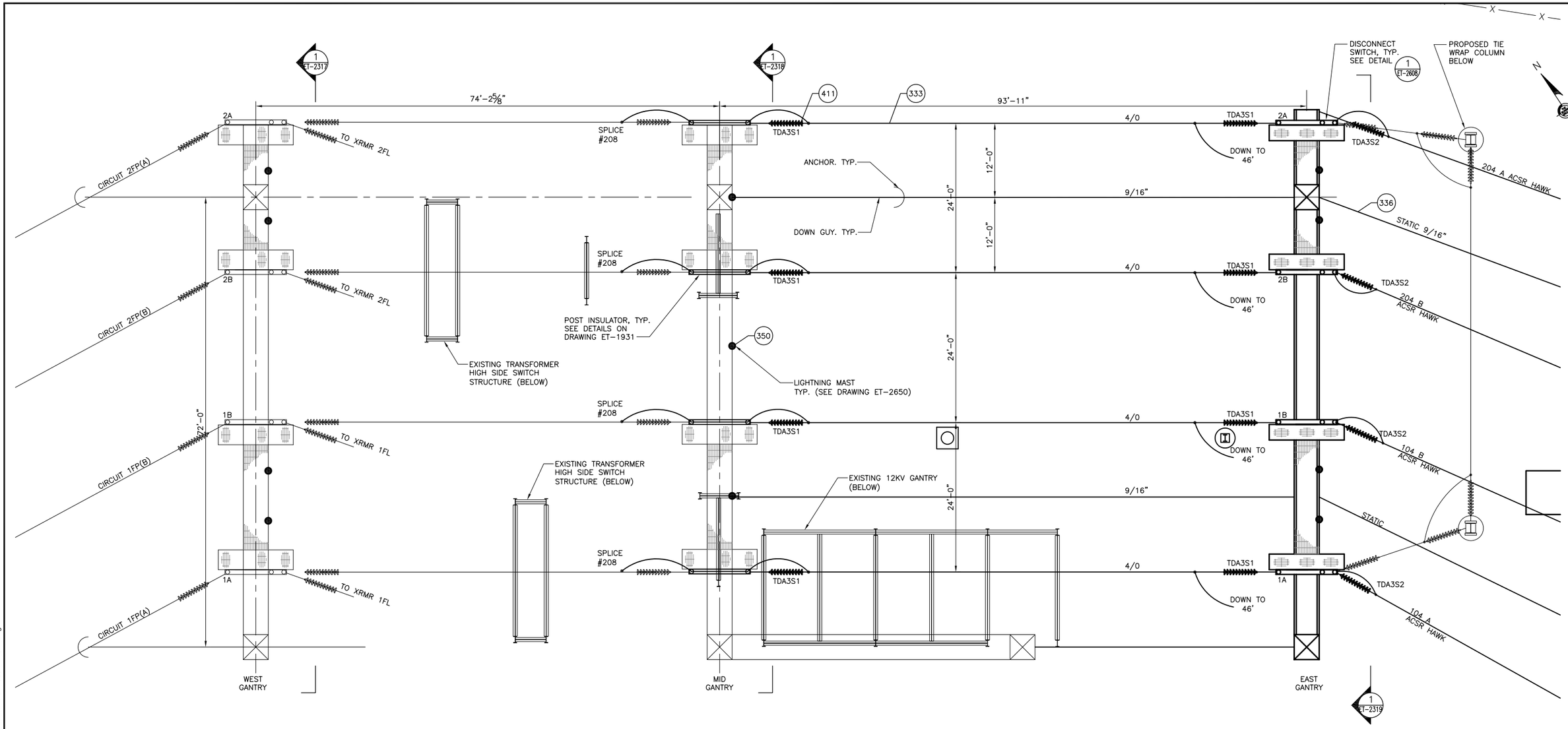
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED 138KV GANTRY PLAN (ELEVATION 85')

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2313.DWG
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1 ET-2314 PAOLI SUBSTATION - 138kV WIRING PLAN - TOP LEVEL

8' 4' 0 8'

SCALE:1/8"=1'-0"

NOTES:

1. REFER TO DRAWING S-5402 FOR 138 KV GANTRY FRAMING ELEVATIONS.
2. SEE DRAWING S-5502 FOR EQUIPMENT MOUNTING LOCATIONS AND DETAILS.

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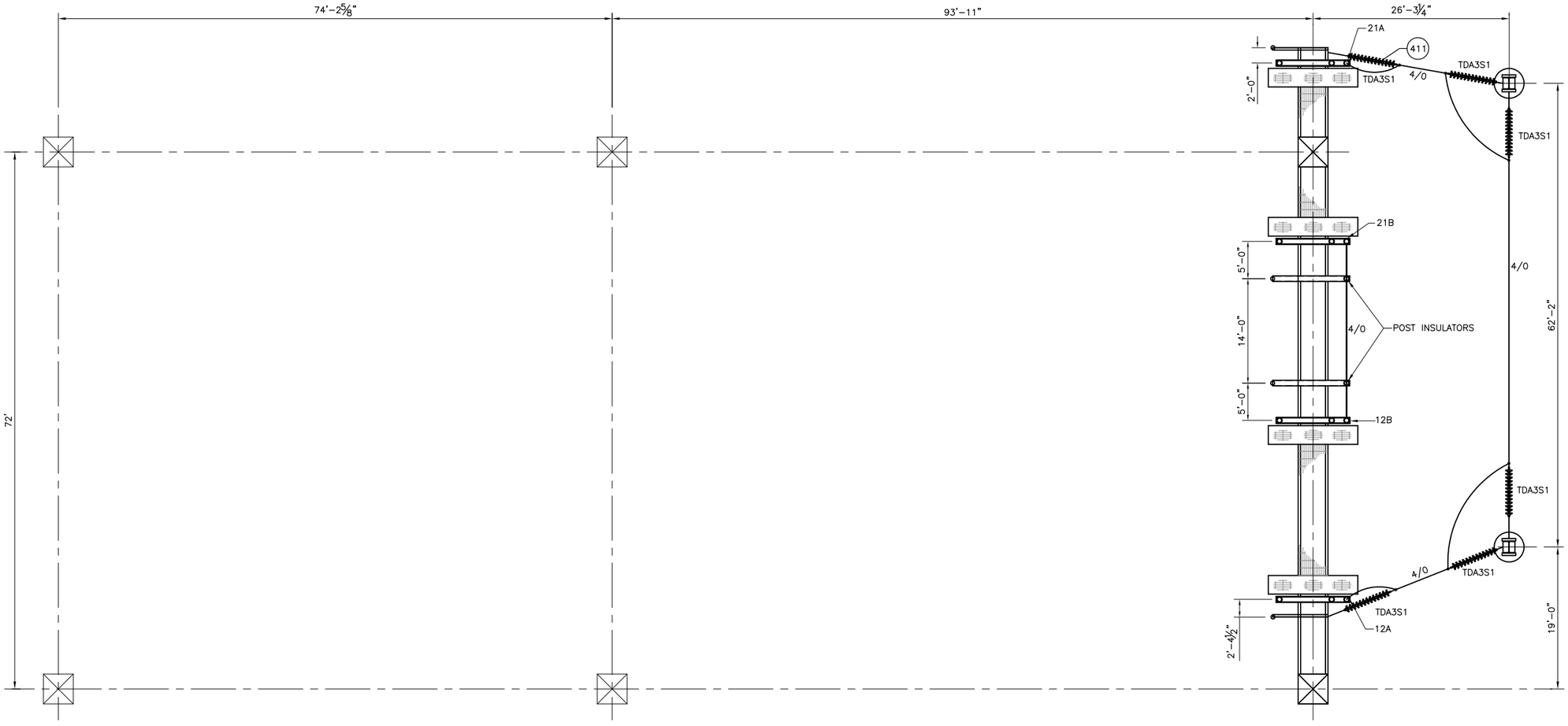
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
138KV GANTRY PLAN VIEWS (ELEV. 46') SHEET 1 OF 2

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2314.DWG
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1 / ET-2315 138kV MID GANTRY PLAN (ELEV 46')

8' 4' 0 8'

SCALE:1/8"=1'-0"

NOTE:
1. SEE DRAWING S-5502 FOR EQUIPMENT MOUNTING LOCATIONS AND DETAILS

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
138KV GANTRY PLAN VIEWS (ELEV. 46') SHEET 2 OF 2

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

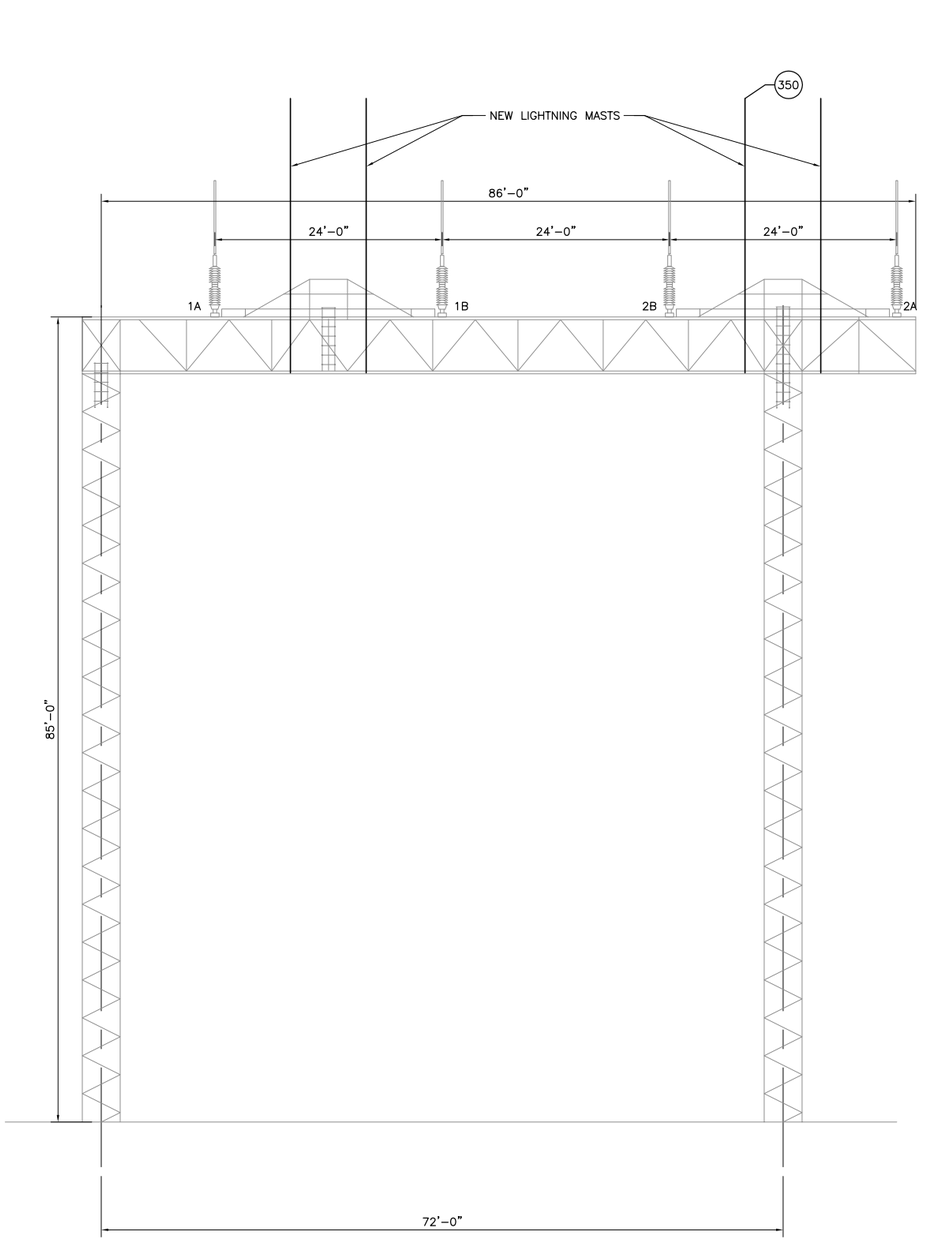
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3/14/2016 2:15:35 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn maw\electrical\substation\2011-059-ET-2315.dwg

MODIFICATIONS TO STRUCTURE:

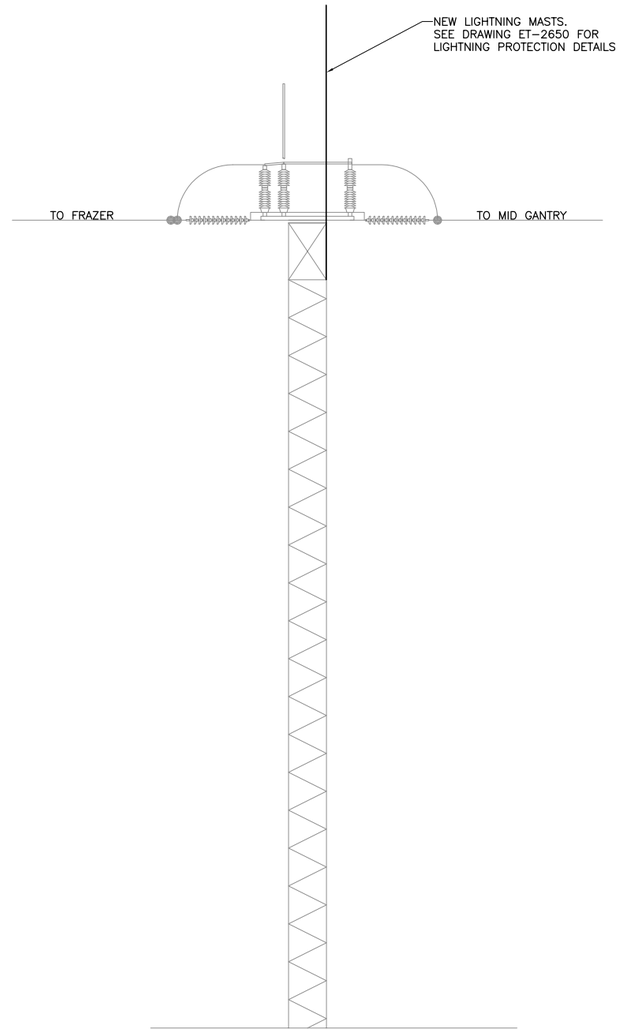
1. STRUCTURE IS EXISTING.
2. INSTALL NEW LIGHTNING ARRESTERS.



1 ET-2317 138kV WEST GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'-0"



2 ET-2317 138kV WEST GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'-0"

100% DESIGN SUBMISSION

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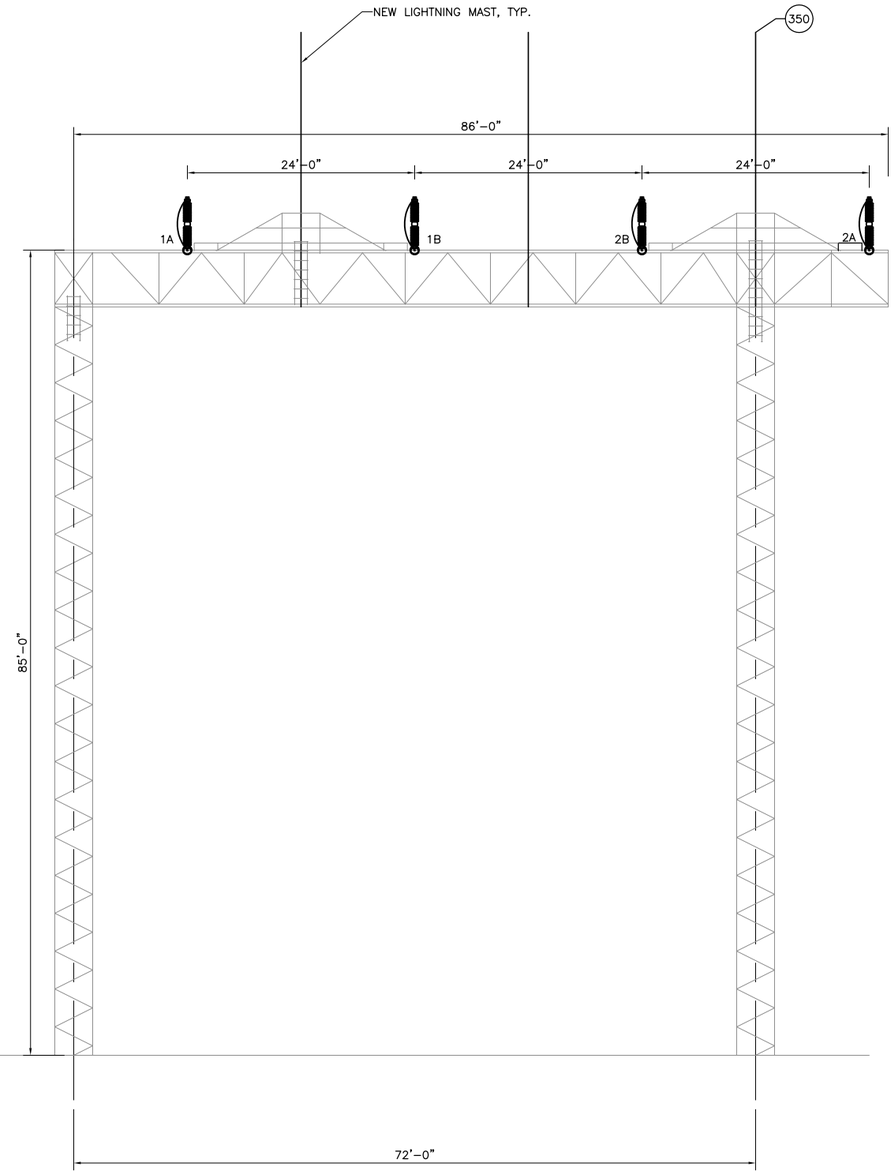
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION
138KV GANTRY ELEVATIONS SHEET 1 OF 3

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2317.DWG
Ref. No.:	2011–059
Sheet No:	387 OF 565

ET–2317

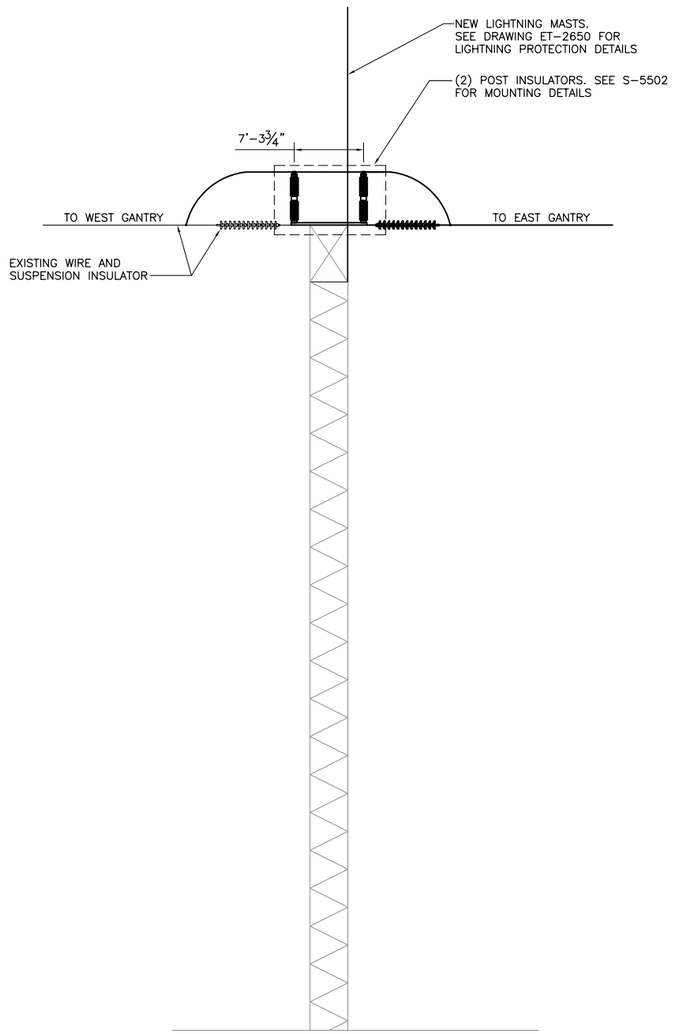
2:15:44 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2317.dwg



1 ET-2318 138kV MID GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'-0"



2 ET-2318 138kV MID GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'-0"

MODIFICATIONS TO STRUCTURE:

1. STRUCTURE IS EXISTING. ALL GANTRY-MOUNTED EQUIPMENT IS NEW UNLESS OTHERWISE INDICATED.
2. REMOVE EXISTING TIE SWITCHES, ASSOCIATED WIRING AND SUPPORTING POLE IN YARD.
3. INSTALL POST INSULATORS ON TOP OF EXISTING STRUCTURE TO ALLOW CIRCUITS TO CONTINUE TO NEW EAST GANTRY.
4. INSTALL NEW LIGHTNING ARRESTERS.

100% DESIGN SUBMISSION

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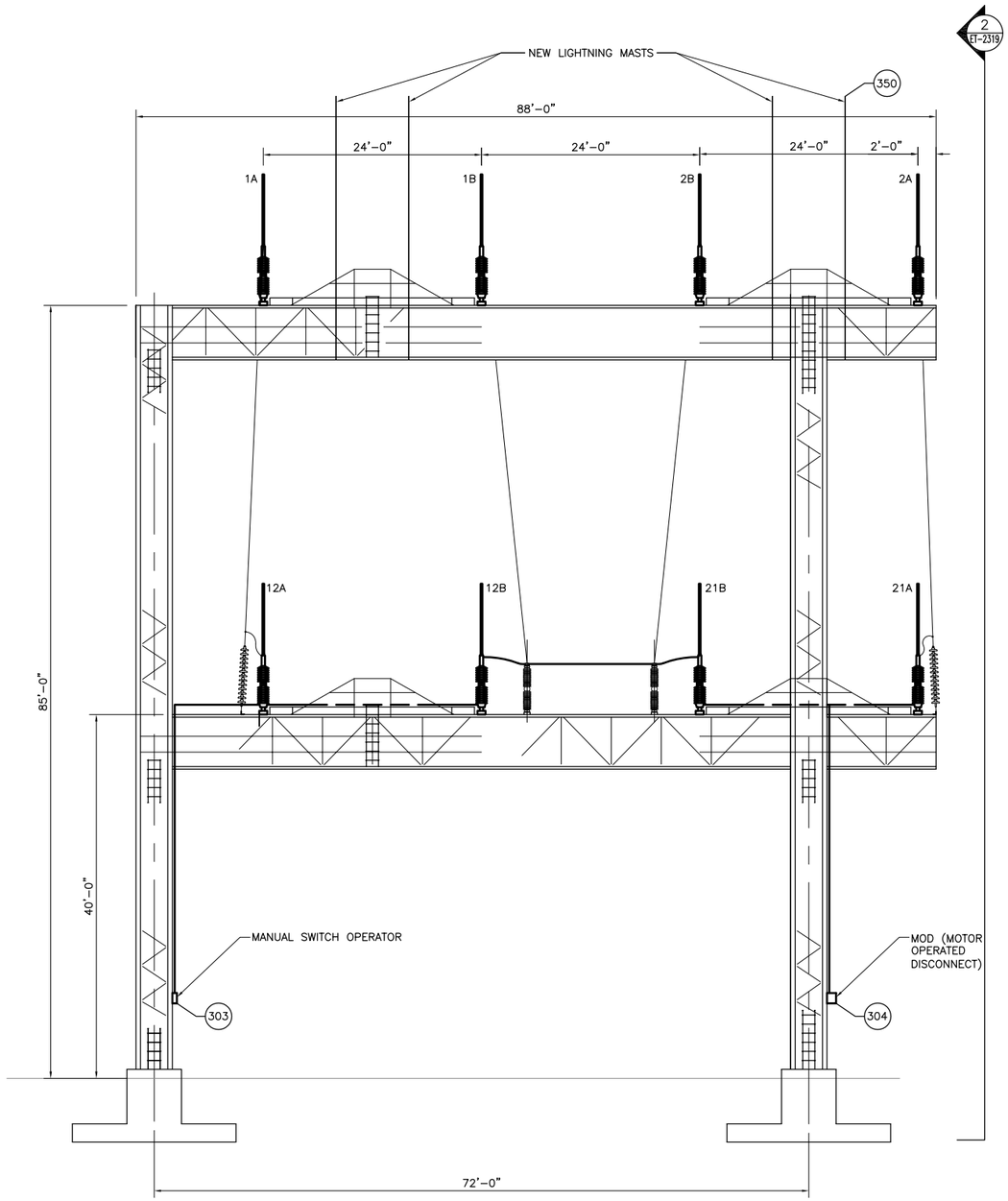
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
138KV GANTRY ELEVATIONS SHEET 2 OF 3

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2318.DWG
Ref. No.:	2011-059
Sheet No:	388 OF 565

ET-2318

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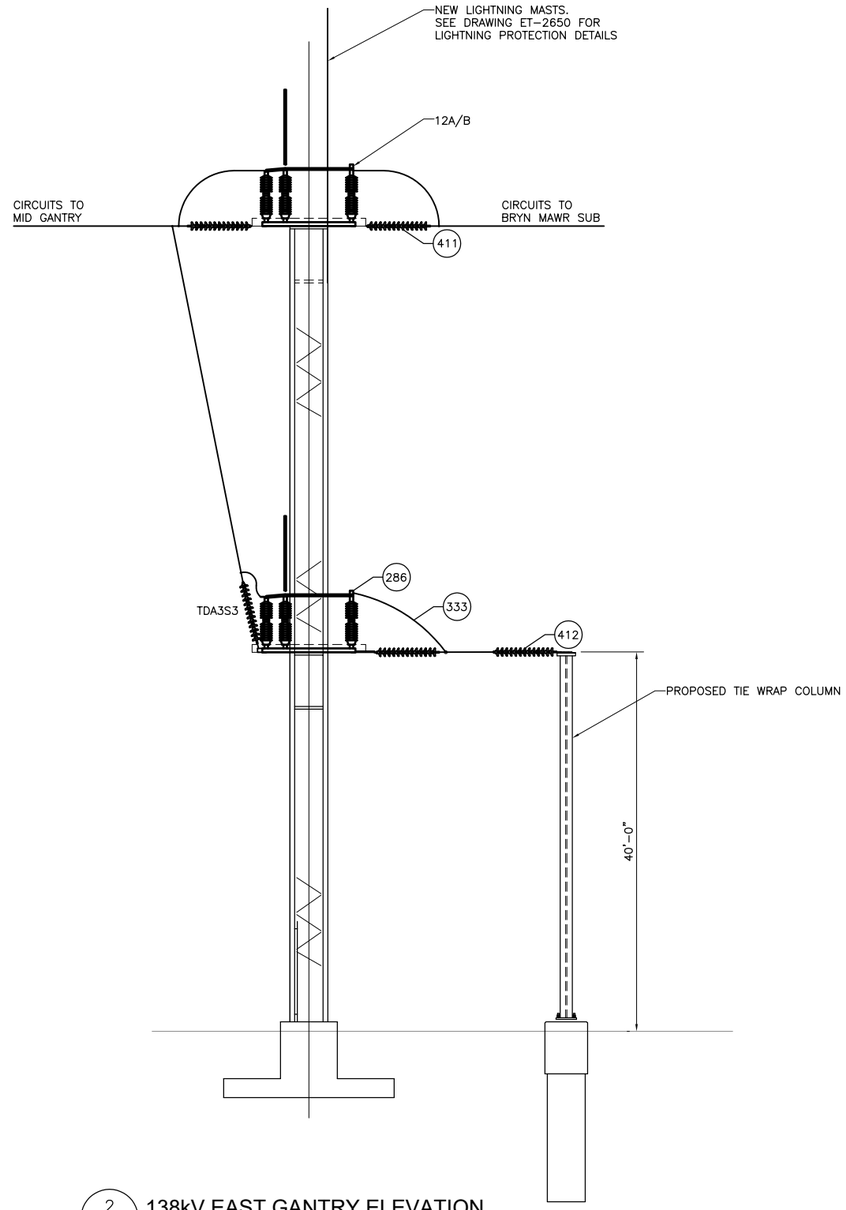
1 ET-2319 **138kV EAST GANTRY ELEVATION**

8' 4' 0 8'

SCALE:1/8"=1'-0"

NOTES:

1. STRUCTURE AND ALL GANTRY-MOUNTED EQUIPMENT IS NEW.
2. NEW EAST GANTRY SHALL HOUSE THE HIGH-SIDE DISCONNECT SWITCHES ON THE TOP COURSE (85' ELEV) AND THE TIE SWITCHES ON THE INTERMEDIATE COURSE (46' ELEV).



2 ET-2319 **138kV EAST GANTRY ELEVATION**

8' 4' 0 8'

SCALE:1/8"=1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
138KV GANTRY ELEVATIONS SHEET 3 OF 3

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2319.DWG
Ref. No.:	2011-059
Sheet No:	389 OF 565

ET-2319

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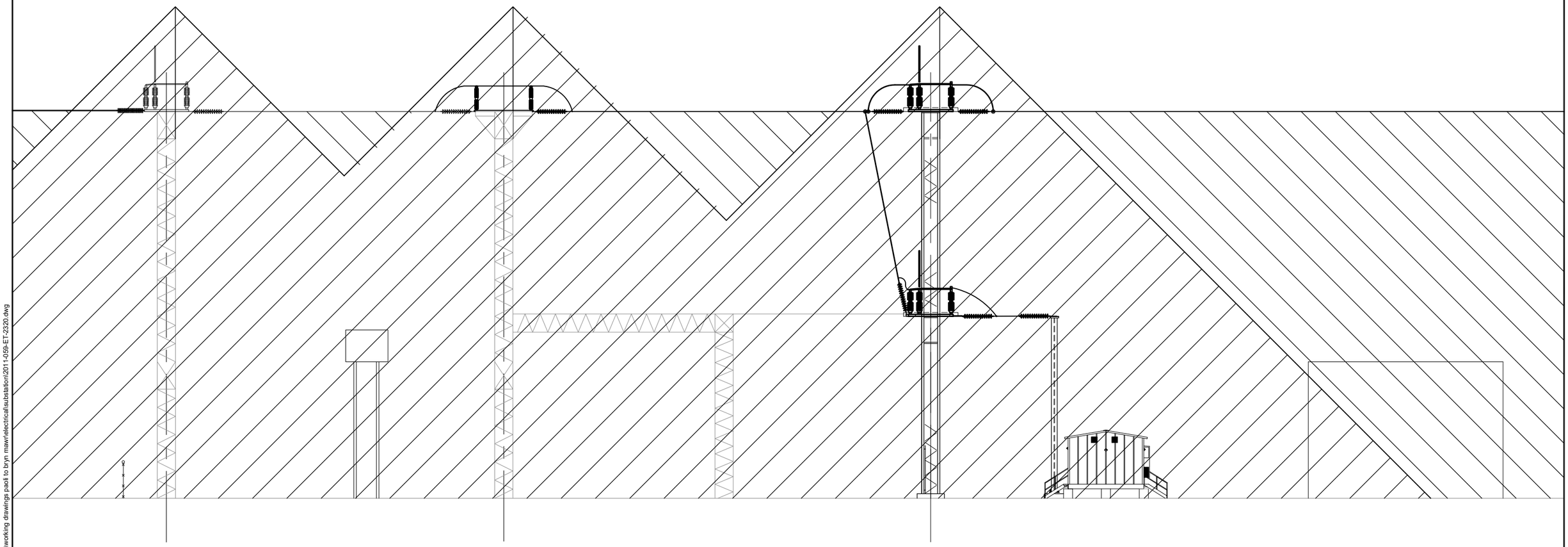
LEGEND:

LIGHTNING ZONE PROTECTION PROVIDED BY LIGHTNING MASTS

LIGHTNING ZONE PROTECTION PROVIDED BY OVERHEAD TRANSMISSION LINE

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. LIGHTNING ZONE PROTECTION DETERMINED IN ACCORDANCE WITH NFPA 780.
3. SEE DRAWING ET–2650 FOR DETAILS OF LIGHTNING MAST COMPONENTS AND MOUNTING ARRANGEMENT.



1 / ET–2320 PAOLI SUBSTATION - PROPOSED LIGHTNING PROTECTION ZONE - NORTH VIEW

8' 4' 0 8'

SCALE:3/32"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED LIGHTNING PROTECTION ZONE – NORTH VIEW

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2320.DWG
Ref. No.:	2011–059
Sheet No:	390 OF 565

ET–2320

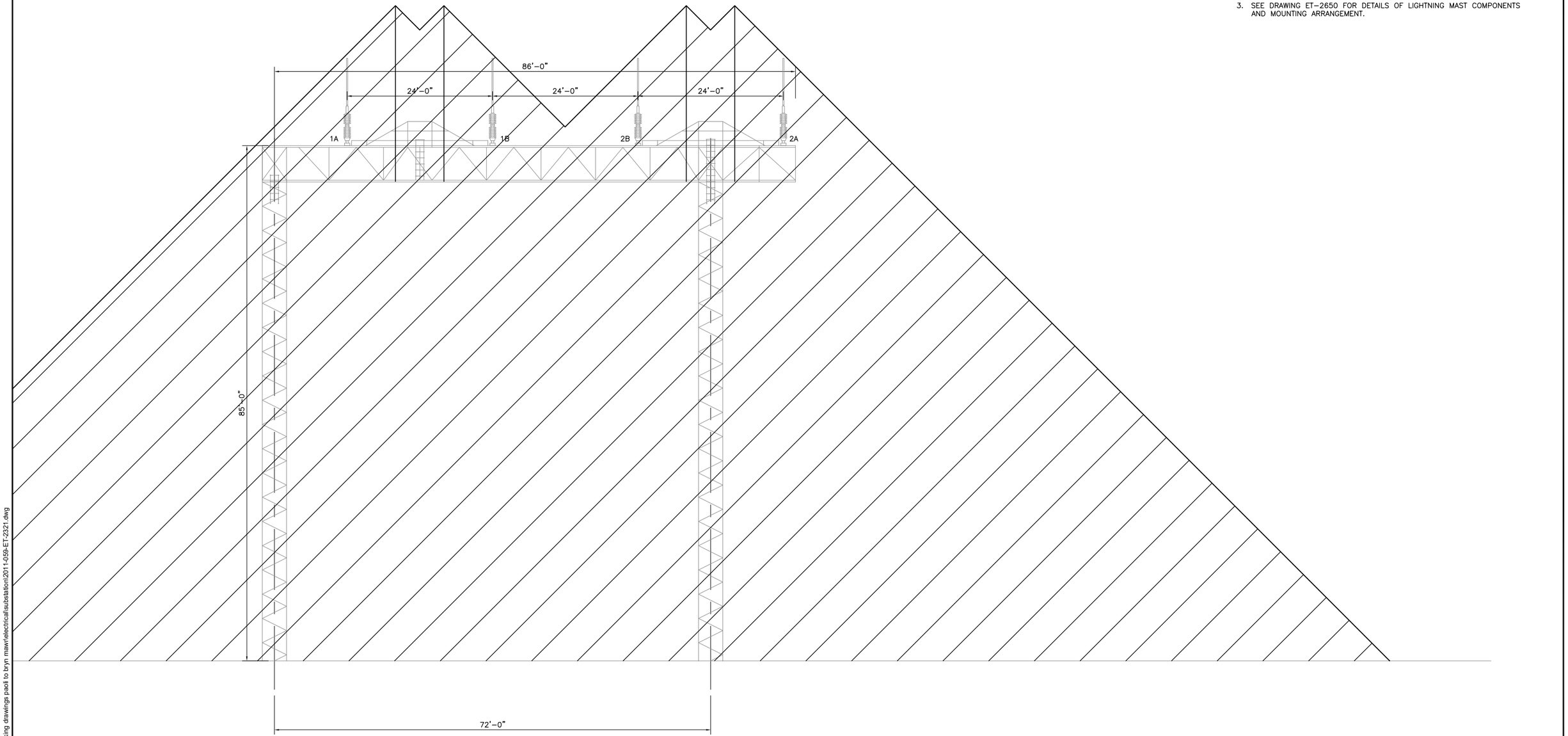
J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2320.dwg 3/17/2016 2:37:38 PM

LEGEND:

LIGHTNING ZONE PROTECTION PROVIDED BY LIGHTNING MASTS

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. LIGHTNING ZONE PROTECTION DETERMINED IN ACCORDANCE WITH NFPA 780.
3. SEE DRAWING ET–2650 FOR DETAILS OF LIGHTNING MAST COMPONENTS AND MOUNTING ARRANGEMENT.



1 / ET–2321 138kV WEST GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED LIGHTNING PROTECTION ZONE – WEST GANTRY

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2321.DWG
Ref. No.:	2011–059
Sheet No:	391 OF 565

ET–2321

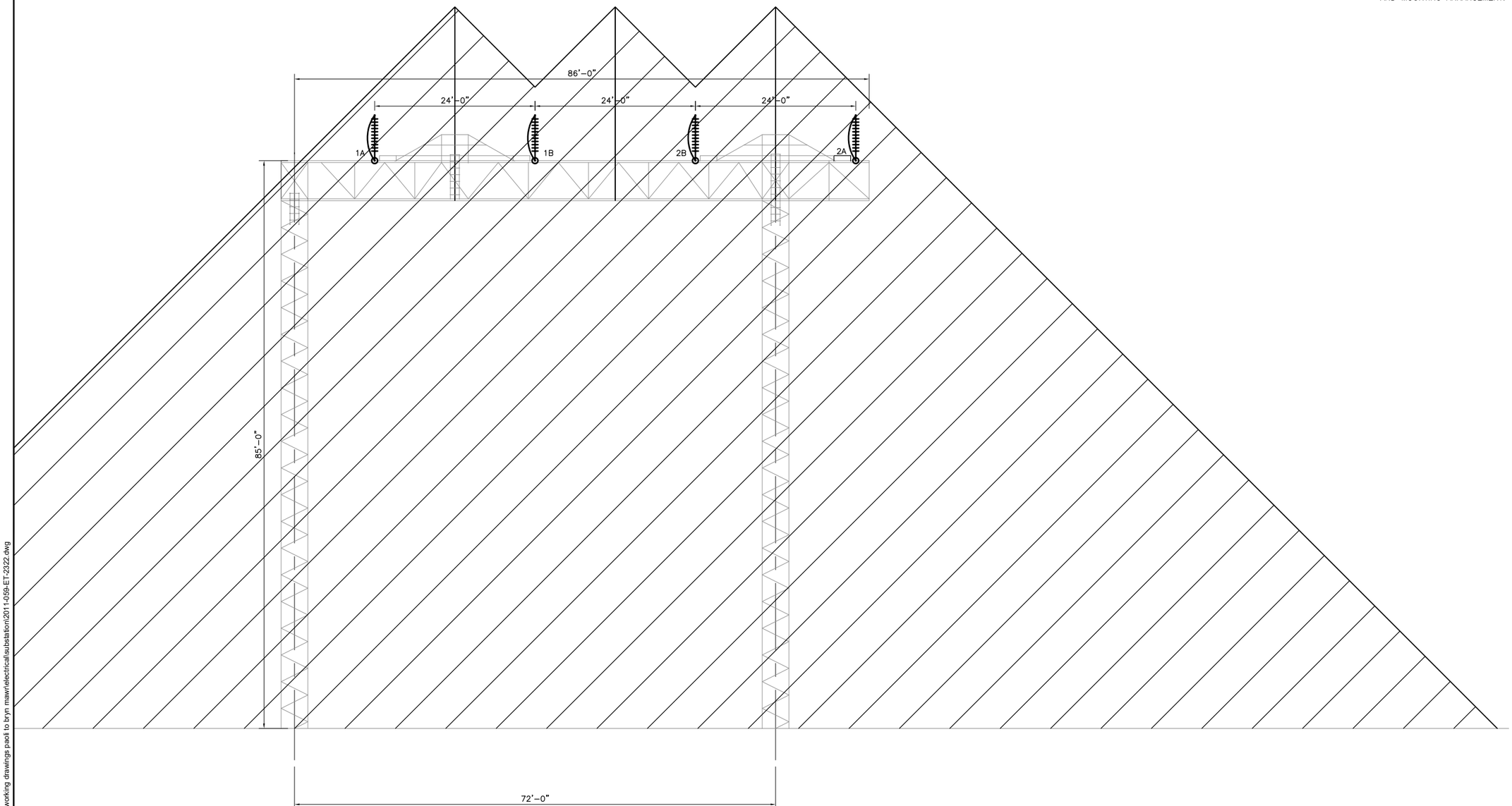
3/14/2016 2:16:18 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2321.dwg

LEGEND:

LIGHTNING ZONE PROTECTION PROVIDED BY LIGHTNING MASTS

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. LIGHTNING ZONE PROTECTION DETERMINED IN ACCORDANCE WITH NFPA 780.
3. SEE DRAWING ET–2650 FOR DETAILS OF LIGHTNING MAST COMPONENTS AND MOUNTING ARRANGEMENT.



1 ET–2322 138kV MID GANTRY ELEVATION

8' 4' 0 8'

SCALE: 1/8"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION

PROPOSED LIGHTNING PROTECTION ZONE – MID GANTRY

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–2322.DWG
Ref. No.:	2011–059
Sheet No:	392 OF 565

ET–2322

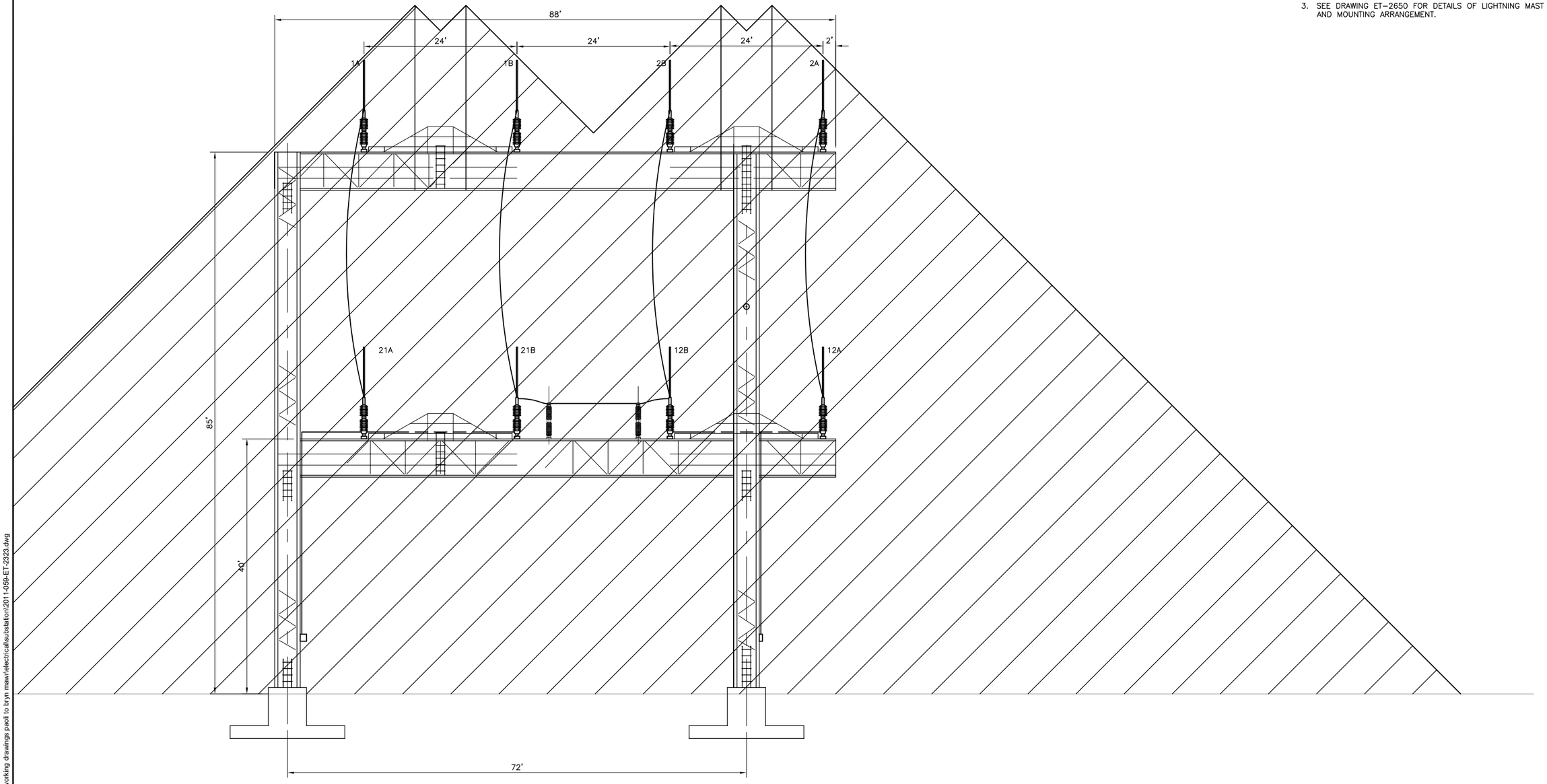
3/14/2016 2:16:28 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2322.dwg

LEGEND:

LIGHTNING ZONE PROTECTION PROVIDED BY LIGHTNING MASTS

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. LIGHTNING ZONE PROTECTION DETERMINED IN ACCORDANCE WITH NFPA 780.
3. SEE DRAWING ET–2650 FOR DETAILS OF LIGHTNING MAST COMPONENTS AND MOUNTING ARRANGEMENT.



1 / ET–2323 138kV EAST GANTRY ELEVATION

8' 4' 0 8'

SCALE:1/8"=1'–0"

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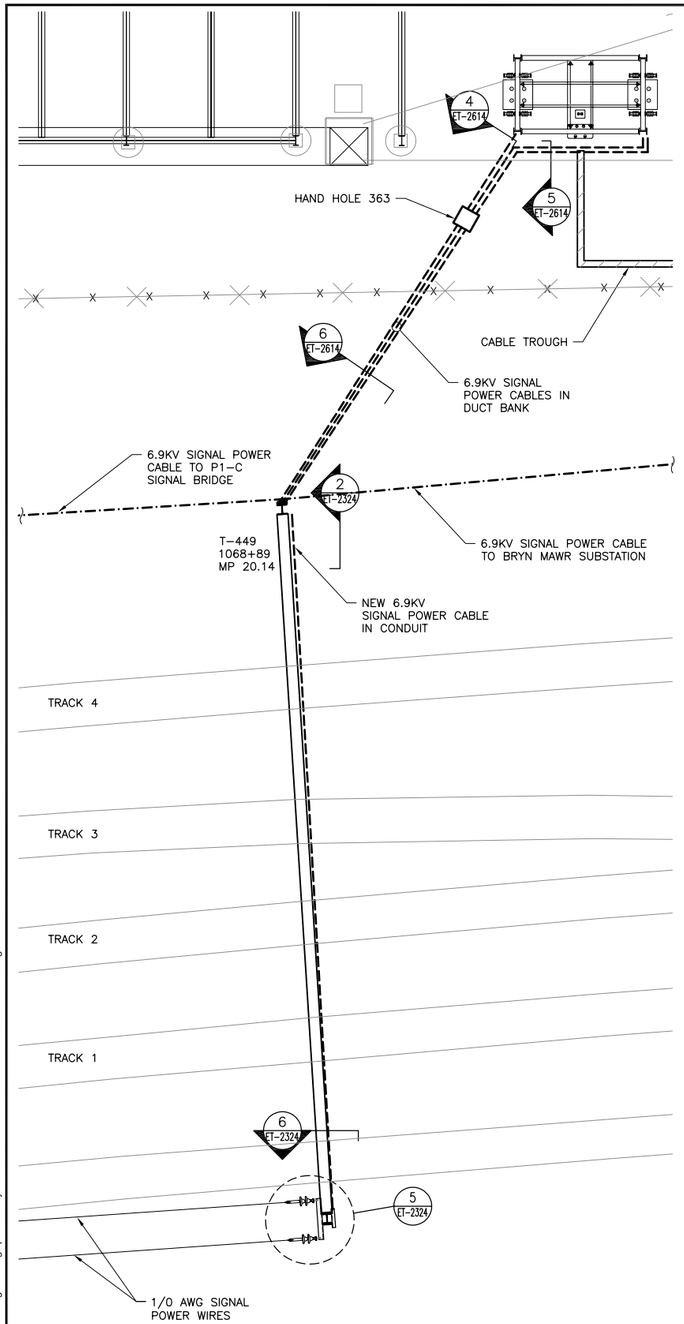
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED LIGHTNING PROTECTION ZONE – EAST GANTRY

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2323.DWG
Ref. No.:	2011-059
Sheet No:	393 OF 565

ET–2323

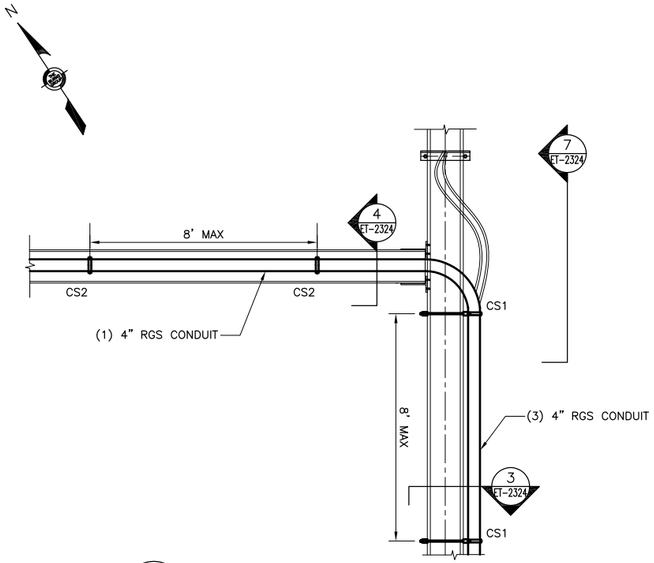
3/17/2016 2:37:46 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2323.dwg



1 ET-2324 PROPOSED SIGNAL POWER PLAN

8' 4' 0 8'

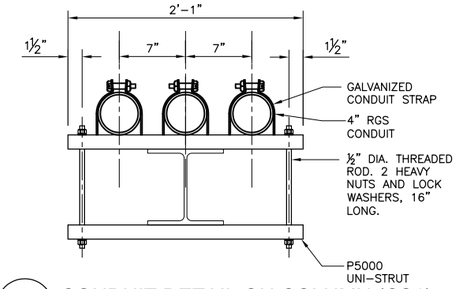
SCALE:1/8"=1'-0"



2 ET-2324 POLE ELEVATION

1' 0 1' 2' 4'

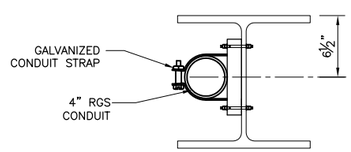
SCALE:3/8"=1'-0"



3 ET-2324 CONDUIT DETAIL ON COLUMN (CS1)

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

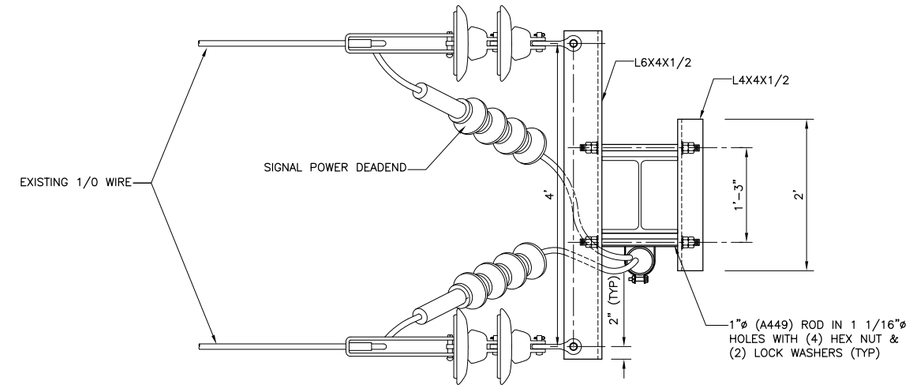


4 ET-2324 CONDUIT DETAIL ON CROSS BEAM (CS2)

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

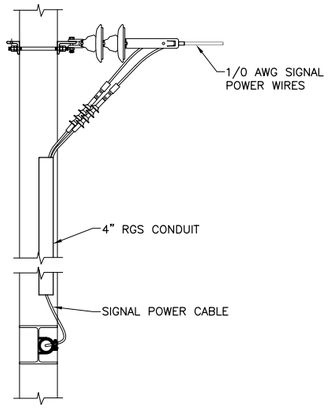
BILL OF MATERIALS						
ID	MARK	AMMES	DESCRIPTION	UNIT	QTY	REF. DWG.
			4" PVC CONDUIT, SCH 80	FT	90	
			4" RGS CONDUIT, SCH 40	FT	160	
220			COLD SHRINK SPLICE JACKET, 3M 5513A	EA	2	
363			QUAZITE 2'X2' HANDHOLE	EA	2	
CS1			CONDUIT SUPPORT	EA	4	ET-2324
CS2			CONDUIT SUPPORT	EA	9	ET-2324



5 ET-2324 SIGNAL POWER PLAN DEADEND (PC1H)

1' 0 1' 2'

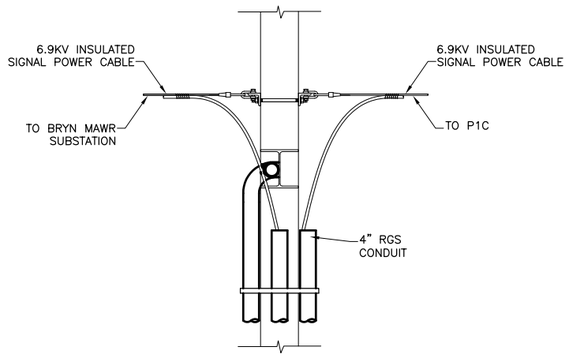
SCALE: 1"=1'-0"



6 ET-2324 POLE SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



7 ET-2324 POLE SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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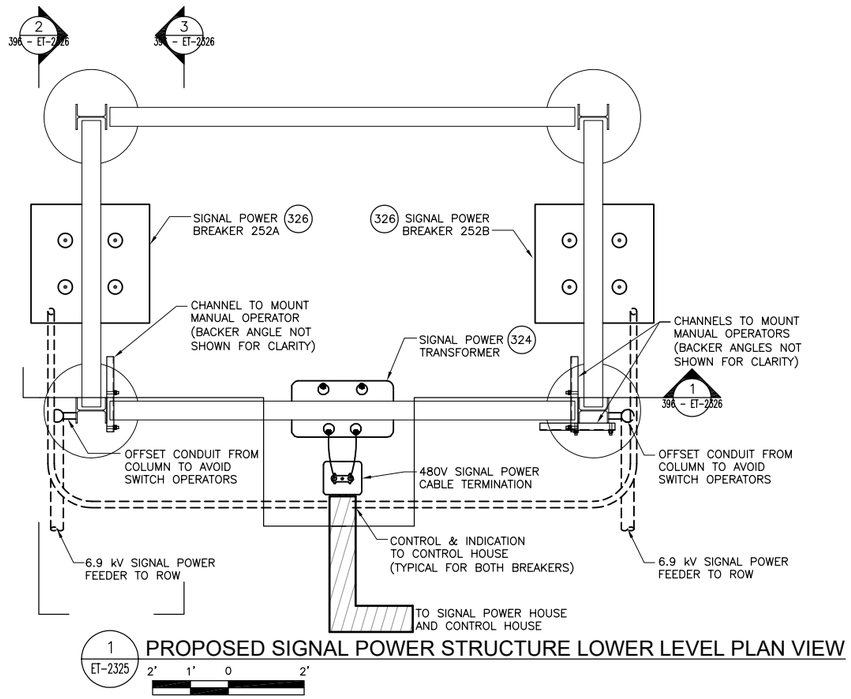
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
SIGNAL POWER CONNECTION DETAILS AT T-449

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2324.DWG
Ref. No.:	2011-059
Sheet No:	394 OF 565

ET-2324

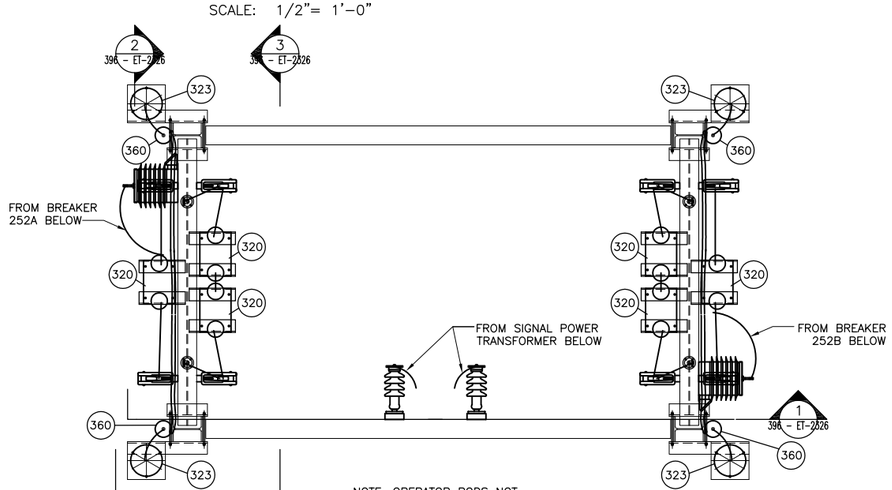
3/14/2016 2:16:57 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2324.dwg



1 ET-2325 PROPOSED SIGNAL POWER STRUCTURE LOWER LEVEL PLAN VIEW

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



2 ET-2325 PROPOSED SIGNAL POWER STRUCTURE MID LEVEL PLAN VIEW

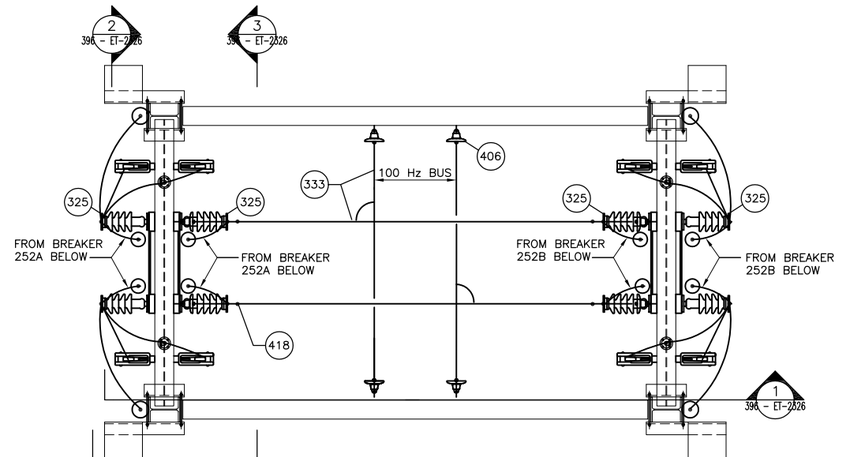
2' 1' 0 2'

SCALE: 1/2"= 1'-0"

BILL OF MATERIALS (ET-2325 TO ET-2326)						
ID	MARK	AMMES	DESCRIPTION	UNIT	QTY	REF. DWG.
235		02-180-03562	LUG - FOR 1/0, COMP. TYPE	EA	20	
320			TRANSFORMER, POTENTIAL, OIL-IMMERSED, 100Hz, 6.9kV/120V	EA	6	
323			LIGHTNING ARRESTOR, 1-POLE, 9kV	EA	4	
324			SIGNAL POWER TRANSFORMER, 75 KVA, 100 Hz, 480V TO 6.9kV	EA	1	
325			DISCONNECT SWITCH, 15kV, 2 POLE, 600 AMP	EA	5	
326			CIRCUIT BREAKER, OUTDOOR, HIGH-SPEED, 2-POLE, 100Hz, 15kV@ (SIG PWR)	EA	2	
333			CONDUCTOR - #4/0 COPPER CABLE, BARE, HARD DRAWN	LF	120	
337			CONTROL CABLE FOR BREAKERS	LF	A/R	
351			CABLE SUPPORTS, UNISTRUT WITH PLASTIC SPOOLS	EA	8	
359			WEATHER HEAD, CONDUIT, FOR 600V CABLES	EA	1	
360			PORCELAIN TERMINATION, 15kV, 1/C #2	EA	4	
363			SIGNAL POWER HAND HOLD, BOX & COVER, SOLID BOTTOM W/ GASKET	EA	2	
365			CURRENT TRANSFORMER, 25 KV, 100 HZ, BB-25-973, ABB	EA	2	
366			FUSED DISCONNECT, 7.8 KV EU, 100A WITH MOUNTING BRACKET, ABB	EA	8	
367			STATION POST, 15KV, TR-205, LAPP	EA	4	
406	FD1G		SUSPENSION INSULATOR ASSEMBLY, 1/0 WIRE, 2 INSUL	EA	8	ET-1920
418	FT4		CONDUCTOR CONNECTOR, 1/0 TO 1/0, AMP & CARTRIDGE	EA	8	ET-1907

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. 3.3kV SIGNAL POWER SHALL BE UTILIZED FOR EXISTING SIGNAL POWER CABLES.
3. 6.9kV SIGNAL POWER SHALL BE UTILIZED FOR FUTURE SIGNAL POWER CABLES.
4. SEE DRAWING S-5407 FOR CORRESPONDING STRUCTURAL DETAILS.
5. ALL EQUIPMENT MOUNTING MUST BE COORDINATED USING SHOP DRAWINGS.
6. INSTALL GROUND WIRE FROM LIGHTNING ARRESTER TO FOUNDATION.



3 ET-2325 PROPOSED SIGNAL POWER STRUCTURE TOP LEVEL PLAN VIEW

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

100% DESIGN SUBMISSION

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Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

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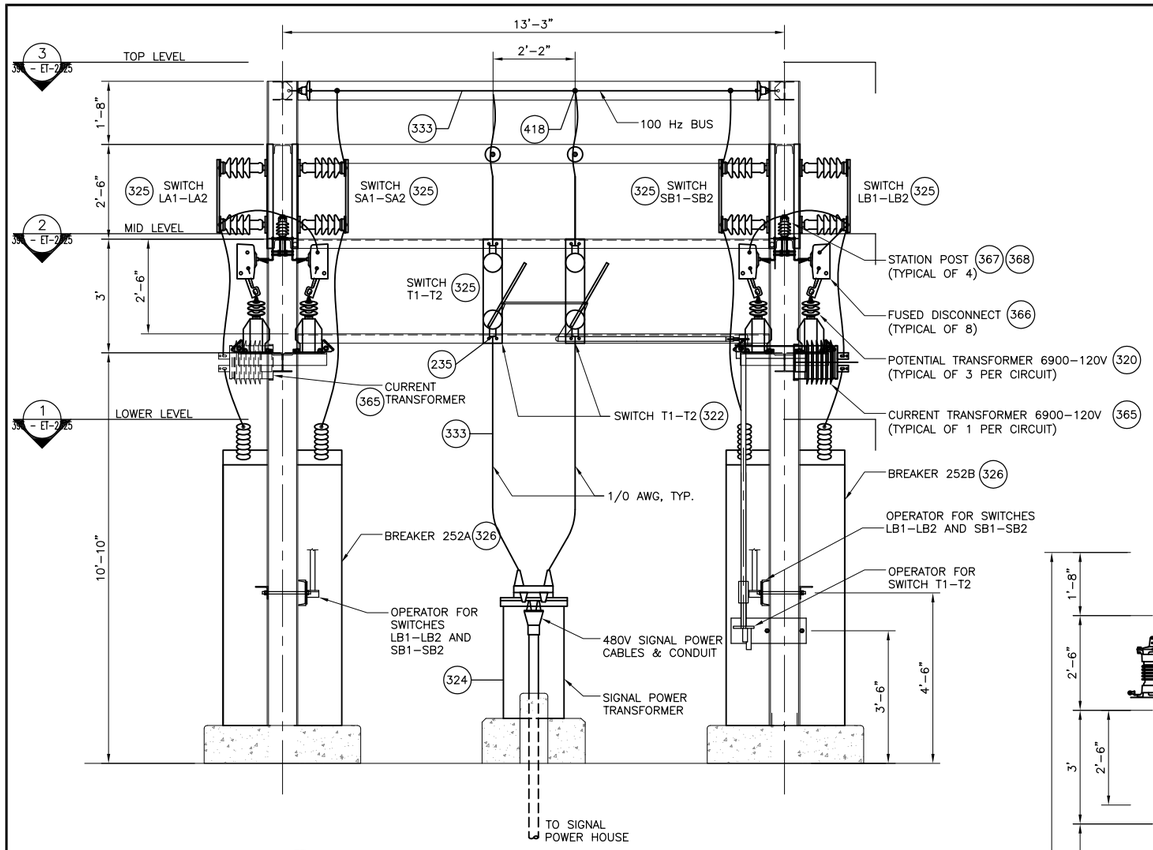
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
SIGNAL POWER STRUCTURE PLAN VIEW

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2325.DWG
Ref. No.:	2011-059
Sheet No:	395 OF 565

ET-2325

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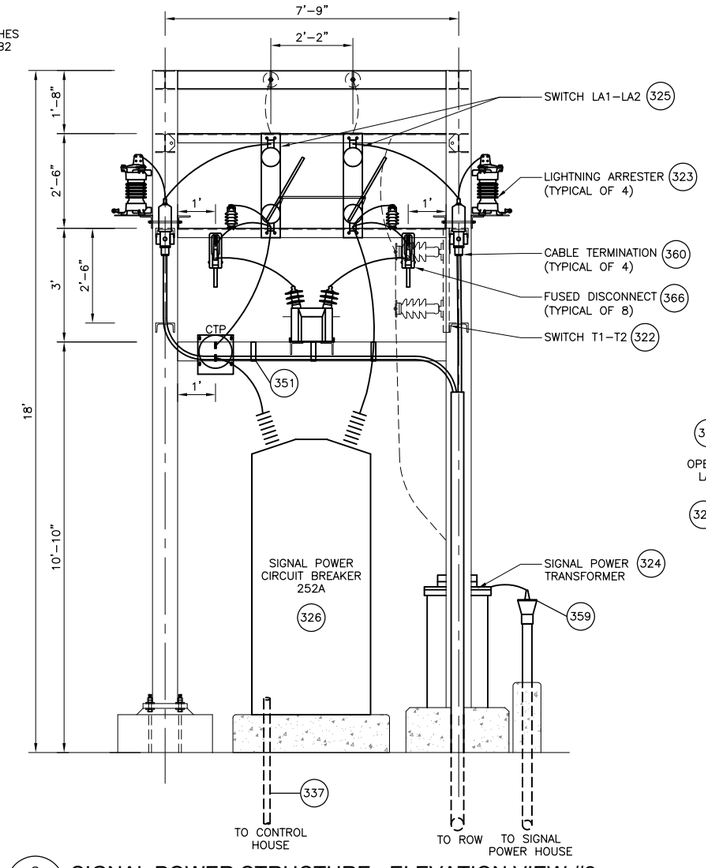
1 ET-2326 SIGNAL POWER STRUCTURE - ELEVATION VIEW #1

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

NOTES:

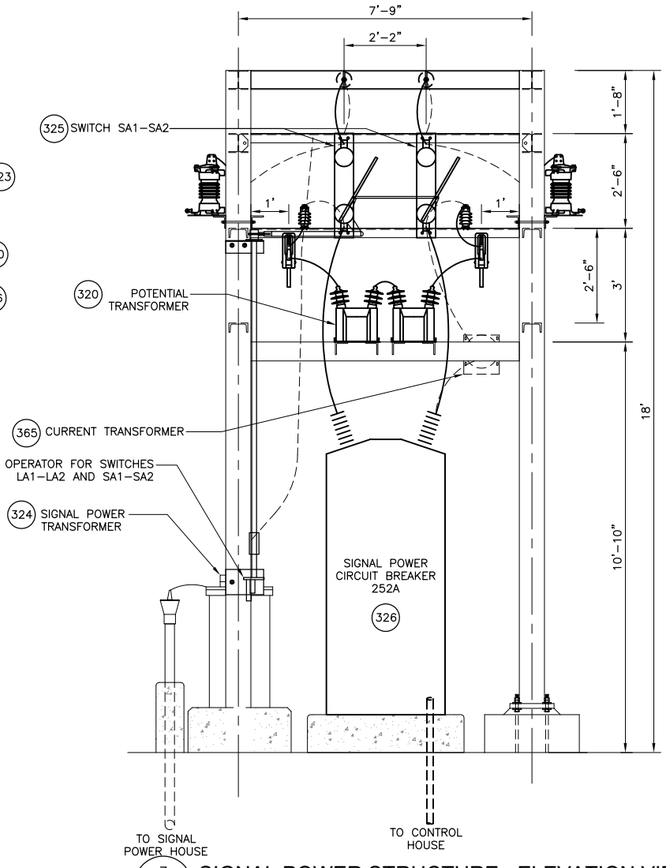
1. DASHED GRAY LINES REPRESENT EQUIPMENT/WIRING IN BACKGROUND AND ARE LIGHTENED FOR CLARITY.
2. SWITCHES LA1-LA2 AND SA1-SA2 ARE COUPLED TOGETHER AND THEREFORE ONLY REQUIRE ONE OPERATOR.
3. SWITCHES LB1-LB2 AND SB1-SB2 ARE COUPLED TOGETHER AND THEREFORE ONLY REQUIRE ONE OPERATOR.
4. SEE DRAWING S-5407 FOR CORRESPONDING STRUCTURAL DETAILS.
5. FOR BILL OF MATERIAL SEE DRAWING ET-2325.



2 ET-2326 SIGNAL POWER STRUCTURE - ELEVATION VIEW #2

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



3 ET-2326 SIGNAL POWER STRUCTURE - ELEVATION VIEW #3

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
SIGNAL POWER STRUCTURE ELEVATIONS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

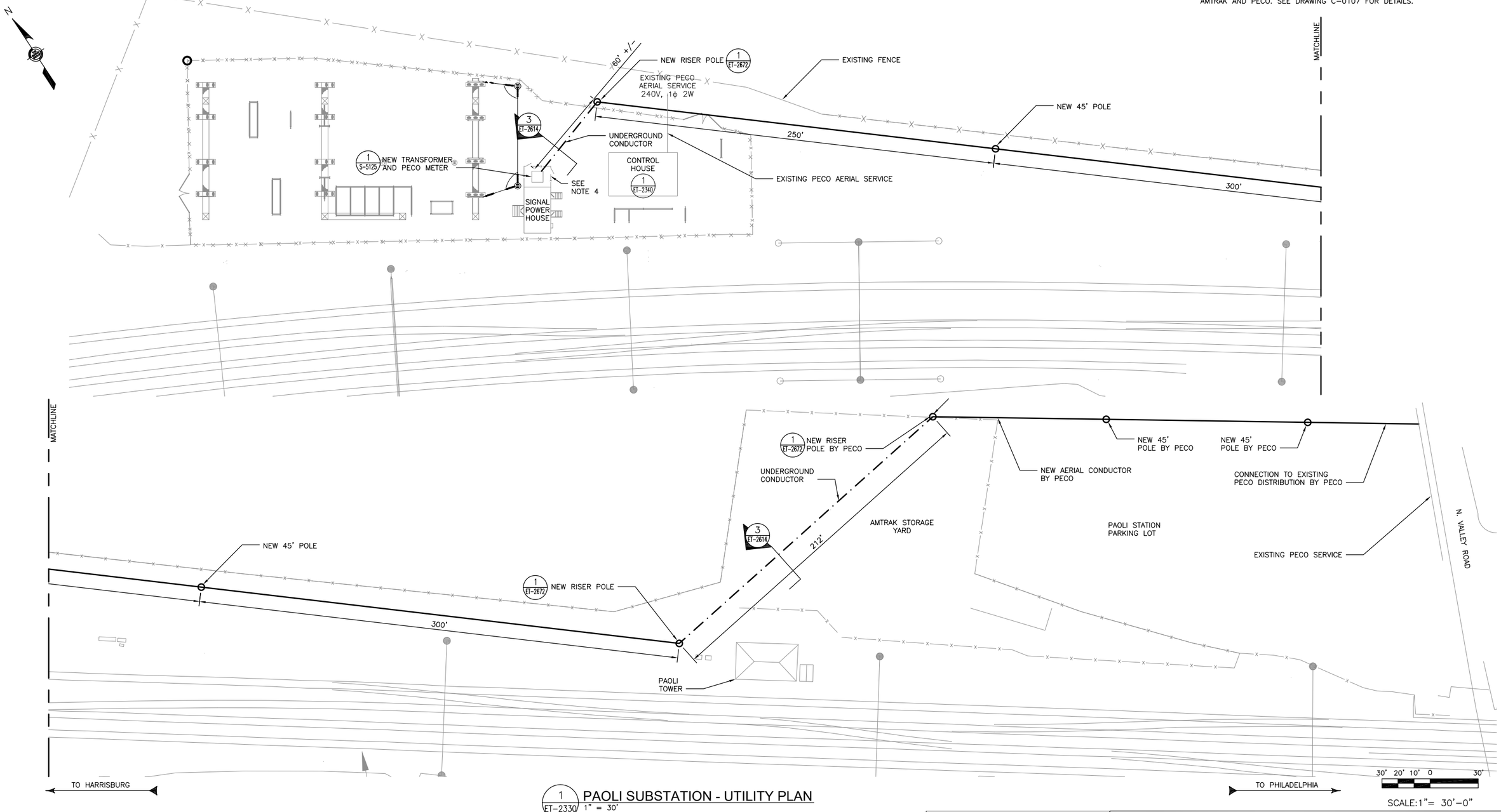
File No.:	2011-059-ET-2326.DWG
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ET-2326

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NOTES:

1. CONTRACTOR SHALL COORDINATE INSTALLATION WITH PECO.
2. WORK NOT IDENTIFIED AS "BY PECO" SHALL BE PERFORMED BY THE CONTRACTOR.
3. POLES, WIRES AND ASSOCIATED EQUIPMENT SHALL BE APPROVED BY PECO.
4. CONTRACTOR SHALL PROVIDE FENCE SURROUNDING PECO TRANSFORMER. CONTRACTOR SHALL ALSO INCLUDE 2 MAN GATES AND LOCKING MECHANISM FOR AMTRAK AND PECO. SEE DRAWING C-0107 FOR DETAILS.



1 ET-2330 PAOLI SUBSTATION - UTILITY PLAN 1" = 30'

SCALE:1"= 30'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
UTILITY PLAN

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

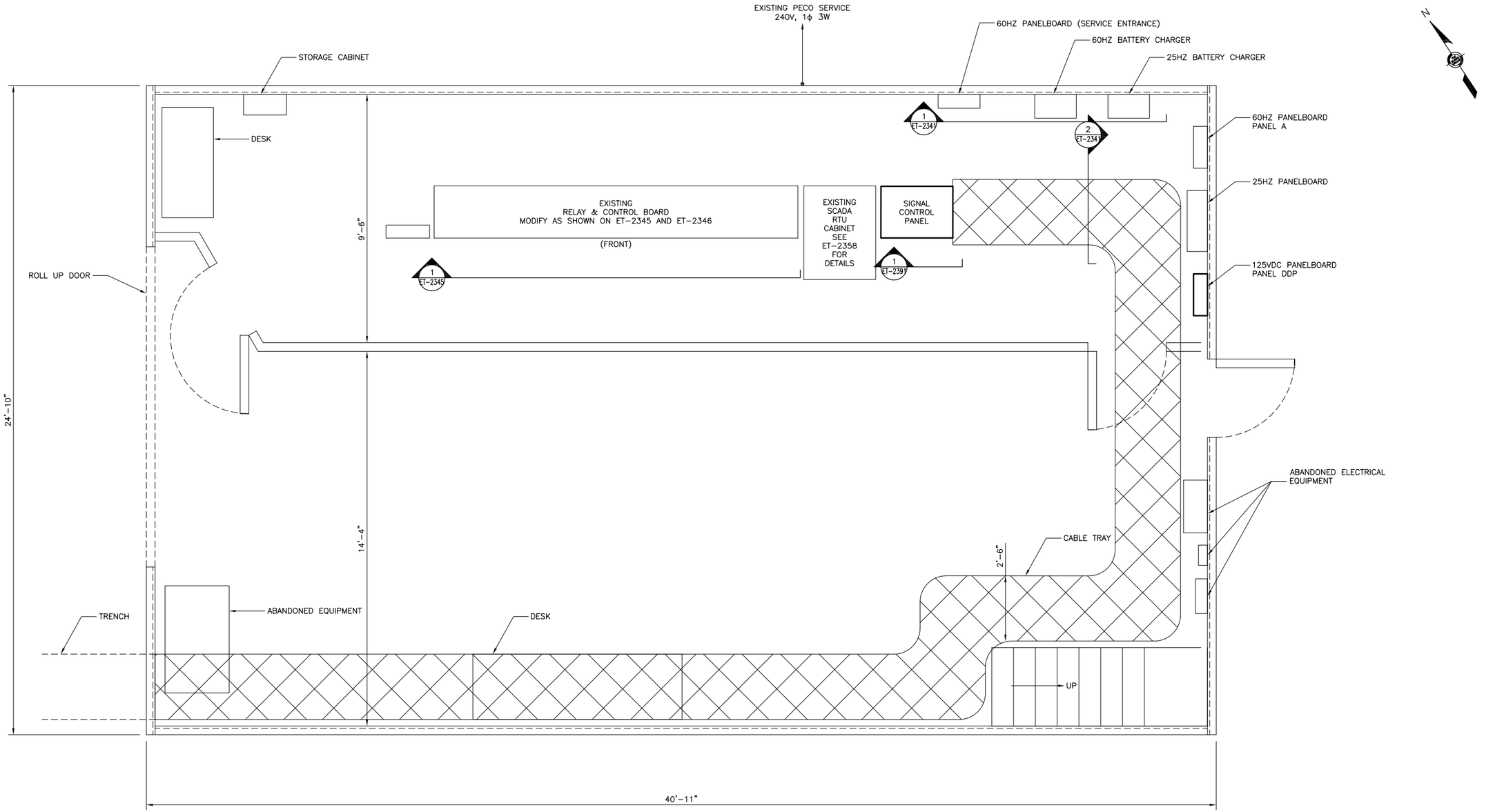
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ET-2330

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. EXISTING ELECTRIC SERVICE STAYS INTACT.



1 / ET–2340 EXISTING CONTROL HOUSE PROPOSED WORK PLAN

2' 1' 0 2'

SCALE: 1/2"=1'–0"

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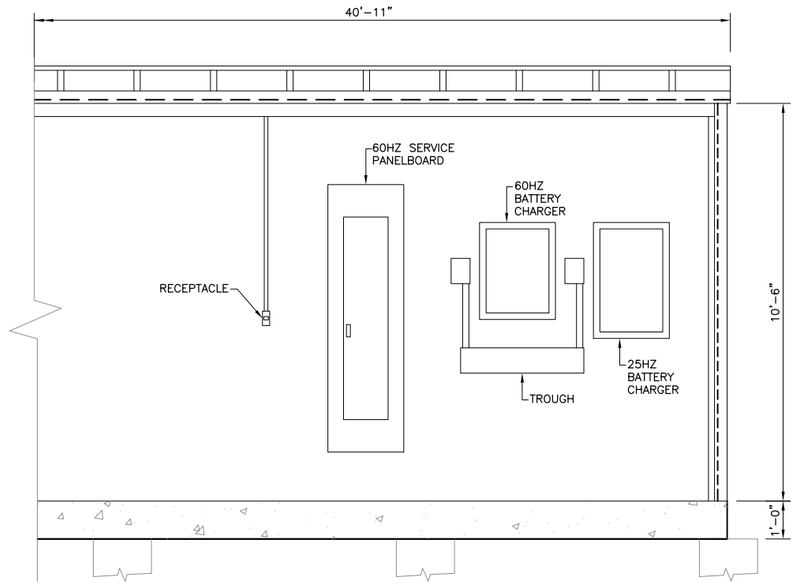
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION
EXISTING CONTROL HOUSE PROPOSED WORK PLAN

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2340.DWG
Ref. No.:	2011–059
Sheet No:	398 OF 565

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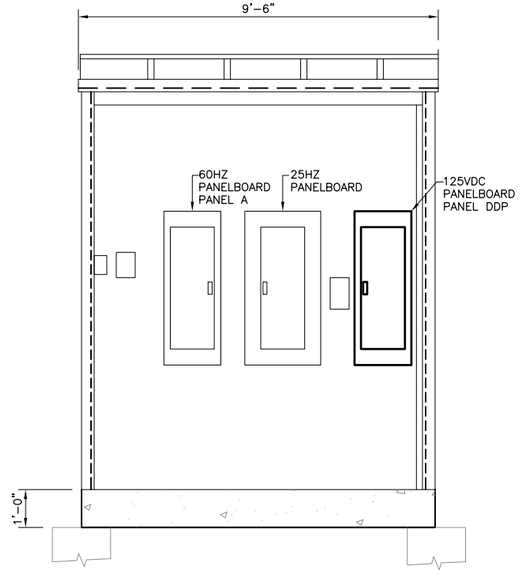
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1 / ET-2341 SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



2 / ET-2341 SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

NOTES:

1. AN ALUMINUM LADDER TYPE CABLE TRAY SYSTEM SHALL BE PROVIDED FOR WIRING BETWEEN PANELS IN ACCORDANCE WITH SPECIFICATION NO. 16790.
2. WIRING VIA THE CABLE PITS WILL BE BY AMTRAK.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
CONTROL HOUSE BUILDING, SECTIONS

Recommended:	JAS	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

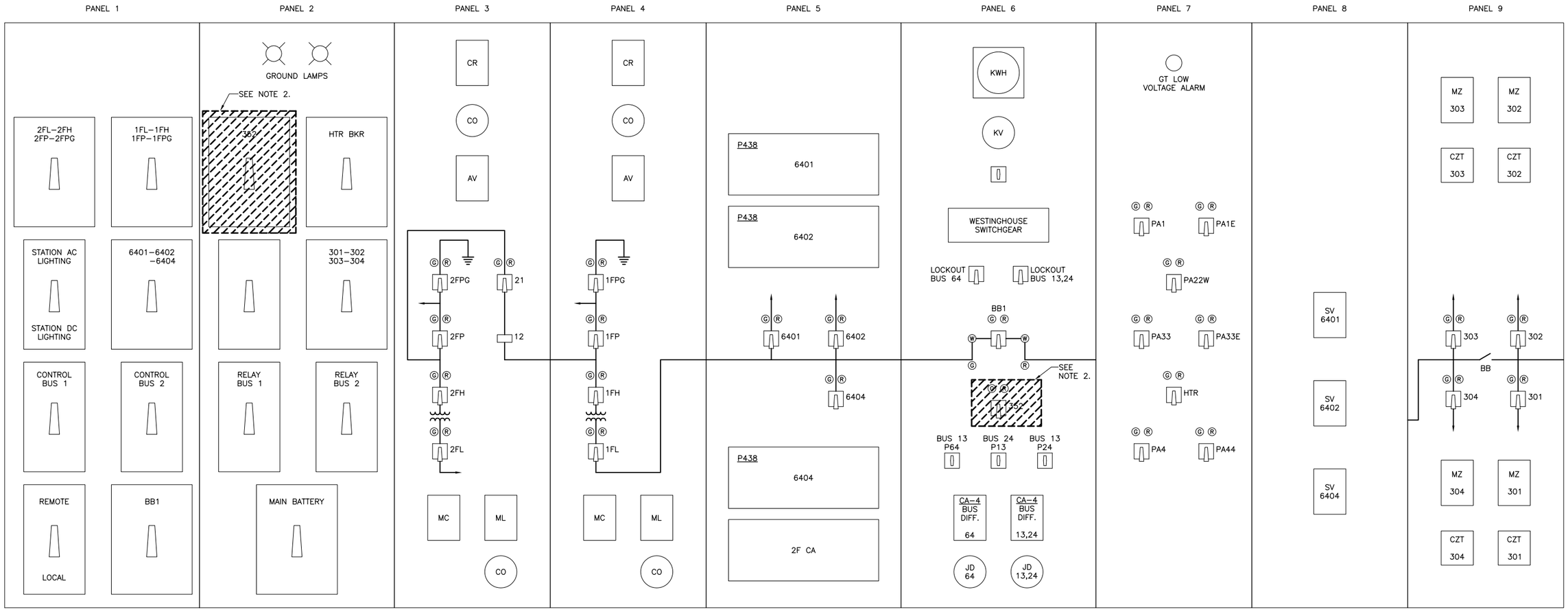
File No.:	
Ref. No.:	2011–059
Sheet No:	OF 565

ET–2341

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SIGNAL POWER TIE BREAKER 352 IS BEING REMOVED AS PART OF THIS PROJECT. THE 352 CONTROL SWITCH, INDICATING LAMPS AND ALL ASSOCIATED WIRING SHALL BE REMOVED. THE DC SWITCH FEEDING THE 352 SHALL BE PREPARED FOR REUSE BY OTHER EQUIPMENT.
3. REMOVAL SHALL BE COORDINATED WITH SIGNAL POWER STAGING.



1 / ET–2345 RELAY & CONTROL PANEL (EXISTING & DEMOLITION)
NOT TO SCALE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
RELAY & CONTROL PANEL (EXISTING & DEMOLITION)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

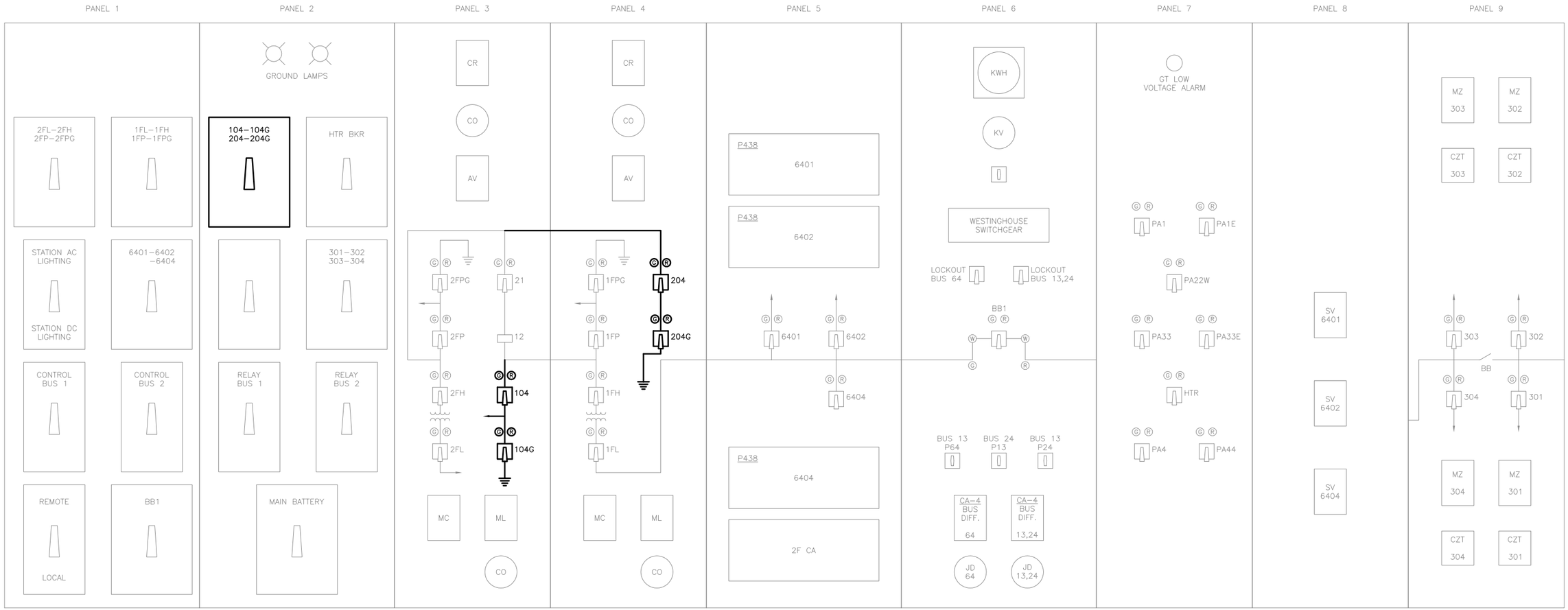
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Ref. No.:	2011–059
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–2346 RELAY & CONTROL PANEL (PROPOSED)
NOT TO SCALE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
RELAY & CONTROL PANEL (PROPOSED)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

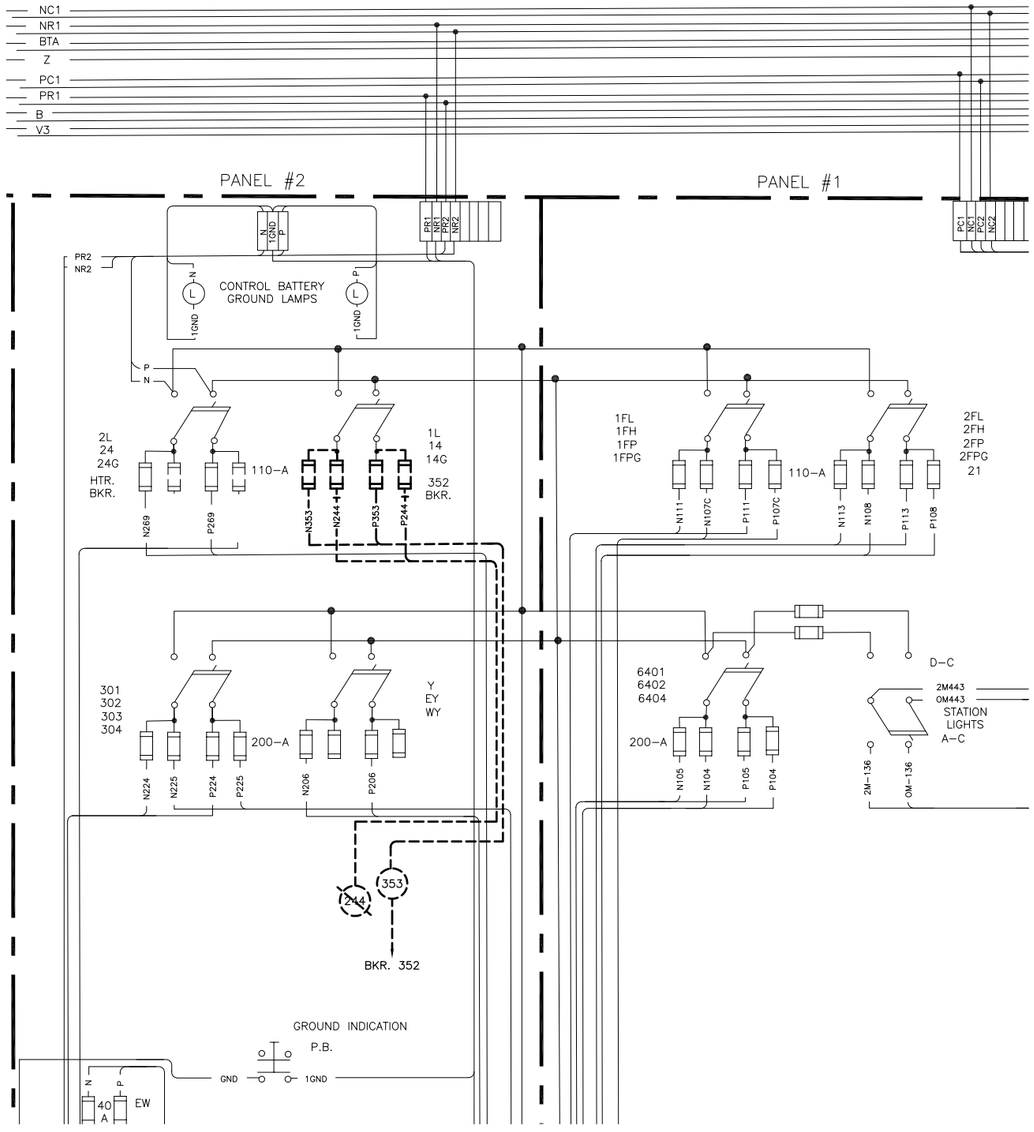
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Ref. No.:	2011–059
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ET–2346

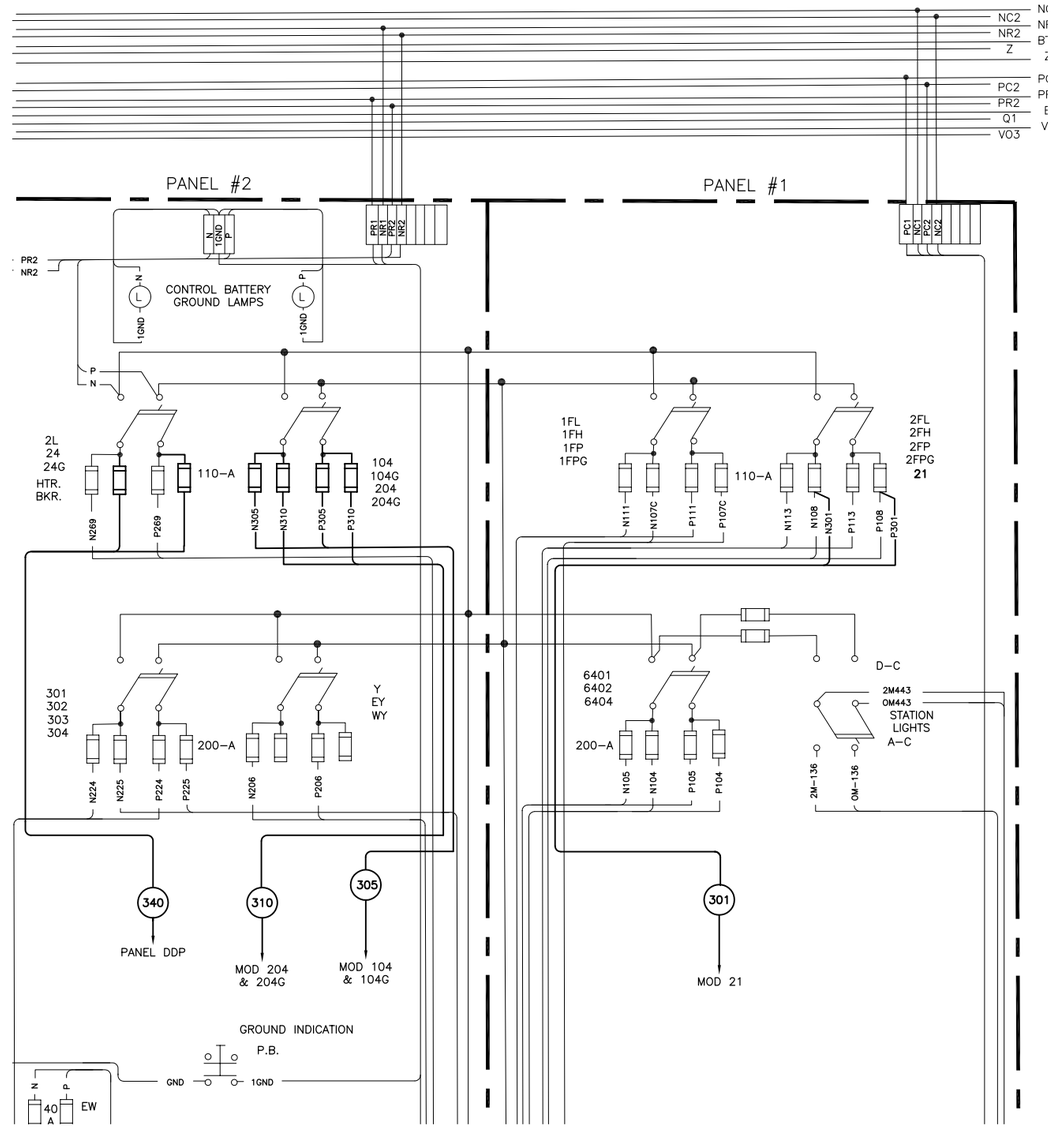
3/14/2016 2:18:04 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2346.dwg

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR CONDUIT SCHEDULE SEE DRAWING ET–2398.



1 ET–2347 PANEL#1&#2 DEMOLITION WORK
SCALE: NONE



2 ET–2347 PANEL#1&#2 PROPOSED WORK
SCALE: NONE

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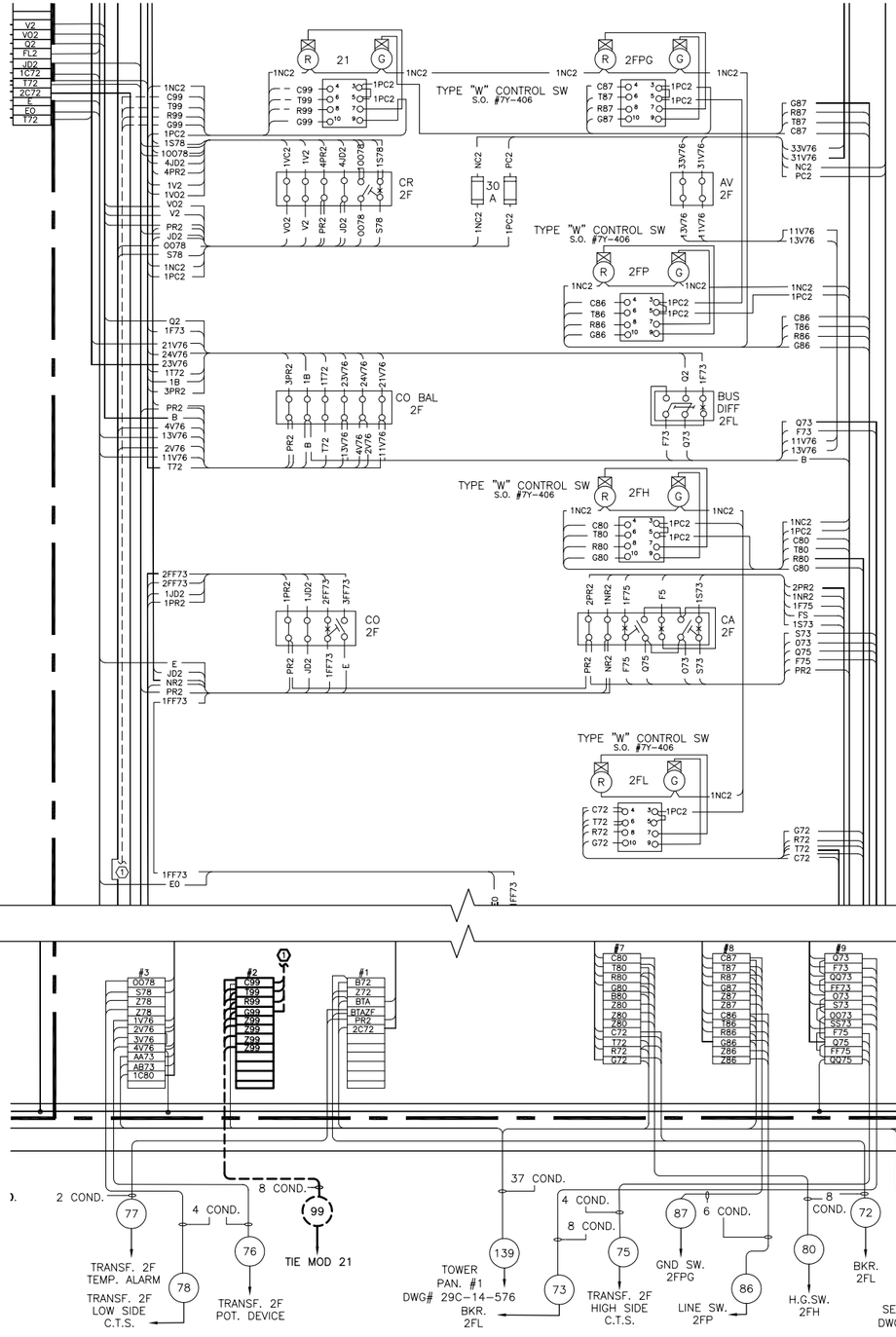
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
RELAY & CONTROL PANEL WIRING DIAGRAM (SHEET 1 OF 4)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

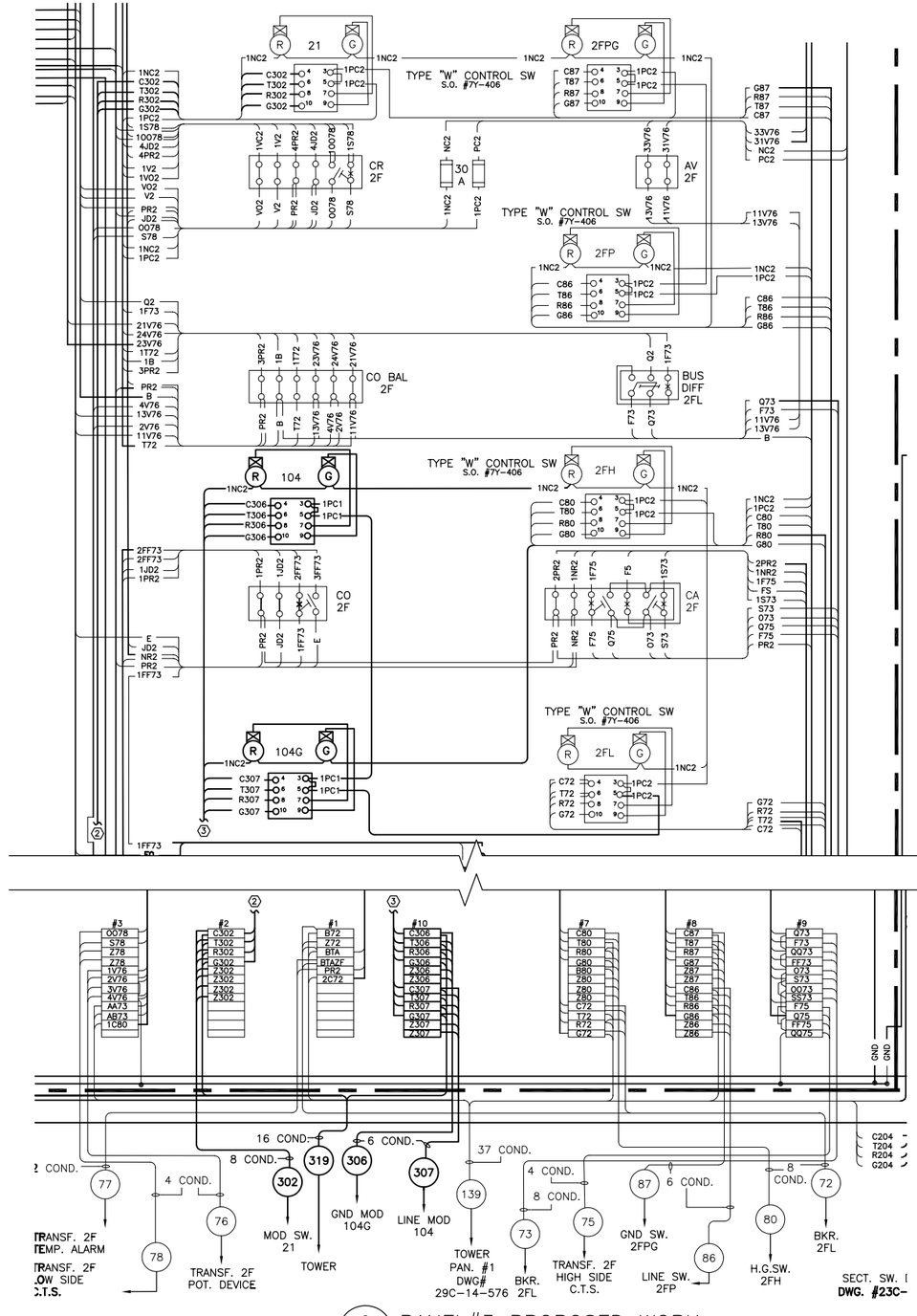
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ET–2347

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1 ET-2348 PANEL#3 DEMOLITION WORK
SCALE: NONE



2 ET-2348 PANEL#3 PROPOSED WORK
SCALE: NONE

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. FOR CONDUIT & CABLE SCHEDULE, SEE DRAWING ET-2398.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
RELAY & CONTROL PANEL WIRING DIAGRAM (SHEET 2 OF 4)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

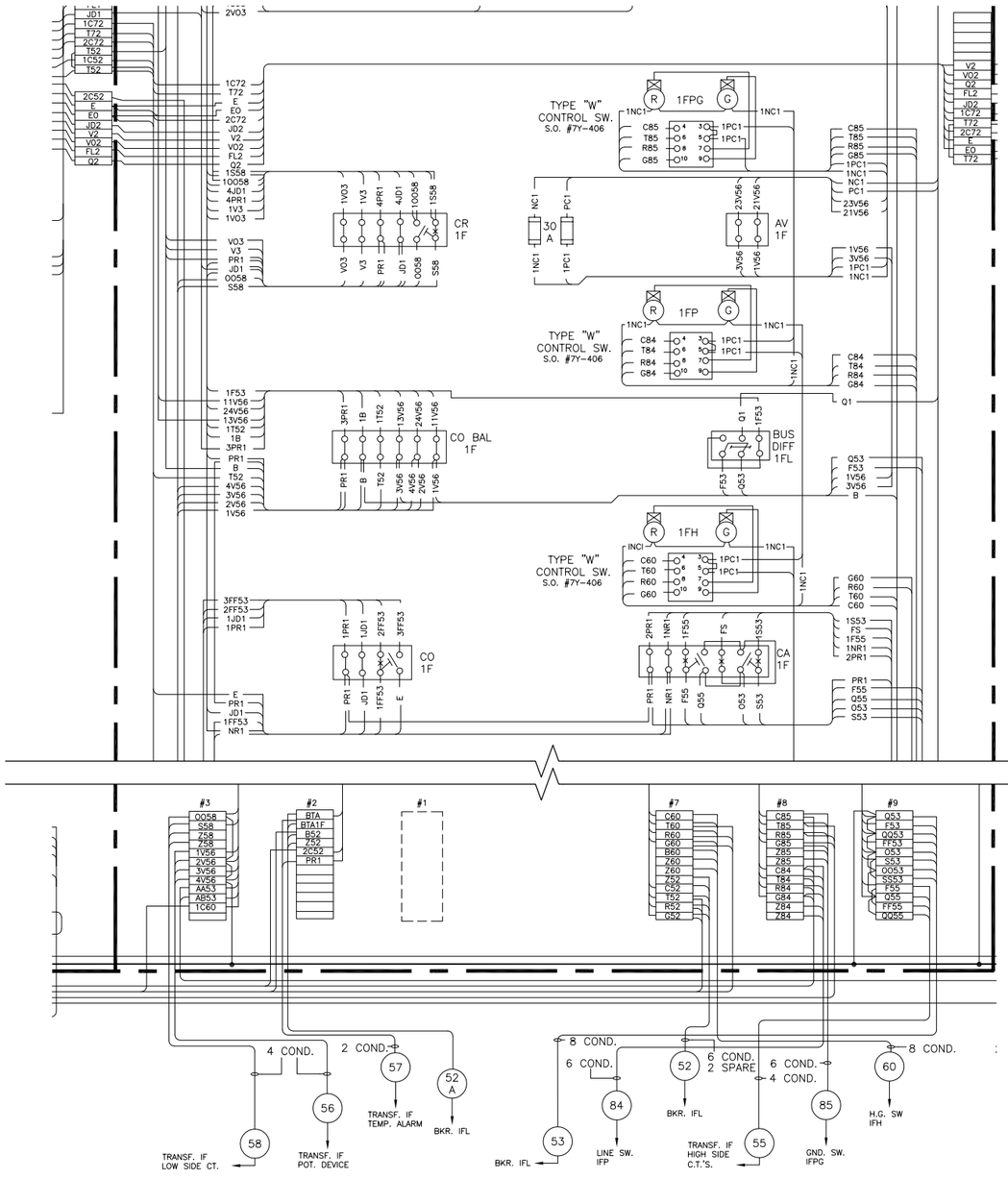
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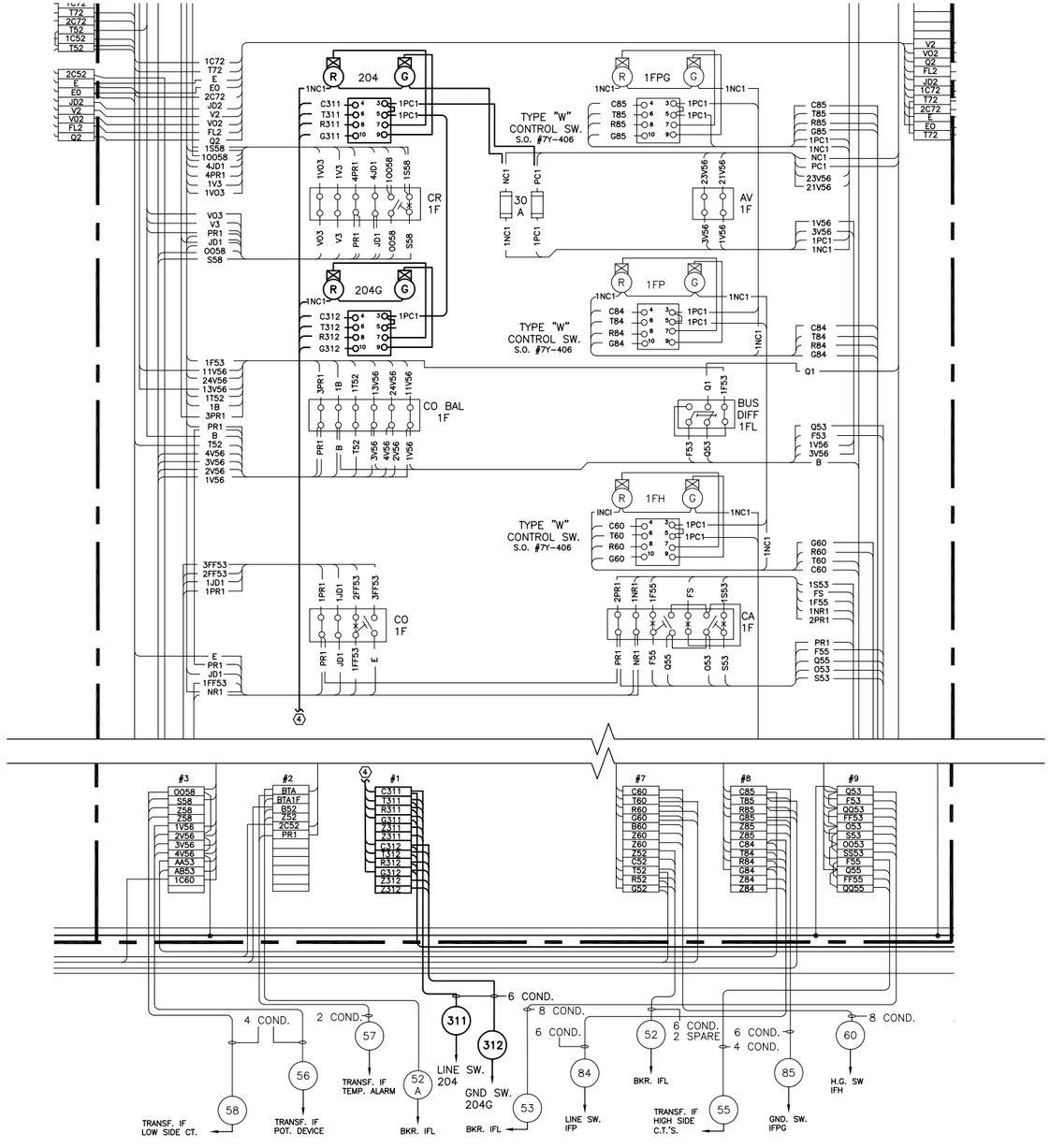
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. FOR CONDUIT SCHEDULE SEE DRAWING ET-2398.



1 ET-2349 PANEL#4 DEMOLITION WORK
SCALE: NONE



2 ET-2349 PANEL#4 PROPOSED WORK
SCALE: NONE

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
RELAY & CONTROL PANEL WIRING DIAGRAM (SHEET 3 OF 4)

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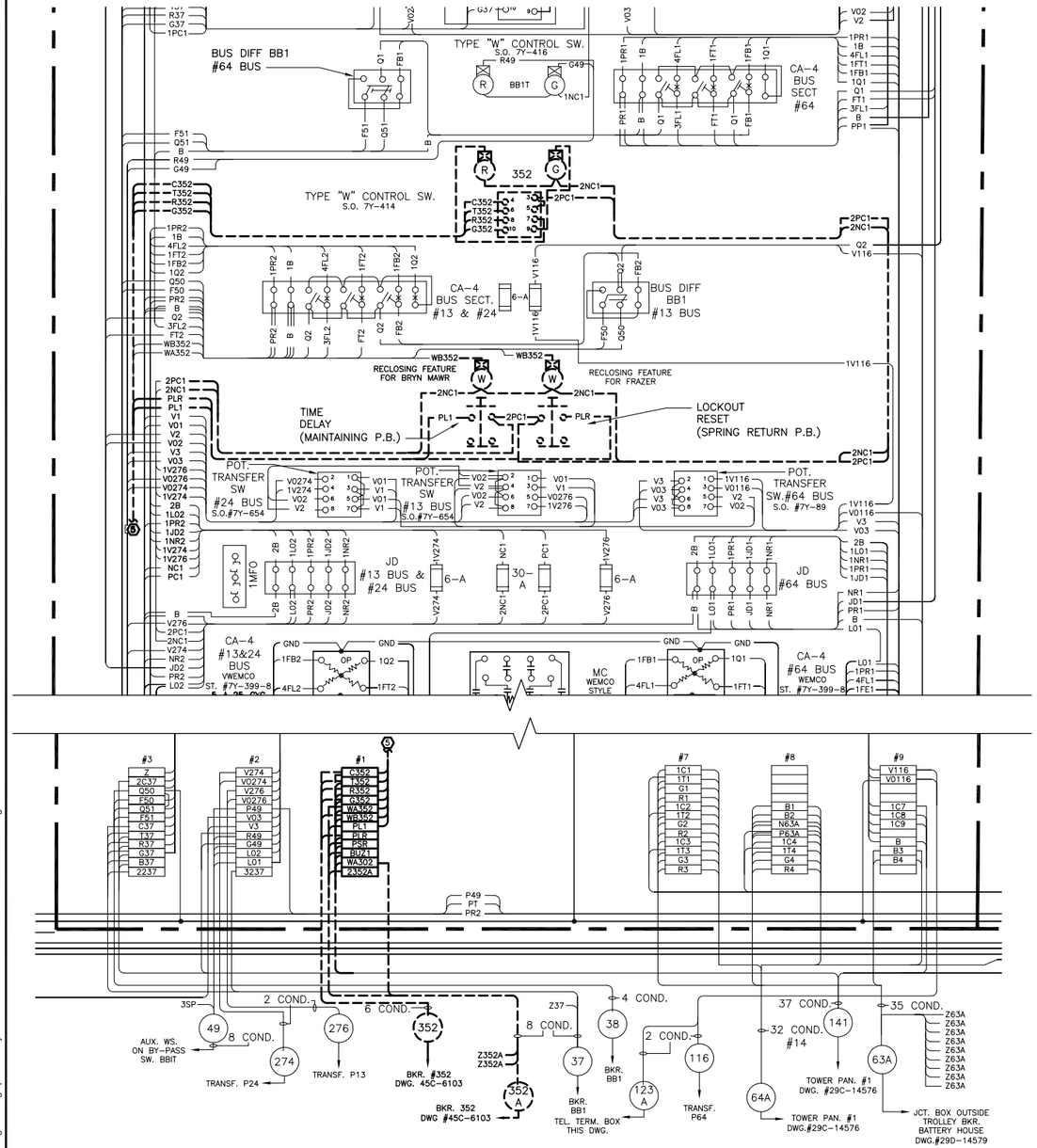
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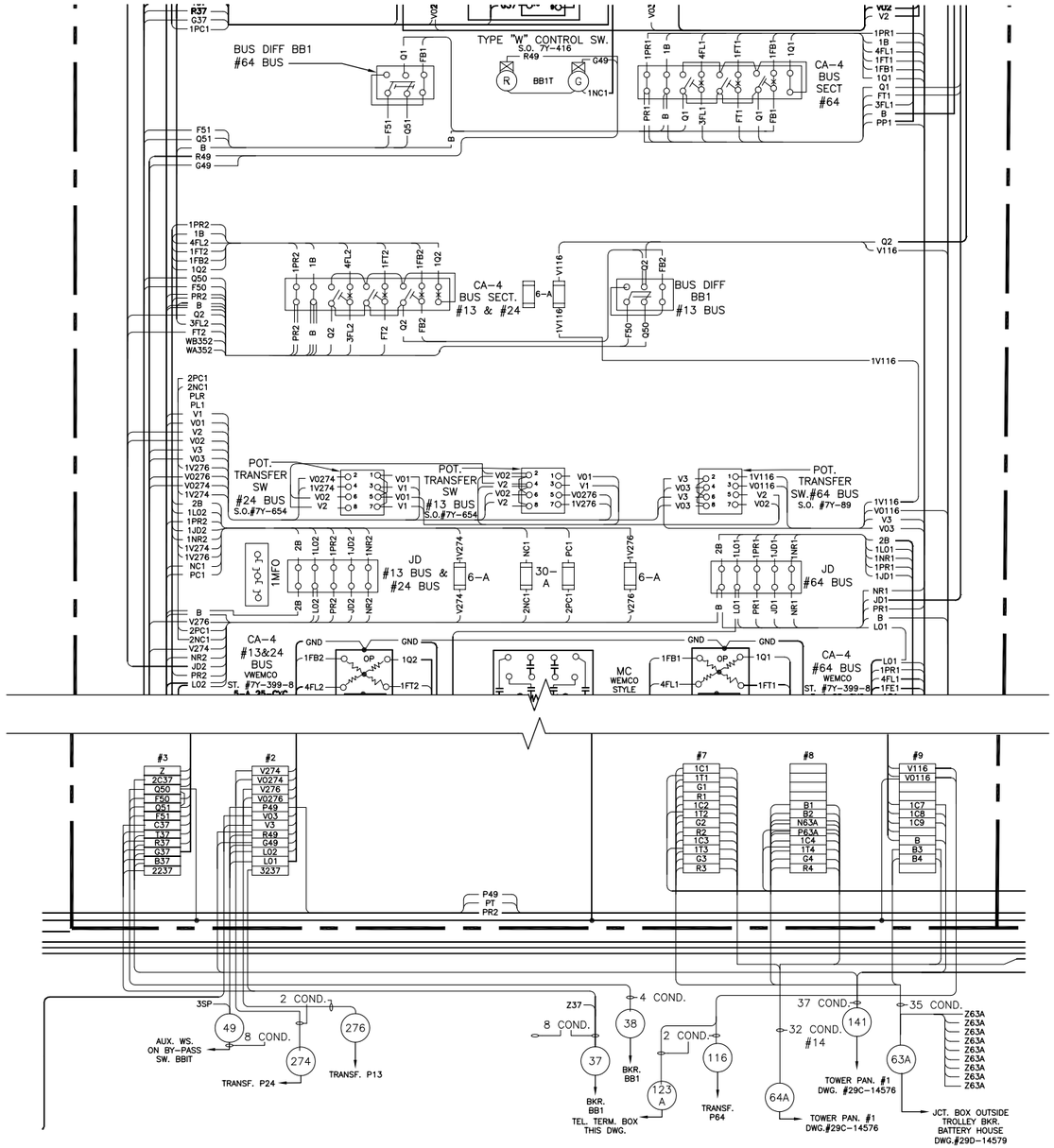
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. FOR CONDUIT SCHEDULE, SEE DRAWING ET-2398.



1 ET-2350 PANEL#6 DEMOLITION WORK
SCALE: NONE



2 ET-2350 PANEL#6 PROPOSED WORK
SCALE: NONE

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PAOLI SUBSTATION
RELAY & CONTROL PANEL WIRING DIAGRAM (SHEET 4 OF 4)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

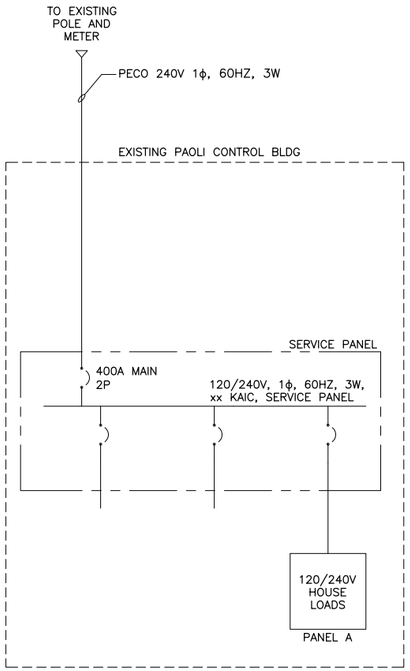
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Ref. No.:	2011-059
Sheet No:	405 OF 565

ET-2350

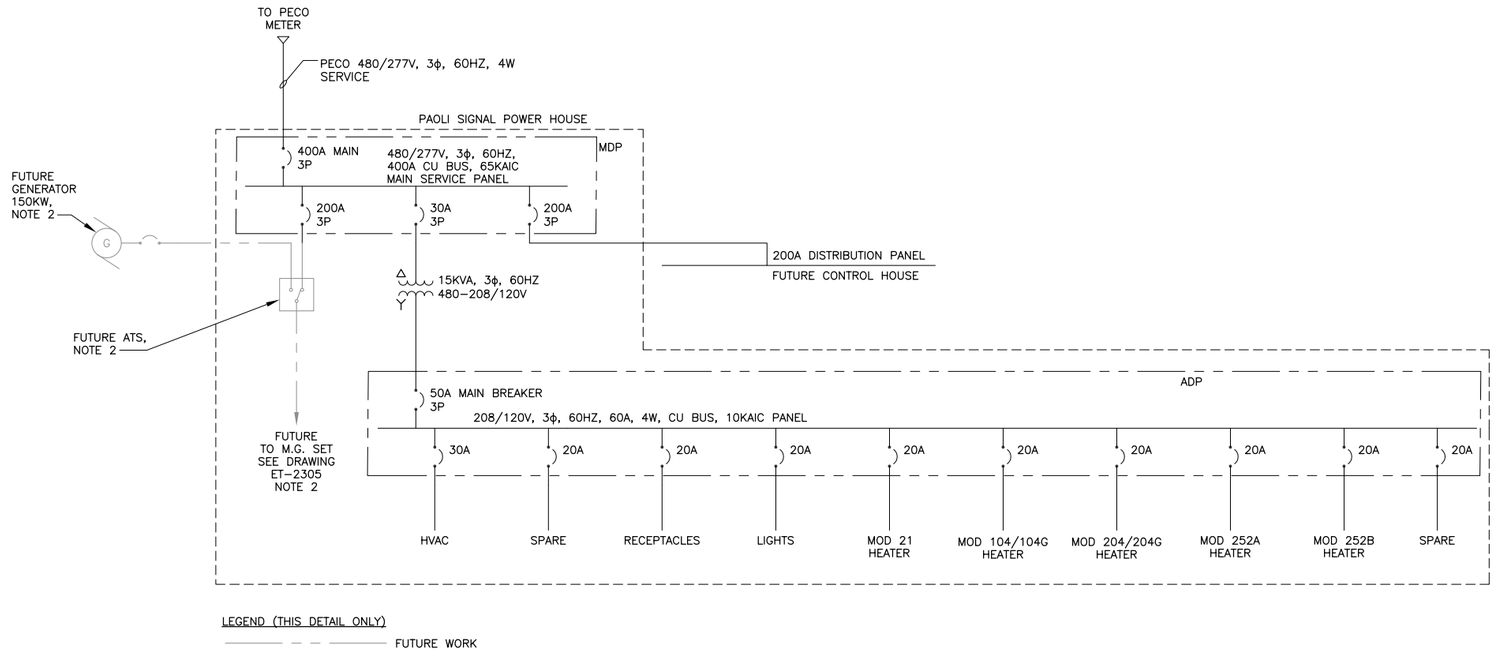
3/14/2016 2:18:40 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2350.dwg

NOTES:

1. SEE DRAWING ET-2370 FOR EQUIPMENT LOCATIONS.
2. FUTURE CONFIGURATION REFLECTS NEW CONTROL BUILDING AND ADDITION OF STANDBY GENERATOR FOR M.G. SET ONLY. CONNECT M.G. SET DIRECTLY TO UTILITY FEED.



1 ET-2354 EXISTING CONTROL BUILDING SERVICE
(TO REMAIN IN SERVICE)



LEGEND (THIS DETAIL ONLY)

FUTURE WORK

2 ET-2354 NEW SIGNAL BUILDING AND STANDBY GENERATOR

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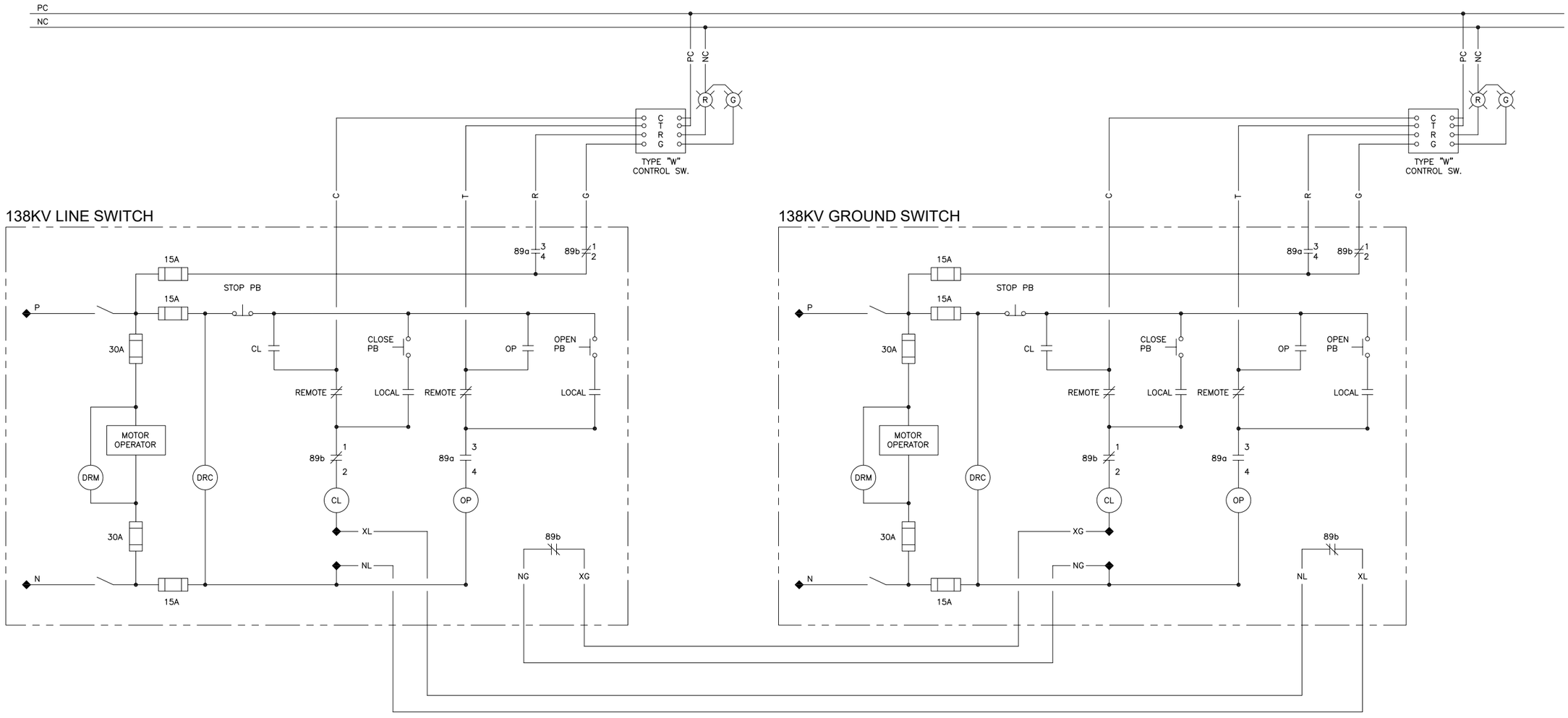
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
60HZ AC STAGING – SINGLE LINE DIAGRAMS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2354.DWG
Ref. No.:	2011-059
Sheet No:	406 OF 565

ET-2354



1 ET-2356 PAOLI SUBSTATION DC SCHEMATIC DIAGRAM

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
DC SCHEMATIC DIAGRAM

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

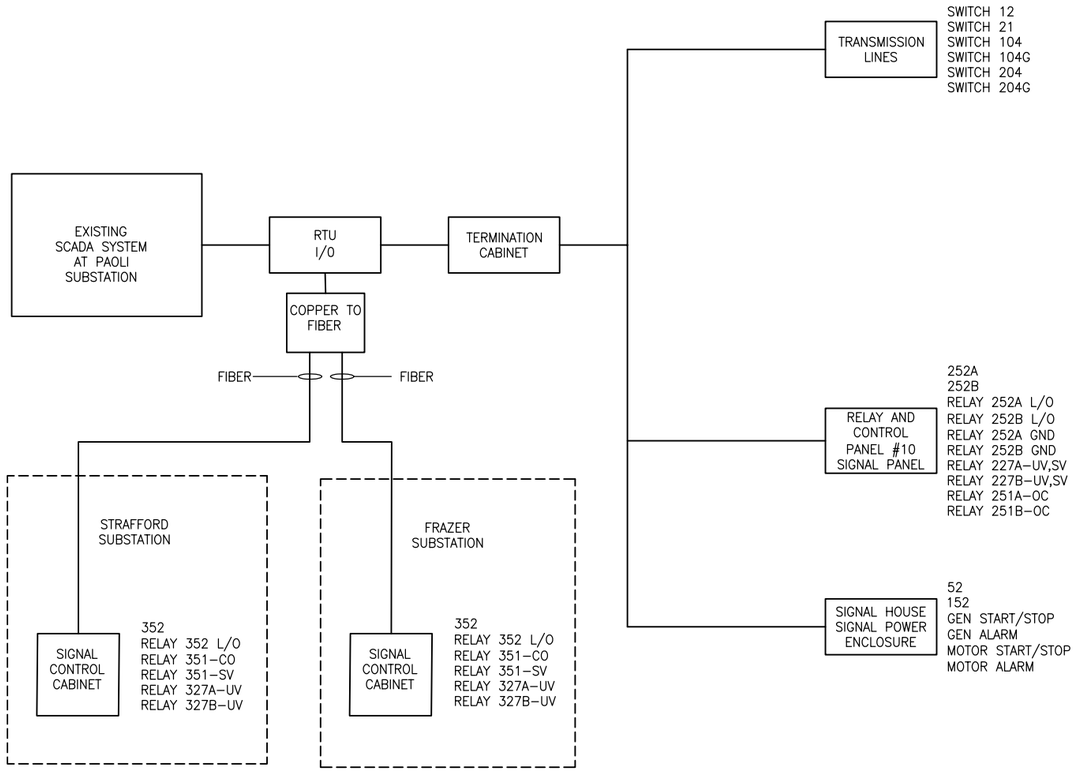
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Ref. No.:	2011–059
Sheet No:	407 OF 565

ET–2356

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–2357 PROPOSED SCADA SYSTEM BLOCK DIAGRAM

PROPOSED PAOLI SCADA RTU POINTS					
POINT NAME	DESCRIPTION	CONTROL	INDICATION	ALARM	ANALOG
1BM	138KV TRANS. SW	x	x		
1BMG	138KV GROUND SWITCH	x	x		
2BM	138KV TRANS.DISCONNECT SW	x	x		
2BMG	138KV GROUND SWITCH	x	x		
21	138KV TRANS.DISCONNECT SW	x	x		
12	138KV TRANS. MANUAL SW		x		
52	60HZ 480V MG 52 BREAKER	x	x		
152	100HZ 480V MG 152 BREAKER	x	x		
GMS	GMS MOTOR STARTER ON	x	x		
AUT	GMS AUTO START ON	x	x		
LOC/REM	GMS LOCAL/REMOTE CONTROL	x	x		
BYP	GMS BYPASS	x	x		
252A	100HZ 6.9KV 252A BREAKER	x	x	x	
252B	100HZ 6.9KV 252B BREAKER	x	x	x	
252A LOC/R	252A LOCKOUT	x	x	x	
252B LOC/R	252B LOCKOUT	x	x	x	
MSF	MOTOR STARTER FAILURE ALARM			x	
AR	MOTOR STARTER OVERLOAD ALARM			x	
PBR	MGS PHASE LOSS ALARM			x	
252A-UV	252A-UV RELAY			x	
252B-UV	252B-UV RELAY			x	
252A-SV	252A-SV RELAY ALARM			x	
252B-SV	252B-SV RELAY ALARM			x	
252A-OC	252A-OC OVER CURRENT ALARM			x	
252B-OC	252B-OC OVER CURRENT ALARM			x	
252A-GND	100HZ 6.9KV PHASE A GND ALARM			x	
252B-GND	100HZ 6.9KV PHASE B GND ALARM			x	
GMS-GEN	GMS GENERATOR OUTPUT VOLTAGE				x
GMS-GEN	GMS GENERATOR OUTPUT CURRENT				x
FR-352	FRAZER 352 BREAKER	x	x	x	
FR-PBR	FRAZER CONTROL POWER LOSS			x	
FR-352 L/O	FRAZER 352 LOCKOUT	x	x	x	
FR-351-CO	FRAZER 351 OVER CURRENT ALARM			x	
FR-351-SV	FRAZER 351 SV RELAY ALARM			x	
FR-327A-UV	FRAZER 327A-UV RELAY ALARM			x	
FR-327B-UV	RAZER 327B-UV RELAY ALARM			x	
ST-352	STRAFFORD 352 BREAKER	x	x	x	
ST-PBR	STRAFFORD CONTROL POWER LOSS			x	
ST-352 L/O	STRAFFORD 352 LOCKOUT	x	x	x	
ST-351-CO	STRAFFORD 351 OVER CURRENT ALARM			x	
ST-351-SV	STRAFFORD 351 SV RELAY ALARM			x	
ST-327A-UV	STRAFFORDR 327A-UV RELAY ALARM			x	
ST-327B-UV	STRAFFORD 327B-UV RELAY ALARM			x	

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
PROPOSED SCADA SYSTEM BLOCK DIAGRAM AND POINT LIST

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

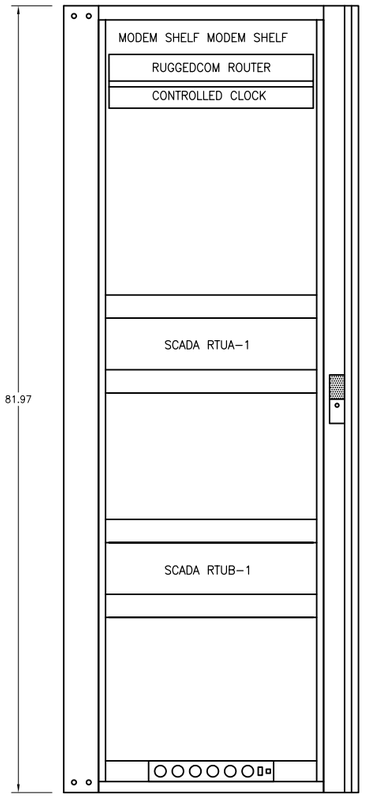
File No.:	2011-059-ET-2357.DWG
Ref. No.:	2011–059
Sheet No:	408 OF 565

ET–2357

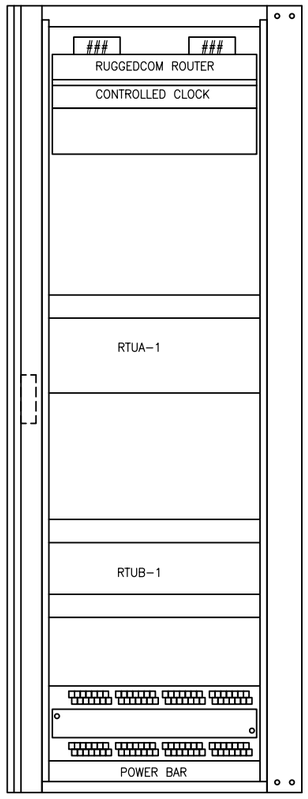
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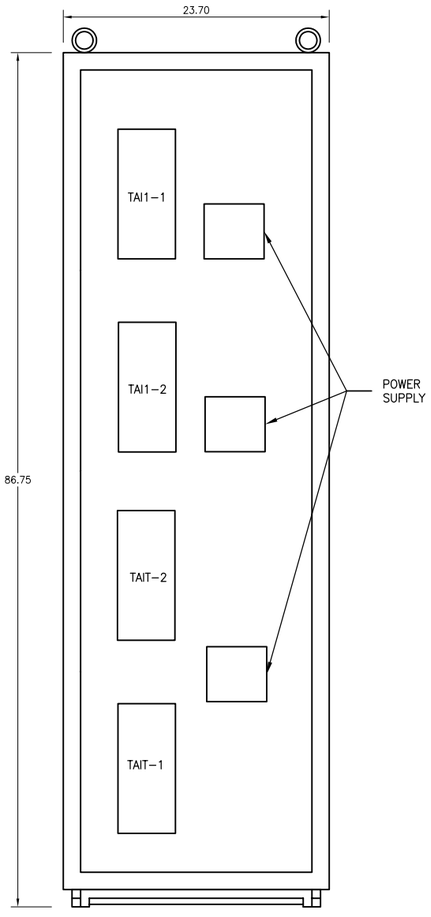
1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE SPECIFICATION SECTION 16760 FOR ALL SCADA SYSTEM RTU COMPONENTS AND CONFIGURATION REQUIREMENTS.



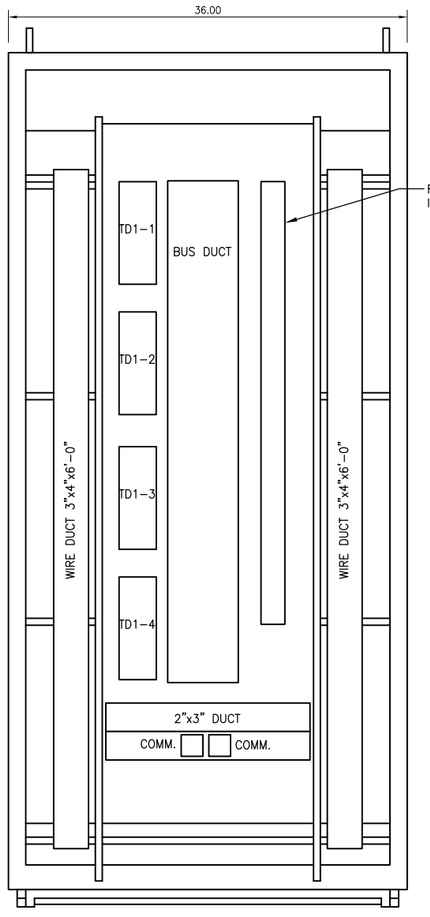
SWING FRAME FRONT VIEW



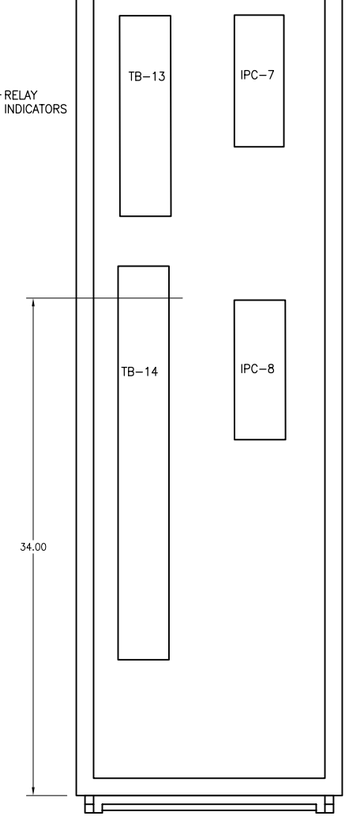
SWING FRAME REAR VIEW



INSIDE VIEW OF LEFT SIDE



INSIDE VIEW REAR OF CABINET
(CABINET SHOWN WITHOUT DOOR OR SWING FRAME)



INSIDE VIEW OF RIGHT SIDE

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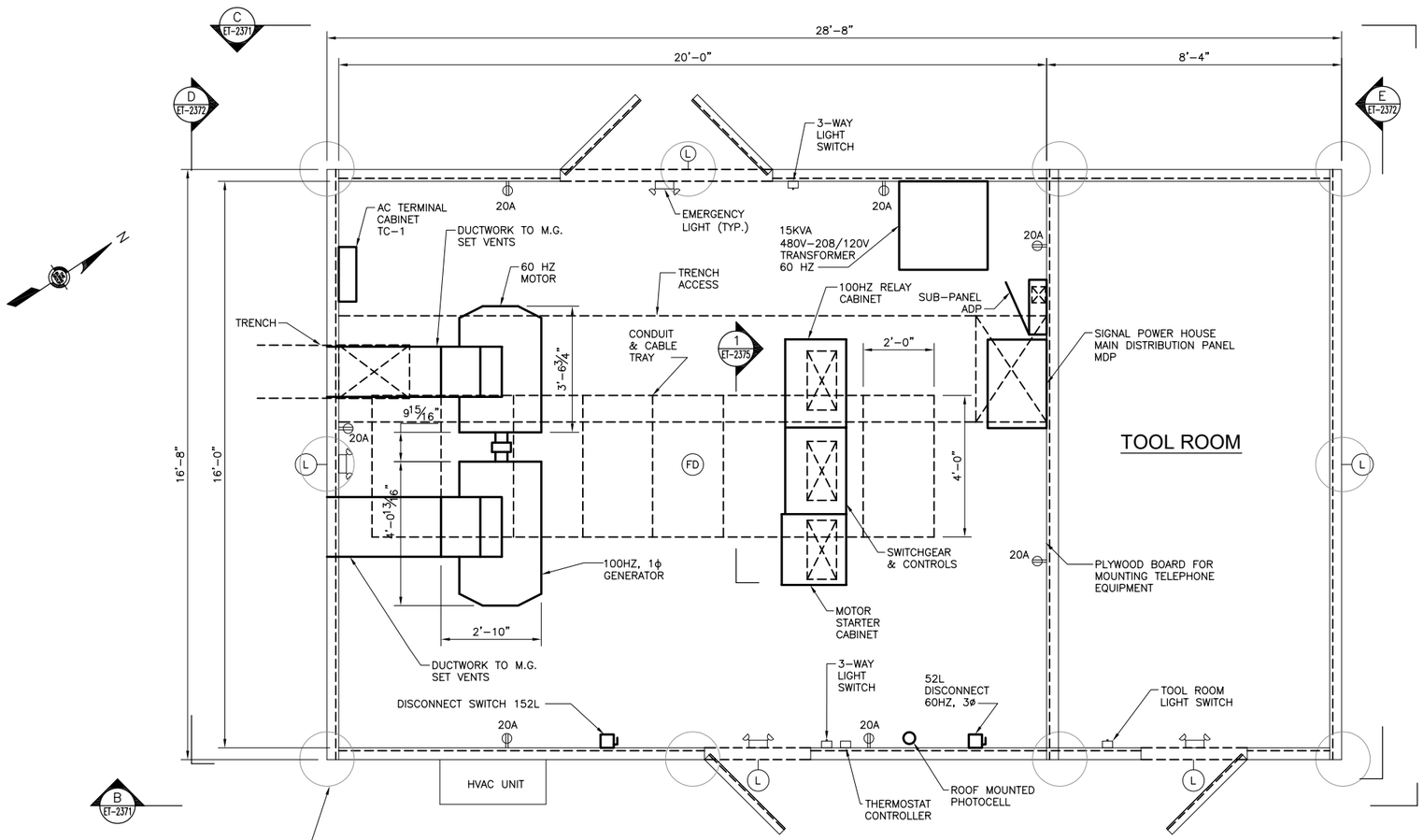
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
SCADA RTU CABINET

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2358.DWG
Ref. No.:	2011–059
Sheet No:	409 OF 565

ET–2358

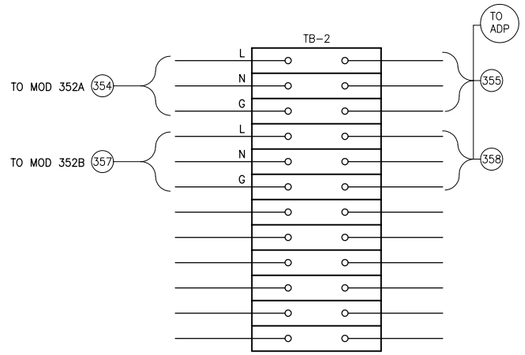
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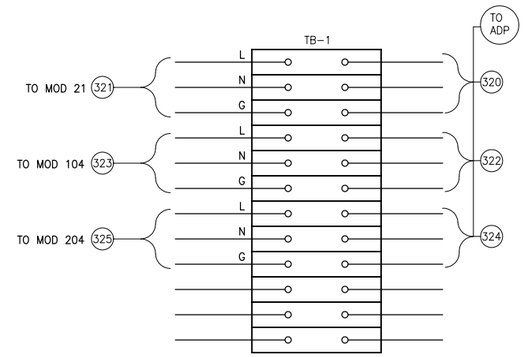


1 ET-2370 SIGNAL POWER HOUSE PLAN

2' 1' 0 2'

SCALE: 1/2"= 1'-0"





2 ET-2370 AC TERMINAL BLOCKS

SCALE: NONE

NOTES:

1. CONCRETE PIER FOUNDATIONS AS REQUIRED. SEE DRAWING S-5408 FOR FOUNDATION DETAILS.
2. DIMENSIONS OF EQUIPMENT INSIDE ENCLOSURE ARE APPROXIMATE. SUPPLIER TO VERIFY AND SUBMIT M.G. BUILDING LAYOUT FOR APPROVAL BASED UPON FINAL EQUIPMENT DIMENSIONS.
3. LIGHTING CONTROL CIRCUIT PHOTOCELL TO BE MOUNTED AT CORNER ADJACENT TO LIGHTING CONTACTORS AS SHOWN.
4. EQUIPMENT WALL LAYOUTS ARE INDICATIVE ONLY.
5. CABLE ENTRY AS NOTED.
6. DRAWING SHOWS A GENERAL LAYOUT OF MAJOR EQUIPMENT. REFER TO SPECIFICATIONS FOR DETAILED REQUIREMENTS.
7. PROVIDE ALL ACCESS DOORS WITH PROVISION FOR PADLOCKS.
8. PROVIDE GROUNDING PADS WITH TAP HOLES AT ALL FOUR CORNERS OF EACH BUILDING FOR 1/2 INCH 13 SILICON BRONZE BOLTS. EACH PAD TO HAVE 4 HOLES AT 1 3/4" CENTERS.
9. CUTOUTS FOR INCOMING AND OUTGOING CABLES TO BE PROVIDED AS REQUIRED.
10. PROVIDE INTRUSION ALARM DOOR LIMIT SWITCHES ON ALL EXTERIOR DOORS.
11. THE CONTACTOR SHALL INSTALL ALL EQUIPMENT SHOWN.
12. AMTRAK TO PROVIDE AND INSTALL THE EMERGENCY TELEPHONE (ET) AND TELEPHONE EQUIPMENT. SPACE TO BE PROVIDED TO FACILITATE THIS EQUIPMENT AS INDICATED.
13. DUCT WORK & VENTS SHALL BE PROVIDED TO VENT MOTOR & GENERATOR HEAT TO OUTSIDE. COORDINATE WITH M.G. SET SUPPLIER.
14. SIGNAL POWER HOUSE MANUFACTURER SHOULD PROVIDE ADEQUATE FRAMING TO SUPPORT THE M.G. SET AND COORDINATE SIGNAL POWER HOUSE FRAMING AS SHOWN ON S-5408.

LEGEND:

- EMERGENCY LIGHTING FIXTURE WITH INTEGRAL BATTERY PACK (120V).
- (L) EXTERIOR LIGHTING FIXTURE
- (FD) FIRE DETECTOR
- PANELBOARD
- DISCONNECT SWITCH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

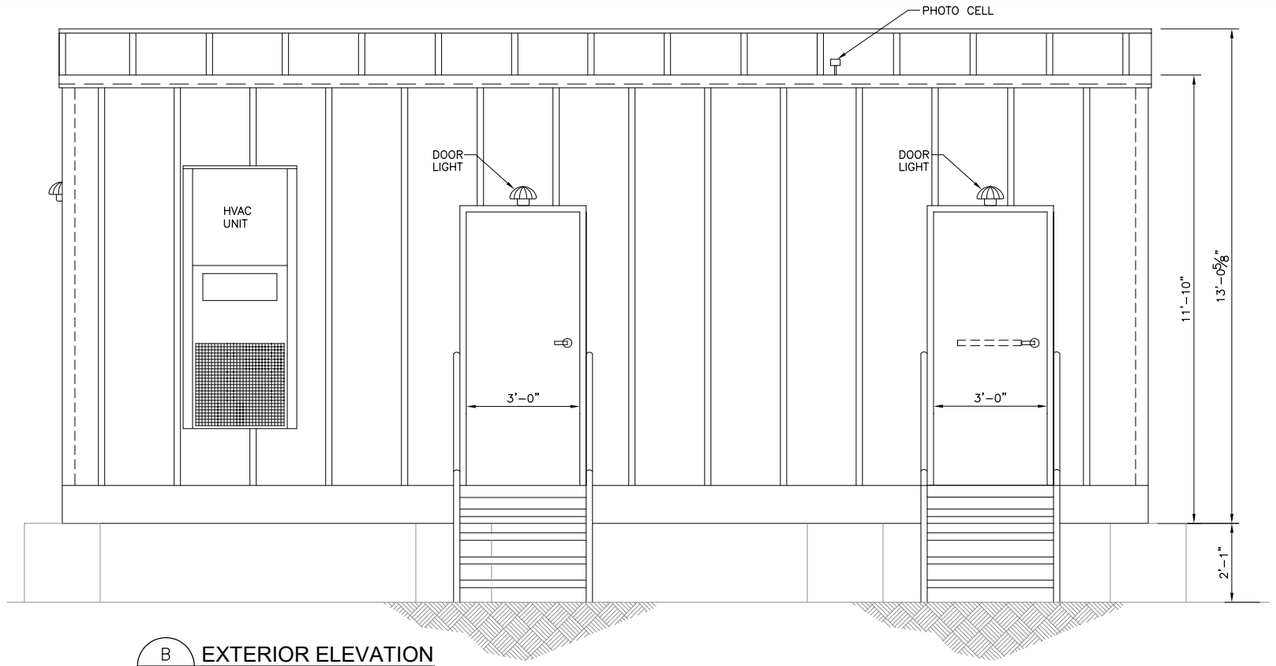
PAOLI SUBSTATION – SIGNAL POWER HOUSE PLAN (SHEET 1 OF 5)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2370.DWG
Ref. No.:	2011-059
Sheet No:	410 OF 565

ET-2370

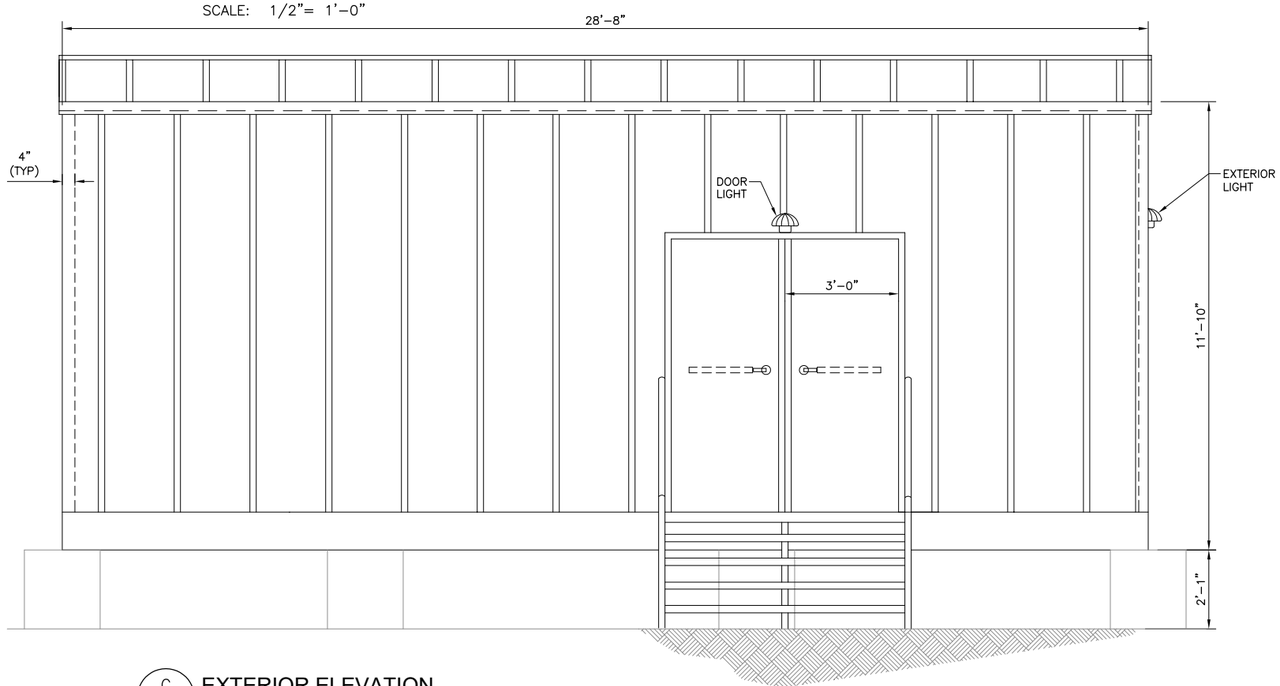
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B ET-2371 EXTERIOR ELEVATION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



C ET-2371 EXTERIOR ELEVATION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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NOTES:

1. CONCRETE PIER FOUNDATIONS AS REQUIRED. SEE STRUCTURAL DRAWINGS FOR FOUNDATION DETAILS.
2. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR STEPS, LANDINGS, AND RAILINGS. STAIRS SHALL BE COORDINATED WITH CONCRETE PADS AS SHOWN ON FOUNDATION PLANS AND DETAILS ON DRAWING S-5408.
3. LANDING STRUCTURE AT DOUBLE DOORS SHALL BE DESIGNED TO SUPPORT 1,500 LBS AND/OR 100 LBS/SQ. FT.
4. BUILDING CONSTRUCTION AND INTERNAL COMPONENTS AS PER SPECIFICATION SECTION 16790.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

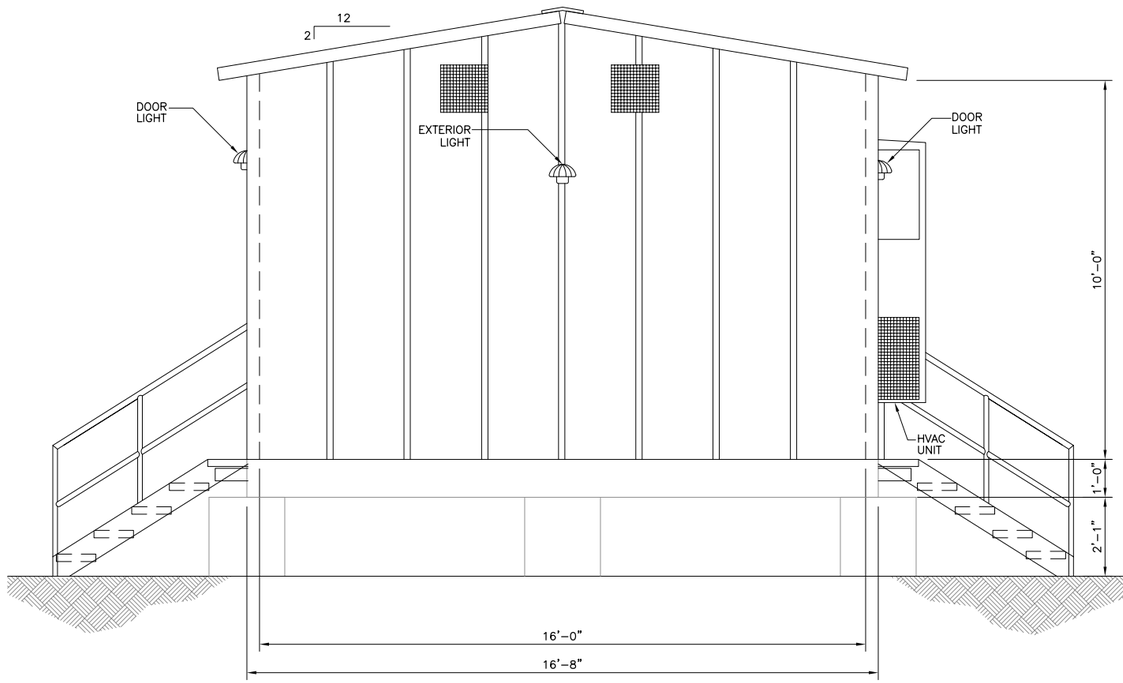
PAOLI SUBSTATION - SIGNAL POWER HOUSE EXTERIOR ELEVATIONS (SHEET 2 OF 5)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2371.DWG
Ref. No.:	2011-059
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ET-2371

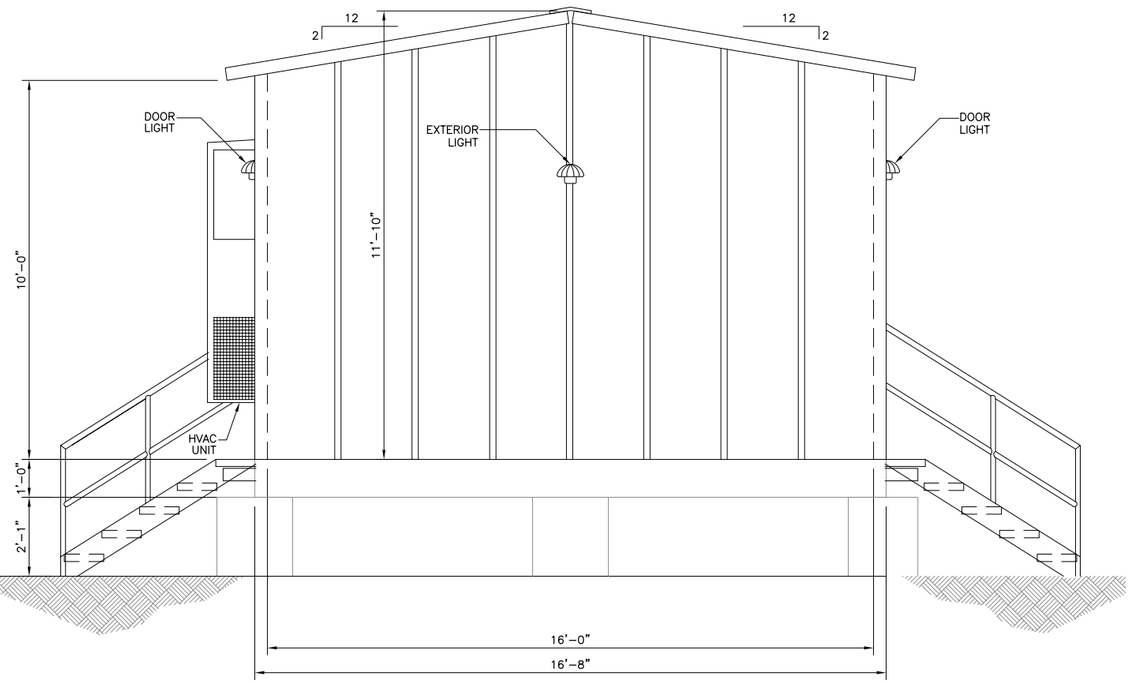
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D ET-2372 EXTERIOR ELEVATION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



E ET-2372 EXTERIOR ELEVATION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION – SIGNAL POWER HOUSE EXTERIOR ELEVATIONS (SHEET 3 OF 5)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

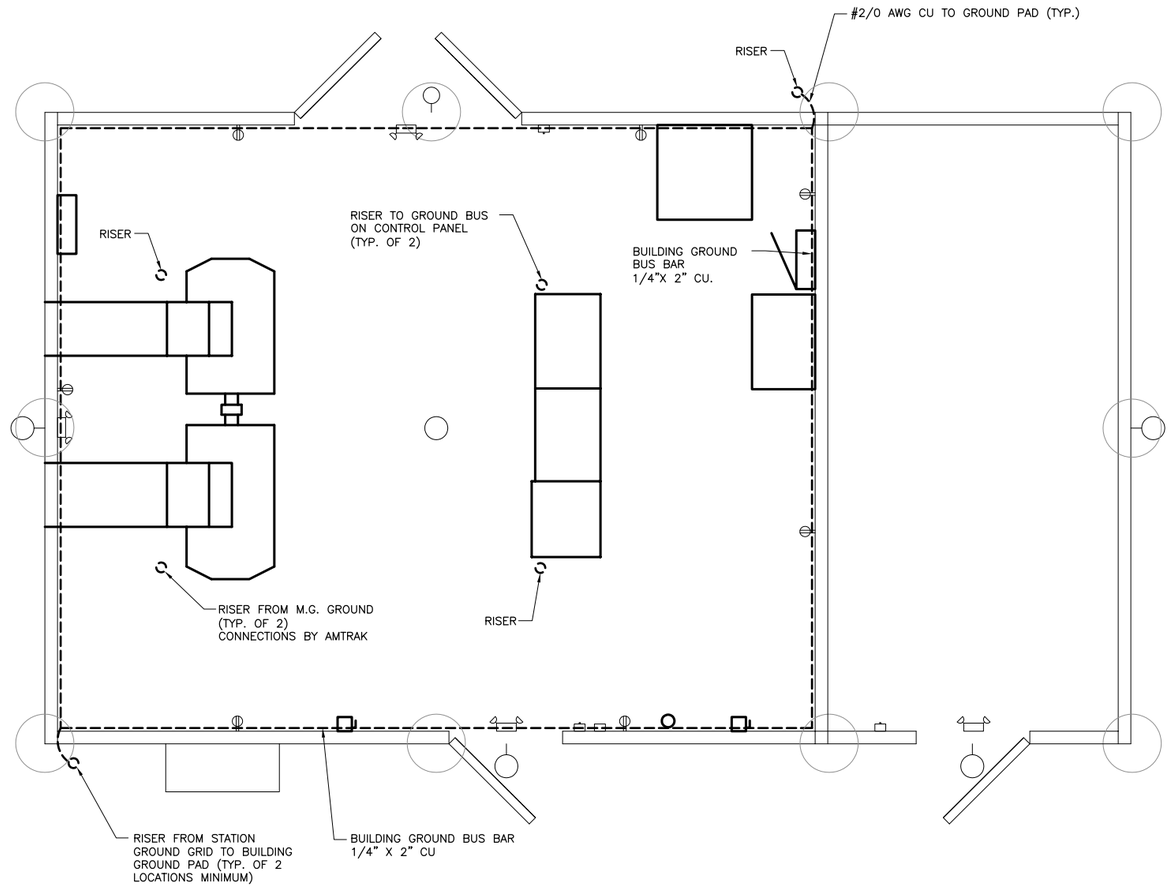
File No.:	2011-059-ET-2372.DWG
Ref. No.:	2011-059
Sheet No:	412 OF 565

ET-2372

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. RISERS SHALL BE #2/0 AWG. CU STRAND.
3. CONNECT GROUND BUS IN BUILDING TO GROUNDED BUILDING STEEL OR TO STATION GROUND GRID WITH INDIVIDUAL RISERS.
4. AT DOORS, PROVIDE CONTINUITY JUMPERS UNDER FLOOR (#2/0 CU).
5. CONNECT GROUND BUS IN R&C SWITCHBOARD TO BUILDING GROUND BUS OR STATION GROUND GRID WITH #2 AWG CU.



1 ET–2373 SIGNAL POWER HOUSE GROUNDING PLAN

2' 1' 0 2'

SCALE: 1/2"= 1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE GROUNDING PLAN (SHEET 4 OF 5)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

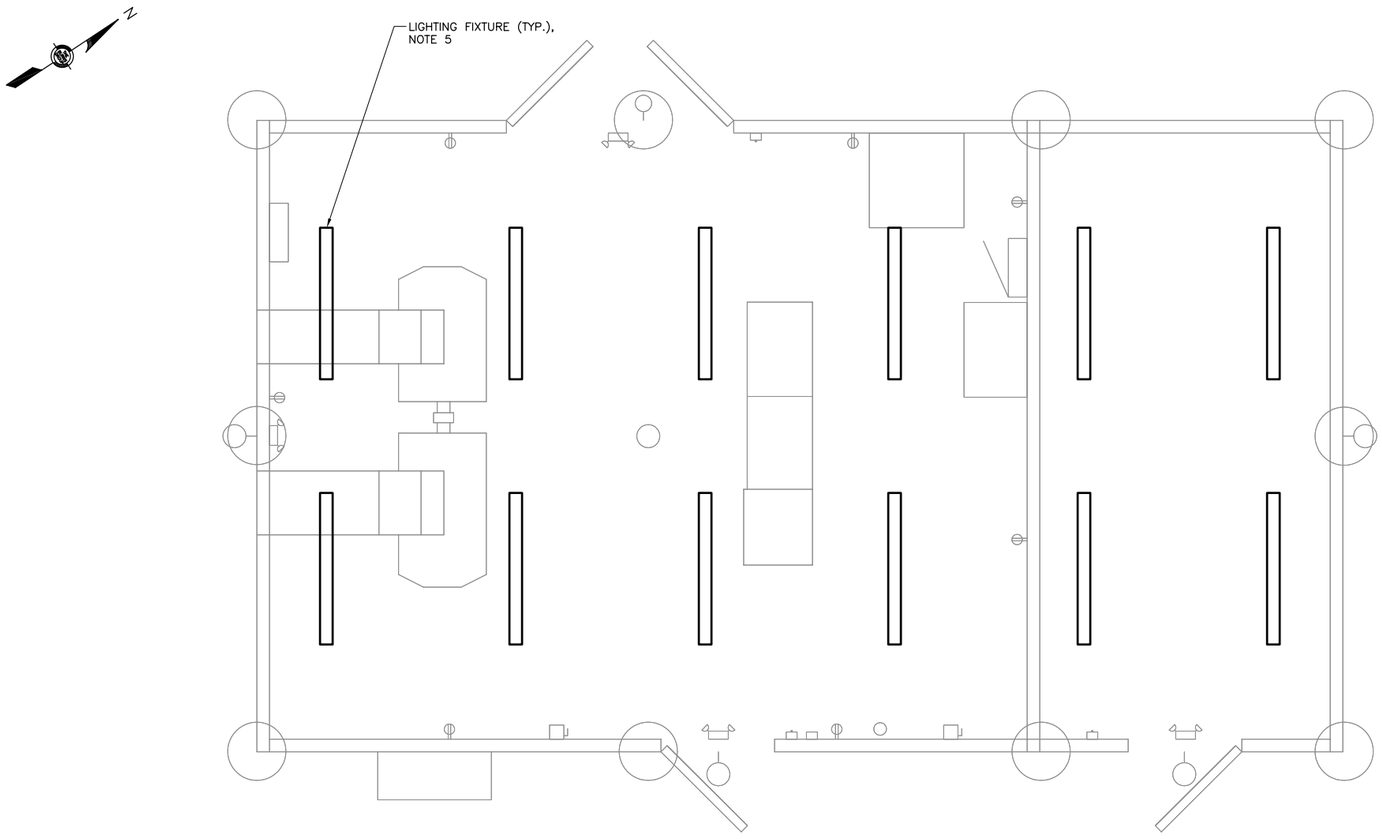
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Ref. No.:	2011–059
Sheet No:	413 OF 565

ET–2373

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. LIGHTING FIXTURES IN CONTROL ROOM SHALL BE INDUSTRIAL TYPE.
3. LIGHTING FIXTURES IN BATTERY ROOM SHALL BE EXPLOSION–PROOF TYPE.
4. LIGHTING FIXTURES INSTALLED SHALL MAINTAIN AN AVERAGE ILLUMINATION LEVEL OF AT LEAST 30 FOOT–CANDLES AT THE FLOOR LEVEL AND UNIFORMITY RATIO PER IES LIGHTING STANDARD.
5. LIGHTING FIXTURES SHALL BE LITHONIA LIGHTING PROTEON SL LED MODEL NUMBER PTNSL4 ND OR EQUAL.



1 / ET–2374 SIGNAL POWER HOUSE LIGHTING PLAN

2' 1' 0 2'

SCALE: 1/2"= 1'–0"

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IN ASSOCIATION WITH

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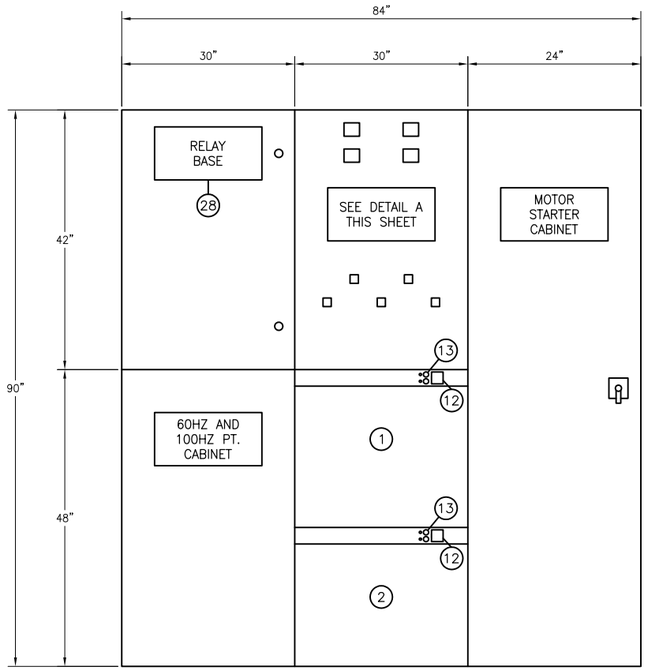
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE LIGHTING PLAN (SHEET 5 OF 5)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2374.DWG
Ref. No.:	2011–059
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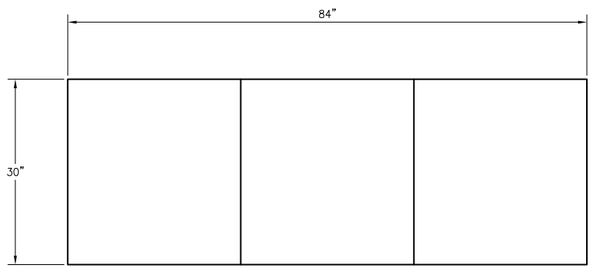
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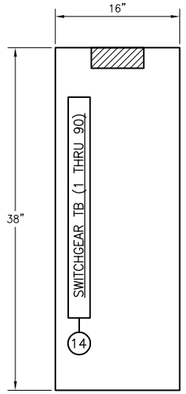
RELAY CABINET NOTE: 3 | SWITCHARGE CABINET NOTE: 2 | MOTOR STARTER CABINET NOTE: 4

A ET-2375 FRONT VIEW NOT TO SCALE

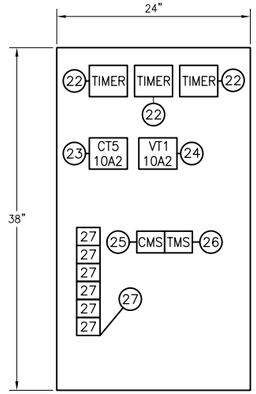


B ET-2375 TOP VIEW NOT TO SCALE

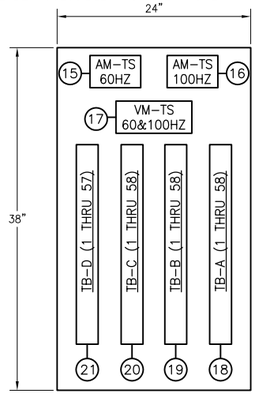
NOTE:
1. SWITCHGEAR TERMINALS FOR INTERNAL CONNECTION AND ALL OUTGOING TERMINALS WILL BE MOUNTED ON REAR AND WILL BE ACCESSIBLE FROM REAR ONLY.



SWITCHGEAR SUBPLATE LAYOUT



LEFT SUBPLATE LAYOUT

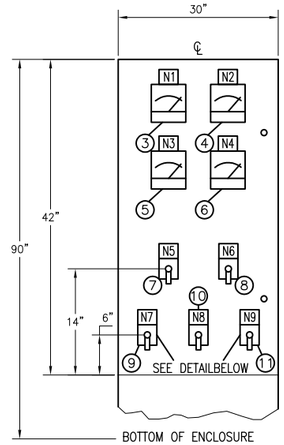


RIGHT SUBPLATE LAYOUT

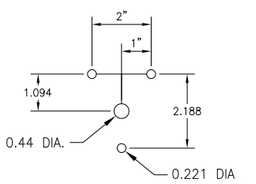
C ET-2375 RELAY CABINET NOT TO SCALE

NAMEPLATE LIST

	1st LINE	2nd LINE
N1	INCOMING	VOLTMETER
N2	INCOMING	AMMETER
N3	OUT PUT	VOLTMETER
N4	OUT PUT	AMMETER
N5	VOLTMETER SWITCH	60HZ
N6	AMMETER SWITCH	60HZ
N7	AUTO START	SWITCH
N8	STATION BYPASS	SWITCH
N9	LOCAL REMOTE	SWITCH



DETAIL "A"



GENERAL NOTE:

1. ALL ARRANGEMENTS SHOWN ARE RECOMMENDATIONS ONLY. ACTUAL LOCATION AND ARRANGEMENT OF EQUIPMENT IS THE RESPONSIBILITY OF THE CONTRACTOR. ALL DIMENSIONS ARE APPROXIMATE AND SHALL BE VERIFIED BY THE MANUFACTURER.
2. ALL NAMEPLATES TO BE 1"X3" 2PLY GRAYOPLY MATERIAL WHITE WITH BLACK CORE.

SWITCHGEAR CABINET DETAILS

ITEM

1 52 ACB, 480V, 3 POLE MAIN CIRCUIT BREAKER
2 152 ACB, 480V, 2 POLE GENERATOR CIRCUIT BREAKER
3 INCOMING VOLTMETER (VM1)
4 INCOMING AMMETER (AM1)
5 OUTPUT VOLTMETER (VM2)
6 OUTPUT AMMETER (AM2)
7 VOLTMETER SWITCH (VM SW)
8 AMMETER SWITCH (AM SW)
9 AUTO START SELECTOR SWITCH (A.S. SW)
10 STATION BYPASS SELECTOR SWITCH (S.B. SW)
11 LOCAL/REMOTE SELECTOR SWITCH (L/R SW)
12 CONTROL SWITCH (CS)
13 INDICATING LAMPS (RED-GREEN)
14 TERMINAL BLOCK (SWITCHGEAR)

RELAY CABINET DETAILS (RIGHT SUBPLATE LAYOUT)

ITEM

15 AMMETER TEST SWITCH 60HZ
16 AMMETER TEST SWITCH 100HZ
17 VOLTMETER TEST SWITCHES 60HZ & 100HZ
18 TERMINAL BLOCK A
19 TERMINAL BLOCK B
20 TERMINAL BLOCK C
21 TERMINAL BLOCK D

RELAY CABINET DETAILS (RIGHT SUBPLATE LAYOUT)

ITEM

22 AGASTAT TIMING RELAY
23 CURRENT TRANSDUCER 100HZ (CT510A2-100HZ)
24 VOLTMETER TRANSDUCER 100HZ (VT110A2-100HZ)
25 START MG KUP RELAY (CMS)
26 STOP MG KUP RELAY (TMS)
27 FUSE BLOCKS (AS NEEDED)

RELAY CABINET DETAILS (MGB BASE)

28 RELAY BASE TO BE MOUNTED IN RELAY CABINET

NOTES:

1. SWITCHGEAR TERMINALS ARE FOR WIRING BETWEEN SWITCHGEAR AND RELAY AND CONTROL SWITCHBOARD.
2. SWITCHGEAR CABINET WILL HOUSE 480V SWITCHGEAR AND METER PANEL ENCLOSURE WILL BE 90"H X 30"W X 30"D.
3. ENCLOSURE WILL HOUSE 100HZ RELAYING AND MOUNT AT TOP OF THE 100HZ CT AND PT CABINET. ENCLOSURE WILL BE 42"H X 30"W X 30"D.
4. ENCLOSURE WILL HOUSE STARTER MOTOR RELAY COMPONENTS. ENCLOSURE WILL BE 90"H X 24"W X 30"D.
5. ENCLOSURE WILL HOUSE 80HZ AND 100HZ PT COMPONENTS. ENCLOSURE WILL BE 48"H X 30"W X 30"D.

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IN ASSOCIATION WITH
Baker
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION - SIGNAL POWER HOUSE
100 HZ RELAY & CONTROL PANEL (SHEET 1 OF 3)

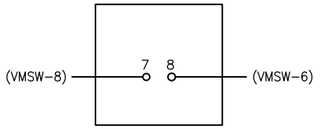
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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Ref. No.:	2011-059
Sheet No:	415 OF 565

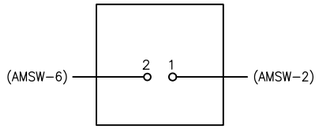
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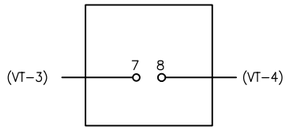
VM1
INCOMING VOLTMETER



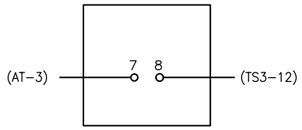
AM1
INCOMING AMMETER



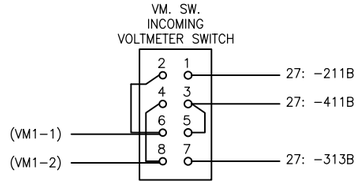
VM2
GENERATOR VOLTMETER



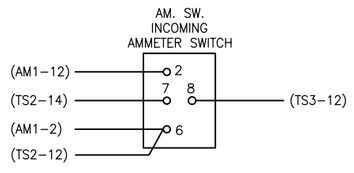
AM2
GENERATOR AMMETER



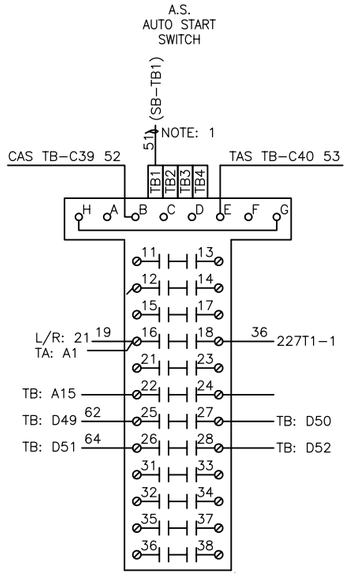
VM. SW.
INCOMING
VOLTMETER SWITCH



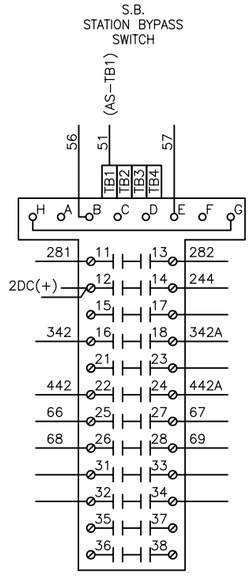
AM. SW.
INCOMING
AMMETER SWITCH



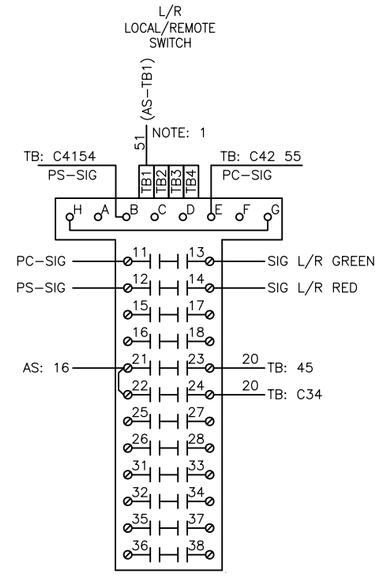
A.S.
AUTO START
SWITCH



S.B.
STATION BYPASS
SWITCH



L/R
LOCAL/REMOTE
SWITCH



WIRE GAUGE NOTES:

1. CT & PT SECONDARY WIRES TO BE #10 SIS.
   TRANSDUCER OUTPUTS TO BE 2 CONDUCTOR #16 SHIELDED CABLE.
2. ALL CONTROL WIRING TO BE #10 SIS.

NOTE: 1

1. LOCAL/REMOTE HANDLE NOT WIRED FOR MANUAL OPERATION ONLY.

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

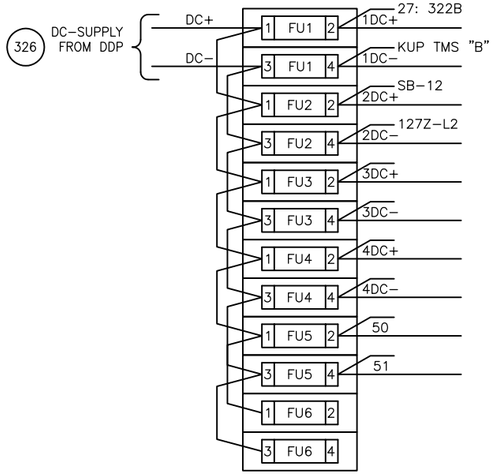
PAOLI SUBSTATION – SIGNAL POWER HOUSE
100 HZ RELAY & CONTROL PANEL (SHEET 2 OF 3)

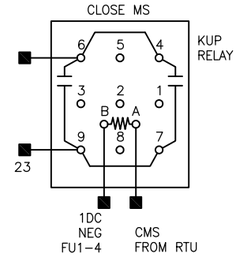
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

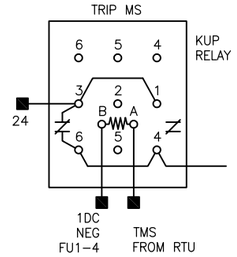
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Ref. No.:	2011-059
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ET–2376

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION – SIGNAL POWER HOUSE 100 HZ RELAY & CONTROL PANEL (SHEET 3 OF 3)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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Ref. No.:	2011–059
Sheet No:	417 OF 565

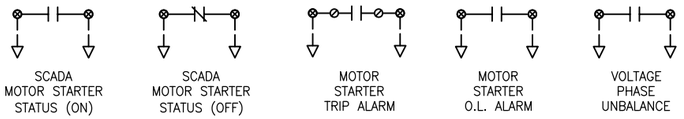
ET–2377

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–010.





NOTE:

MOTOR CONTROLLER MUST BE COMPATIBLE WITH THE 150KW NATURAL GAS FIRED GENERATOR SET SHOWN ON DWG ET–2354 SO THAT THE GENERATOR SET MAY START AND OPERATE THE SIGNAL MG SET SHOWN HERE.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION – SIGNAL POWER HOUSE SYNCHRONOUS MOTOR STARTER SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

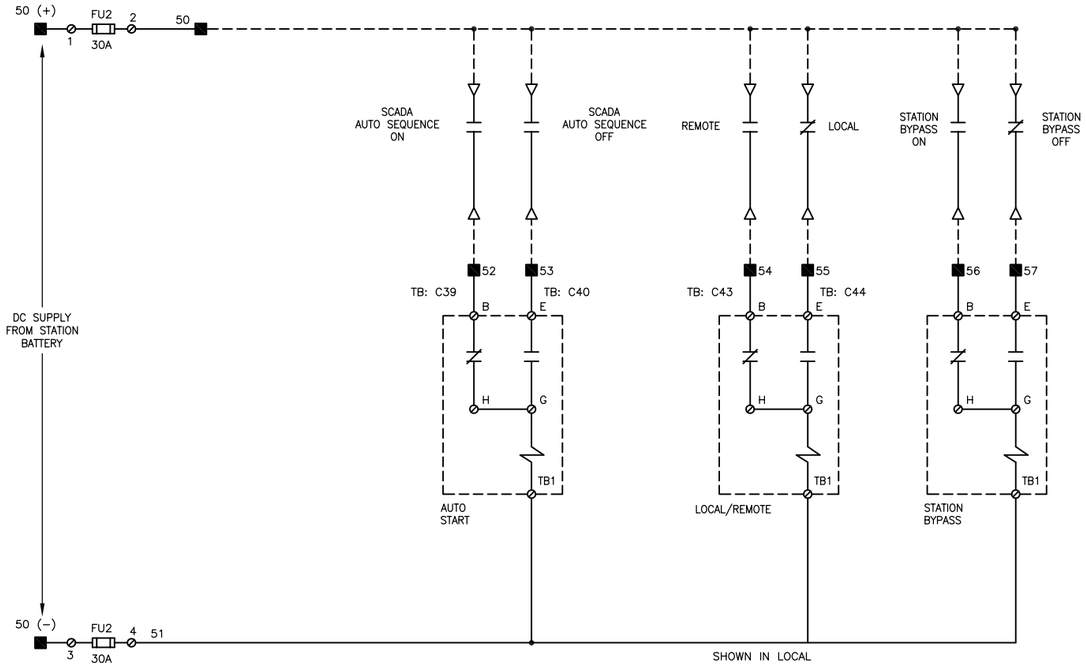
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ET–2379

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



AUTO START SWITCH

	POSITION		USED ON CIRCUIT
	LOC.	REM.	
11 — 13	X		
12 — 14		X	
15 — 17	X		
16 — 18		X	227T1 TIMER
21 — 23	X		
22 — 24		X	227A–UV
25 — 27	X		SCADA
26 — 28		X	SCADA
31 — 33	X		
32 — 34		X	
35 — 37	X		
36 — 38		X	

STATION BYPASS

	POSITION		USED ON CIRCUIT
	LOC.	REM.	
11 — 13	X		52A CLOSE
12 — 14		X	52A CLOSE
15 — 17	X		
16 — 18		X	252A CLOSE
21 — 23	X		
22 — 24		X	252B CLOSE
25 — 27	X		SCADA
26 — 28		X	SCADA
31 — 33	X		
32 — 34		X	
35 — 37	X		
36 — 38		X	

LOCAL/REMOTE SWITCH

	POSITION		USED ON CIRCUIT
	LOC.	REM.	
11 — 13	X		SIG L/R GREEN
12 — 14		X	SIG L/R RED
15 — 17	X		
16 — 18		X	
21 — 23	X		M.S. START
22 — 24		X	M.S. START
25 — 27	X		
26 — 28		X	

⊗ MOTOR STARTER TERMINAL

■ SWITCHGEAR SECTION TERMINAL (OUTGOING)

⊘ DEVICE TERMINAL

△ SCADA INTERFACE TERMINAL

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE
AUTO START & LOCAL/REMOTE SWITCH SCHEMATIC

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

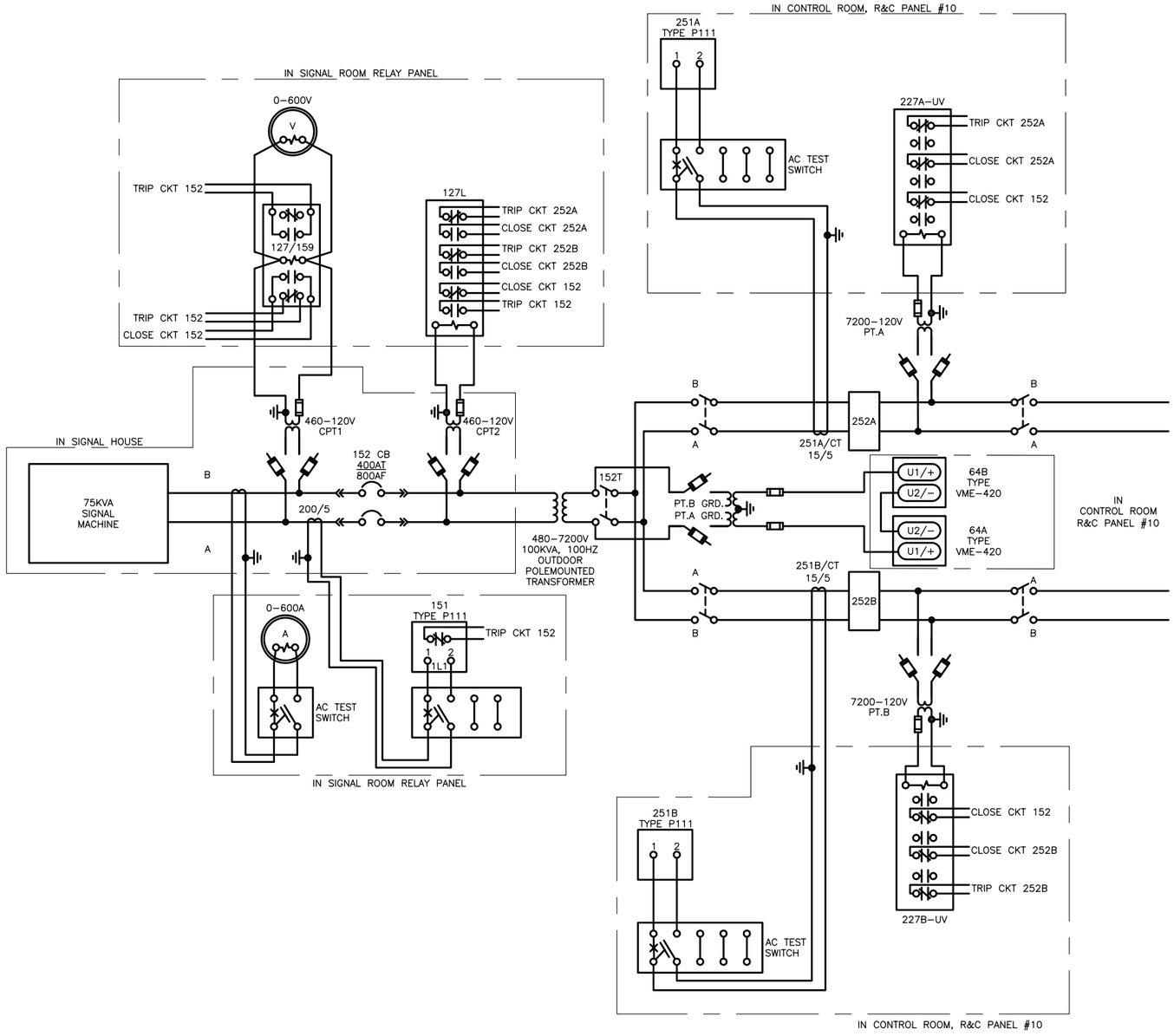
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ET–2380

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–2381 100 HZ AC SCHEMATIC

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE
100 HZ AC SCHEMATIC

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

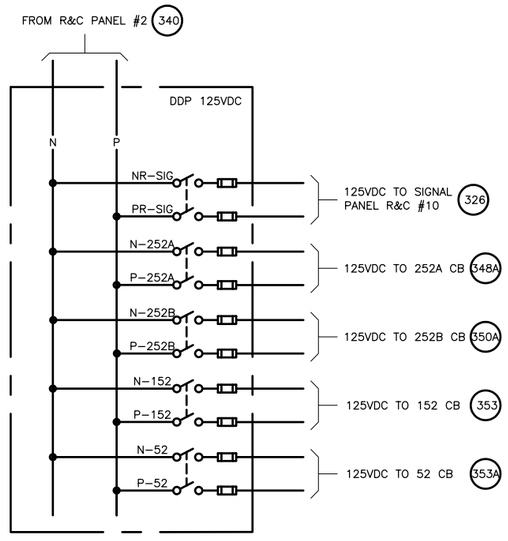
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–2382 100 HZ DC SCHEMATIC

NOTE: (DDP PANEL LOCATED AT CONTROL HOUSE)

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE
100 HZ DC SCHEMATIC

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

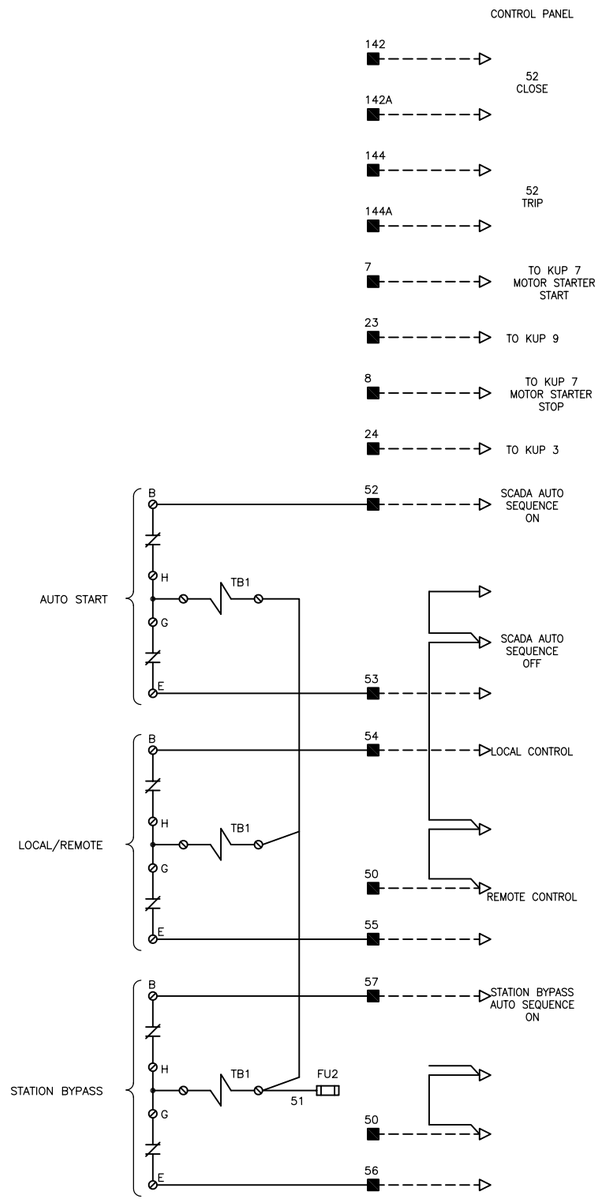
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Ref. No.:	2011–059
Sheet No:	421 OF 565

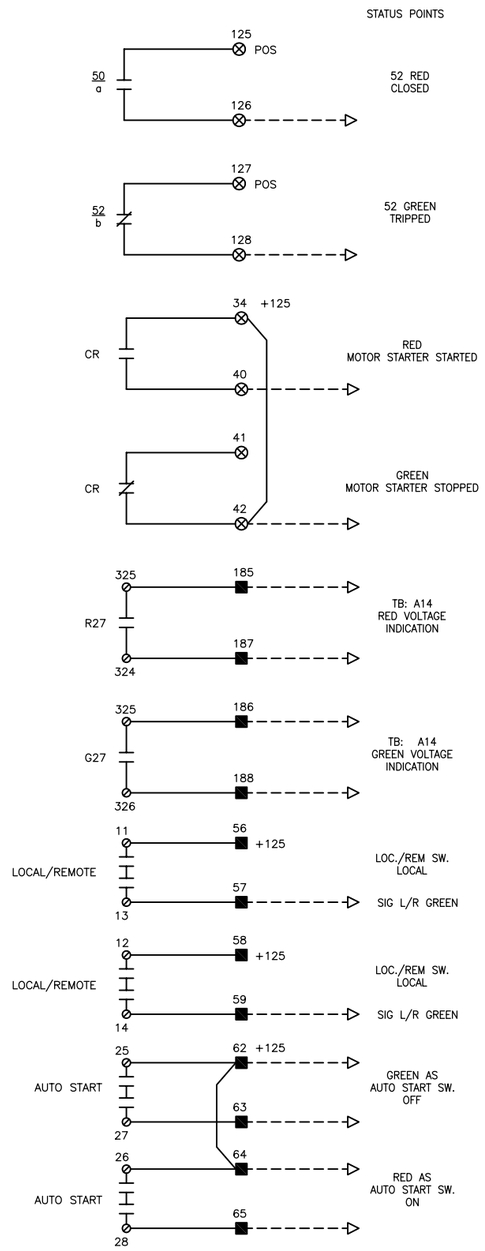
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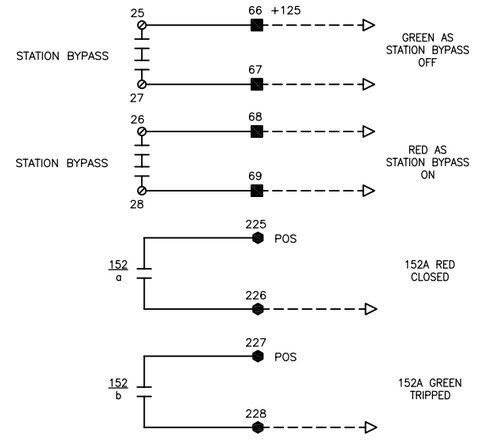
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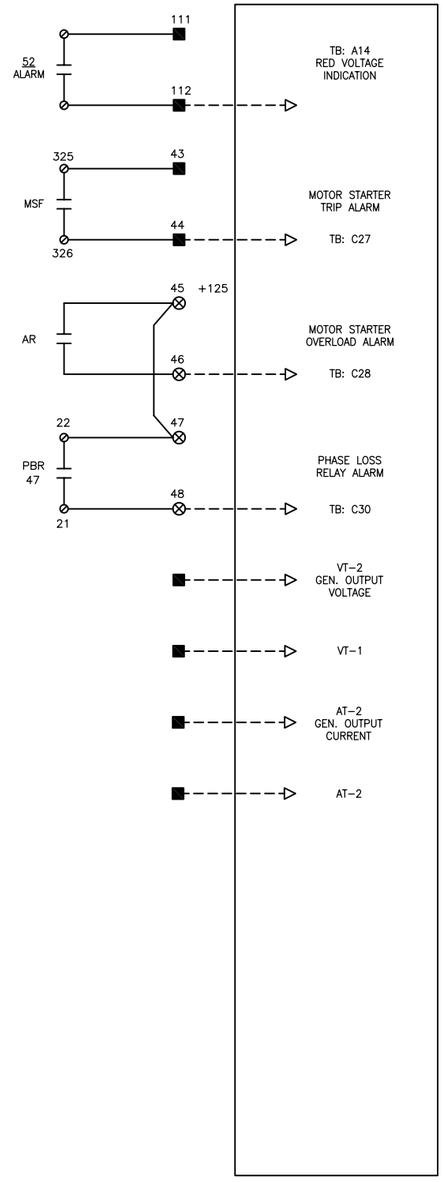
NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.









- ⊗ MOTOR STARTER TERMINAL
- ⬢ SWITCHGEAR SECTION TERMINAL (INTERNAL)
- ⊘ DEVICE TERMINAL
- △ SCADA INTERFACE TERMINAL
- ■ SWITCHGEAR SECTION TERMINAL (OUTGOING)

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

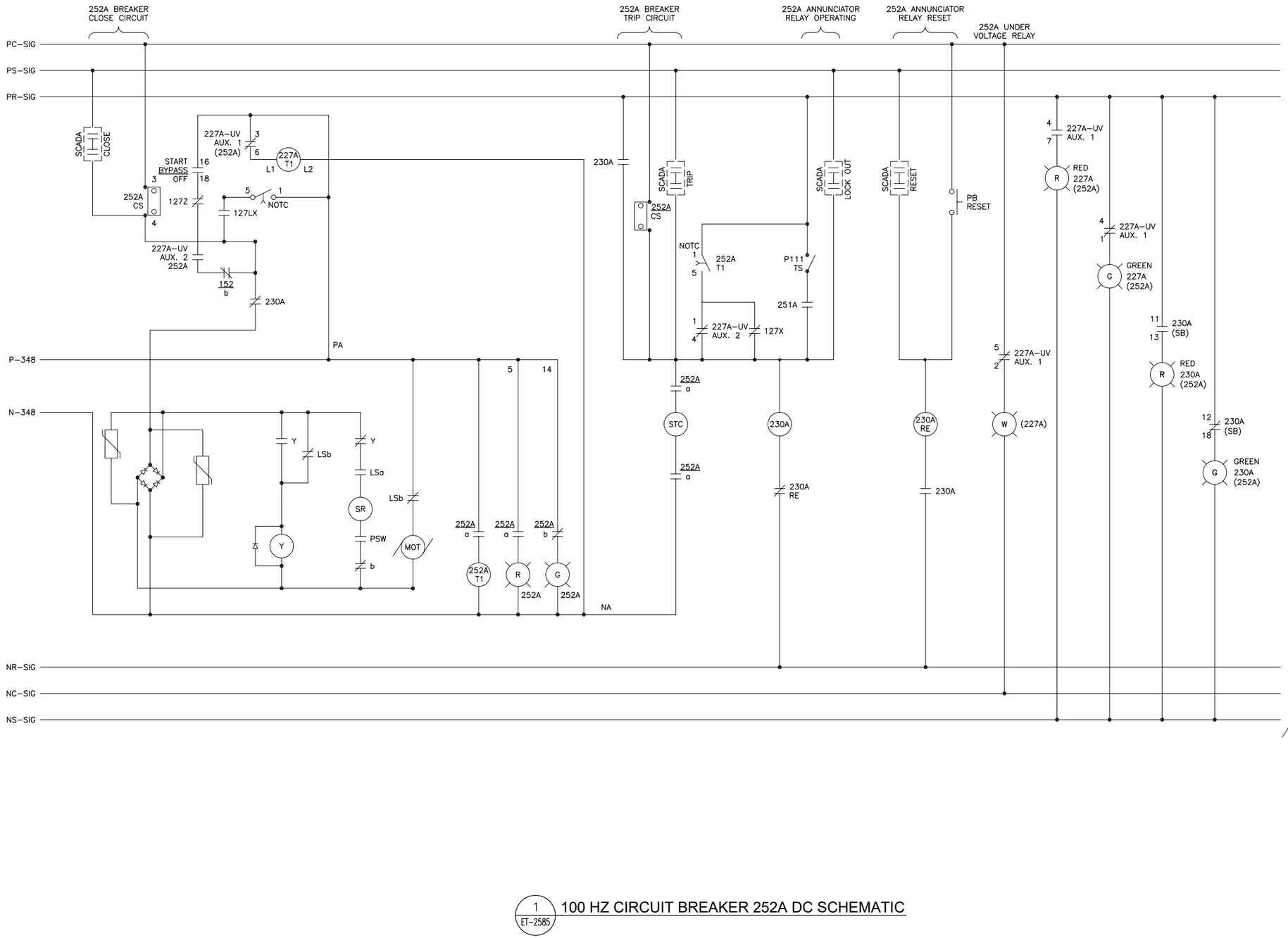
PAOLI SUBSTATION – SIGNAL POWER HOUSE SCADA CONTROL STATUS & ALARM POINTS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-2383.DWG
Ref. No.:	2011–059
Sheet No:	422 OF 565

ET–2383

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1 / ET–2585 100 HZ CIRCUIT BREAKER 252A DC SCHEMATIC

LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	RELAY POSITIVE DC SUPPLY BUS
NR	RELAY NEGATIVE DC SUPPLY BUS
PC	CONTROL POSITIVE DC SUPPLY BUS
NC	CONTROL NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	SCADA POSITIVE DC SUPPLY BUS
NS	SCADA NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT
W	WHITE INDICATION LIGHT

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

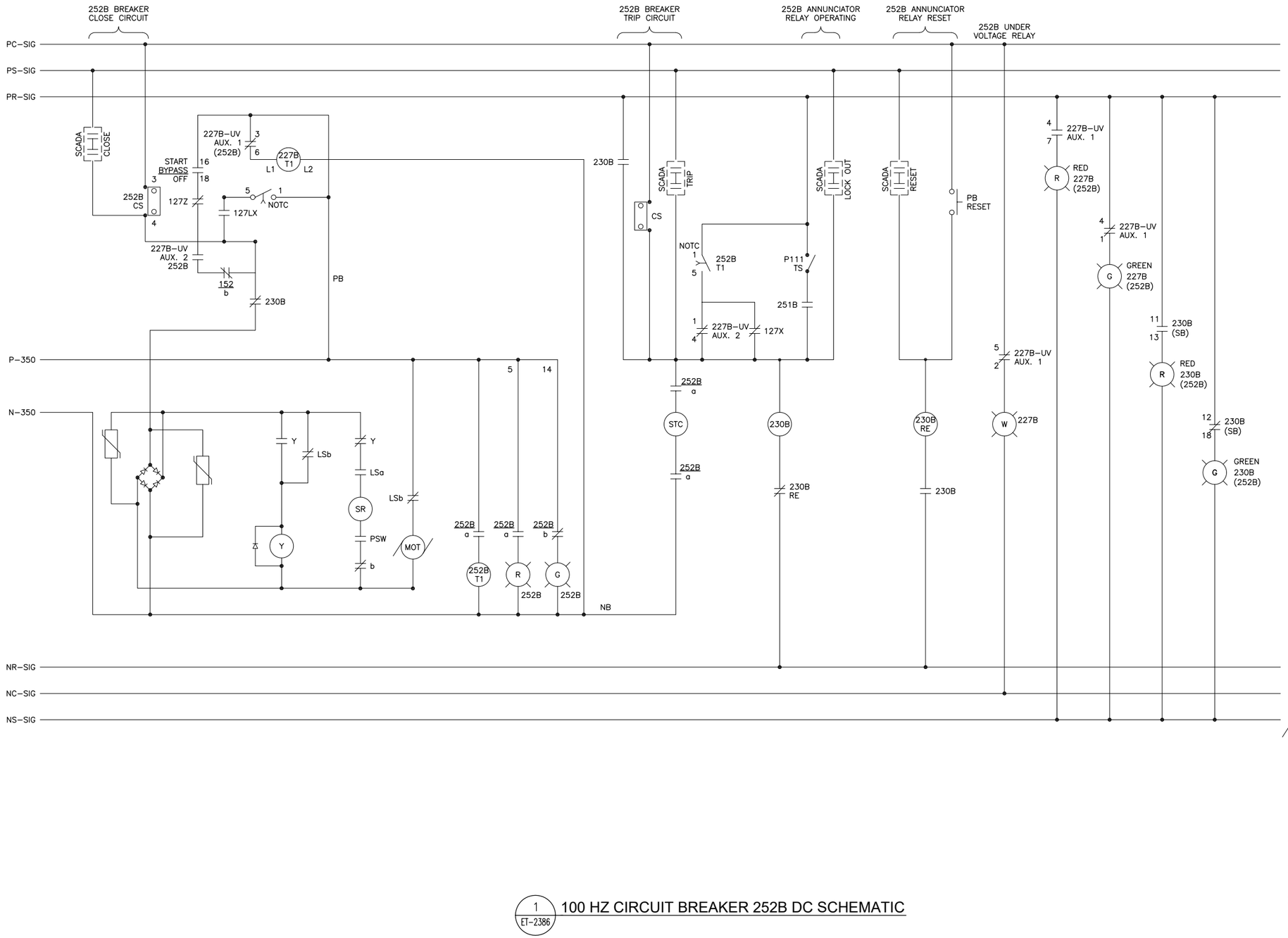
PAOLI SUBSTATION – SIGNAL POWER HOUSE
CIRCUIT BREAKER 252A DC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–2385.DWG
Ref. No.:	2011–059
Sheet No:	423 OF 565

ET–2385

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1 / ET–2386 100 HZ CIRCUIT BREAKER 252B DC SCHEMATIC

LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	RELAY POSITIVE DC SUPPLY BUS
NR	RELAY NEGATIVE DC SUPPLY BUS
PC	CONTROL POSITIVE DC SUPPLY BUS
NC	CONTROL NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	SCADA POSITIVE DC SUPPLY BUS
NS	SCADA NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT
W	WHITE INDICATION LIGHT

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AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

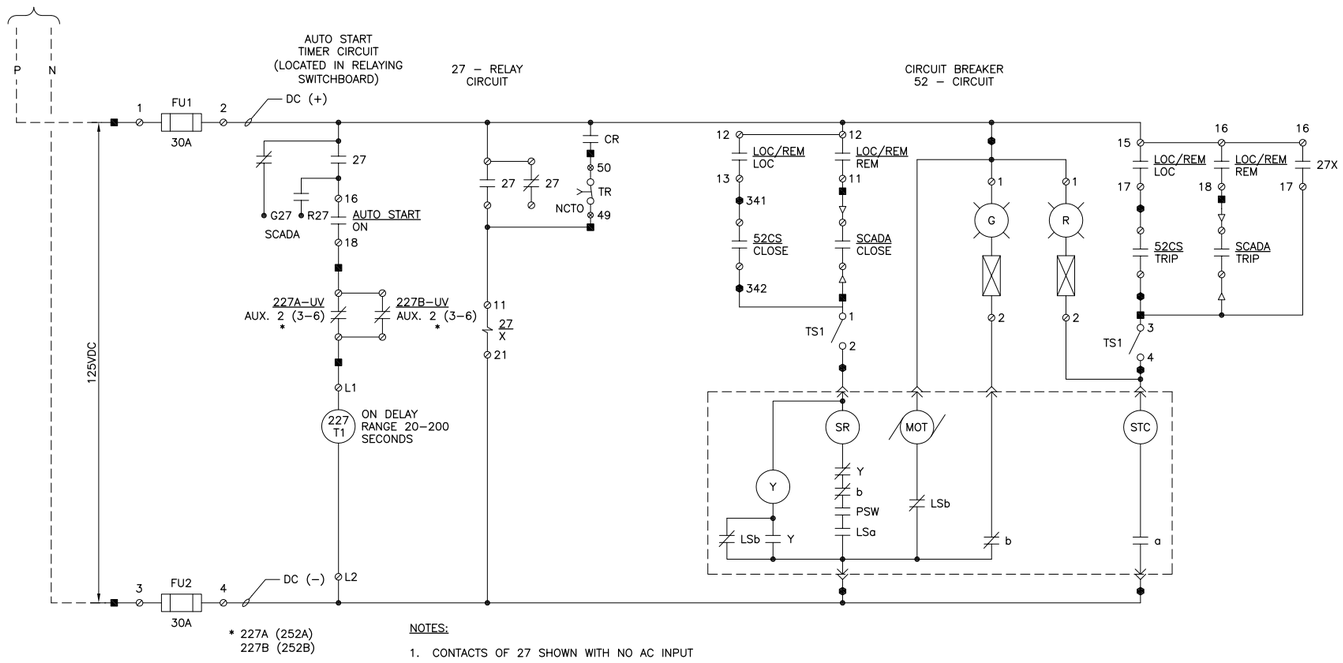
PAOLI SUBSTATION – SIGNAL POWER HOUSE CIRCUIT BREAKER 252B DC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–2386.DWG
Ref. No.:	2011–059
Sheet No:	424 OF 565

ET–2386

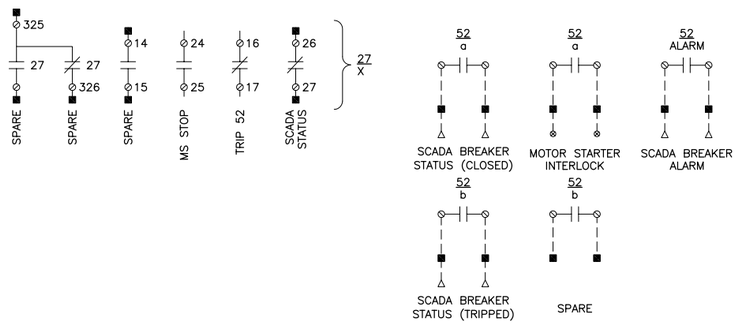
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* 227A (252A)
227B (252B)

NOTES:

1. CONTACTS OF 27 SHOWN WITH NO AC INPUT



LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

1 / ET–2387 60 HZ CIRCUIT BREAKER 52 DC SCHEMATIC

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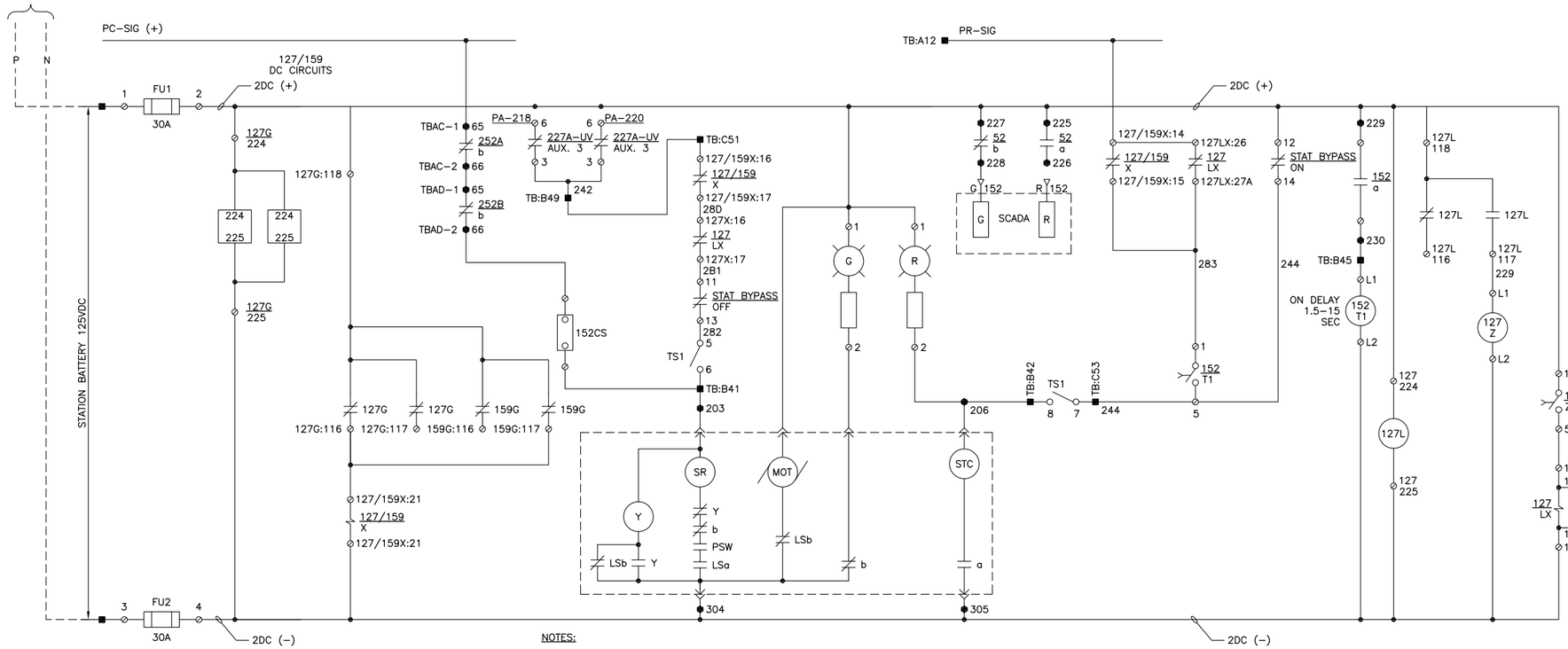
PAOLI SUBSTATION – SIGNAL POWER HOUSE CIRCUIT BREAKER 52A DC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–2387.DWG
Ref. No.:	2011–059
Sheet No:	425 OF 565

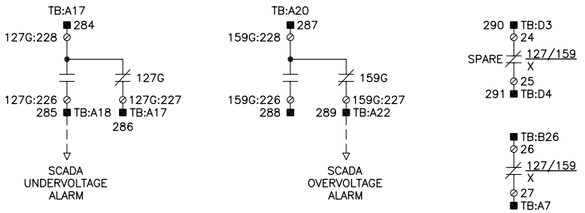
ET–2387

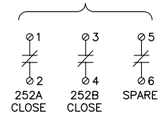
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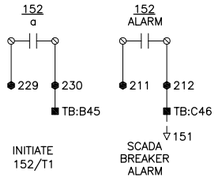


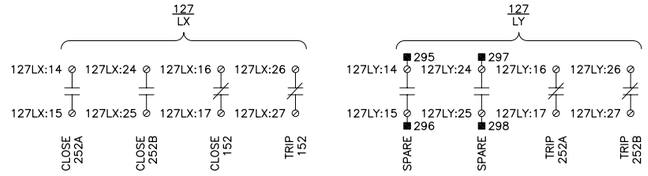
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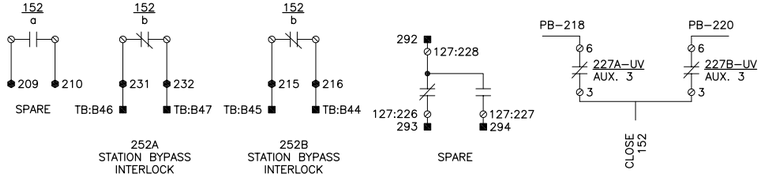
1. CONTACTS OF 27 SHOWN WITH NO AC INPUT











LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

1 / ET–2388 100 HZ CIRCUIT BREAKER, 152 DC SCHEMATIC

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION – SIGNAL POWER HOUSE
100 HZ CIRCUIT BREAKER, 152 DC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

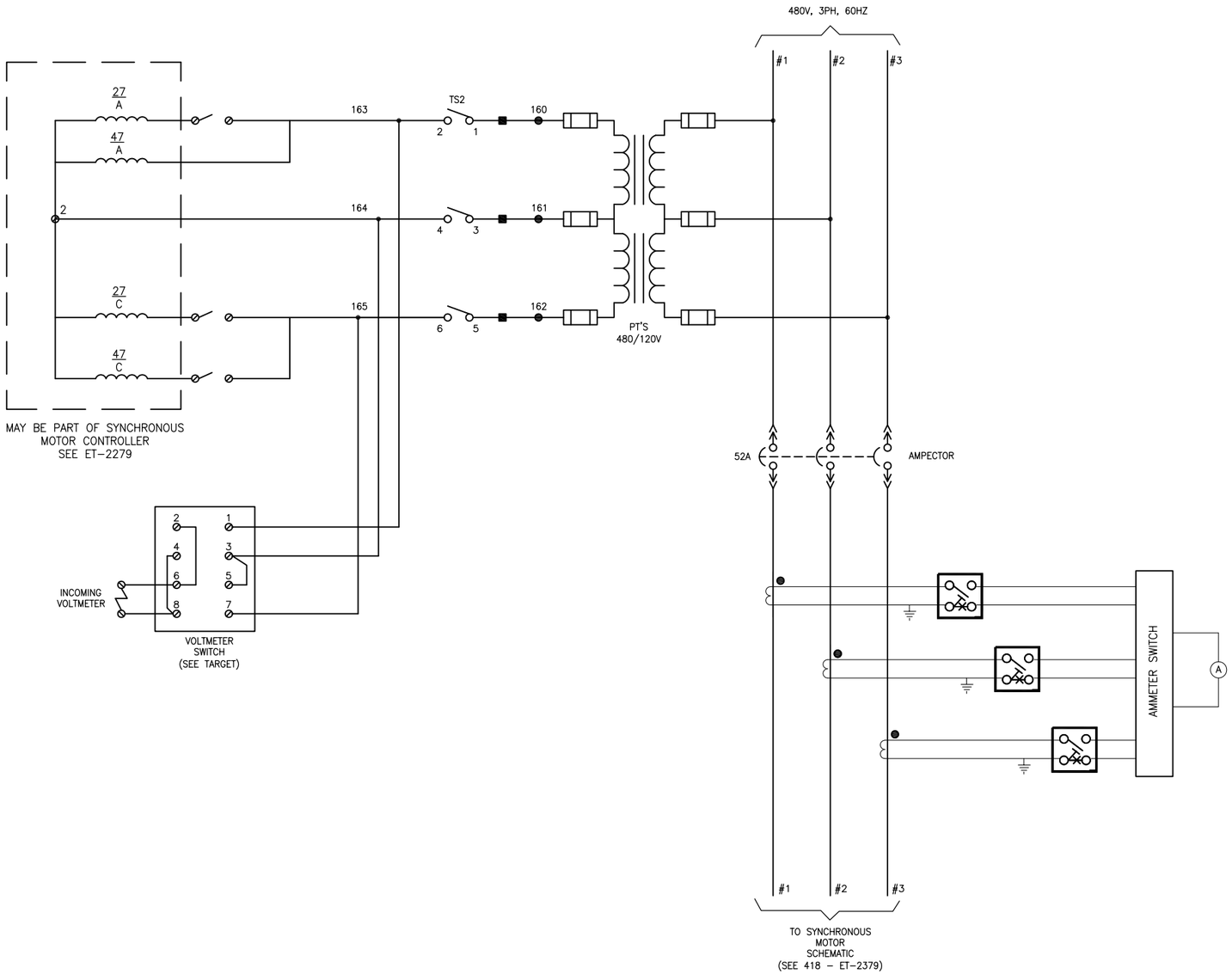
File No.:	2011–059–ET–2388.DWG
Ref. No.:	2011–059
Sheet No:	426 OF 565

ET–2388

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



2:21:09 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2389.dwg

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI SUBSTATION – SIGNAL POWER HOUSE MG SYSTEM THREE LINE DIAGRAM

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

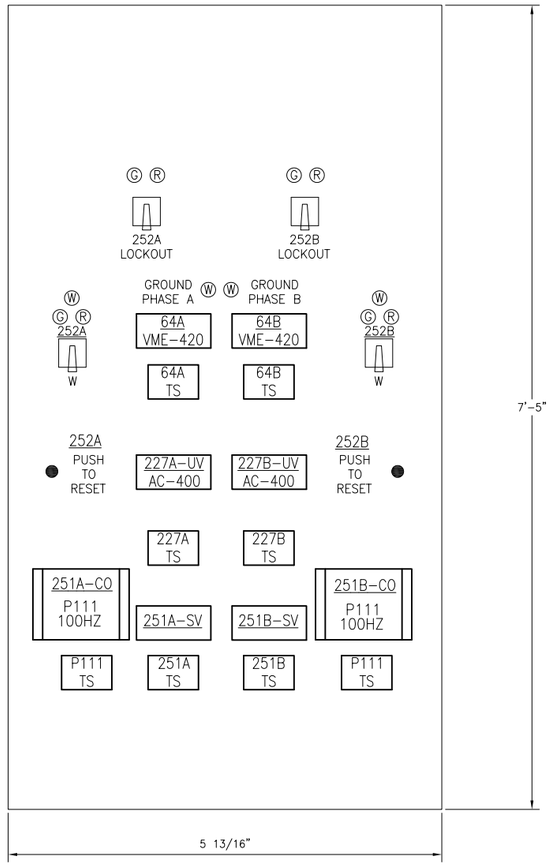
File No.:	2011-059-ET-2389.DWG
Ref. No.:	2011–059
Sheet No:	427 OF 565

ET–2389

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.

RELAY AND CONTROL PANEL 10
(SIGNAL PANEL)



1 / ET–2391 100HZ SIGNAL CONTROL PANEL

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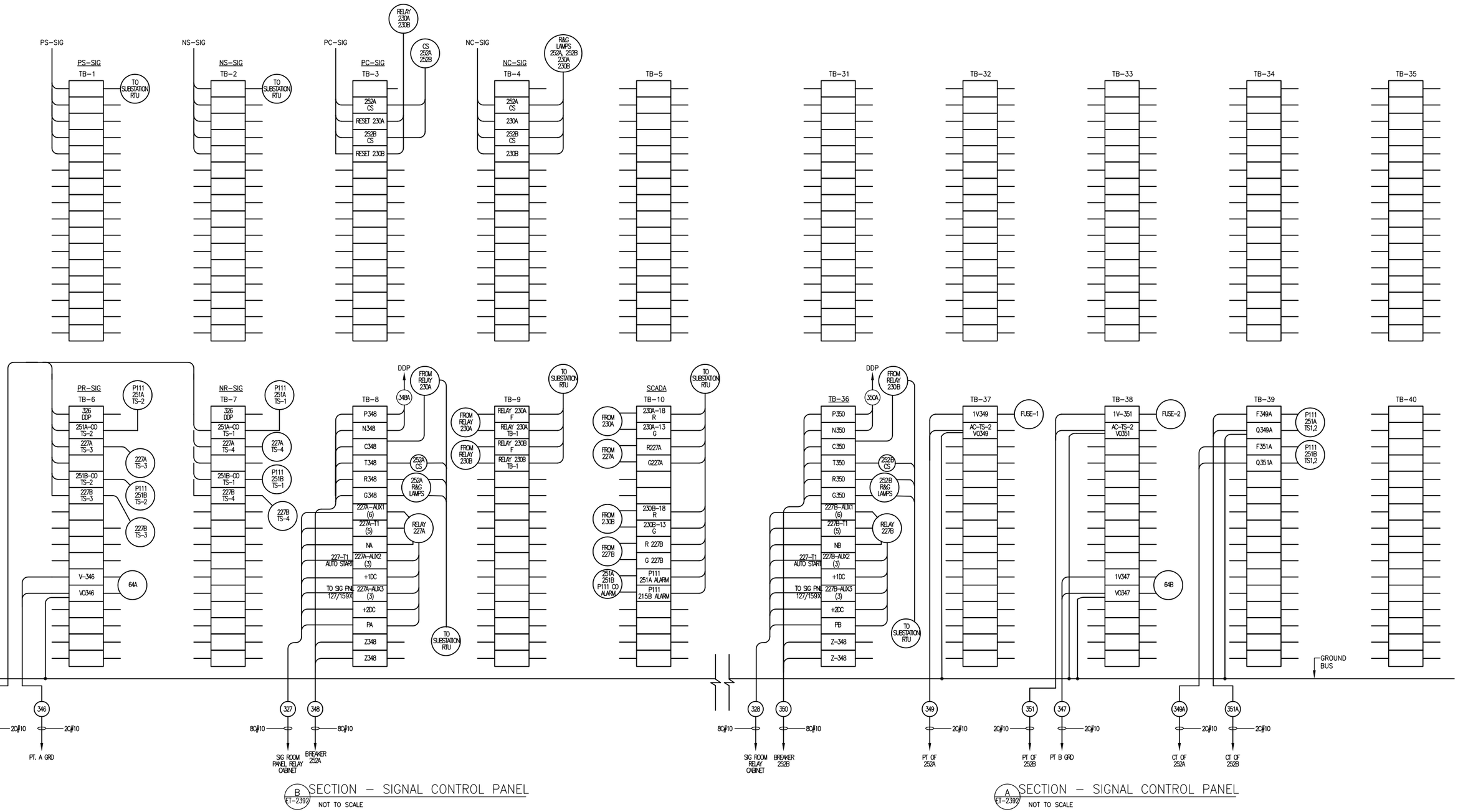
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION – CONTROL HOUSE
100HZ SIGNAL CONTROL PANEL (SHEET 1 OF 3)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2391.DWG
Ref. No.:	2011–059
Sheet No:	428 OF 565

ET–2391

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B ET-2392 SECTION – SIGNAL CONTROL PANEL
NOT TO SCALE

A ET-2392 SECTION – SIGNAL CONTROL PANEL
NOT TO SCALE

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PHILADELPHIA, PA 19103

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – CONTROL HOUSE
100HZ SIGNAL CONTROL PANEL (SHEET 2 OF 3)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2392.DWG
Ref. No.:	2011-059
Sheet No:	429 OF 565

ET–2392

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277A–T1
L1 – 227A UV AUX. 1 (3)
L2 – NA
1 – PA
5 – CP#10, TB8–8

252A–T1
L1 – 252A/a CONTACT
L2 – NA
1 – PR–SIG
5 – 252A–T1 (1)

AUX1 AUX3
1 – G227A 1 –
2 – W227A 2 –
3 – 227A–T1 3 –127/159X
4 – PR–SIG 4 –
5 – PC–SIG 5 –
6 – PA 6 – +2DC
7 – R277A 7 –

AUX2
1 – 252AT1–(5)
3 – 227–T1
4 – TRIP 252A
5 – 127/L Z
6 – +1DC
8 – 152 b

277B–T1
L1 – 227B UV AUX. 1 (3)
L2 – NB
1 PR–SIG
5 CP#10, TB36–8

252B–T1
L1 – 252B/a CONTACT
L2 – NB
1 PR–SIG
5 252B–T1 (1)

AUX1 AUX3
1 – G227B 1 –
2 – W227 2 –
3 – 227B–T1 3 – 127/159X
4 – PR–SIG 4 –
5 – PC–SIG 5 –
6 – PB 6 – +2DC
7 – R277B 7 –

AUX2
1 – 252B T1–(5)
3 – 227T1
4 – TRIP 252(B)
5 – 127/L Z
6 – +1DC
8 – 152 b

227A–T1: 227A UV AUX 1 (3) L1 L2 NA; PA 1 5 TB8–8
252A–T1: 252A a L1 L2 NA; PR–SIG 1 5 227A–UV AUX2(1)
227B–T1: 227B UV AUX 1 (3) L1 L2 NB; PB 1 5 T36–8
252B–T1: 252B a L1 L2 NB; PR–SIG 1 5 252B–T1

W227A W NC–SIG TB4–
227A–UV AUX 1: G227A 1 2 3 227A–T1; PR–SIG 4 5 PC SIG 6 PA; R227A 7 8 9; A B
227A–UV AUX 2: 252A–T1 (5) 1 2 3; TRIP 252A 4 127L Z 5 6; 7 152 b 8 9; A B; 227–T1 INITIATE AUTO START +1DC
227A–UV AUX 3: 1 2 3; 4 5 6 PA; 7 8 9; A B; 127/159X

W227B W NC–SIG TB4–
227B–UV AUX 1: G227B 1 2 3 227B–T1; PR–SIG 4 5 PC SIG 6 PB; R227B 7 8 9; A B
227B–UV AUX 2: 252B–T1 (5) 1 2 3; TRIP 252B 4 127L Z 5 6; 7 152 b 8 9; A B; 227–T1 INITIATE AUTO START +1DC
227B–UV AUX 3: 1 2 3; 4 5 6; 7 8 9; A B; 127/159X

227A–UV: XU2–AC–400 100HZ VOLTAGE RELAY; 12 11 14; A1 A3; PR–SIG; N L1; NR–SIG
277A–UV TS: NR–SIG, TB7–3; PR–SIG, TB6–3; 1V349; V0349
64A VME–420: 12 11 14; 12 11 14; V1/+ V2/– A1 A2; 1V0346; 2PR–SIG 2NR–SIG 2PR1–SIG 2NR1–SIG; 64A TS; GROUND PHASE A; GROUND PHASE A SCADA
2V346 1V346 1PR–SIG 1NR–SIG; TB6–11 1V346; TB6–12 V0346; NR–SIG; PR–SIG

227B–UV: XU2–AC–400 100HZ VOLTAGE RELAY; 12 11 14; A1 A3; PR–SIG; N L1; NR–SIG
277B–UV TS: NR–SIG, TB7–6; PR–SIG, TB6–6; 1V351; V0351
64B VME–420: 12 11 14; 12 11 14; V1/+ V2/– A1 A2; 1V0347; 2PR–SIG 2NR–SIG 2PR1–SIG 2NR1–SIG; 64B TS; GROUND PHASE B; GROUND PHASE B SCADA
2V347 1V347 1PR–SIG 1NR–SIG; TB37–11 1V347; TB37–12 V0347

NC–SIG TB4–2; PR–SIG; R; G; 11 12 15 16 21; 13 18 17 14 23; TB10–2; TB10–1; 230A F H TB1 TB2 TB3; PC–SIG TB3–3; PB; TB9–1, LO–230A; NR–SIG; TB9–2, RESET–230A; PR–SIG; RESET 230A

NC–SIG TB4–4; PR–SIG; R; G; 11 12 15 16 21; 13 18 17 14 23; TB10–8; TB10–7; 230B F H TB1 TB2 TB3; PC–SIG TB5–5; PB; TB9–3,LO–230B; NR–SIG; TB9–4,RESET–230B; PR–SIG; RESET 230B

NC–SIG TB4–2; PC–SIG TB3–2; R; G; 252A CS; L/O RELAY 230A; 4 3 T348 6 5 R348 8 7 G348 10 9; TB8–4,5,6

NC–SIG TB4–4; PC–SIG TB3–4; R; G; 252B CS; L/O RELAY 230B; 4 3 T350 6 5 R350 8 7 G350 10 9; TB36–4,5,6

2F249A
251A–CO (P111)
252A ALARM
(SCADA) TB10–11
L/O RELAY–F
PR–SIG; C2; LO 252A; C1; A1–A2
PR–SIG; NR–SIG; 1F249A
1F249A; 251A–CO TS; NR–SIG TB7–2; PR–SIG TB6–2; F249A C249A; R&C PNL#10 TB39–1,2
251A–SV; 3F249A; 251A–SV TS; 1V–249; VO–249

2F351A
251B–CO (P111)
252B ALARM
(SCADA) TB10–12
L/O RELAY–F
PR–SIG; C2; LO 252B; C1; A1–A2
PR–SIG; NR–SIG; 1F351A
1F351A; 251B–CO TS; NR–SIG TB7–5; TR–SIG TB6–5; F351A C351A; R&C PNL #10 TB39–3,4
251B–SV; 3F351A; 251B–SV TS; 1V–351; VO–351

NOTE:
1. AUXILIARY RELAYS AND TIMERS TO BE RAIL MOUNTED ON REAR OF SIGNAL CONTROL PANEL (R&C#10)

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IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION – CONTROL HOUSE
100HZ SIGNAL CONTROL PANEL (SHEET 3 OF 3)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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CONDUCTORS			CONDUIT		FROM	TO	DESCRIPTION	ROUTE	LENGTH (FT.)	
CABLE NO.	SIZE	OPERATING VOLTAGE	NO.	SIZE & MATERIAL					CABLE	COND.
301	(1)-2C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #1	MOD 21	MOD 21 DC POWER	TRAY/TROUGH/CONDUIT	335	–
302	(1)-8C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #4	MOD 21	MOD 21 CONTROL	TRAY/TROUGH/CONDUIT	335	–
305	(1)-2C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #2	MOD 104	MOD 104 DC POWER	TRAY/TROUGH/CONDUIT	365	–
306	(1)-6C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #3	MOD 104	MOD 104 CONTROL	TRAY/TROUGH/CONDUIT	365	–
307	(1)-6C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #3	MOD 104G	MOD 1BMG CONTROL	TRAY/TROUGH/CONDUIT	365	–
308	(1)-8C-#10	125VDC	1	2" RGS	MOD 104	MOD 104G	LINE-GROUND INTERLOCK	CONDUIT	30	30
310	(1)-2C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #2	MOD 204	MOD 204 DC POWER	TRAY/TROUGH/CONDUIT	305	–
311	(1)-6C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #4	MOD 204	MOD 204 CONTROL	TRAY/TROUGH/CONDUIT	305	–
312	(1)-6C-#10	125VDC	1	TRAY	RELAY&CONTROL PANEL #4	MOD 204G	MOD 204G CONTROL	TRAY/TROUGH/CONDUIT	305	–
313	(1)-8C-#10	125VDC	1	2" RGS	MOD 204	MOD 204G	LINE-GROUND INTERLOCK	CONDUIT	30	30
319	(2)-8C-#10	125VDC	1	2" RGS	RELAY&CONTROL PANEL #3	TOWER		CONDUIT	200	
320	(1)-3C-#10	120VAC	1	1" RGS	ADP	AC TERMINAL CABINET CT-1	MOD 21 HEATER	CONDUIT/TROUGH	50	30
321	(1)-3C-#10	120VAC	1	1" RGS	AC TERMINAL CABINET	MOD 21	MOD 21 HEATER	CONDUIT/TROUGH	150	–
322	(1)-3C-#10	120VAC	1	1" RGS	ADP	AC TERMINAL CABINET CT-1	MOD 104/104G HEATER	CONDUIT/TROUGH	50	30
323	(1)-3C-#10	120VAC	1	1" RGS	AC TERMINAL CABINET	MOD 104/104G	MOD 104/104G HEATER	CONDUIT/TROUGH	150	–
324	(1)-3C-#10	120VAC	1	1" RGS	ADP	AC TERMINAL CABINET CT-1	MOD 204/204G HEATER	CONDUIT/TROUGH	50	30
325	(1)-3C-#10	120VAC	1	1" RGS	AC TERMINAL CABINET	MOD 204/204G	MOD 204/204G HEATER	CONDUIT/TROUGH	150	–
326	(1)-2C-#10	125VDC			DDP(PR-SIG, NR-SIG)	SIGNAL HOUSE MG RELAY CABINET	125VDC SIGNAL RELAY BUS	TRAY/TROUGH/CONDUIT	150	
327	(1)-8C-#10	125VDC			SIGNAL CONTROL PANEL (R&C#10)	SIGNAL HOUSE MG RELAY CABINET	227A-UV	TRAY/TROUGH/CONDUIT	180	
328	(1)-8C-#10	125VDC			SIGNAL CONTROL PANEL (R&C#10)	SIGNAL HOUSE MG RELAY CABINET	227B-UV	TRAY/TROUGH/CONDUIT	180	
335	(1)-31C-#14	125VDC			SIGNAL CONTROL PANEL (R&C#10)	SUBSTATION RTU	STATUS-CONTROL-ALARM	TRAY	50	
336	(1)-31C-#14	125VDC			SIGNAL HOUSE MG ROOM	SUBSTATION RTU	STATUS-CONTROL-ALARM	TROUGH	180	
337	(1)-31C-#14	125VDC			SIGNAL HOUSE MG ROOM	SUBSTATION RTU	STATUS-CONTROL-ALARM	TROUGH	180	
340	(1)-2C-#10	125VDC			R&C PANEL #2	DDP	POWER SUPPLY	CONDUIT	80	80
346	(1)-2C-#10	120VAC			PT.A. GRD	SIGNAL CONTROL PANEL (R&C#10)	100HZ PHASE A GRD DETECTION	TRAY/TROUGH	250	
347	(1)-2C-#10	120VAC			PT.B. GRD	SIGNAL CONTROL PANEL (R&C#10)	100HZ PHASE A GRD DETECTION	TRAY/TROUGH	250	
348	(1)-8C-#10	125VDC			252A CBK	SIGNAL CONTROL PANEL (R&C#10)	252A CONTROL	TRAY/TROUGH/CONDUIT	280	
348A	(1)-2C-#10	125VDC			252A CBK	DDP (252A)	252A DC POWER	TRAY/TROUGH/CONDUIT	280	
349	(1)-2C-#10	120VAC			252A LINE PT	SIGNAL CONTROL PANEL (R&C#10)	252A PT CABLE	TRAY/TROUGH/CONDUIT	300	
349A	(1)-2C-#10	120VAC			252A LINE CT	SIGNAL CONTROL PANEL (R&C#10)	252A CT CABLE	TRAY/TROUGH/CONDUIT	300	
350	(1)-8C-#10	125VDC			252B CBK	SIGNAL CONTROL PANEL (R&C#10)	252B CONTROL	TRAY/TROUGH/CONDUIT	280	
350A	(1)-2C-#10	125VDC			252B CBK	DDP (252B)	252B DC POWER	TRAY/TROUGH/CONDUIT	280	
351	(1)-2C-#10	120VAC			252B LINE PT	SIGNAL CONTROL PANEL (R&C#10)	252B LINE PT CABLE	TROUGH	300	
351A	(1)-2C-#10	120VAC			252B LINE CT	SIGNAL CONTROL PANEL (R&C#10)	252B LINE CT CABLE	TROUGH	300	

CONDUCTORS			CONDUIT		FROM	TO	DESCRIPTION	ROUTE	LENGTH (FT.)	
CABLE NO.	SIZE	OPERATING VOLTAGE	NO.	SIZE & MATERIAL					CABLE	COND.
352	(1)-2C-#10	120VAC			SIGNAL HOUSE MG ROOM	SIGNAL CONTROL PANEL (R&C#10)	100HZ VOLTAGE METERING	TROUGH	150	
352A	(1)-2C-#10	120VAC			SIGNAL HOUSE MG ROOM	SIGNAL CONTROL PANEL (R&C#10)	100HZ CURRENT METERING	TROUGH	150	
353	(1)-2C-#10	125VDC			DDP(152-8)	SIGNAL HOUSE MG ROOM	125VDC POWER	TROUGH	150	
353A	(1)-2C-#10	125VDC			DDP(52)	SIGNAL HOUSE MG ROOM	125VDC POWER	TROUGH	150	
354	(1)-3C-#10	120VAC			252A CBK	AC TERMINAL CABINET CT-1	AUXILARY POWER	TROUGH	150	
355	(1)-3C-#10	120VAC			ADP	AC TERMINAL CABINET CT-1	AUXILARY POWER	TROUGH	50	
356	(1)-2C-#10					252A BF DISC	INTERLOCK	TROUGH	50	
357	(1)3C-#10	120VAC			252B CBK	AC TERMINAL CABINET CT-1	AUXILARY POWER	TROUGH	150	
358	(1)-3C-#10	120VAC			ADP	AC TERMINAL CABINET CT-1	AUXILARY POWER	TROUGH	50	
359	(1)-2C-#10					252B BF DISC	INTERLOCK	TROUGH	50	

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. FOR PROPOSED MAIN WIRING DIAGRAM SEE DRAWING ET-2302.

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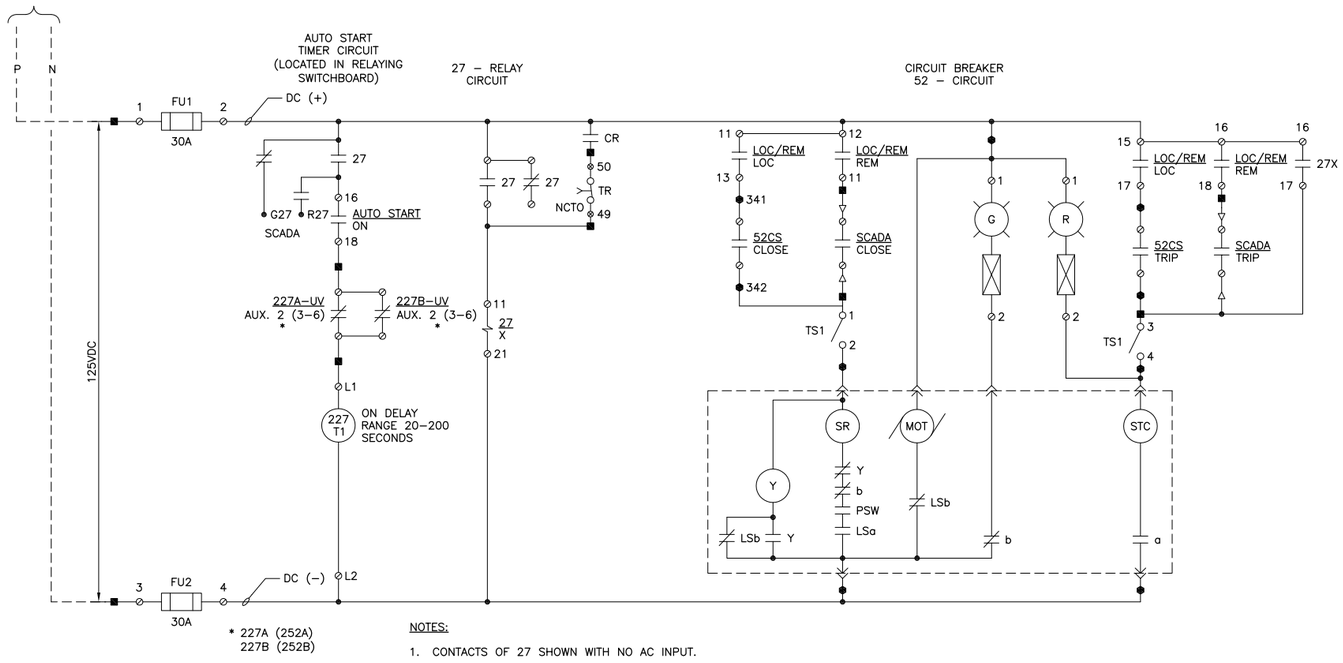
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI SUBSTATION
CONDUIT & CABLE SCHEDULE

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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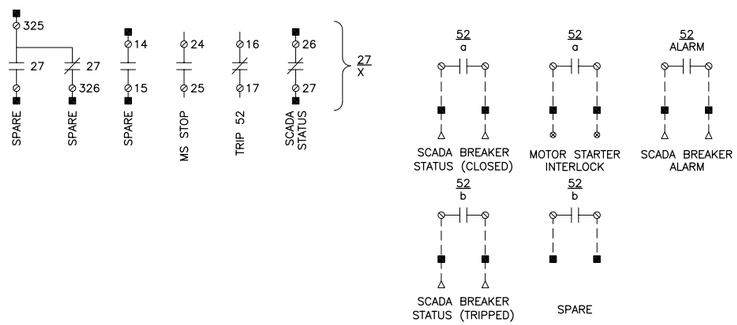
ET-2398

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NOTES:

1. CONTACTS OF 27 SHOWN WITH NO AC INPUT.



1 / ET–2512 60 HZ CIRCUIT BREAKER 52 CONTROL SCHEMATIC

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.

LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TYPICAL SUBSTATION SCHEMATICS

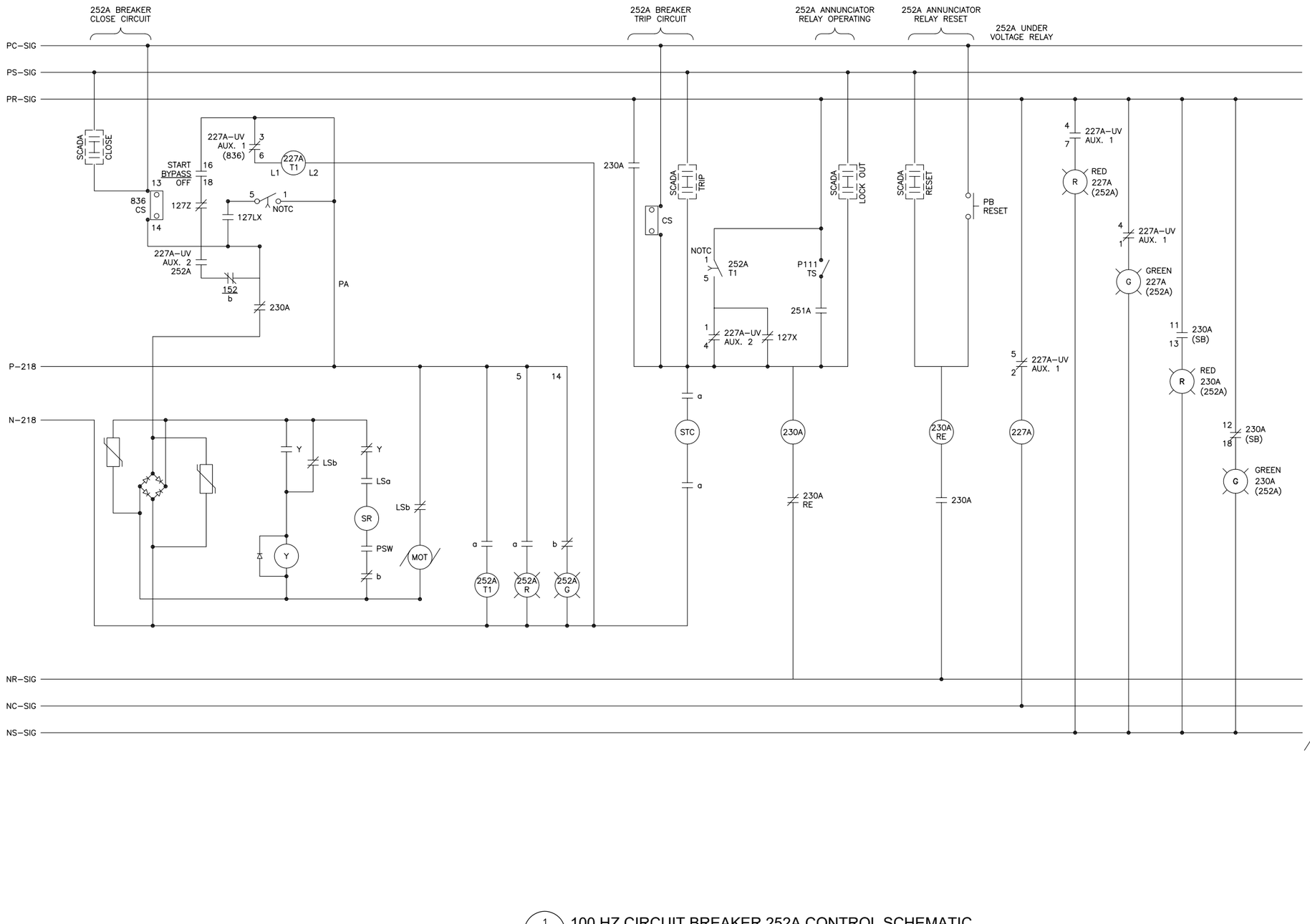
60 HZ CIRCUIT BREAKER 52 CONTROL SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2512.DWG
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ET–2512

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LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
⊘	DEVICE TERMINAL
⊗	MOTOR STARTER TERMINAL
✪	CIRCUIT BREAKER TERMINAL
⬢	SWITCHGEAR SECTION TERMINAL (INTERNAL)
△	SCADA INTERFACE TERMINAL
■	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

1 / ET–2515 — 100 HZ CIRCUIT BREAKER 252A CONTROL SCHEMATIC

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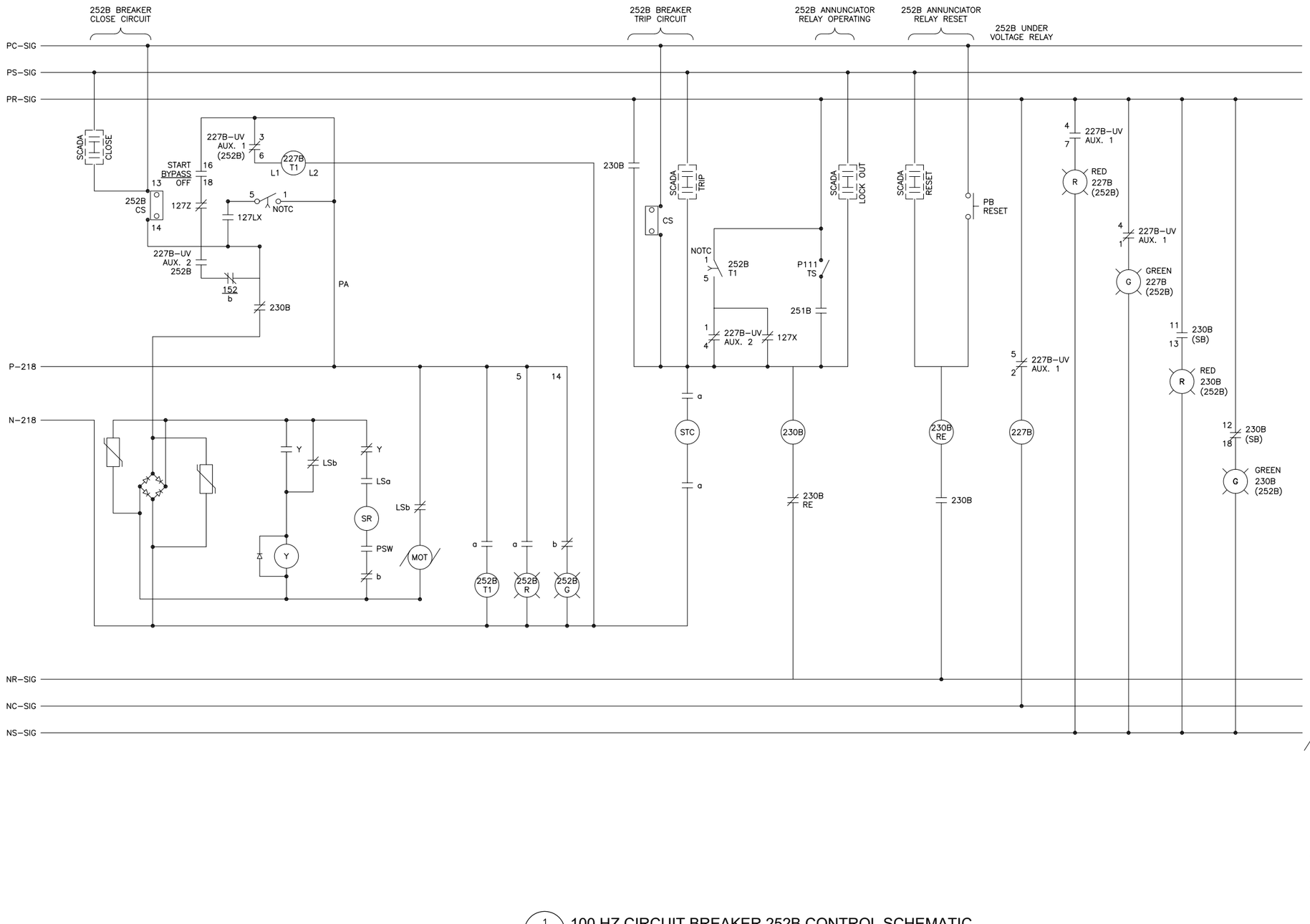
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TYPICAL SUBSTATION SCHEMATICS
100 HZ CIRCUIT BREAKER 252A CONTROL SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125 VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME–1
b	BREAKER 'b' CONTACT (CLOSED CONTACT WHEN BREAKER OPEN)
a	BREAKER 'a' CONTACT (CLOSED CONTACT WHEN BREAKER CLOSED)
	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI–PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

1 / ET–2515 100 HZ CIRCUIT BREAKER 252B CONTROL SCHEMATIC

100% DESIGN SUBMISSION

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No	Revisions	Date	By

AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TYPICAL SUBSTATION SCHEMATICS
100 HZ CIRCUIT BREAKER 252B CONTROL SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

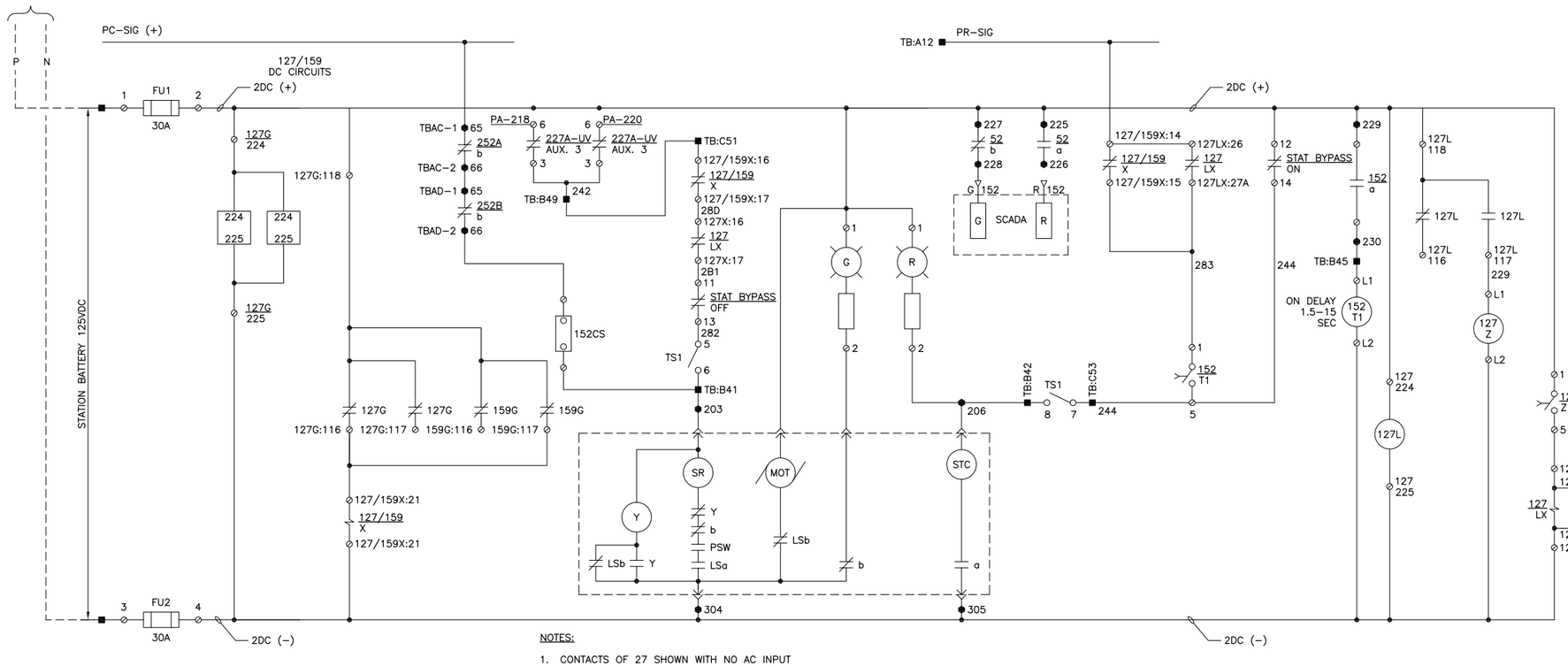
File No.:	2011–059–ET–2516.DWG
Ref. No.:	2011–059
Sheet No:	434 OF 565

ET–2516

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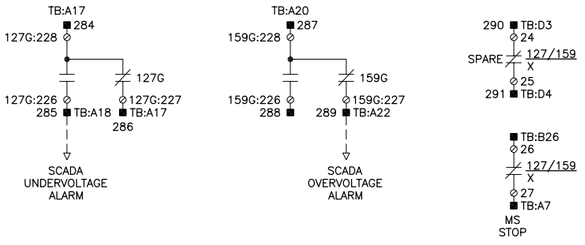
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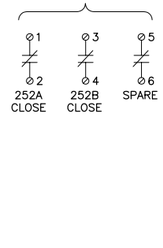
1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.

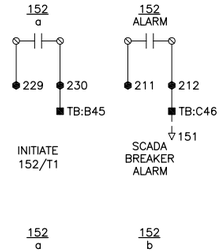


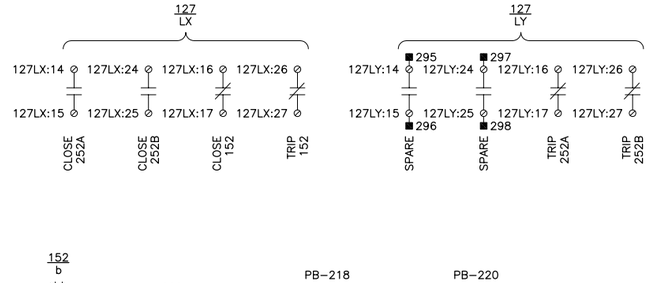
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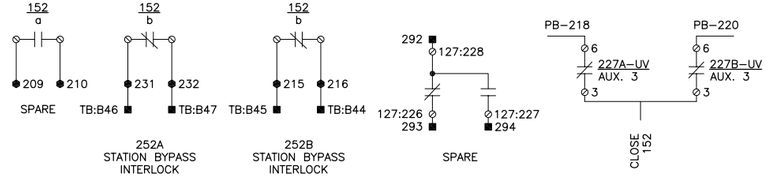
1. CONTACTS OF 27 SHOWN WITH NO AC INPUT











LEGEND

CR	MOTOR STATUS (ON)
CS	CONTROL SWITCH
LOC	LOCAL
REM	REMOTE
SR	SCADA REMOTE
TS	TEST SWITCH
PSW	BREAKER POSITION SWITCH
LSa	BREAKER LIMIT SWITCH, (N.O.) PERMISSIVE CLOSE
LSb	BREAKER LIMIT SWITCH, (N.C.) MOTOR CUT OFF SWITCH
PX, XF, XT	SUPV. CLOSE INTERLOCK W/BUS LOCKOUT, 125VDC POSITIVE SUPPLY
PR	SCADA POSITIVE DC SUPPLY BUS
NR	SCADA NEGATIVE DC SUPPLY BUS
PC	RELAY POSITIVE DC SUPPLY BUS
NC	RELAY NEGATIVE DC SUPPLY BUS
SB	TYPE SB LOCKOUT RELAY
HFA	TYPE HFA AUXILIARY RELAY
PS	CONTROL POSITIVE DC SUPPLY BUS
NS	CONTROL NEGATIVE DC SUPPLY BUS
27	UNDERVOLTAGE RELAY
27X	AUXILIARY RELAY RXME-1
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	N.C. CONTACT
	N.O. CONTACT
	FUSE
	RESISTOR
	WIRING CONNECTION
	DEVICE TERMINAL
	MOTOR STARTER TERMINAL
	CIRCUIT BREAKER TERMINAL
	SWITCHGEAR SECTION TERMINAL (INTERNAL)
	SCADA INTERFACE TERMINAL
	SWITCHGEAR SECTION TERMINAL (OUTGOING)
MOT	BREAKER OPERATING MOTOR
SR	BREAKER CLOSING COIL (SPRING RELEASE)
Y	BREAKER ANTI-PUMPING RELAY
STC	BREAKER TRIP SOLENOID
R	RED INDICATION LIGHT
G	GREEN INDICATION LIGHT

1 ET-2517 100 HZ CIRCUIT BREAKER 152 CONTROL SCHEMATIC

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No	Revisions	Date	By

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OFFICE OF
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Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
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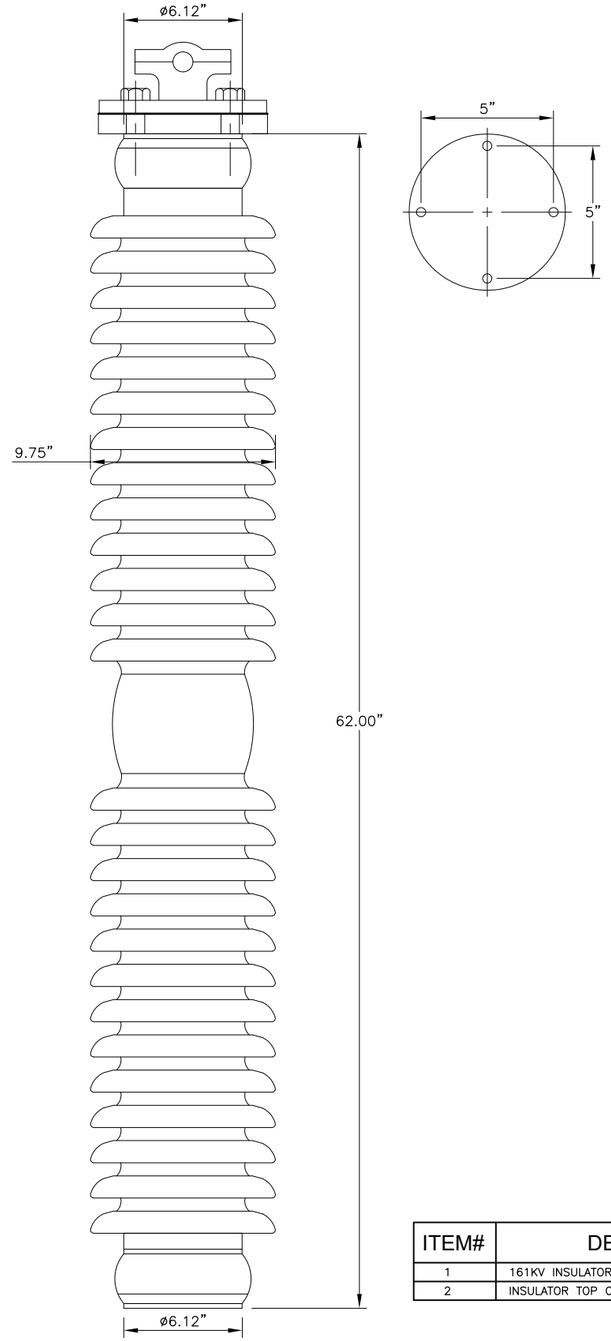
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TYPICAL SUBSTATION SCHEMATICS
100 HZ CIRCUIT BREAKER 152 CONTROL SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-2517.DWG
Ref. No.:	2011-059
Sheet No:	435 OF 565

ET-2517

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3/14/2016
2:21:59 PM



1 / ET-2606 161KV SUBSTATION POST INSULATOR

4' 2' 0 4'

SCALE:1/4"= 1'-0"

ITEM#	DESCRIPTION	MANUFACTURER
1	161KV INSULATOR 750KV BIL REF. TR291 #315291-PA-70	LAPP INSULATORS
2	INSULATOR TOP CLAMP BURNDY UHR15-5	BURNDY

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

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BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
SUBSTATION DETAILS
161KV SUBSTATION POST INSULATOR

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2606.DWG
Ref. No.:	2011-059
Sheet No:	436 OF 565

ET-2606

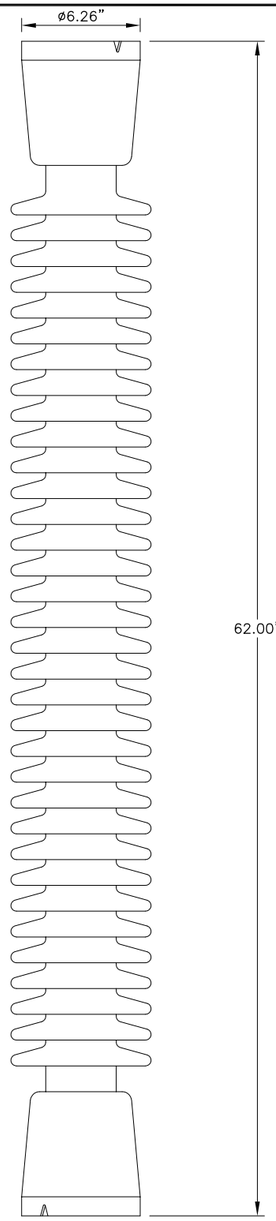
3/14/2016 2:22:07 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\substation\2011-059-ET-2606.dwg

CHARACTERISTICS	
ARRESTER RATING	18KV, RMS
ARRESTER MCOV	15.3KV, RMS
1.2/50µS IMPULSE WITHSTAND (BIL)	125KV, CREST
60HZ DRY 60 SEC WITHSTAND	42KV, RMS
60HZ WET 10 SEC WITHSTAND	36KV, RMS

1 ET-2607 **15KV LIGHTNING ARRESTER DETAILS**

4' 2' 0 4'

SCALE:1/4"= 1'-0"



CHARACTERISTICS	
ARRESTER RATING	103KV, RMS
ARRESTER MCOV	
CRITICAL IMPULSE FLASHOVER, POS.	810KV
LIGHTNING IMPUSLE WITHSTAND	750KV
LOW FREQUENCY WET WITHSTAND	315KV

2 ET-2607 **144KV LIGHTNING ARRESTER DETAILS**

4' 2' 0 4'

SCALE:1/4"= 1'-0"

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BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
SUBSTATION DETAILS
15KV AND 144KV LIGHTNING ARRESTER DETAILS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

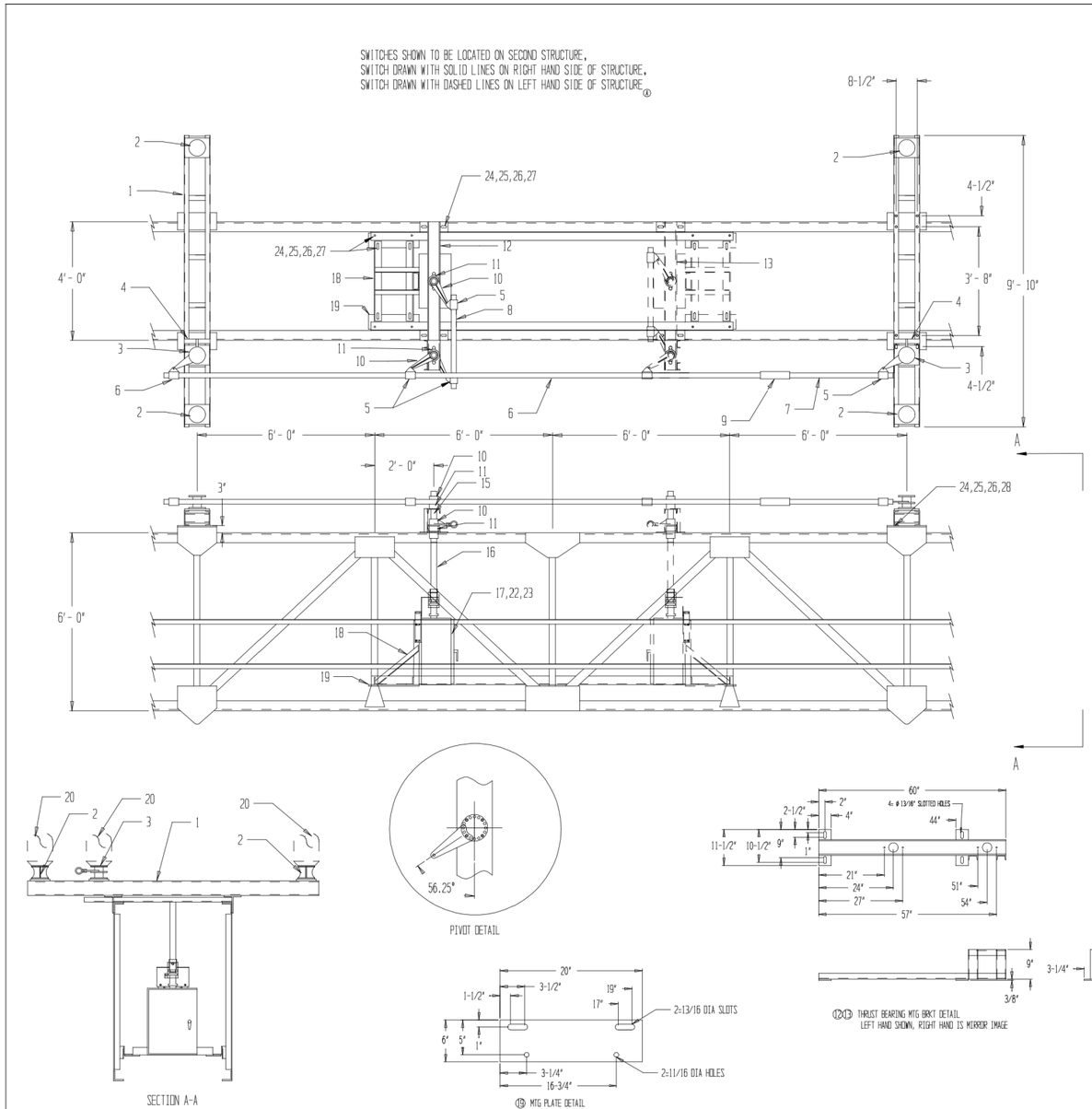
File No.:	2011-059-ET-2607.DWG
Ref. No.:	2011-059
Sheet No:	437 OF 565

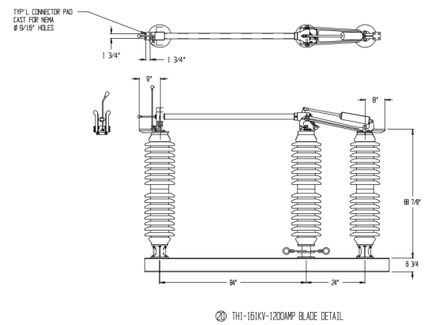
ET-2607

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NOTES:

1. 138KV DISCONNECT SWITCH AND MOTOR OPERATOR SHOWN IS PER APPROVED AMTRAK SUPPLIER TURNER ELECTRIC.
2. DETAILS ARE PROVIDED FOR INFORMATION ONLY.
3. ALL DIMENSIONS ARE IN INCHES UNLESS NOTED.
4. SUPPLIER AS INDICATED OR APPROVED EQUAL SHALL BE PROVIDED.
5. MODIFICATIONS REQUIRED AS NEEDED TO MATCH PROPOSED MOUNTINGS SHALL BE BY CONTRACTOR AND SHALL BE BE SUBMITTED AS SHOP DRAWINGS.





20 TH1-161KV-1200AMP BLADE DETAIL

				40	40		ALUM	30	MACHINE BOLTS 5/8"-11 X 2-1/4" (INSUL. BOLTS)
				8	8		GALV	29	MACHINE BOLTS 5/8"-11 X 1-1/2" (INSUL. BOLTS)
				16	16	0045724X	ALUM	28	WEDGEWASHER 5/8"
				12	12		GALV	27	FLATWASHER 5/8"
				28	28		GALV	26	LOCKWASHER 5/8"
				28	28		GALV	25	NUT 5/8"-11
				28	28		GALV	24	MACHINE BOLT 5/8" X 2"
				4	4		GALV	23	LOCKWASHER 1/2"
				4	4		GALV	22	MACHINE BOLT 1/2" X 1-1/2"
				2	2	A009519-:		21	BLADE ASSY 161KV 600AMP
				6	6			20	INSULATORS
				2	2	008327SXG	GALV	19	MTG PLATE
				1	1	016333SXG	GALV	18	OPERATOR MTG BRKT
				1	1	SF200-125YDC		17	MOTOR OPERATOR ASSY, NEMA 4X CABINET
				1	1	RM301390	GALV	16	OPERATOR PIPE 2" IPS SCH 80 @ 5'-0"
				1	1	RM301390	GALV	15	OPERATOR PIPE 2" IPS SCH 80 @ 2'-0"
				1	1	007976SXG	GALV	14	COLLAR
				1	-	008332RSXG	GALV	13	THRUST BEARING MTG BRKT RIGHT HAND
				-	1	008332LSXG	GALV	12	THRUST BEARING MTG BRKT LEFT HAND
				3	3	A9247		11	THRUST BEARING ASSY
				3	3	A9256	GALV	10	PIPE LEVER ASSY
				1	1	A5771	GALV	9	1-1/2" COUPLING
				1	1	RM301370	GALV	8	REACH ROD 1-1/2" IPS SCH 80 @ 3'-6"
				1	1	RM301370	GALV	7	REACH ROD 1-1/2" IPS SCH 80 @ 4'-0"
				1	1	RM301370	GALV	6	REACH ROD 1-1/2" IPS SCH 80 @ 21'-0"
				5	5	A9254	GALV	5	1-1/2" CLEVIS ASSY
				1	1	A9294	GALV	4	BLADE STOP
				2	2	A9245		3	PIVOT ASSY W/1 LEVER
				4	4	005735SIDXMGM	GALV	2	INSULATOR PEDESTAL
				2	2	008324SXE	GALV	1	SWITCH BASE
QUANTITY				PART			MATERIAL	ITEM	DESCRIPTION

TO: AMTRAK
NORTH ELIZABETH , NJ

CUSTOMER P.O.# S 07005775 — SERIAL NUMBER: 79546-1 THRU 7

REVISIONS	DATE	BY	MARK
ADDED STRUCTURE NOTE	9-3-91	LD	A
ITEM 17 WAS W7260XSU, ITEM 22-23 CHANGED FOR SF200	12-20-04	TEP	B
ITEM 18 WAS 8326, ADD BLADE DETAIL	12-20-04	TEP	B

161 KV — 1200 AMP

TH116112AMTR VERT'L BREAK SW.
HORIZ. MTD, CONTROL MECHANISM

DRAWING # SK910701 SHEET 1 OF 1

BY	DATE
LD	7-1-91
APP'D BY	DATE

TURNER ELECTRIC CORPORATION
FAIRVIEW HEIGHTS, IL., USA

1 / ET-2608 — 138KV DISCONNECT SWITCH AND MOTOR OPERATOR

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AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station—Philadelphia, Pennsylvania 19104

Approved	Date

Burns — BURNS ENGINEERING, INC. | 215 979-7700 | TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400 | PHILADELPHIA, PA 19103
IN ASSOCIATION WITH Baker AECOM

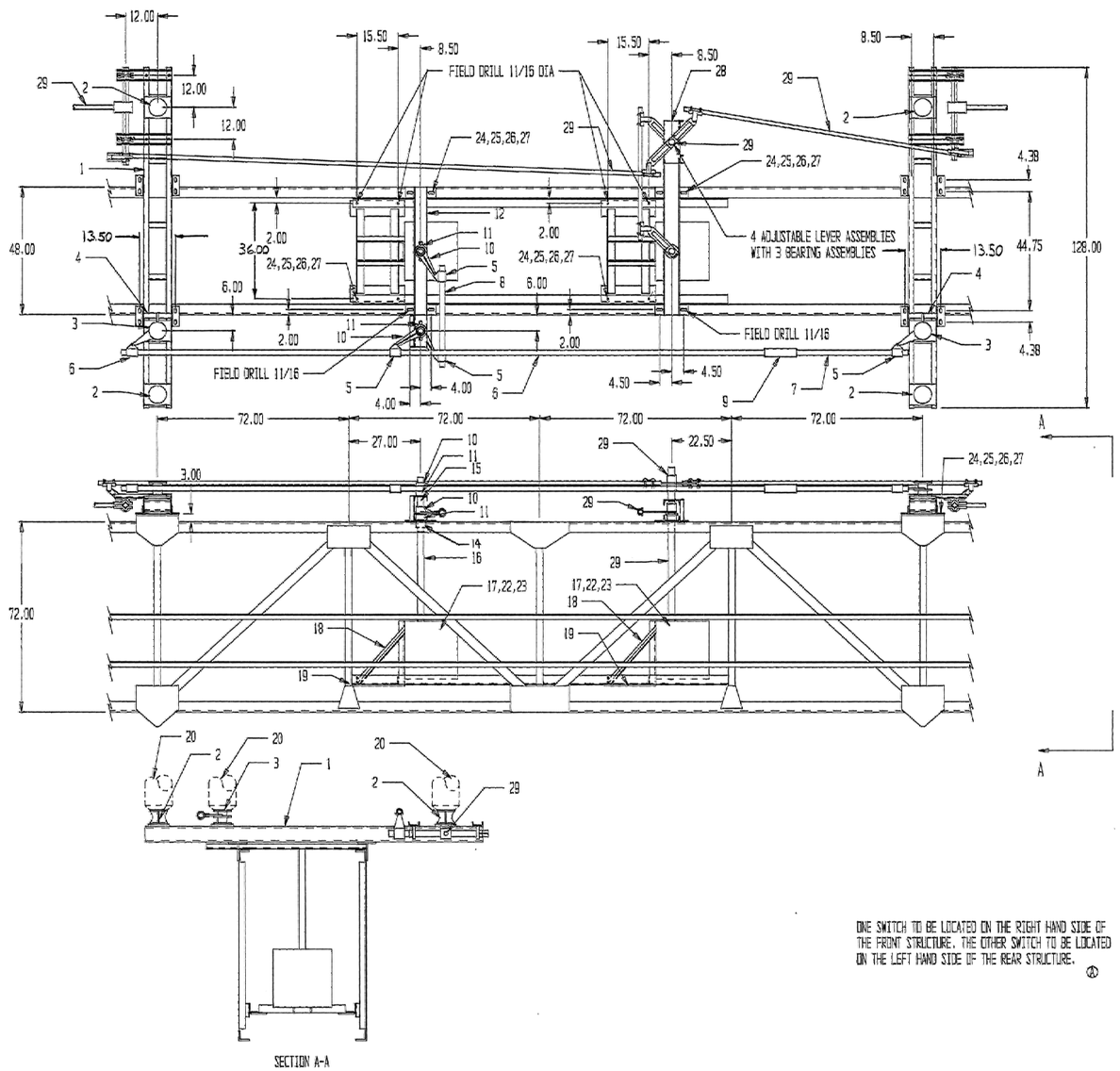
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
SUBSTATION DETAILS
161KV DISCONNECT SWITCH AND MOTOR OPERATOR

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2608.DWG
Ref. No.:	2011-059
Sheet No:	438 OF 565

ET-2608

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ONE SWITCH TO BE LOCATED ON THE RIGHT HAND SIDE OF THE FRONT STRUCTURE. THE OTHER SWITCH TO BE LOCATED ON THE LEFT HAND SIDE OF THE REAR STRUCTURE. ②

NOTES:

1. 161KV DISCONNECT SWITCH WITH GROUND AND MOTOR OPERATOR SHOWN IS PER APPROVED AMTRAK SUPPLIER TURNER ELECTRIC.
2. DETAILS ARE PROVIDED FOR INFORMATION ONLY.
3. ALL DIMENSIONS ARE IN INCHES UNLESS NOTED.
4. SUPPLIER AS INDICATED OR APPROVED EQUAL SHALL BE PROVIDED.
5. MODIFICATIONS REQUIRED AS NEEDED TO MATCH PROPOSED MOUNTINGS SHALL BE BY CONTRACTOR AND SHALL BE BE SUBMITTED AS SHOP DRAWINGS.

QUANTITY	PART	MATERIAL	ITEM	DESCRIPTION
			30	
	MP260033		29	USCO GROUND SWITCH G3-161-06
	008380L	GALV	28	GRD SW MTG BRKT LEFT HAND(BY TECO)
	40	GALV	27	FLATWASHER 5/8"
	40	GALV	26	LOCKWASHER 5/8"
	40	GALV	25	NUT 5/8"-11
	40	GALV	24	MACHINE BOLT 5/8" X 2"
	8	SS	23	LOCKWASHER 5/8"
	8	SS	22	MACHINE BOLT 5/8" X 1-3/4"
	2	SK870928	21	BLADE ASSY 161KV 600AMP
	6		20	INSULATORS
	2	008327	GALV	19	MTG PLATE
	2	008328	GALV	18	OPERATOR MTG BRKT
	2	MP260035		17	MOTOR OPERATOR CN-4A
	1	RM301390	GALV	16	OPERATOR PIPE 2" IPS SCH 80 @5'-0"
	1	RM301390	GALV	15	OPERATOR PIPE 2" IPS SCH 80 @ 2'-0"
	1	007976	GALV	14	COLLAR
	-	008332R	GALV	13	THRUST BEARING MTG BRKT RIGHT HAND
	1	008332L	GALV	12	THRUST BEARING MTG BRKT LEFT HAND
	3	A8247		11	THRUST BEARING ASSY
	3	A9256	GALV	10	PIPE LEVER ASSY
	1	A5771	GALV	9	1-1/2" COUPLING
	1	RM301370	GALV	8	REACH ROD 1-1/2" IPS SCH 80 @ 3'-6"
	1	RM301370	GALV	7	REACH ROD 1-1/2" IPS SCH 80 @ 4'-0"
	1	RM301370	GALV	6	REACH ROD 1-1/2" IPS SCH 80 @ 21'-0"
	5	A8254	GALV	5	1-1/2" CLEVIS ASSY
	2	6746/6747	GALV	4	BLADE STOP
	2	A8245		3	PIVOT ASSY W/1 LEVER (4123)
	4	005735SM	GALV	2	INSULATOR PEDESTAL
	2	008381	GALV	1	SWITCH BASE

TO:	AMTRAK
	NORTH ELIZABETH , NJ
CUSTOMER P.O.#	WPA 81249 D
SERIAL NUMBER:	8061-38037,38038

REVISIONS	DATE	BY	MARK
ADDED NOTE	9-3-91	LD	A

161 KV — 600 AMP

TH116106/8061T CONTROL MECHANISM

DRAWING #	BY	DATE
SK910713	LD	8-7-91
SHEET 1 OF 1	APP'D BY	DATE
	WSD	9-9-91

TURNER ELECTRIC CORPORATION
FAIRVIEW HEIGHTS, IL., USA

1 / ET-2609 161KV DISCONNECT SW. W/ GROUND & MOTOR OPERATOR

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

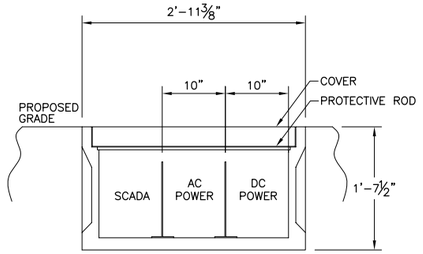
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
SUBSTATION DETAILS
161KV DISCONNECT SW. W/ GROUND & MOTOR OPERATOR

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-2609.DWG
Ref. No.:	2011–059
Sheet No:	439 OF 565

ET–2609

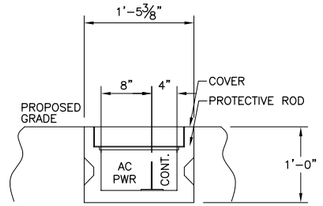
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1 ET-2614 CONTROL TRENCH TO CONTROL ROOM

1' 0 1' 2'

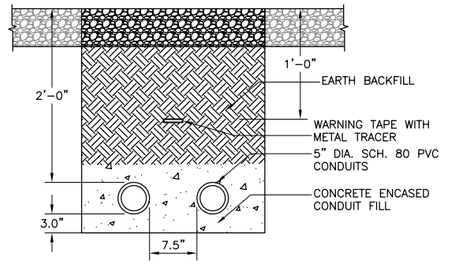
SCALE: 1"=1'-0"



2 ET-2614 GENERATOR AND SIGNAL POWER TRENCH

1' 0 1' 2'

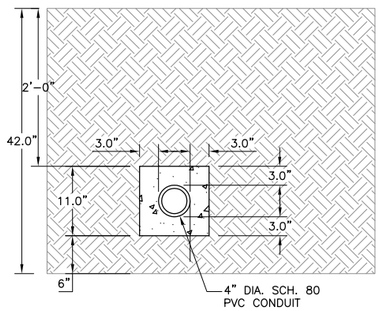
SCALE: 1"=1'-0"



3 ET-2614 UTILITY CONCRETE ENCASED TRENCH

1' 0 1' 2'

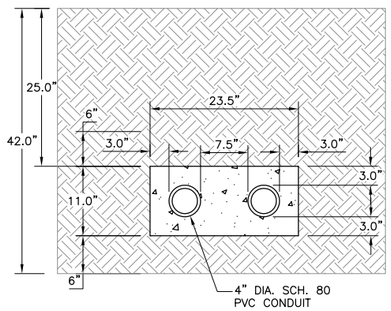
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4 ET-2614 CONCRETE ENCASED DUCTBANK

1' 0 1' 2'

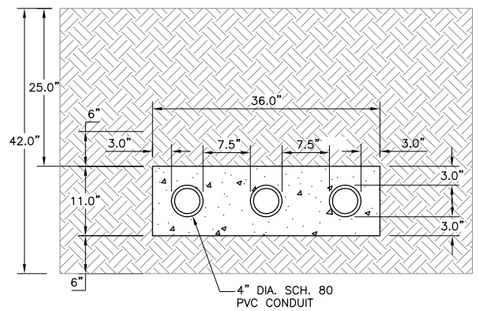
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5 ET-2614 CONCRETE ENCASED DUCTBANK

1' 0 1' 2'

SCALE: 1"=1'-0"



6 ET-2614 CONCRETE ENCASED DUCTBANK

1' 0 1' 2'

SCALE: 1"=1'-0"

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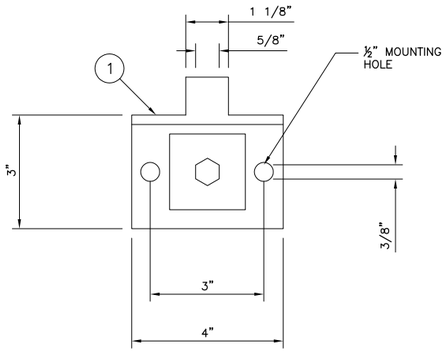
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
SUBSTATION DETAILS
TRENCH DETAILS

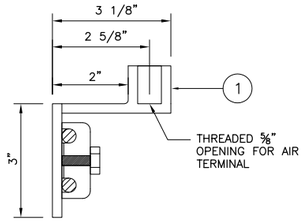
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File No.:	2011-059-ET-2614.DWG
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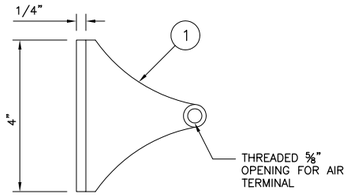
ET-2614



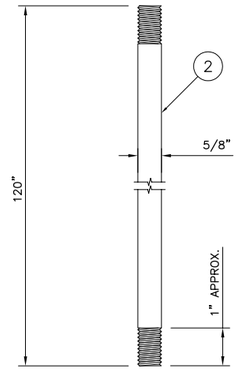
1 ET-2650 **LBASE-01: FRONT VIEW**
SCALE: 6"=1'-0"



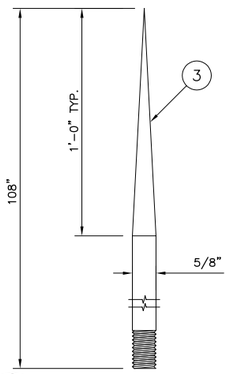
2 ET-2650 **LBASE-01: SIDE VIEW**
SCALE: 6"=1'-0"



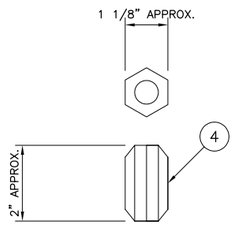
3 ET-2650 **LBASE-01: TOP VIEW**
SCALE: 6"=1'-0"



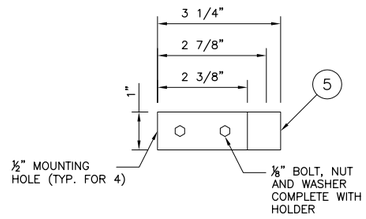
4 ET-2650 **LTEXT-01**
SCALE: 6"=1'-0"



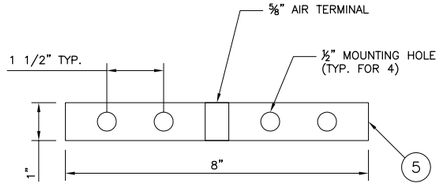
5 ET-2650 **ATERM-01**
SCALE: 6"=1'-0"



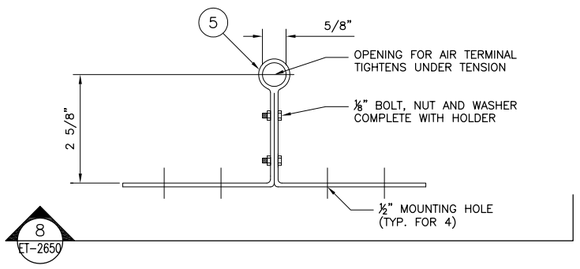
6 ET-2650 **COUPL-01**
SCALE: 6"=1'-0"



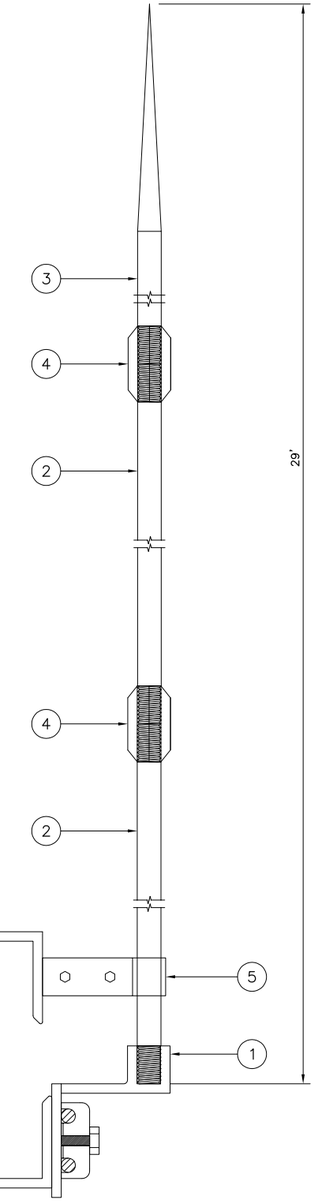
7 ET-2650 **STRAP-01: SIDE VIEW**
SCALE: 6"=1'-0"



8 ET-2650 **STRAP-01: FRONT VIEW**
SCALE: 6"=1'-0"



9 ET-2650 **STRAP-01: TOP VIEW**
SCALE: 6"=1'-0"



10 ET-2650 **LIGHTNING MAST ASSEMBLY: "LMAST-01"**
SCALE: 6"=1'-0"

LIGHTNING MAST ASSEMBLY, LMAST-01, BILL OF MATERIALS

ITEM	MARK	AMTRAK #	REF. DWG.	DESCRIPTION	UNIT	QTY
1	LBASE-01	--	THIS SHEET	5/8" BRONZE CAST POINT BASE (2" OFFSET) WITH CABLE CLAMP FOR ⅝" ROD. EROCP REF. LPC31958	EA	1
2	LTEXT-01	--	THIS SHEET	5/8" STAINLESS STEEL (TYPE 304) EXTENDSION ROD 120" LONG TERMINAL ERICO REF. LPS273120	EA	2
3	ATERM-01	--	THIS SHEET	5/8" AIR TERMINAL STAINLESS STEEL (TYPE 304) 108" LONG TERMINAL ERICO REF. LPS418X108	EA	1
4	COUPL-01	--	THIS SHEET	5/8" TO 5/8" STAINLESS STEEL COUPLING (STRAIGHT) ERICO REF. LPS295 5F 5F	EA	2
5	STRAP-01	--	THIS SHEET	STRAP TYPE POINT HOLDER TINNED COPPER WITH 2" OFFSET ERICO REF. SERIES LPC670 WITH 2" OFFSET	EA	1

6" 3" 0 6"

SCALE: 6"= 1'-0"

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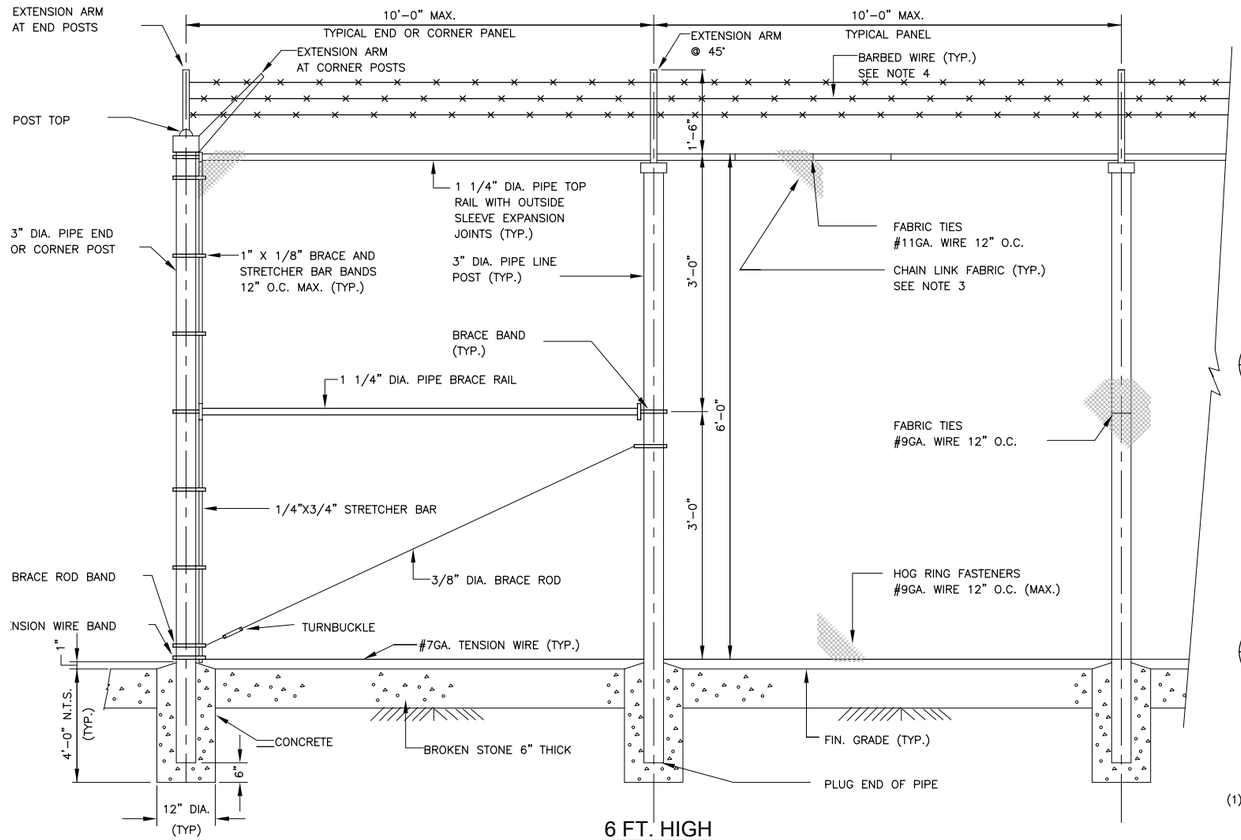
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
SUBSTATION DETAILS
LIGHTNING PROTECTION DETAILS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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Ref. No.:	2011-059
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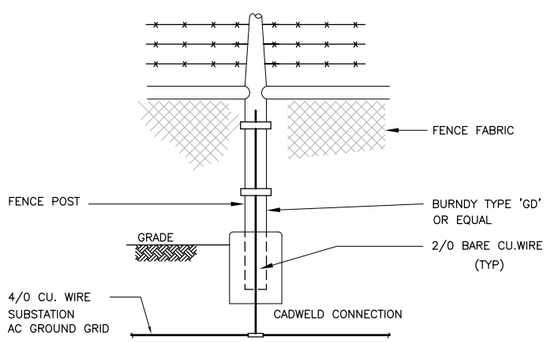
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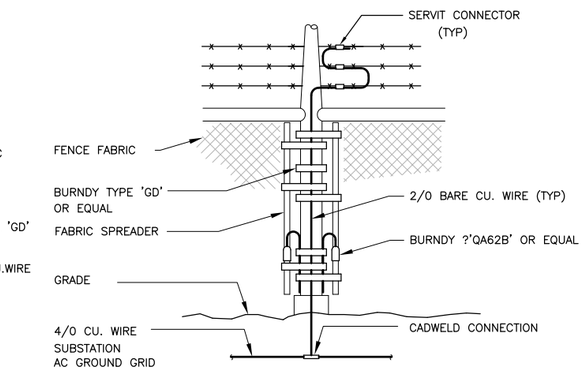


6 FT. HIGH
CHAIN LINK FENCE-BLACK VINYL COATED STEEL

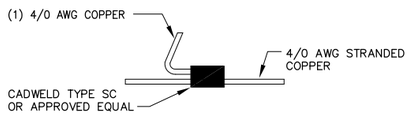
1 ET-2660 **TYPICAL FENCE ELEVATION**
SCALE: NONE



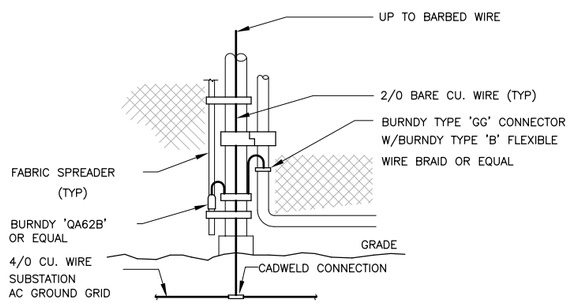
2 ET-2660 **FENCE POST GROUNDING (TYP.)**
SCALE: NONE



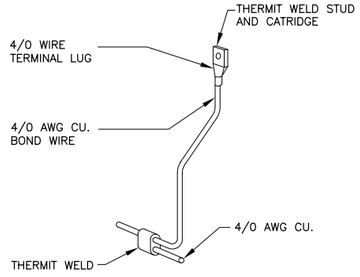
3 ET-2660 **FENCE FABRIC AND BARBED WIRE GROUNDING (TYP)**
SCALE: NONE



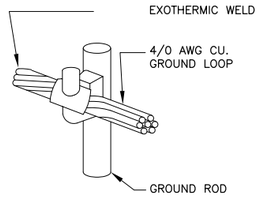
5 ET-2660 **4/0 AWG TO 4/0 AWG**
SCALE: NONE



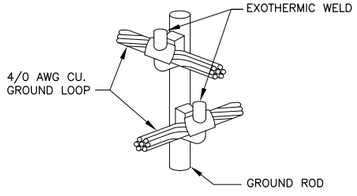
4 ET-2660 **GATE GROUNDING (TYP)**
SCALE: NONE



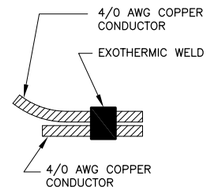
7 ET-2660 **POLE TO GROUND GRID**
SCALE: NONE



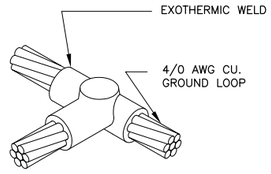
8 ET-2660 **4/0 AWG TO GROUND ROD**
SCALE: NONE



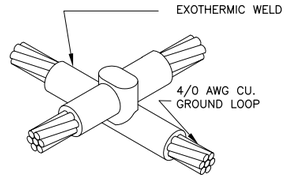
10 ET-2660 **TWO 4/0 AWG TO GROUND ROD**
SCALE: NONE



6 ET-2660 **4/0 AWG TO 4/0 AWG**
SCALE: NONE



9 ET-2660 **4/0 AWG TO 4/0 AWG**
SCALE: NONE



11 ET-2660 **4/0 AWG TO 4/0 AWG**
SCALE: NONE

NOTES:

1. LAYOUT OF POST LOCATIONS SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH THE INTENT OF THE CONTRACT PLAN. ALL SUCH LAYOUTS AND DETAILS SHALL BE CHECKED AND APPROVED BY AMTRAK PRIOR TO ERECTION TO THE FENCE.
2. FOR FENCE AND GATE LOCATION SEE SITE PLANS.
3. HOT DIP GALVANIZED CHAIN – LINK FABRIC FOR GATES & FENCES FOR ALL SUBSTATIONS SHALL BE #9FGA. STEEL WIRE WOVEN IN A 1"X 1" MESH. TOP AND BOTTOM EDGES SHALL BE TWISTED AND BARBED. PROVIDE COLORED VINYL COATING ON THE CHAIN LINK FABRIC.
4. 3 LINES OF BARBED WIRE, EACH COMPOSED OF 2 TWISTED, BLACK VINYL COATED, #12GA, STEEL WIRES, WITH BARBS SPACED 5" APART, SHALL BE PROVIDED
5. ALL PIPE SIZES ARE NOMINAL: ALL PIPES ARE SCHEDULE 80 GALVANIZED STEEL EXCEPT AS OTHERWISE STATED IN THE SPECIFICATIONS. ALL STEEL FOR TIES, BRACES, BANDS, FASTENERS, EXTENSION ARMS, ETC SHALL BE GALVANIZED AND BLACK VINYL COATED.
6. CHAIN–LINK FENCE TO CONFORM TO THE CURRENT AASHTO SPECIFICATIONS, DESIGNATION M181
7. TEMPORARY FENCE ARRANGMENTS DURING CONSTRUCTION SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST.
8. ALL STEEL COMPONENTS AND PARTS SHALL BE HOT DIP GALVANIZED.
9. "DANGER – HIGH VOLTAGE" WARNING SIGNS SHALL BE PROVIDED ON ALL THE FOUR SIDES OF THE FENCE.

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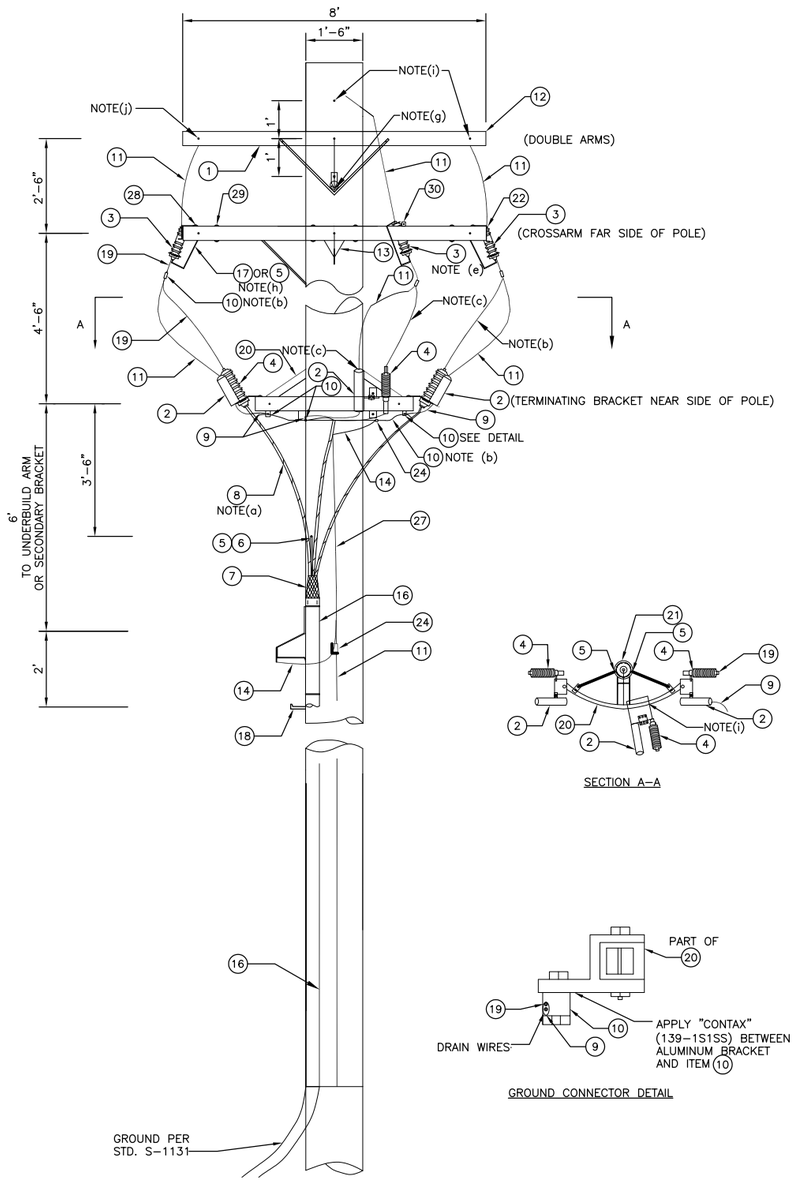
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
SUBSTATION DETAILS
GROUNDING DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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SECTION A-A

GROUND CONNECTOR DETAIL

1 / ET-2672 **34KV DEAD END TERMINAL POLE**
1/2" = 1'-0"

BILL OF MATERIAL			
ITEM	CODE NO	DESCRIPTION	QTY
1	132-00686	CROSSARM #8	3
2	138-42271	ARRESTER, LIGHTNING, 27KV RP.	3
3	138-44753	MOUNTING, FUSE, 25KV , 200E AMP[NOTE(e)]	3
4	138-71065	TERMINAL, F/1/0 35KV AL CABLE	3
5	132-57254	SCREW, LAG, 1/2"X4 - 1/2" GALV	*
6	132-76017	WASHER, ROUND, FLAT, 1/2" GALV	1
7	SEE S-1831	GRIP, F/1/0 CABLE	3
8	125-09397	CABLE, UG 35KV, 1X1/0 STR AL CLPE	*
9	135-76855	WIRE, #4 SOL CU BARE, S D	*
10	132-14607	CONNECTOR, TAP, VISE TYPE, CU, 2/0 STR	9
11	135-79839	WIRE #4 SOL CU COVERED SD	*
12	SEE S-0251	CONNECTOR, HOT LINE CLAMP W/STIRRUP	3
13	132-31005	GAIN, CROSSARM	1
14	135-79577	WIRE, 4/0 AL, 7 STR, CLPE COV	*
15			
16	SEE S-1172	MOLDING, PLASTIC	*
17	138-	FUSE, 25KV POWER	*
18	132-64905	STEP, POLE	1
19	135-08012	WIRE, 2/0 STR CU BARE	*
20	132-05959	BRACKET, TERM ALUM. 4"-2" W/ATTACHMENTS	1
21	*	5/8" MACHINE BOLT	2
22	132-05956	BRACKET, CUTOUT, END MNT, 12" DROP	2
23			
24	SEE S-0252	CONNECTOR TAP COMPRESSION	*
25	138-76046	FUSE, C L., 50A, 23KV, X-LIMITER	*
26			
27	138-65605	STAPLE, 1/2" X 2" , GALV	*
28	132-05440	BOLT, MACHINE, 5/8" X 6", GALV	2
29	132-02416	BOLT, MACHINE, 3/8" X 5-1/2", GALV	*
30	132-05964	HEAVY DUTY NEMA BRACKET	1

*AS REQUIRED

REFERENCES:

GROUNDING INSTALLATION AT POLE_____S-1131
POLE MOLDING INSTALLATION_____S-1172
GUYING_____SECTION-1200 S-160S
34 KV TERMINAL F/1/O CONCENTRIC NEUTRAL
CABLE_____S-S192-B
3ø SINGLE & DOUBLE DEADEND STRUCTURES_____S-1622-B
FUSING PRACTICE - TERMINAL POLE_____S-5506
AERIAL SURGE ARRESTER PRACTICE_____S-1025
HOT LINE & STIRRUP CONNECTOR FOR AERIAL CONNECTIONS_____S-1025
FOR AERIAL CONNECTIONS_____S-0251
DISTRIBUTION CUTOUTS & FUSE MOUNTINGS_____S-0107

NOTES:

(a) MINIMUM BENDING RADIUS {NON JACKETED 10", JACKETED 11-1/4"}
(b) DRESS LEAD HORIZONTALLY FOR INSTALLATION OF SAFETY GROUND
(c) LEADS FROM FUSE MOUNTINGS TO BE CONNECTED DIRECTLY TO TERMINATORS
(d) USE POLE STEP AS A FUSE MANAGER
(e) FOR DELTA CONNECTED LOADS, USE 34.5KV RATED CUTOUTS 138-73529. THESE CUTOUTS REQUIRE 34.5KV RATED POWER FUSES. SEE EQUIPMENT BULLETON 99-05. THESE CUTOUTS AND FUSES CANNOT BE USED IN LOCATIONS WHERE AVAILABLE FAULT CURRENT EXCEEDS 12,500 AMPS. CONTACT DISTRIBUTION ENGINEERING WHEN THIS SITUATION OCCURS.
(f) TERMINATE PLASTIC MOLDING 3" BELOW TOP OF BASKET GRIP.
(g) CLEARANCE FROM HOT PART TO FIBERGLASS GUY INSULATOR SHALL BE AT LEAST 6" AND TO LOWER END OF GUY INSULATOR AT LEAST 30". LIGHTNING ARRESTER TOWARD THE GUY AND MAY BE ROTATED TO SECURE REQUIRED CLEARENCE
(h) CURRENT LIMITING FUSE REQUIRED IN AREAS WHERE FAULT CURRENT EXCEEDS 12,500 AMPS.
(i) FIELD DRILL 9/16" HOLE IN ARM TO ACCOMMODATE ½" DIA. BOLT.
(J) CONDUCTORS DEAD ENDED FAR SIDE OF POLE

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IN ASSOCIATION WITH Baker AECOM

ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
PAOLI SUBSTATION
34KV DEAD END TERMINAL POLE

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 12/19/14

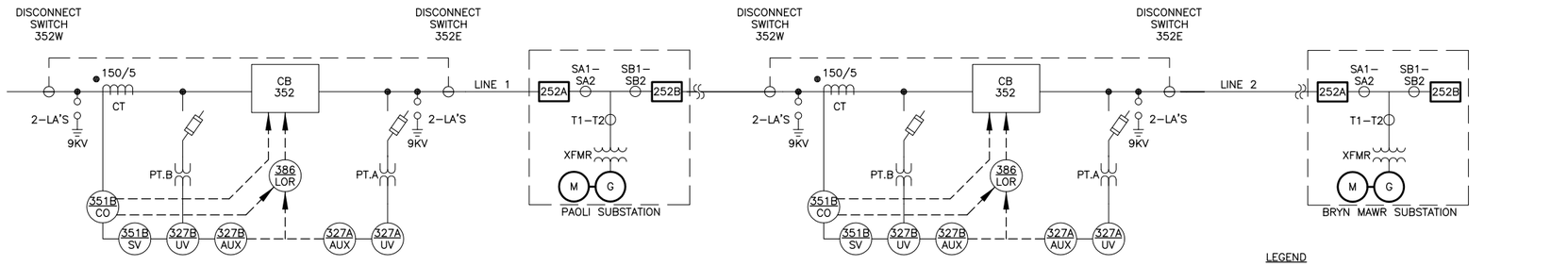
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. 100 HZ SIGNAL POWER TRANSMISSION SHALL BE SECTIONALIZED BY CIRCUIT BREAKERS (252A AND 252B) AT EACH SUBSTATION AND AT EACH INTERMEDIATE POINT WITH CIRCUIT BREAKER (352).
3. UNDER NORMAL CONDITIONS CIRCUIT BREAKER (352) IS OPEN. WHENEVER A SECTION OF MAIN TRANSMISSION IS DE–ENERGIZED, CIRCUIT BREAKER (352) SHALL AUTOMATICALLY CLOSE, UNLESS A FAULTED CONDITION EXISTS ON A SECTION OF LINE, IN WHICH CASE OVER–CURRENT RELAY 51 SHALL OPEN THE BREAKER.
4. 252A (252B) AND 352 SHALL BE PROPERLY COORDINATED TO AVOID FALSE TRIPS. 252A AND 252B TRIP DELAY SHALL BE LONGER THAN 352 TRIP.
5. SCADA SHALL PROVIDE THE POWER DIRECTOR WITH DISCRETIONARY CONTROL OF ALL APPARATUS AT ALL TIMES, IN ADDITION TO REMOTE AUTOMATIC CONTROL.



LEGEND

M	MOTOR
G	GENERATOR
CB	CIRCUIT BREAKER
CO	TIME OVER–CURRENT RELAY
SV	INSTANTANEOUS ADJUSTABLE VOLTAGE RELAY
UV	UNDER–VOLTAGE RELAY
AUX	AUXILIARY RELAY
LOR	LOCKOUT AND RESET RELAY
XFMR	TRANSFORMER

SCENARIOS	OPERATION STATUS/SEQUENCE
#1 NORMAL	CB 352 OPEN CB 252A, 252B, CLOSED LINE 1 ENERGIZED BY G1 LINE 2 ENERGIZED BY G2
#2 LINE FAULT (USING LINE 1 FAULT AS EXAMPLE)	1 LINE 1 FAULT 2 252B TRIP (351–CO PICKS UP) LINE 1 DE–ENERGIZED 3 352 CLOSE (327B–UV PICKS UP) LINE 1 ENERGIZED BY G2 4 352 TRIP (351B–CO PICKS UP DUE TO LINE 1 FAULT) AND LOCKED OUT BY 386–LOR LINE 1 DE–ENERGIZED LINE 2 REMAINS ENERGIZED BY G2
#3 ONE GENERATOR OUT OF SERVICE WITHOUT LINE FAULT	1 G1 OUT OF SERVICE 2 252B TRIP (227–UV PICKS UP) LINE 1 DE–ENERGIZED 3 352 CLOSE (327–UV PICKS UP) LINE 1 ENERGIZED BY G2 LINE 2 ENERGIZED BY G2

1 ET–3200 BREAKER 352 OPERATION
SCALE: NONE

#	BREAKER	FROM SUB	TO SUB	LOCATION NAME	CONNECTION TYPE	SITE PLAN DWG.
1	352	FRAZER (SUB 64)	PAOLI (SUB 4)	MALVERN	WIRE	ET-3203
2	352	PAOLI (SUB 4)	BRYN MAWR (SUB 3)	STRAFFORD	CABLE	ET-3202

2 ET–3200 352 BREAKER LOCATION & CONNECTION TYPE
SCALE: NONE

100% DESIGN SUBMISSION

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AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
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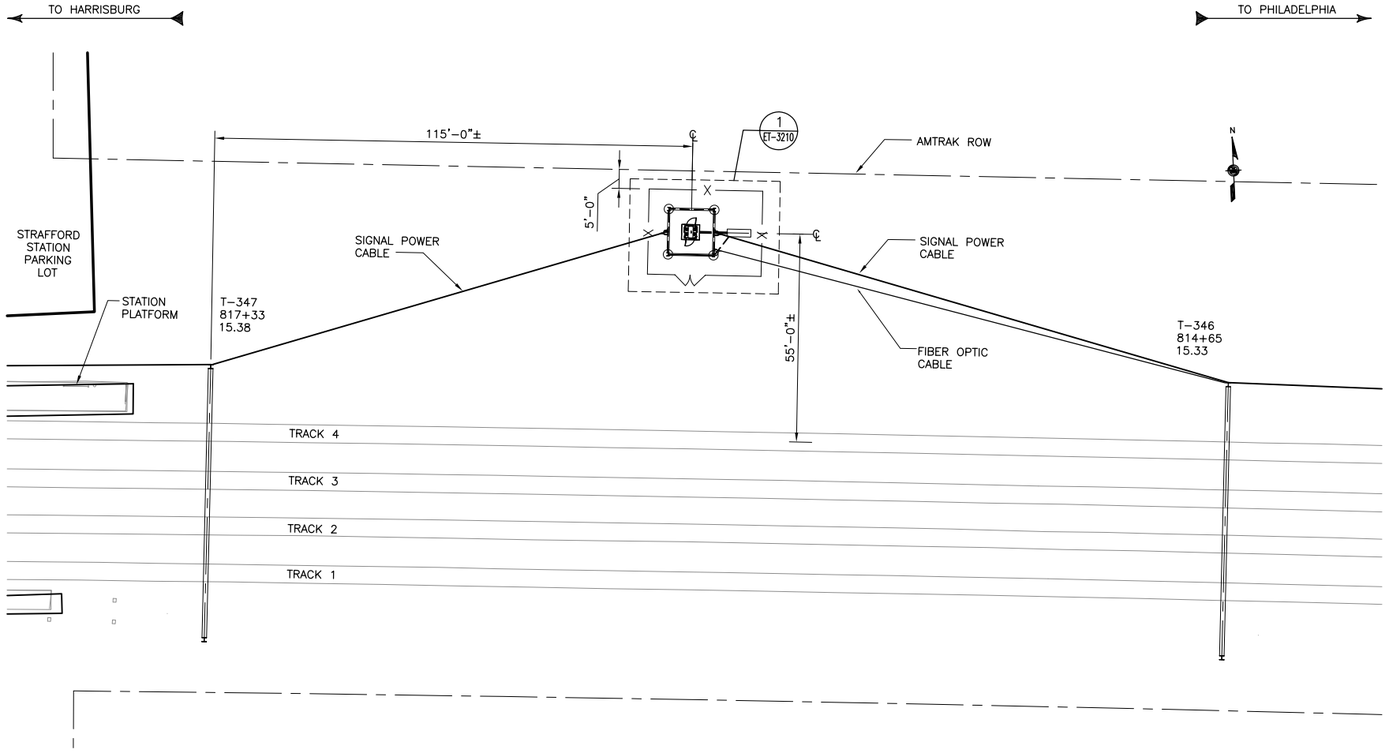
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
GENERAL NOTES AND TRIPPING SEQUENCE

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–3200.DWG
Ref. No.:	2011–059
Sheet No:	444 OF 565

ET–3200

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PROPOSED 352 BREAKER INSTALLATION AT STRAFFORD STATION – PLAN STA 816+18

20' 10' 0 20'

SCALE:1"=20'-0"

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-010.
2. FOR 352 BREAKER INSTALLATION GENERAL NOTES AND TRIPPING SEQUENCE SEE DRAWING 444 – ET-3200.
3. PROVIDE FIBER OPTIC CABLE FROM BRYN MAWR SUBSTATION (SUB #3) TO BREAKER 352 CONTROL CABINET.
4. FOR PROPOSED PLAN OF CONSTRUCTION SEE DRAWING 015 – ET-0018.
5. FOR OVERALL 100HZ STAGING PLANS SEE DRAWINGS 030 – ET-0050 THROUGH 032 – ET-0052.
6. FOR TYPICAL 352 FIBER ROUTING DETAILS SEE DRAWING 452 – ET-3217.
7. FOR FIBER OPTIC (MESSENGER WIRE) DEAD END DETAIL SEE SIGNAL POWER SPLICING AND TERMINATION ASSEMBLIES DRAWING 366 – ET-1913.
8. FOR STRUCTURAL DETAILS SEE DRAWING S-5501.

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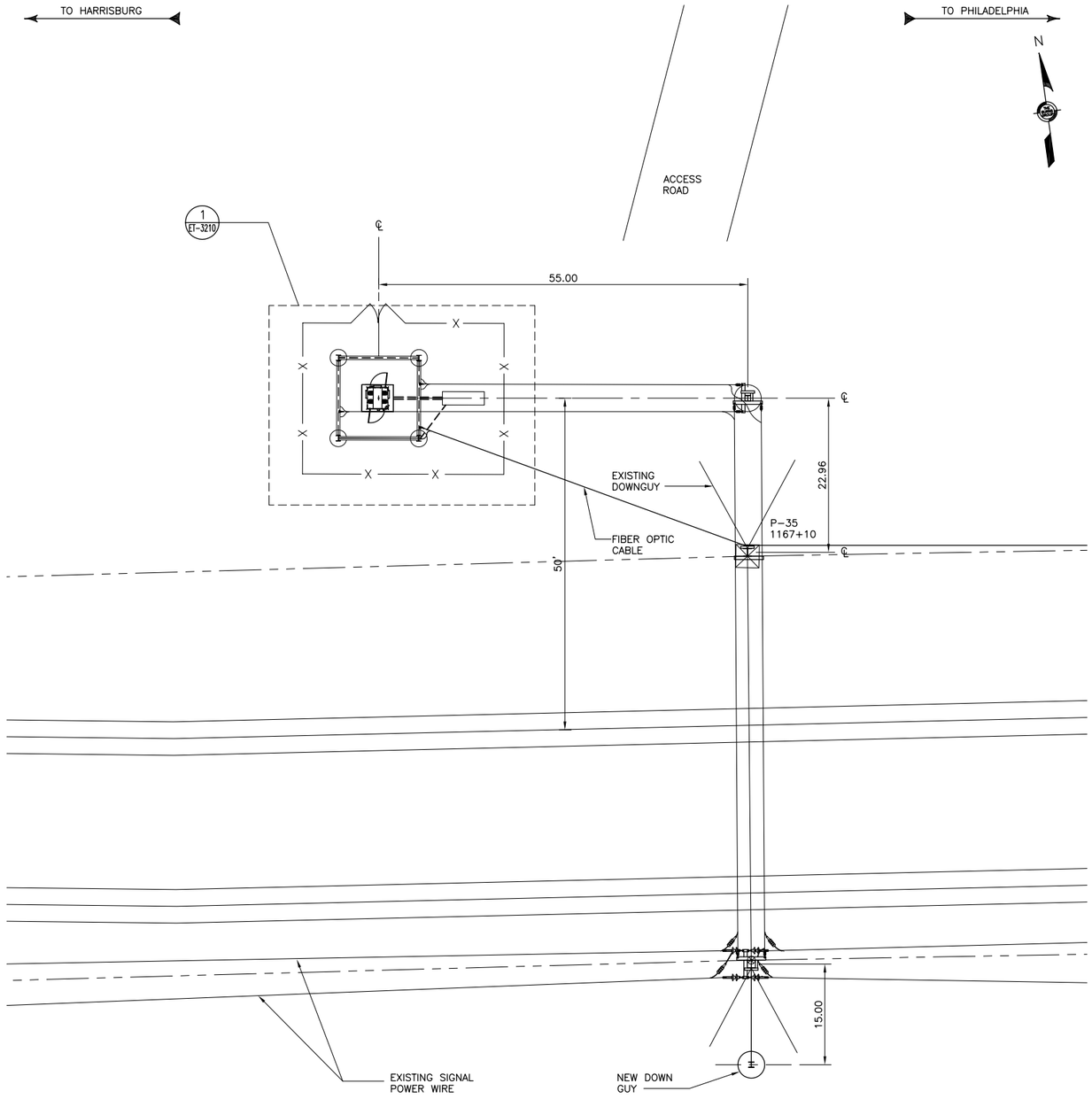
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
STRAFFORD PLAN – PROPOSED INSTALLATION

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-3201.DWG
Ref. No.:	2011-059
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ET-3201

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PROPOSED 352 BREAKER INSTALLATION BETWEEN FRAZER AND PAOLI SUBSTATION STA 1167+65

10' 5' 0 10'

SCALE:1"=10'-0"

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS, SEE DRAWING ET-0012.
2. PROVIDE FIBER OPTIC CABLE FROM PAOLI SUBSTATION (SUB #2) TO BREAKER 352 CONTROL CABINET.
3. FOR TYPICAL FIBER ROUTING DETAILS SEE DRAWING ET-3217.
4. STRUCTURAL FRAMING AND DETAILS SEE DRAWINGS S-5501 AND S-5503.

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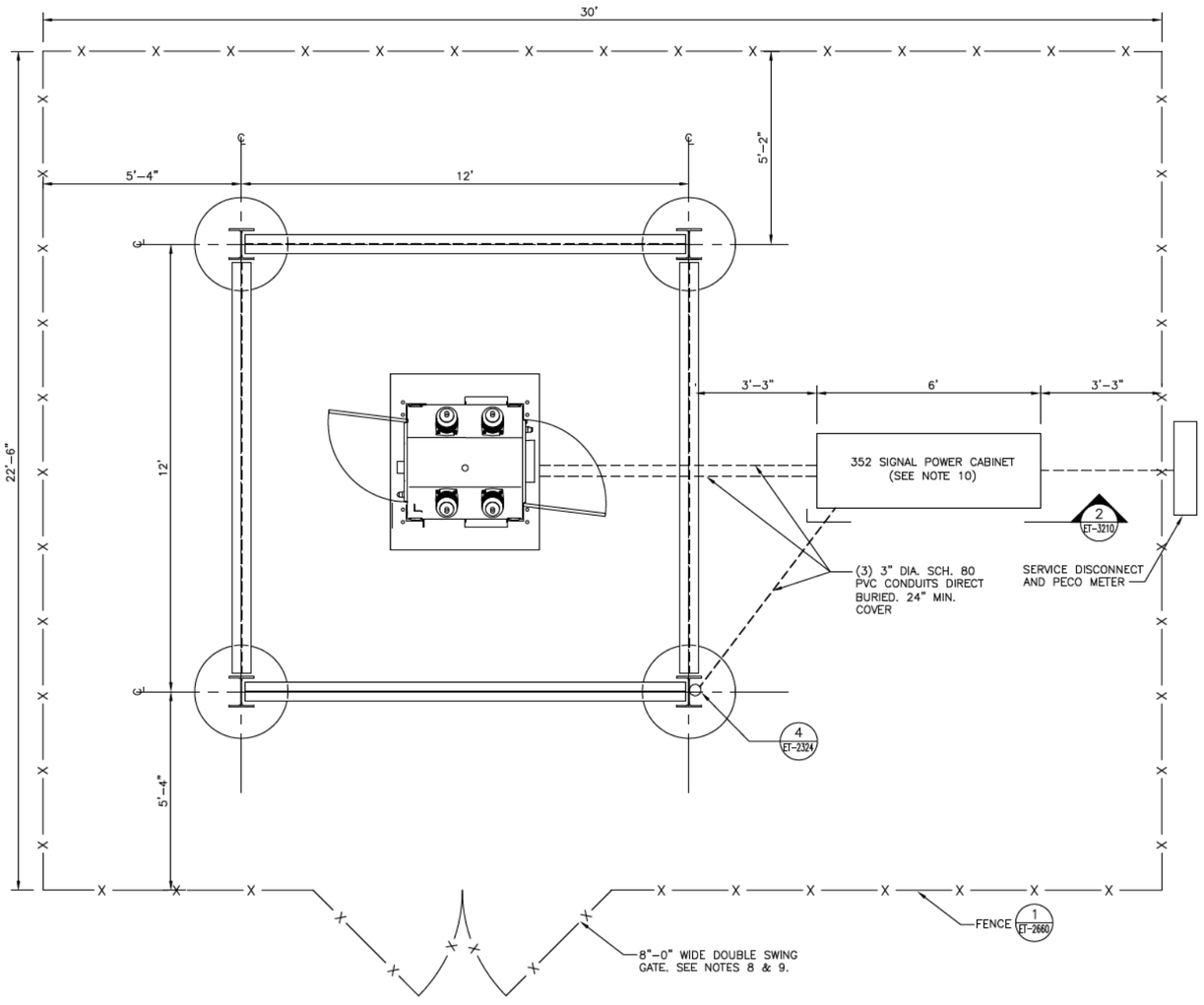
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
FRAZER PLAN - PROPOSED INSTALLATION

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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ET-3202

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1 ET-3210 **352 SIGNAL POWER STRUCTURE SITE PLAN**

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

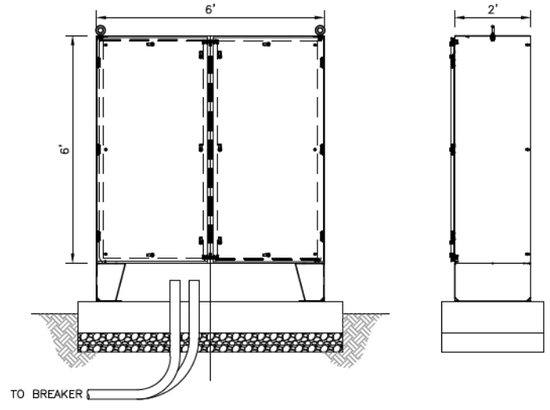
- FRAZER 352 BREAKER LOCATION: STATION 1166+55
- STRAFFORD STATION 352 LOCATION: STATION

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. CONTRACTOR SHALL PROVIDE DIRECT STROKE LIGHTNING PROTECTION FOR ALL APPARATUS AND LINES UNLESS PROTECTION IS PROVIDED BY THE CATENARY STRUCTURES ALONG THE RIGHT-OF-WAY.
3. LIGHTNING ARRESTERS SHALL BE LOCATED ON EACH OUTGOING FEEDER, ON BOTH SIDES OF THE CIRCUIT BREAKER (352).
4. CONTROL CABINET SHALL HOUSE RELAYS, BATTERY, CHARGER AND REMOTE TERMINAL UNIT (RTU).
5. FINAL CONTROL CABINET DESIGN WILL BE PROVIDED ON SUBSEQUENT SUBMISSION UPON COORDINATION WITH AMTRAK C&S DEPARTMENT.
6. SEE DRAWINGS ET-3211 AND ET-3212 FOR LAYOUT OF ELECTRICAL EQUIPMENT.
7. SEE DRAWING S-5501 FOR STRUCTURAL DETAILS.
8. LOCATE GATE IN FENCE TO ALLOW FOR CONVENIENT ACCESS. THIS IS DEPENDANT ON EACH LOCATION.
9. CONTRACTOR SHALL PROVIDE LOCKING MECHANISM FOR GATE. COORDINATE KEYING WITH AMTRAK.
10. CONTRACTOR SHALL COORDINATE WITH UTILITY TO PROVIDE 120VAC SINGLE PHASE ELECTRICAL SERVICE FOR CONTROL CABINET. A SEPARATE AC POWER PANEL MAY BE INSTALLED INSIDE CONTROL CABINET TO PROVIDE LOW VOLTAGE AC POWER FOR BATTERY CHARGER, CABINET LIGHT, CONVENIENT OUTLET AND HEATER.

BILL OF MATERIALS (352 BREAKER)

ID	MARK NO.	AMMES	DESCRIPTION	REF. DRAWING	UNIT	FRAZER QTY	STRAFFORD QTY	TOTAL
83	S4	4456227009	SHACKLE CHAIN W/BOLT NUT & COTTER	ET-305	EA	2	2	4
219			AUTOMATIC DEADEND, HUBBELL GDE-702		EA	2	2	4
222			COLD SHRINK TERMINATION, 3M 5513A		EA	4	4	8
320			TRANSFORMER, POTENTIAL, OIL-IMMERSED, 100Hz, 6.9kV/120V		EA	2	2	4
323			LIGHTNING ARRESTOR, 1-POLE, 9kV		EA	4	4	8
325			DISCONNECT SWITCH, 15kV, 2 POLE, 600 AMP		EA	4	4	8
326			CIRCUIT BREAKER, OUTDOOR, HIGH-SPEED, 2-POLE, 100Hz, 15kV@ (SIG PWR)		EA	1	1	2
365			CURRENT TRANSFORMER, 25 KV, 100 HZ, BB-25-973, ABB		EA	1	1	2
366			FUSED DISCONNECT, 7.8 KV EU, 100A WITH MOUNTING BRACKET, ABB		EA	4	4	8
368			ALTOS FIGURE 8 FIBER OPTIC GEL-FREE CABLES-12 STRAND		LF	X	X	X
369			AUTOMATIC DEADEND, MODEL #GDE5100		EA	1	2	3
370			FIBER ALIGN ALUM. SUSPENSION SUPPORT, #4450199, PREFORMED LINE PRODUCTS W/ SHACKLE OPTION		EA	36	105	141



2 ET-3210 **CONTROL CABINET DETAILS**

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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National Railroad Passenger Corporation
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Approved	Date

Burns Engineering, Inc. | 330 979-7700
Two Commerce Square, 2001 Market St, Suite 650
Philadelphia, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
CIRCUIT BREAKER #352 AND CONTROL CABINET

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

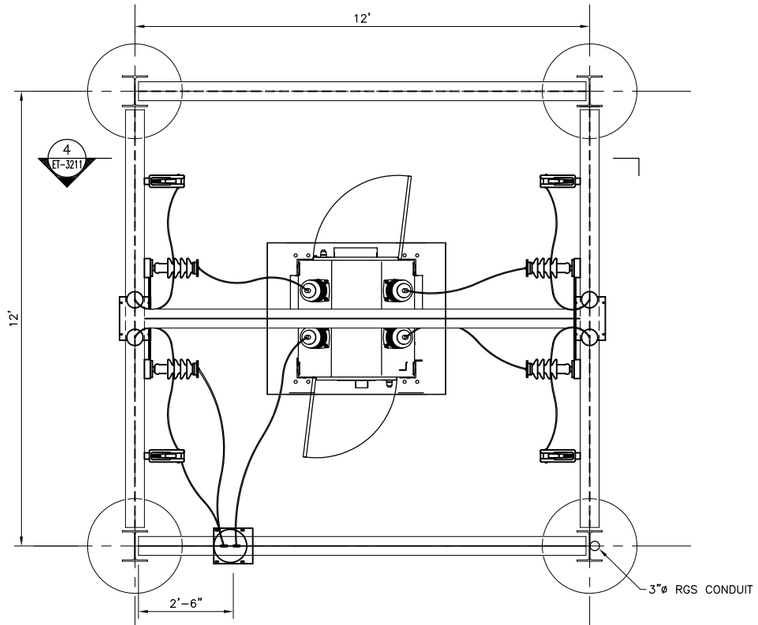
File No.:	2011-059-ET-3210.DWG
Ref. No.:	2011-059
Sheet No:	447 OF 565

ET-3210

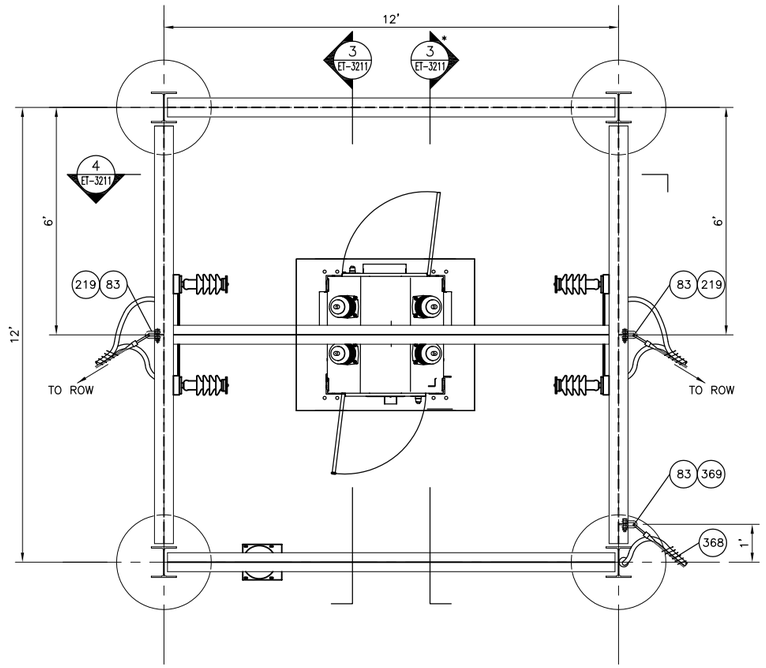
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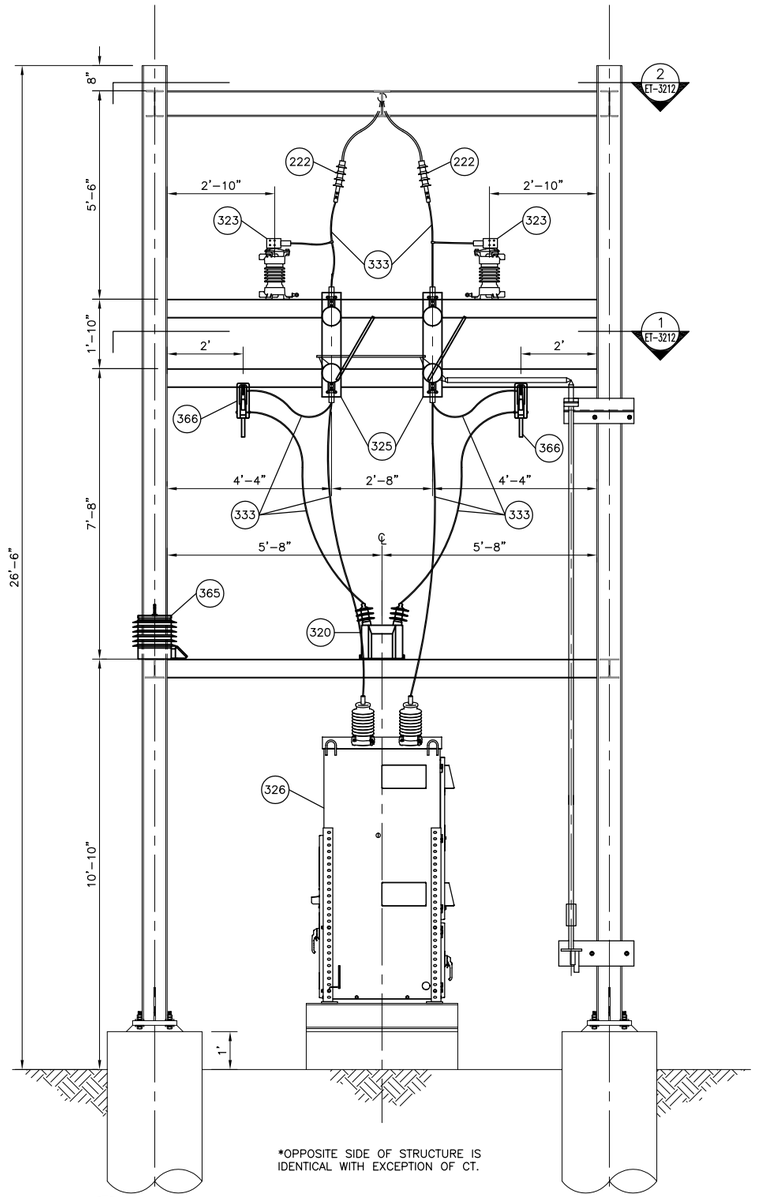
1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR 352 BREAKER INSTALLATION PLANS, SECTIONS AND DETAILS SEE DRAWING S–5501.
3. FOR EQUIPMENT MOUNTING DETAILS SEE DRAWING S–5503.
4. FOR BOM FOR THE 352 BREAKER LOCATION, SEE DRAWING ET–3210.



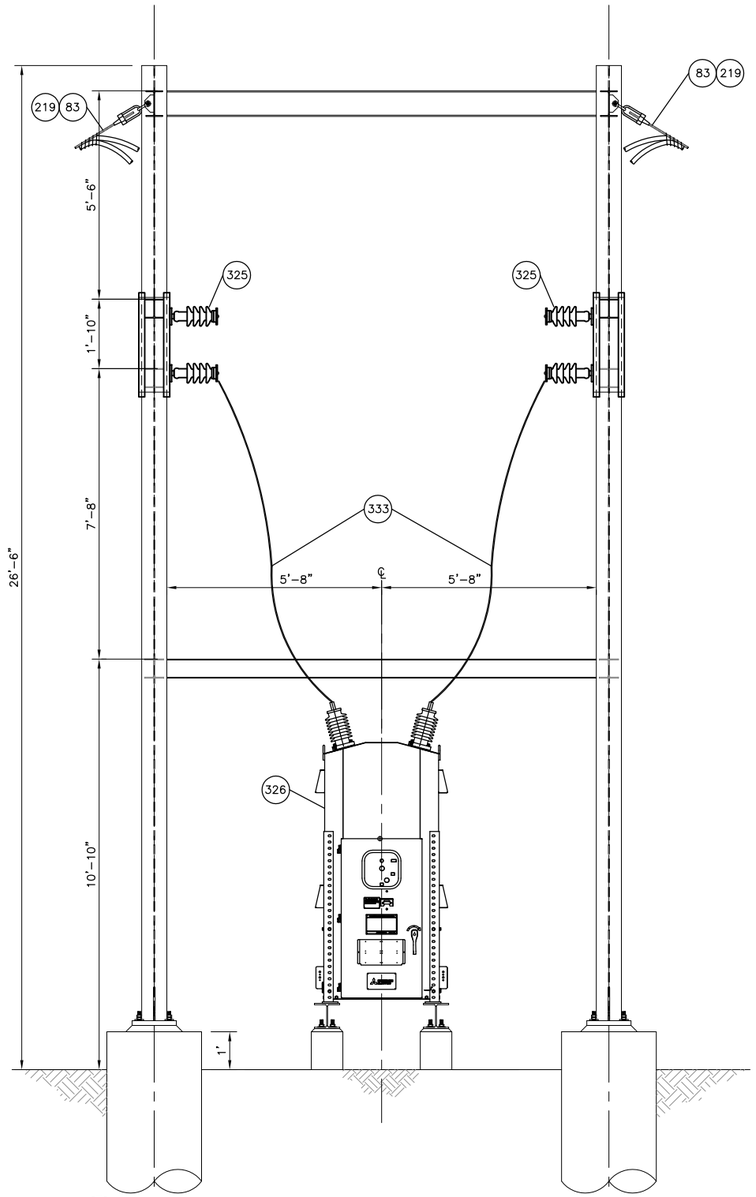
1 ET-3211 **352 BREAKER SIGNAL POWER STRUCTURE PLAN - MID LEVEL**
SCALE: 1/2" = 1'-0"



2 ET-3211 **352 BREAKER SIGNAL POWER STRUCTURE PLAN - TOP LEVEL**
SCALE: 1/2" = 1'-0"



3 ET-3211 **352 BREAKER SIGNAL POWER STRUCTURE - SECTION**
SCALE: 1/2" = 1'-0"



4 ET-3211 **352 BREAKER SIGNAL POWER STRUCTURE - SECTION**
SCALE: 1/2" = 1'-0"

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
STRAFFORD – SIGNAL POWER STRUCTURE PLAN AND SECTION

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

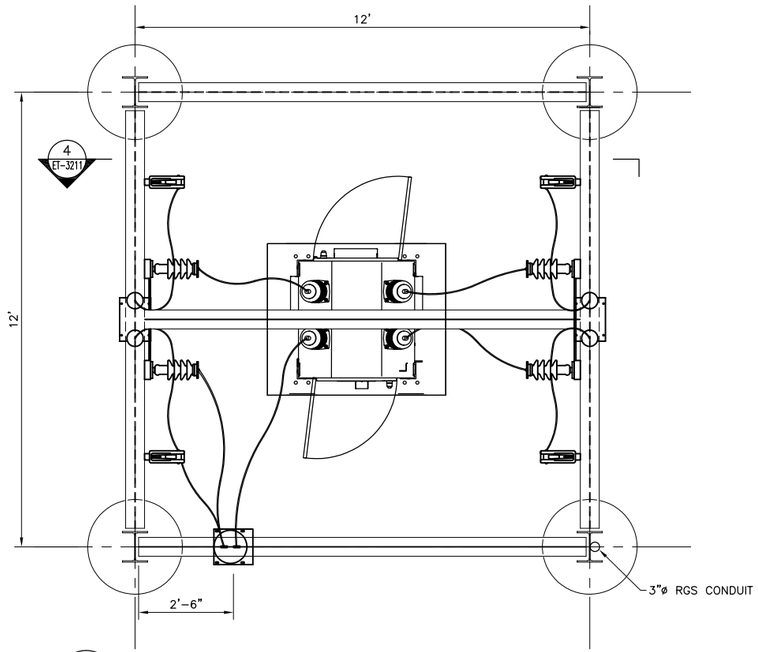
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Ref. No.:	2011-059
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ET–3211

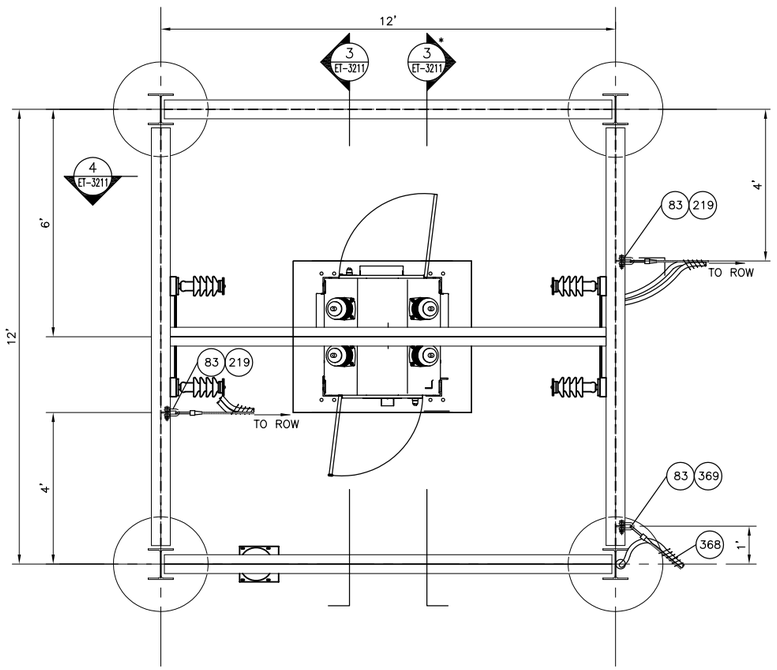
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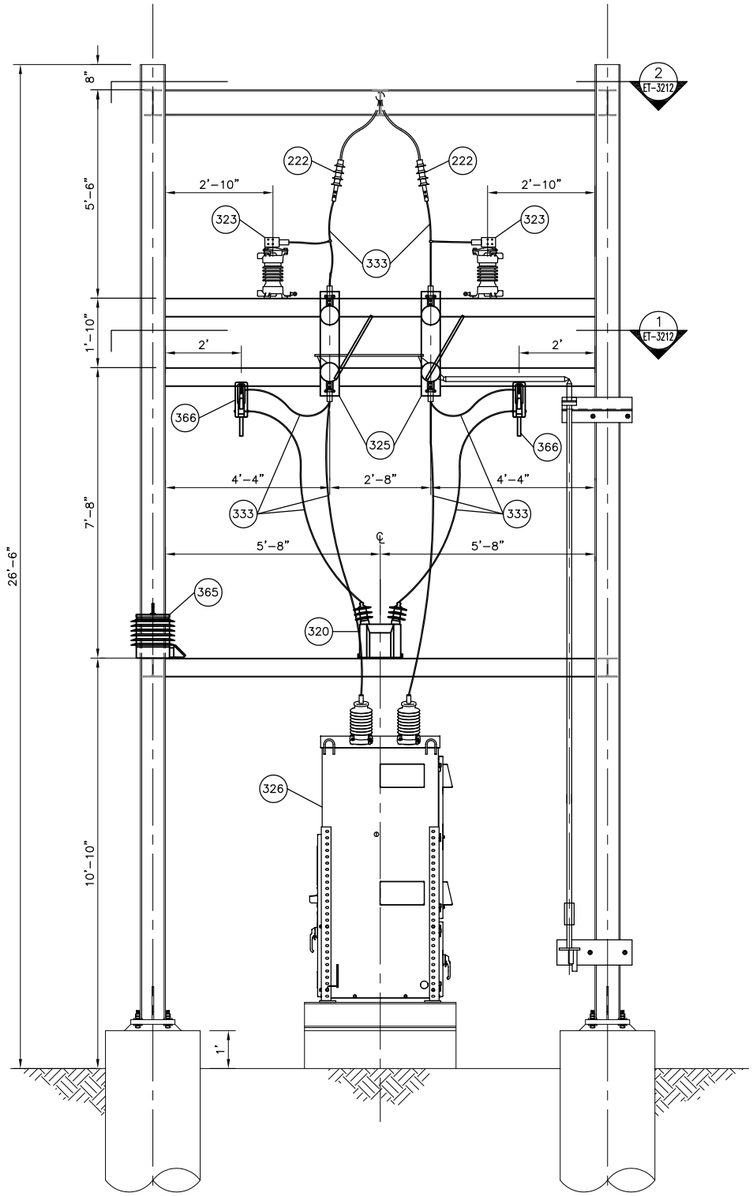
1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR STRUCTURAL – 352 BREAKER INSTALLATION PLANS, SECTIONS AND DETAILS SEE DRAWING S–5501.
3. FOR BOM FOR THE 352 BREAKER LOCATION, SEE DRAWING 447 – ET–3210.



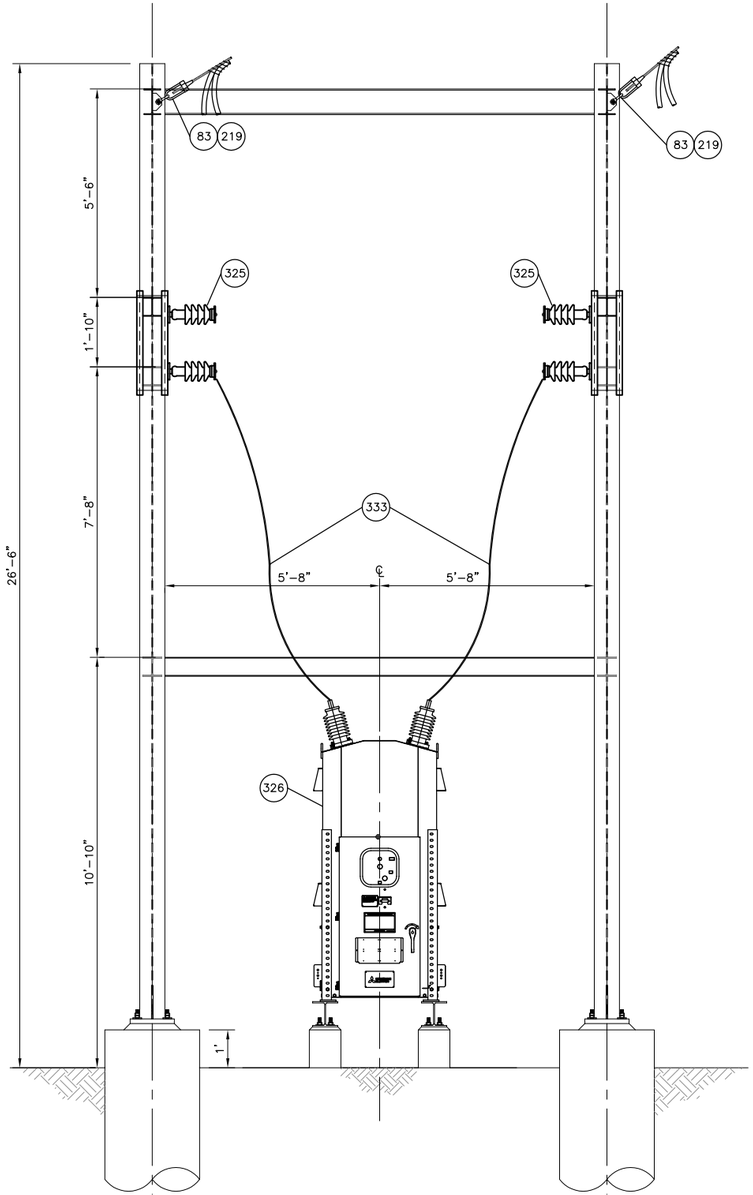
1 ET-3212 SIGNAL POWER 6.9 kV GANTRY - MID LEVEL PLAN VIEW
SCALE: 1/2" = 1'–0"



2 ET-3212 SIGNAL POWER 6.9 kV GANTRY - TOP LEVEL PLAN VIEW
SCALE: 1/2" = 1'–0"



3 ET-3212 SIGNAL POWER 6.9 kV GANTRY - SECTION
SCALE: 1/2" = 1'–0"



4 ET-3212 SCALE: 1/2" = 1'–0"

2' 1' 0 2'

SCALE: 1/2"= 1'–0"

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
353 BREAKER INSTALLATION
FRAZER – SIGNAL POWER GANTRY PLAN AND SECTION

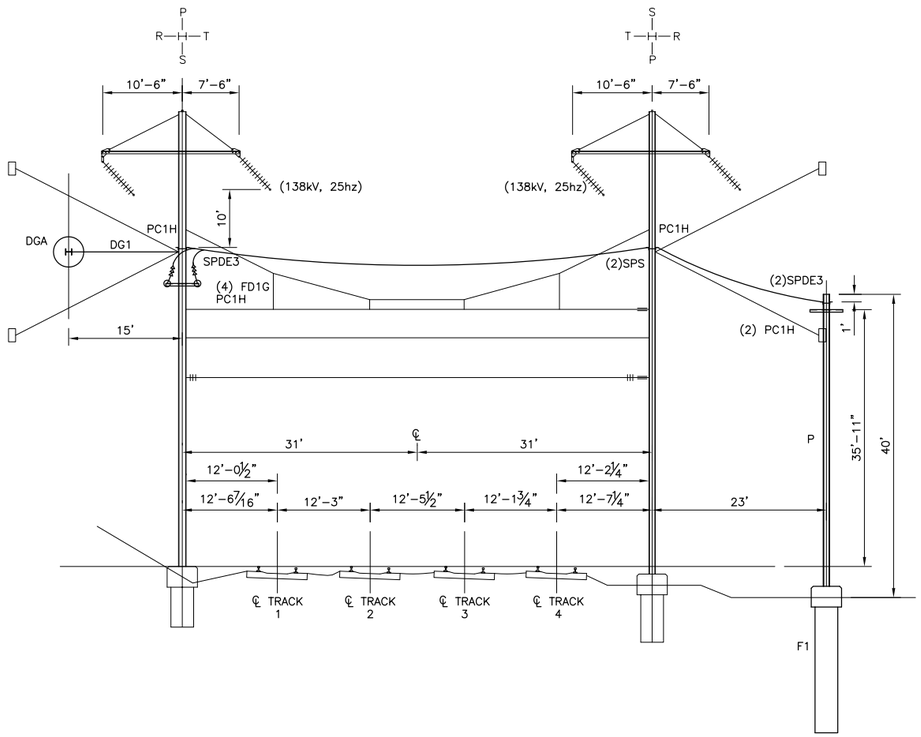
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Sheet No:	449 OF 565

ET–3212

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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
FD1G	FEEDER DEADEND	ET-1920	4
SPS	SIGNAL POWER SUPPORT	ET-1913	2
PC1H	SLIDING CLAMP	S-5211	5
DG1	DOWNGUY	ET-1908	1
DGA	DOWNGUY ANCHOR	S-5101	1
P	POLE	S-5103	1
F1	FOUNDATION	S-5102	1



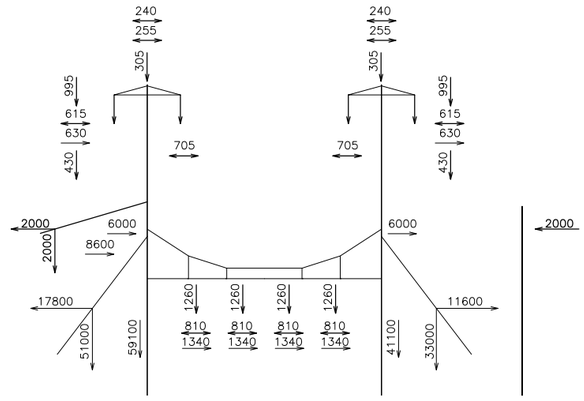
STRUCTURE ERECTION DIAGRAM P-35

1167+10

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
235' LOAD SPAN
(NOT TO SCALE)

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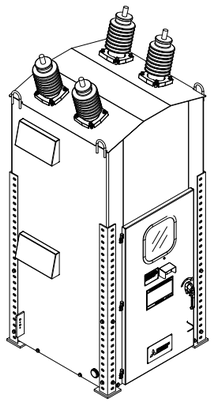
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
353 BREAKER INSTALLATION
SIGNAL POWER FEED FROM STRUCTURE P-35

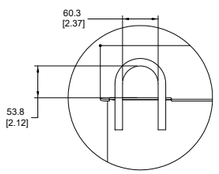
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Ref. No.:	2011-059
Sheet No:	450 OF 565

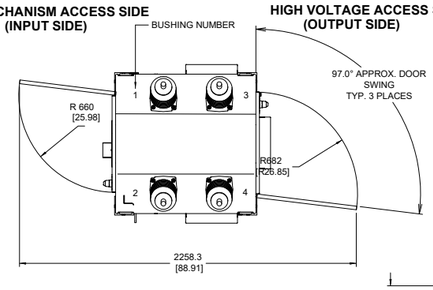
ET-3213

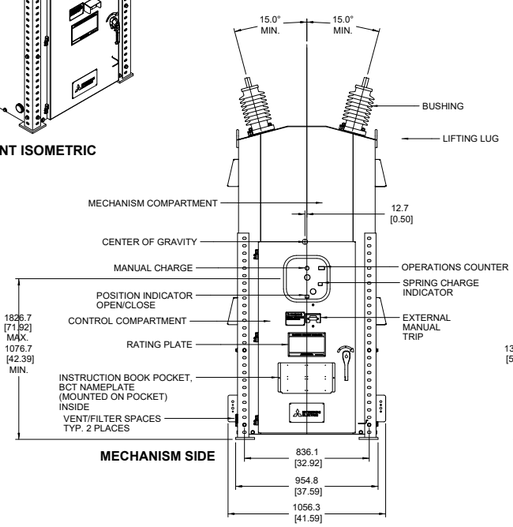


FRONT ISOMETRIC

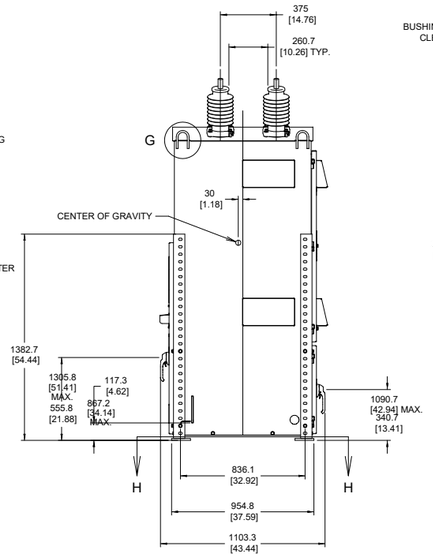


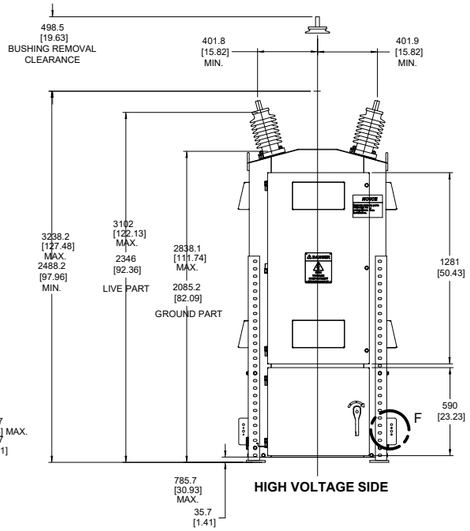
DETAIL G



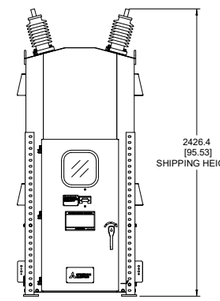


MECHANISM SIDE

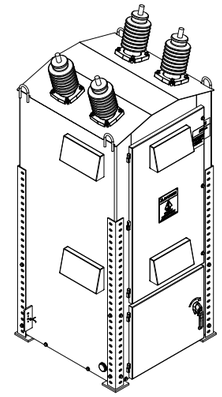




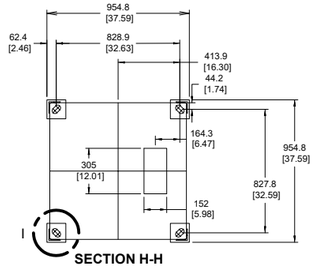
HIGH VOLTAGE SIDE



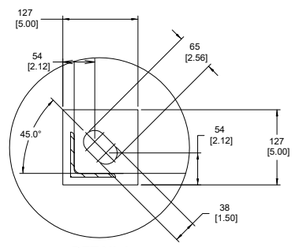
SHIPPING VIEW



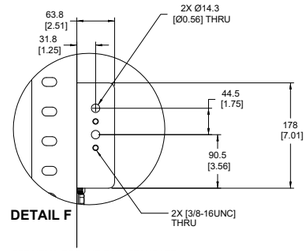
REAR ISOMETRIC



SECTION H-H



DETAIL I



DETAIL F

SST NEMA GROUND PAD, STANDARD
WITH 2 TAPPED HOLES AND 2 THRU HOLES

NOTES:

1. **DESIGN RATINGS AT 60 Hz (SEE NOTE 9 FOR 100 Hz RATINGS):**
   - RATED MAXIMUM VOLTAGE ..... 17 kV
   - RATED CONTINUOUS CURRENT 1200A
   - RATED SHORT CIRCUIT CURRENT ..... 25 kA
   - RATED DRY WITHSTAND VOLTAGE (60 Hz) ..... 50 kV
   - RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE (PEAK) ..... 110 kV
2. **WEIGHT:**
   - TOTAL & SHIPPING WEIGHT (APPROX.) ..... 998 kg [2200 lb]
3. **INSULATOR:**
   - TYPE ..... PORCELAIN
   - MINIMUM CREEPAGE DISTANCE ALONG SURFACE ..... 640 [25.2"]
4. **SURFACE TEATMENT:**
   - SUPPORT STRUCTURE ..... HOT DIPPED GALVANIZED
   - HOUSING ..... PAINT ANSI 70 LIGHT GRAY INSIDE AND OUTSIDE
5. **DYNAMIC LOADING:**
   - HORIZONTAL – (ACTING ALONG TANK CENTER LINE) ..... 0.33kN [74.4lb]
   - VERTICAL UP – (ACTING THROUGH CG) ..... 1.62kN [385.1lb]
   - VERTICAL DOWN – (ACTING THROUGH CG) ..... 2.10kN [472.1lb]
   - VERTICAL FORCES ADD TO OR SUBTRACT FROM BREAKER WEIGHT.
6. **INSTALLATION NOTE:**
   LEVEL THE BREAKER BY INSERTING SHIMS BETWEEN THE BREAKER STRUCTURE AND THE FOUNDATION.
7. **HEIGHT DIMENSIONS:**
   INCREMENTALLY CHANGE BY 50mm (1.96 in) RELATIVE TO LEG ADJUSTMENT.
8. **INPUT AND OUTPUT SIDES**
   DESIGNATIONS BASED ON INPUT BEING CONNECTED TO STATIONARY CONTACT SIDE OF INTERRUPTER AND OUTPUT BEING CONNECTED TO MOVING CONTACT SIDE OF INTERRUPTER.
9. **MAXIMUM RATINGS AT 100 Hz:**
   - RATED MAXIMUM VOLTAGE ..... 7 kV
   - RATED CONTINUOUS CURRENT ..... 1200 A
   - RATED SHORT CIRCUIT CURRENT ..... 1 kA
   - RATED DRY WITHSTAND VOLTAGE (100 Hz) ..... 36 kV
   - RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE (PEAK) ..... 110 kV

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.

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IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
352 BREAKER DETAIL

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

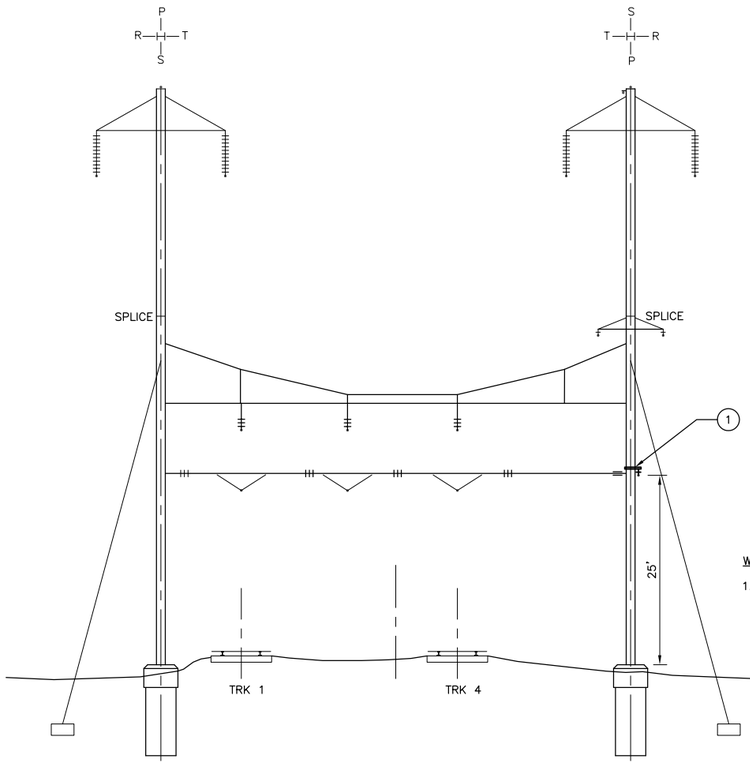
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ET–3216

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BILL OF MATERIAL 352 BREAKER FIBER RUN – MALVERN TO PAOLI		
ITEM	QTY	UNIT
PC–4	36	EA
SUSPENSION SUPPORT (ITEM 370)	36	EA
FIBER		LF

BILL OF MATERIAL 352 BREAKER FIBER RUN – STRAFFORD TO BRYN MAWR		
ITEM	QTY	UNIT
PC–4	105	EA
SUSPENSION SUPPORT (ITEM 370)	105	EA
FIBER		LF



WORK STATEMENT:

1. INSTALL FIBER FROM SUBSTATION TO PROPOSED 352 BREAKER 25' ABOVE TOF.

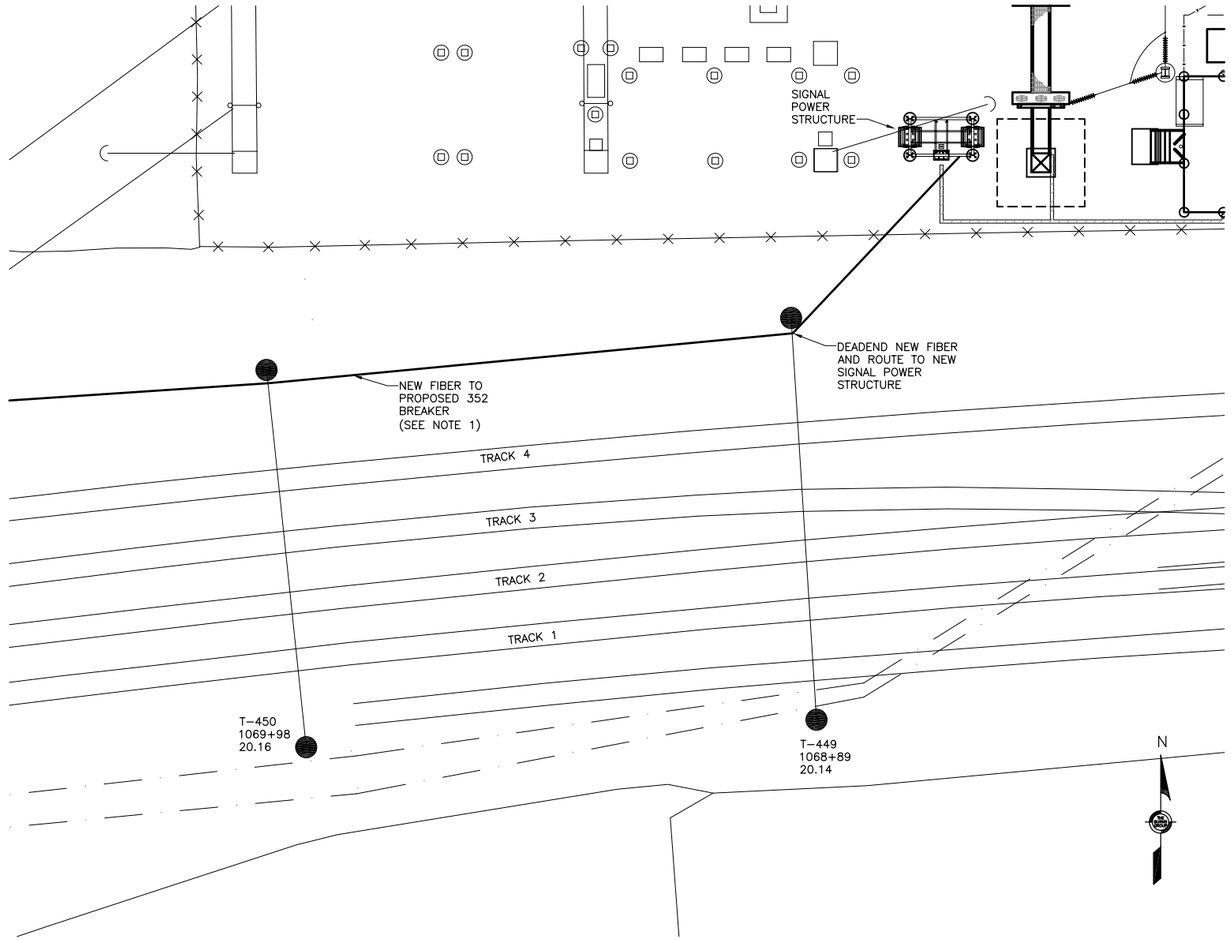
1 ET–3217 TYPICAL STRUCTURE ERECTION DIAGRAM PAOLI TO FRAZER

0 10 20

SCALE: 1"=10'–0"

NOTE:

1. OTHER CONDUCTORS NOT SHOWN FOR CLARITY



2 ET–3217 TYPICAL FIBER ROUTING INTO SUBSTATION - PLAN

16' 8' 0 16'

SCALE:1/16"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
TYPICAL 352 FIBER ROUTING DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

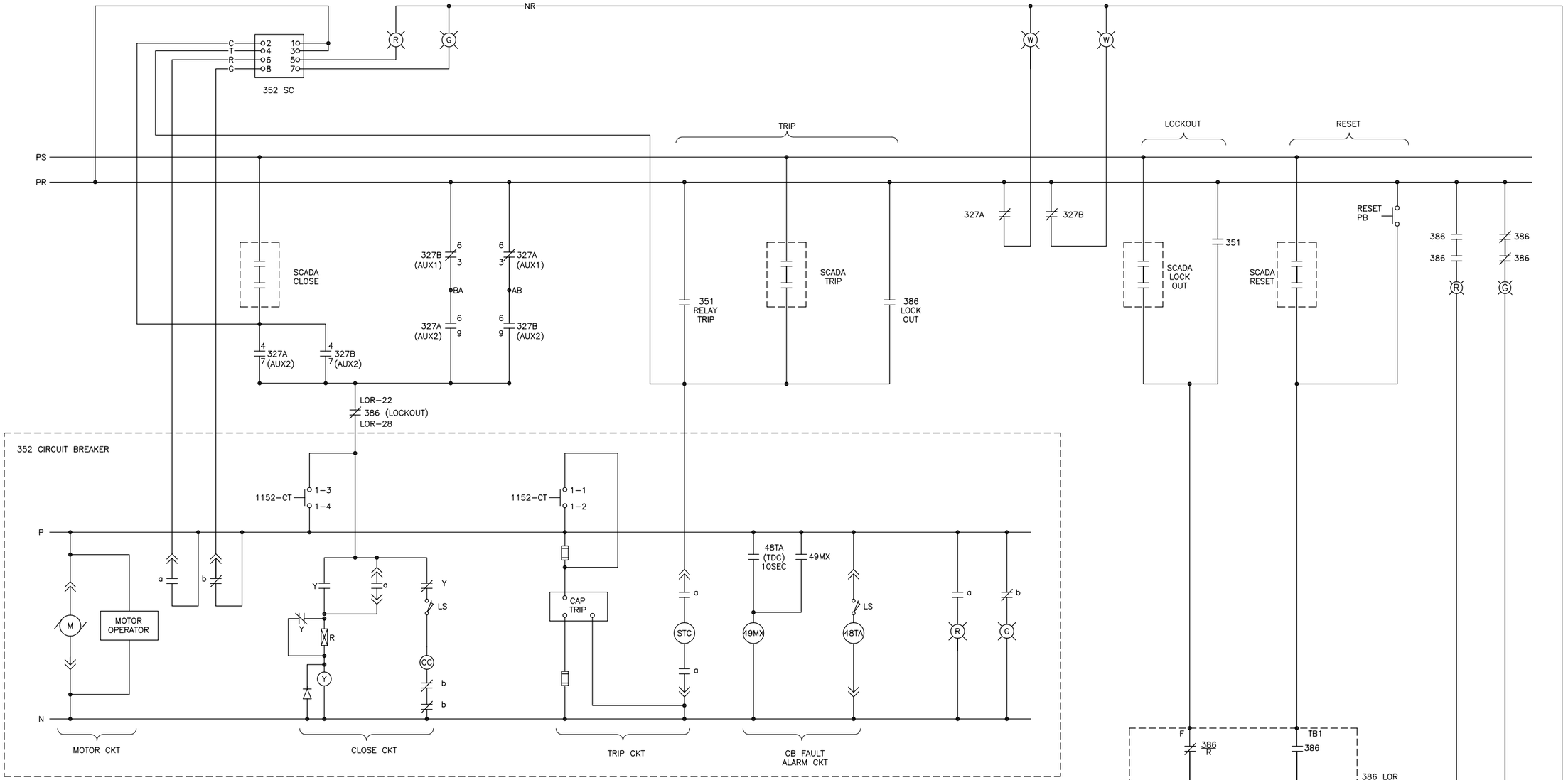
File No.:	2011–059–ET–3217.DWG
Ref. No.:	2011–059
Sheet No:	452 OF 565

ET–3217

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–3221 352 BREAKER - CONTROL DC SCHEMATIC

SCALE: NONE

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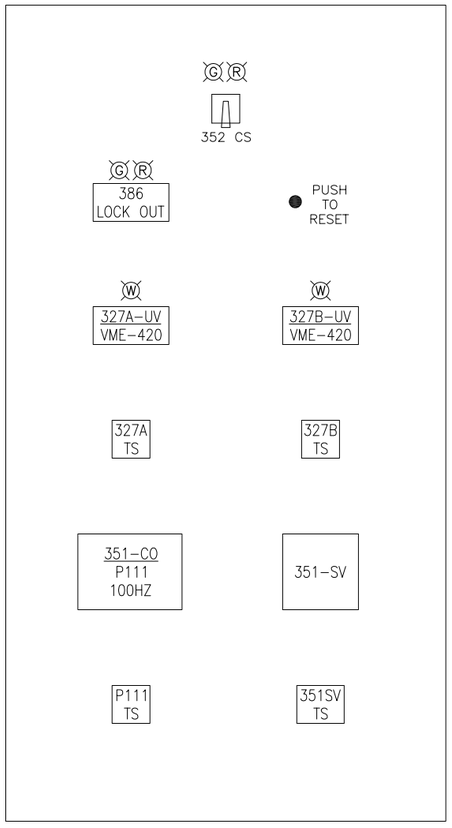
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
352 BREAKER – CONTROL DC SCHEMATIC

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

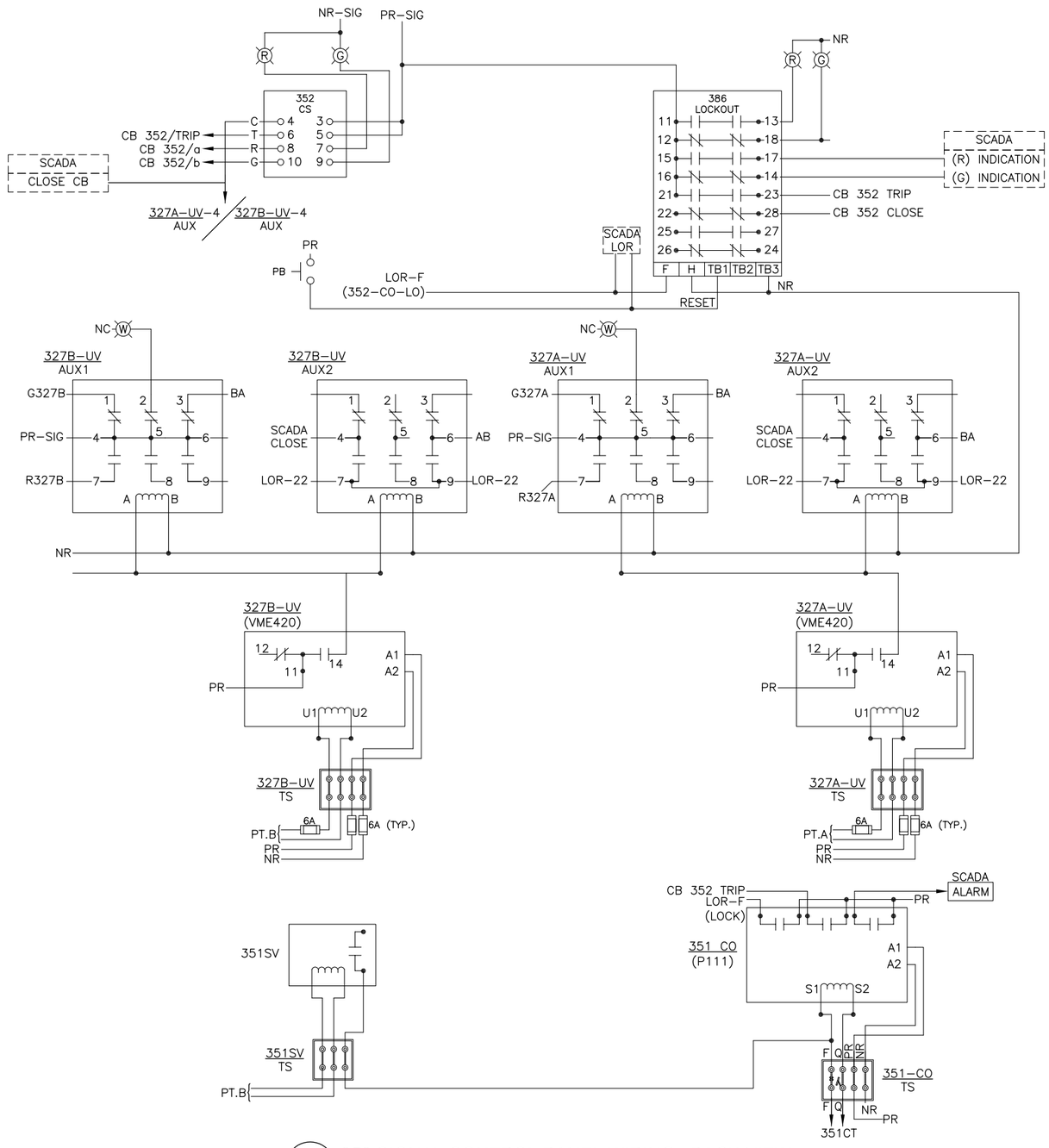
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ET–3221

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1 ET–3222 352 SIGNAL CONTROL PANEL - FRONT VIEW
N.T.S.



2 ET–3222 352 SIGNAL CONTROL PANEL WIRING - BACK VIEW
N.T.S.

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.

327B–UV AUX1

1 – G327B
2 – W327B
3 – BA
4 – PR–SIG
5 – PR–SIG
6 – PR–SIGN
7 – R327B

327B–UV AUX2

4 – SCADA CLOSE/352SC–C
6 – AB
7 – LOR–22
9 – LOR–22

327A–UV AUX1

1 – G327A
2 – W327A
3 – AB
4 – PR–SIG
5 – PR–SIG
6 – PR–SIGN
7 – R327A

327A–UV AUX2

4 – SCADA CLOSE/352SC–C
6 – BA
7 – LOR–22
9 – LOR–22

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PHILADELPHIA, PA 19103
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Baker
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
SIGNAL CONTROL PANEL AND WIRING

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

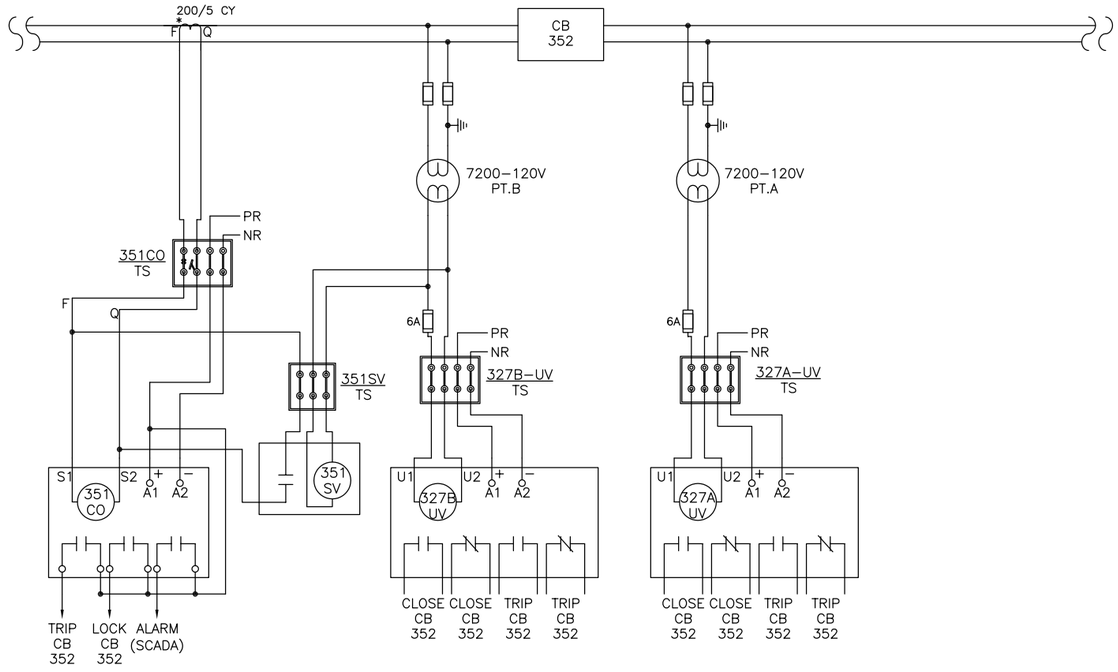
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–3223 100HZ 352 CIRCUIT BREAKER AC SCHEMATIC

SCALE: NONE

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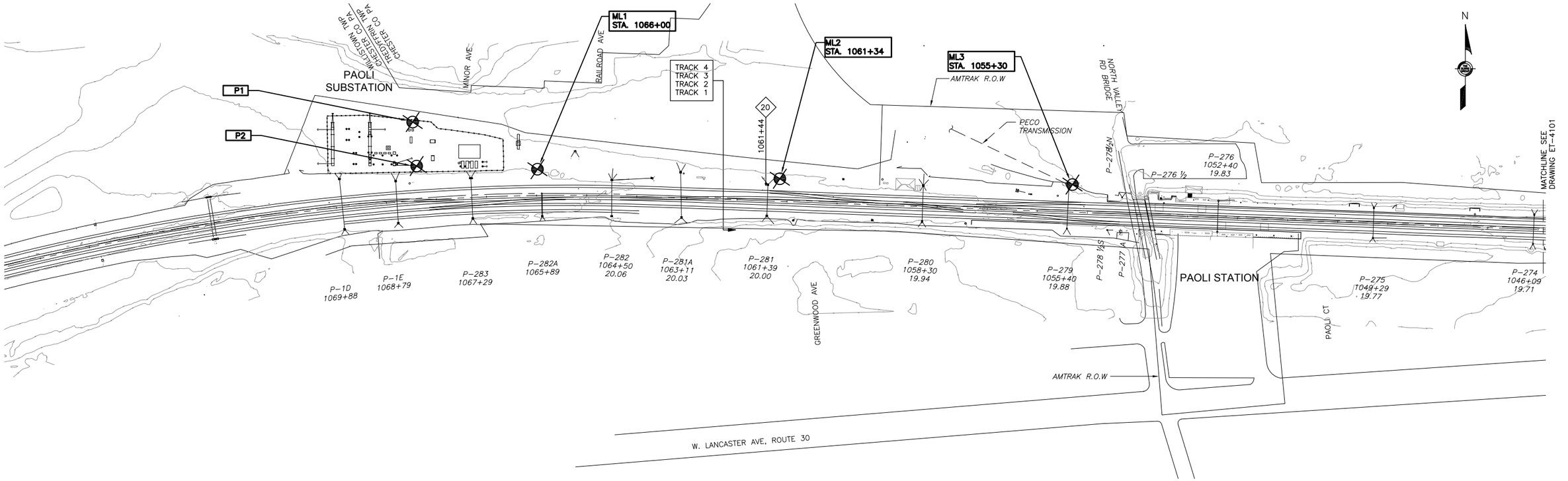
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
100HZ 352 CIRCUIT BREAKER AC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

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ET–3223

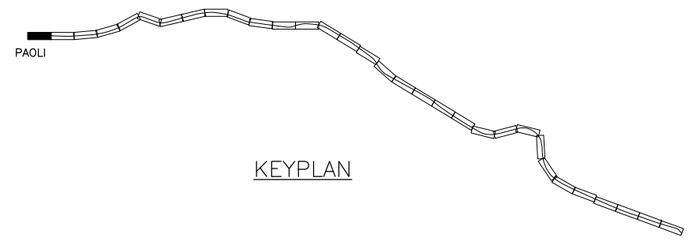
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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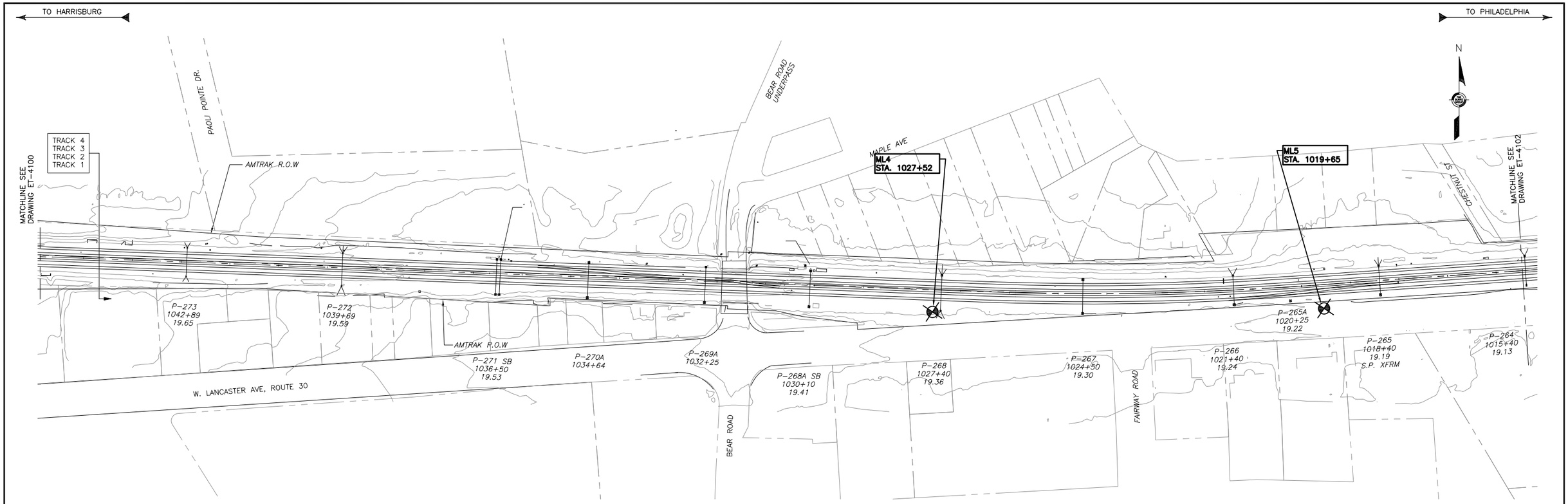
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
BORING LOCATION PLAN
STA. 1075+00 TO 1046+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4100.DWG
Ref. No.:	2011-059
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ET-4100

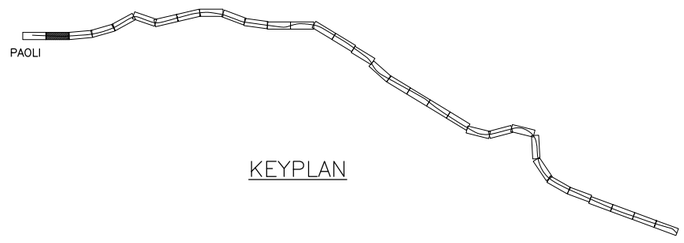
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BORING LOCATION PLAN
STA. 1046+00 TO 1015+45

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

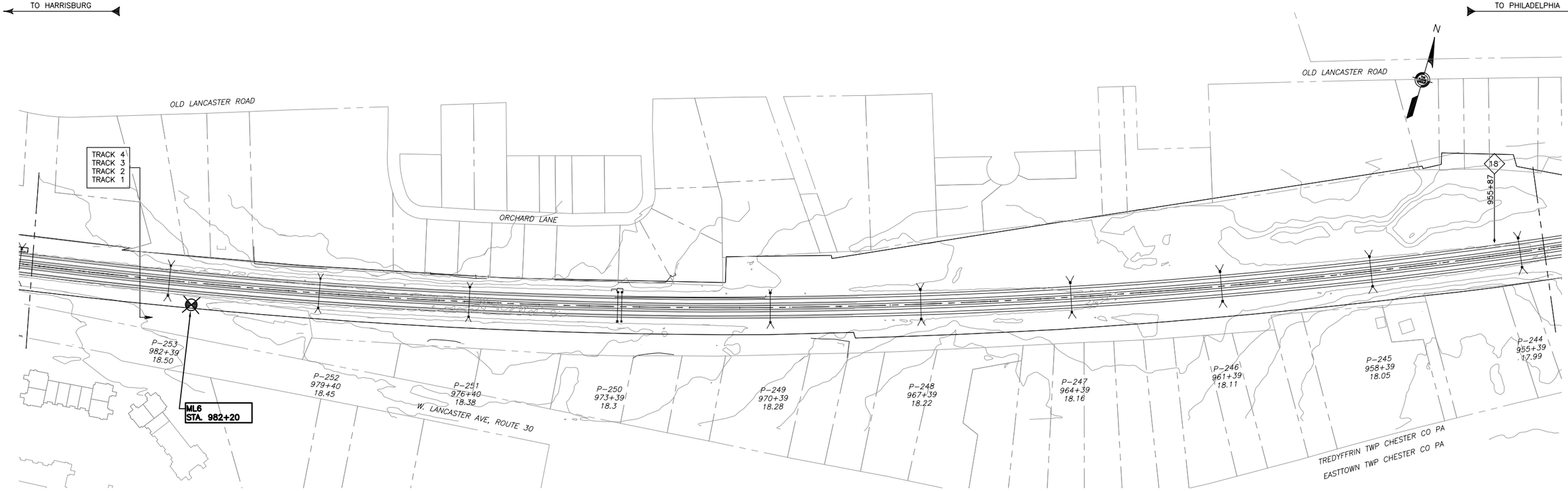
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Ref. No.:	2011-059
Sheet No:	457 OF 565

ET-4101

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TO HARRISBURG

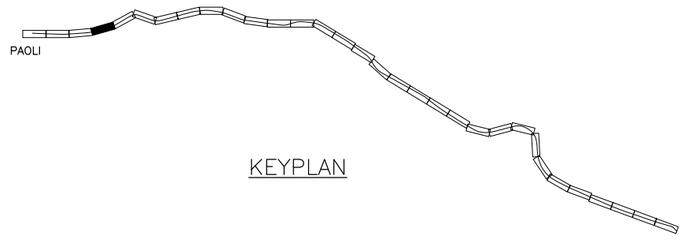
TO PHILADELPHIA



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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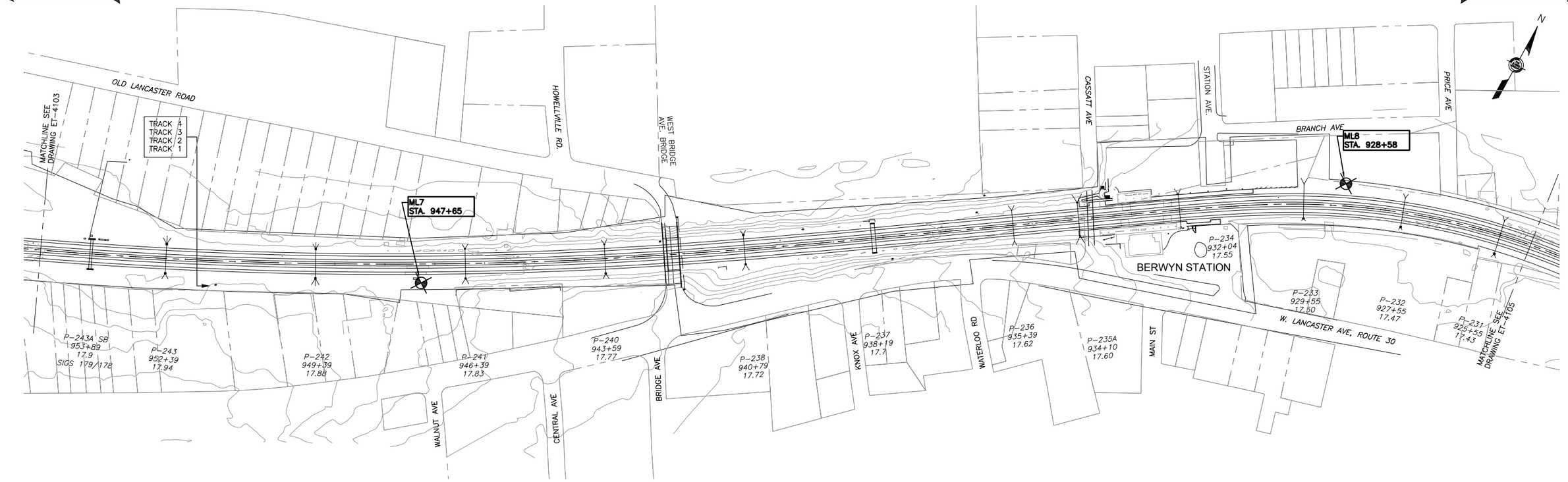
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 985+00 TO 955+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4103.DWG
Ref. No.:	2011-059
Sheet No:	458 OF 565

ET-4103

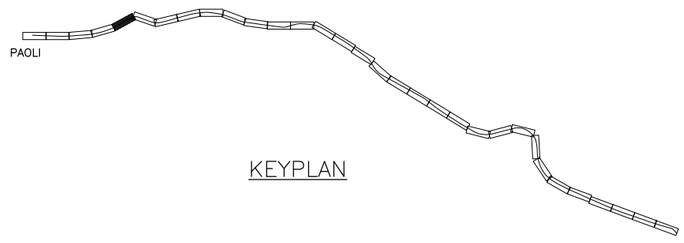
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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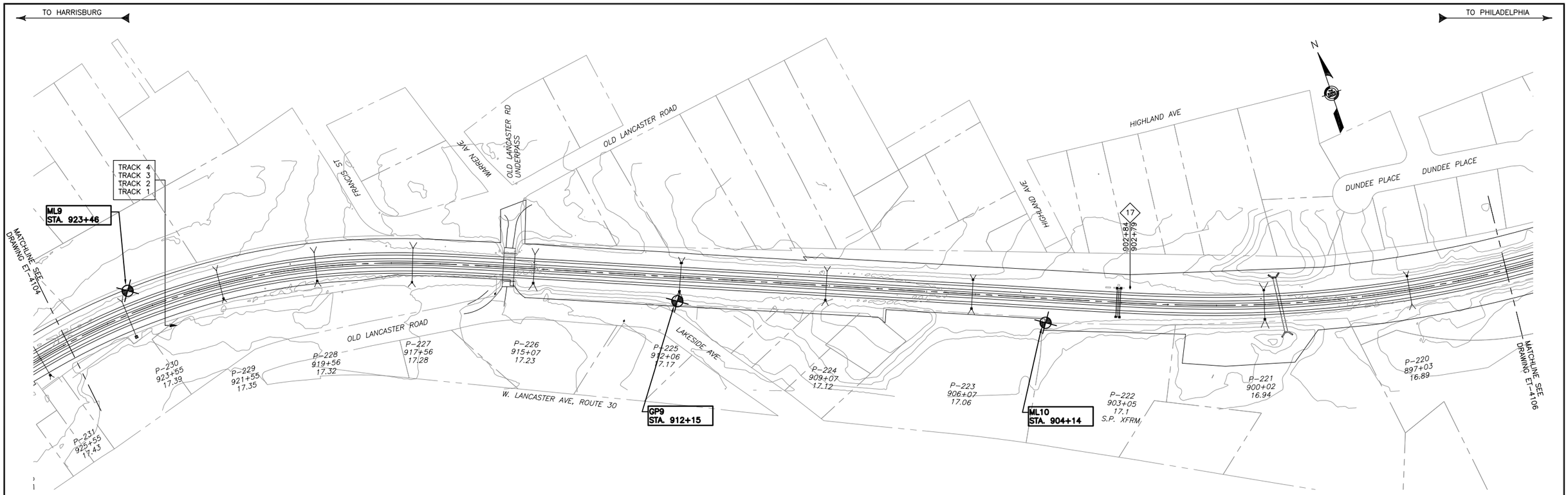
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 955+00 TO 925+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4104.DWG
Ref. No.:	2011-059
Sheet No:	459 OF 565

ET-4104

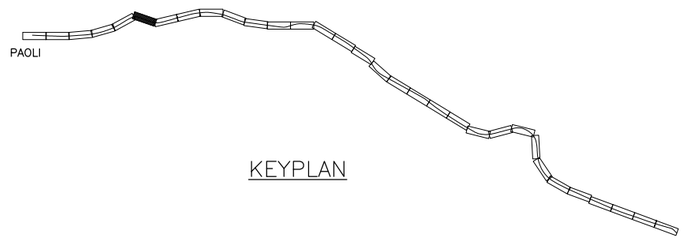
2:26:07 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\borings\2011-059-et-4104.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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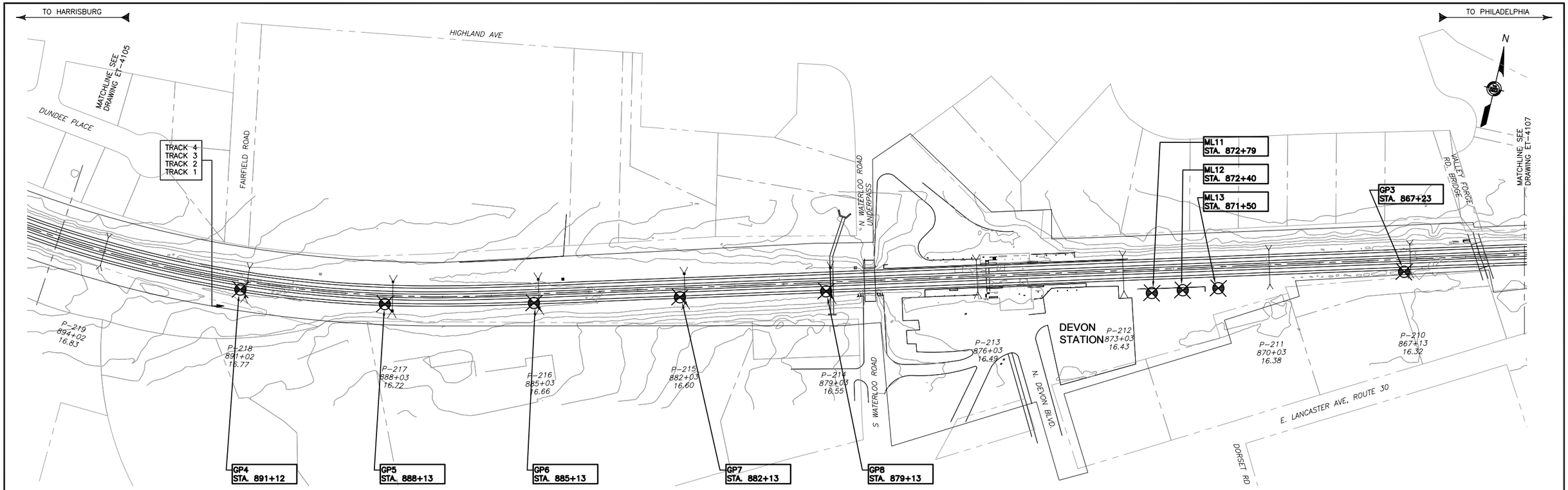
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA 925+00 TO 895+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4105.DWG
Ref. No.:	2011-059
Sheet No:	460 OF 565

ET-4105

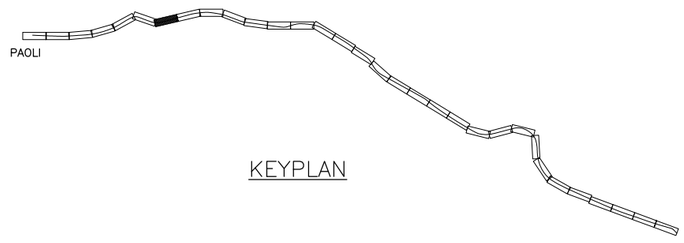
3/14/2016 2:26:14 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\borings\2011-059-et-4105.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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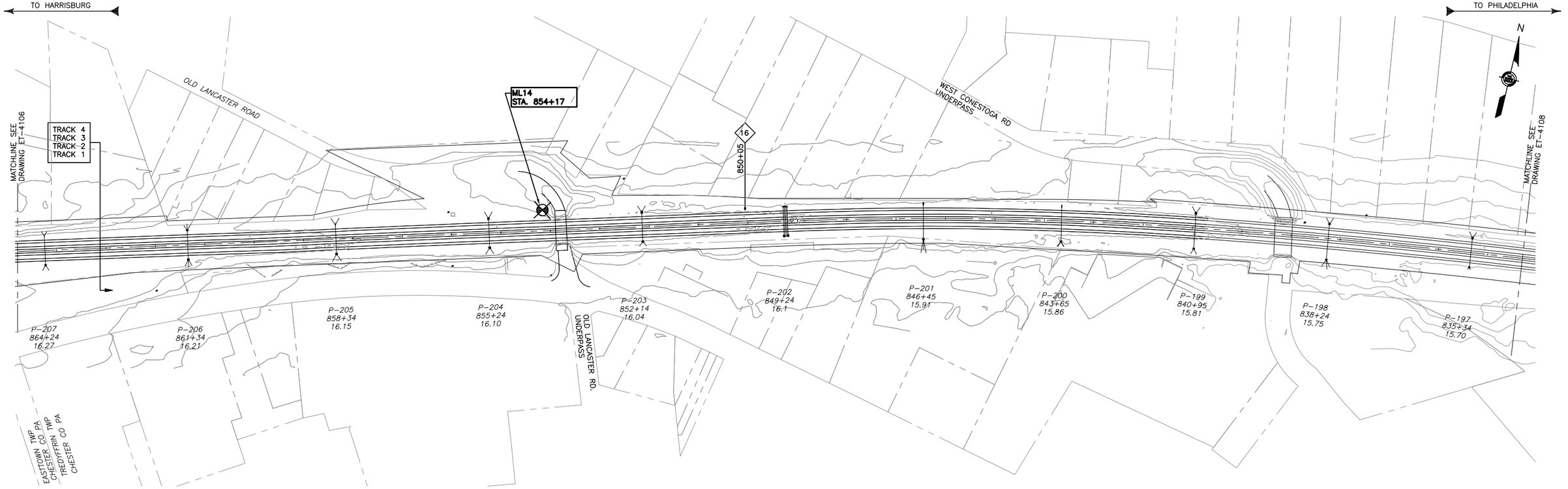
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 895+00 TO 865+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4106.DWG
Ref. No.:	2011-059
Sheet No:	461 OF 565

ET-4106

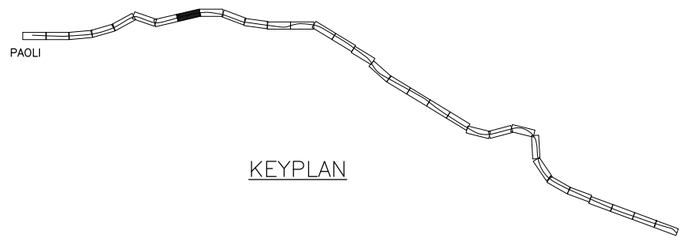
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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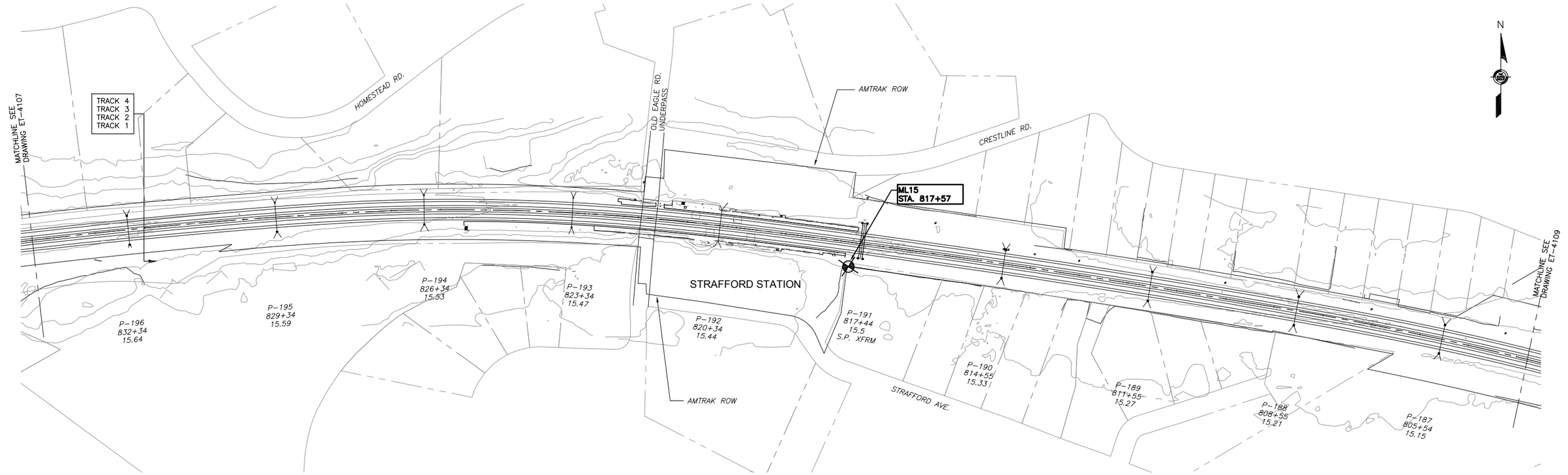
BORING LOCATION PLAN
STA. 865+00 TO 835+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4107.DWG
Ref. No.:	2011-059
Sheet No:	462 OF 565

ET-4107

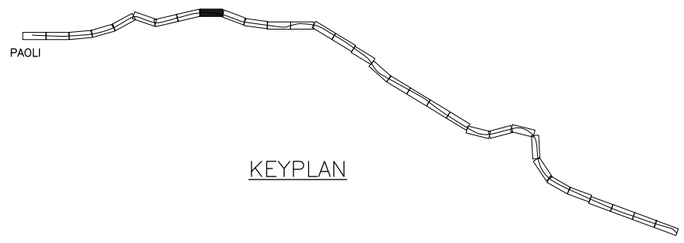
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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BORING LOCATION PLAN
STA. 835+00 TO 804+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

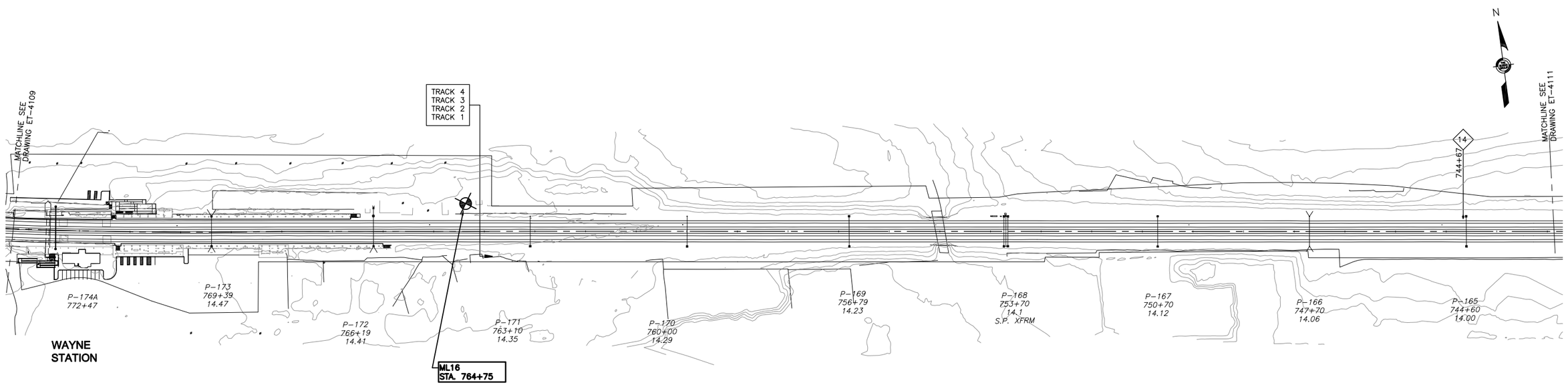
File No.:	2011-059-ET-4108.DWG
Ref. No.:	2011-059
Sheet No:	463 OF 565

ET-4108

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TO HARRISBURG

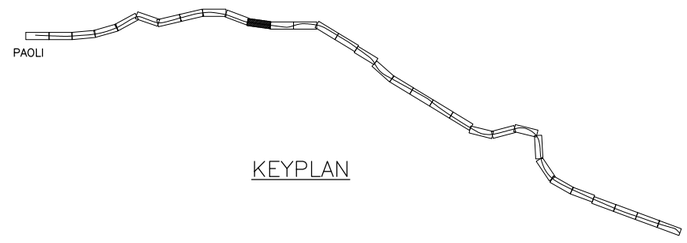
TO PHILADELPHIA



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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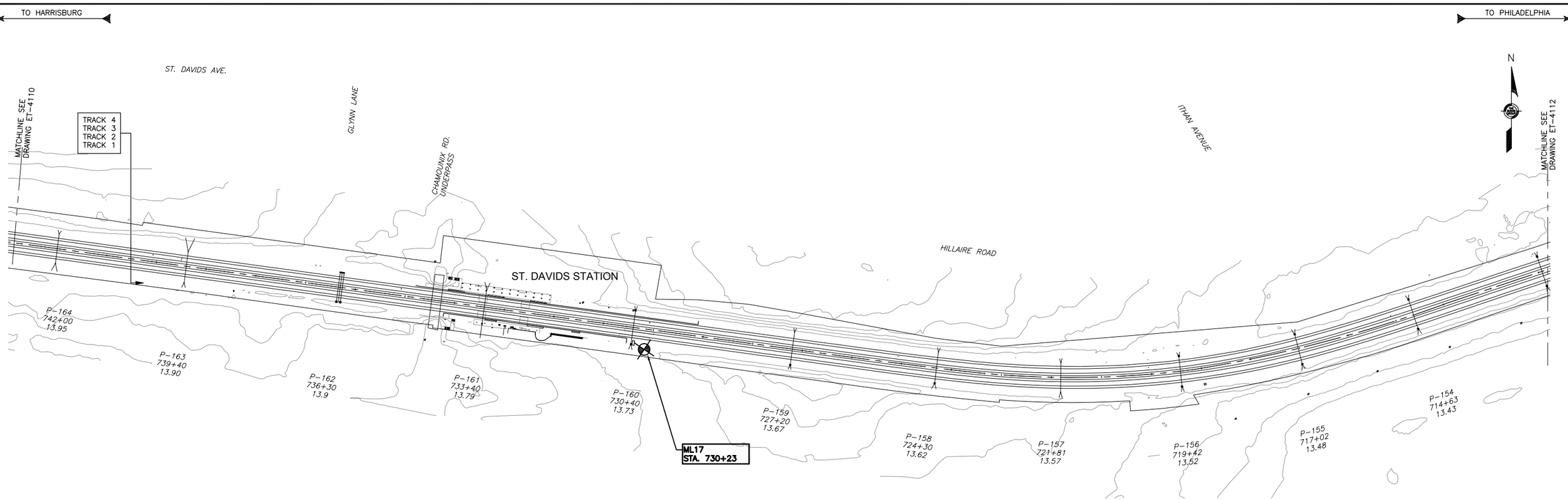
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 774+00 TO 744+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4110.DWG
Ref. No.:	2011-059
Sheet No:	464 OF 565

ET-4110

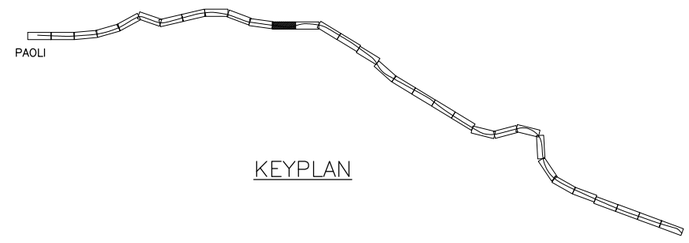
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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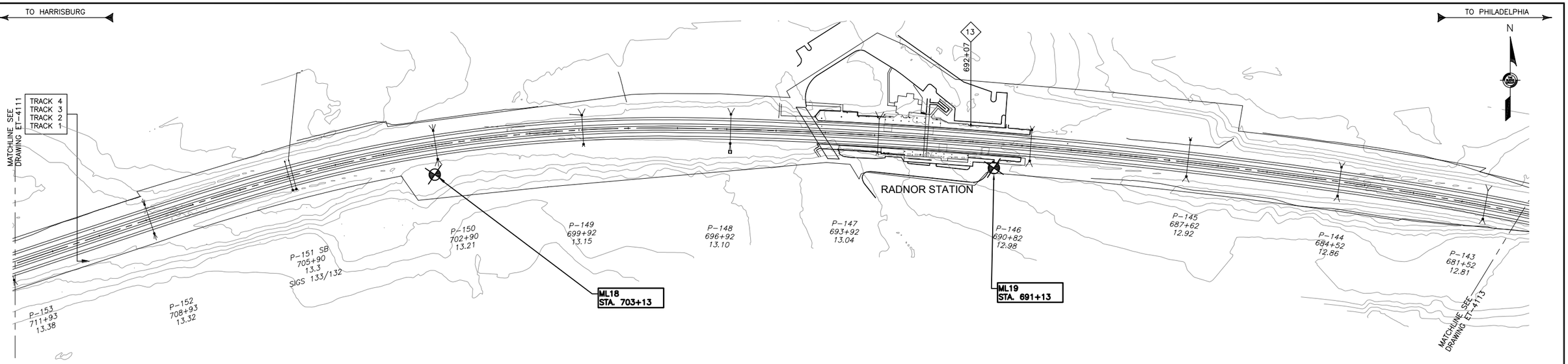
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 744+00 TO 712+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-4111.DWG
Ref. No.:	2011-059
Sheet No:	465 OF 565

ET-4111

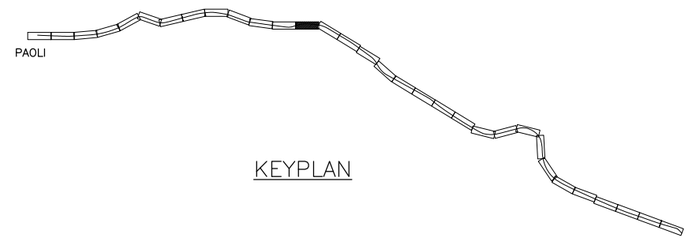
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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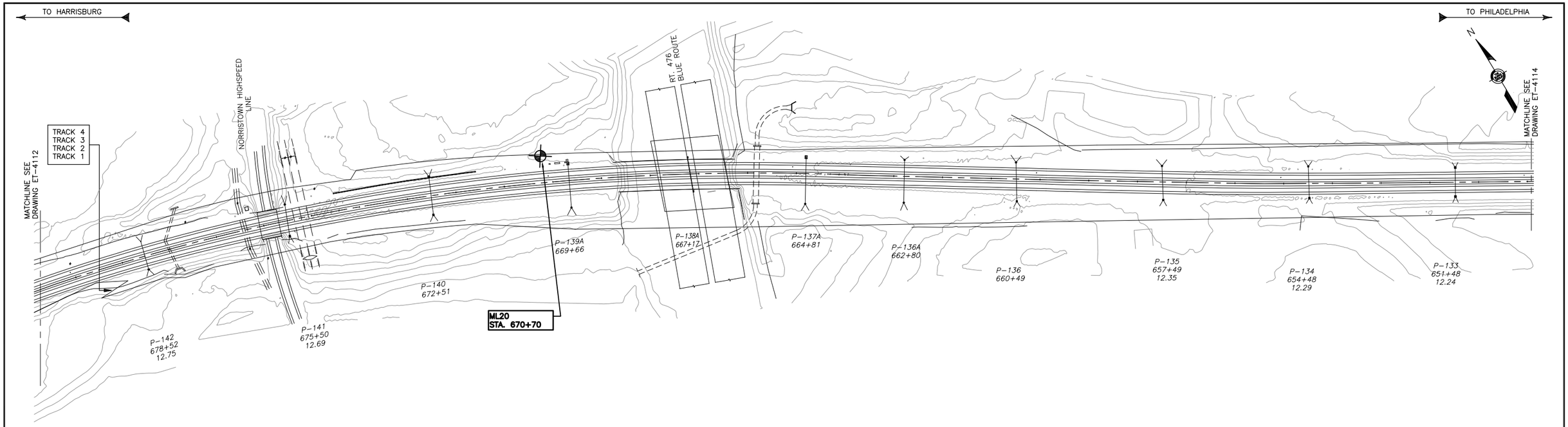
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 712+00 TO 681+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4112.DWG
Ref. No.:	2011-059
Sheet No:	466 OF 565

ET-4112

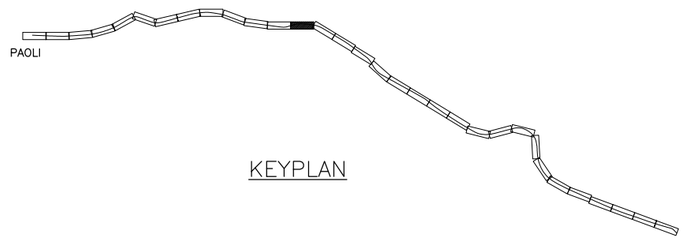
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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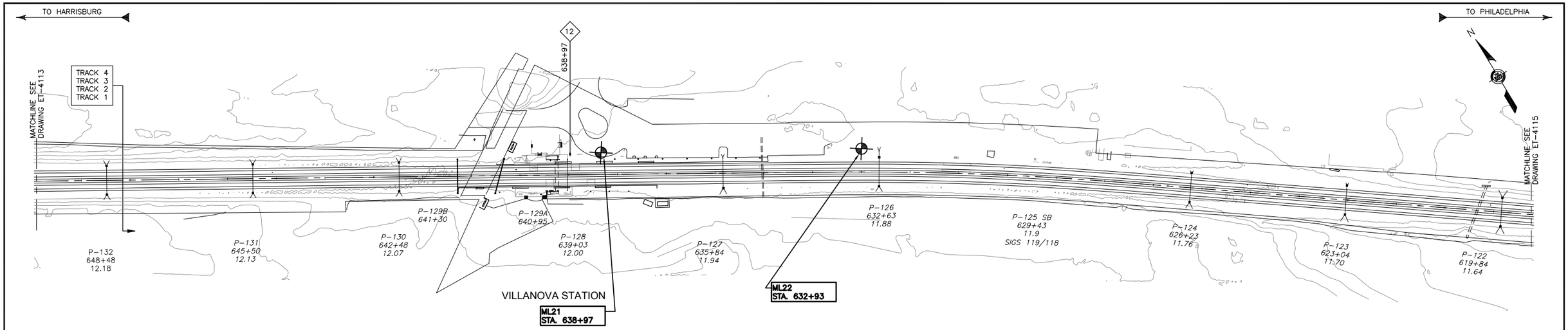
BORING LOCATION PLAN
STA. 681+00 TO 650+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4113.DWG
Ref. No.:	2011-059
Sheet No:	467 OF 565

ET-4113

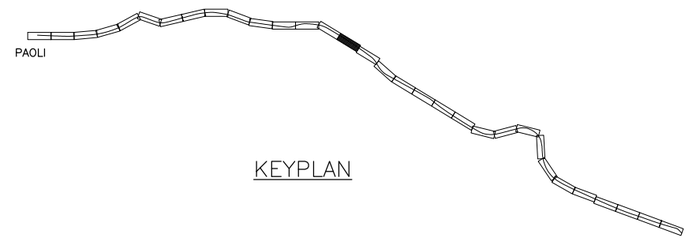
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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BORING LOCATION PLAN
STA. 650+00 TO 619+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4114.DWG
Ref. No.:	2011-059
Sheet No:	468 OF 565

ET-4114

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TO HARRISBURG

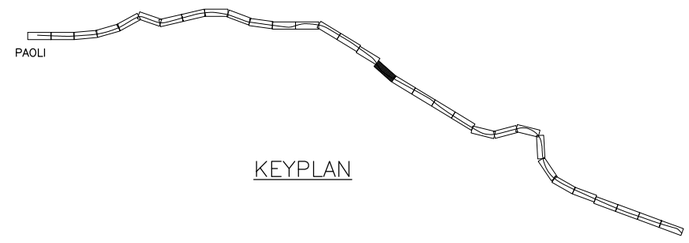
TO PHILADELPHIA



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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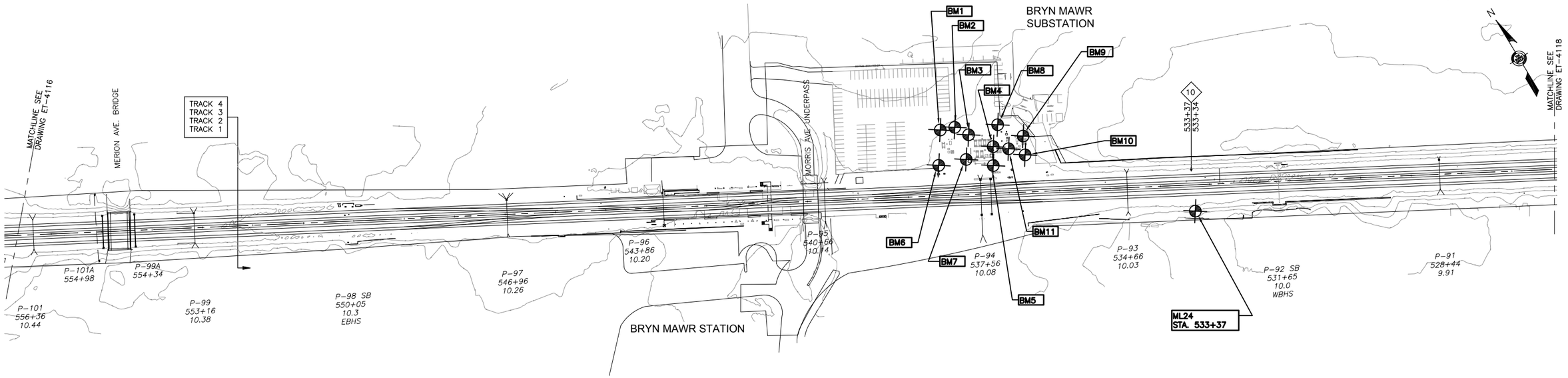
BORING LOCATION PLAN
STA. 588+00 TO 556+65

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4116.DWG
Ref. No.:	2011-059
Sheet No:	469 OF 565

ET-4116

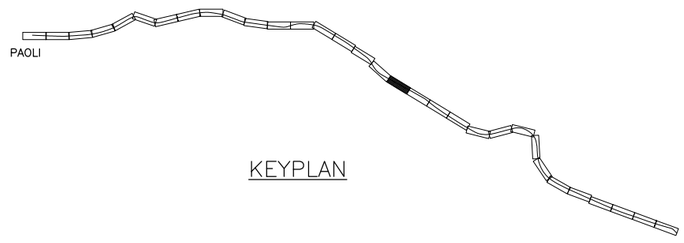
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BORING LOCATION PLAN
STA 556+65 TO 526+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4117.DWG
Ref. No.:	2011-059
Sheet No:	470 OF 565

ET-4117

3/14/2016 2:27:31 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\borings\2011-059-et-4117.dwg

Project:)Amtrak Zoo to Paoli Project Location:)Paoli Sub Station Project Number:)11043	Log of Boring P1 Sheet 1 of 1

Date(s)r Drilled)7/29/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)543'
Groundwater Leveir and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location))	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	1–1–1–1	0.3	17					Fill		Silty fill, tan/black, moist, very loose	
			S2	1–2–4–4	1.5	75					GM		Silty gravel with sand (gm), tan, moist, loose	
	10		S3	5–8–10–11	2.0	100		14.9	NV	NP	GM		Silty gravel with sand (gm), tan, moist, medium dense	
	15		S4	9–8–8–6	1.5	75					GM		Silty gravel with sand (gm), tan, moist, medium dense	
	20		S5	7–6–6–7	1.0	50							Decomposed rock, tan/red/white, dry, medium dense	
	25		S6	32–23–24–44	1.7	83							Decomposed rock, tan/red/white, dry, dense	
	30												Boring Terminated at 25'	

Project:)Amtrak Zoo to Paoli Project Location:)Paoli Sub Station Project Number:)11043	Log of Boring P2 Sheet 1 of 1

Date(s)r Drilled)7/29/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)18.5
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)543'
Groundwater Leveir and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location))	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	3–5–5–1	0.7	33					Fill		Fill, black, dry, loose	
			S2	1–1–1–1	0.0	0							No recovery	
	10		S3	2–1–5–3	0.5	25					Fill		Fill, black/tan, moist, loose	
	15		S4	21–24–20–21	1.7	83		5.4	NV	NP	GW–GM		Well–graded gravel with silt and sand with decomposed rock,gray/brown, dry, dense	
	20		S5	50/4"	0.7	33					GW–GM		Bedrock, very dense	
													Boring Terminated at 18.5'	
	25													
	30													

BORING LOGS

NOTES:

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
BORING LOGS
SHEET 1 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4200.DWG
Ref. No.:	2011–059
Sheet No:	471 OF 565

ET–4200

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Project:)Paoli to Zoo Transmission Line
Project Location:)Paoli
Project Number:)11043

Log of Boring ML1
Sheet 1 of 1

Date(s)r Drilled)8/2/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)20'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)545'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 1066+00 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	5–4–6–7	2.0	100					ML		Sandy silt (ml) with gravel, tan, dry, loose	
			S2	10–14–16–13	1.0	50					ML		Sandy silt (ml) with decomposed rock, tan/red, dry, medium dense	
)	10		S3	12–14–12–12	1.0	50					ML		Sandy silt (ml) with decomposed rock, tan/red, dry, medium dense	
			S4	13–19–20–23	0.7	33		20.0	NV	NP	ML		Sandy silt (ml), red/yellow, dry, dense	
)	15													
			S5	17–24–35–35	0.0	0							No Recovery	
)	20												Boring Terminated at 20'	
	25													
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Paoli
Project Number:)11043

Log of Boring ML2
Sheet 1 of 1

Date(s)r Drilled)8/2/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)540'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 1061+34 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	4–2–2–1	0.2	8					Fill		Fill, brown, dry, very loose	
			S2	2–3–2–2	0.5	25					ML		Silt (ml) with gravel, tan, moist, loose	
)	10		S3	2–2–1–2	1.0	50		22.8	NV	NP	ML		Gravely silt (ml) with sand, tan, moist, very loose	
			S4	5–5–10–13	1.7	83					ML		Silt (ml) with gravel, tan, moist, medium dense	
)	15													
			S5	14–17–22–35	1.0	50							Decomposed rock, tan, dry, dense	
)	20													
			S6	35–35–25–38	0.8	42							Decomposed rock and quartz, tan/white, dry, very dense	
	25												Boring Terminated at 25'	
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Paoli
Project Number:)11043

Log of Boring ML3
Sheet 1 of 1

Date(s)r Drilled)8/2/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)23.3'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)540'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 1055+40 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	3–5–4–4	1.6	80					Fill		Silty fill, gray/tan, dry, loose	
			S2	5–6–7–8	1.5	75					ML		Silt (ml), tan, moist, medium dense	
)	10		S3	6–7–7–6	1.2	58					ML		Silt (ml) with gravel, tan/red, moist, medium dense	
			S4	17–21–23–22	1.0	50		6.8	NV	NP	GM		Silty gravel (gm) with sand, tan/red, dry, dense	
)	15													
			S5	12–17–19–21	1.3	67					ML		Silt (ml) and decomposed rock, tan, dry, dense	
)	20													
			S6	50/4"	0.3	17							Decomposed rock and quartz, tan/white, dry, very dense	
	25												Refusal at 23.3'	
)	30													

BORING LOGS

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 2 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–4201.DWG
Ref. No.:	2011–059
Sheet No:	472 OF 565

ET–4201

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Project:)Paoli to Zoo Transmission Line
Project Location:)Paoli
Project Number:)11043

Log of Boring ML4
Sheet 1 of 1

Date(s)r Drilled)8/5/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)18.4'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)521'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 1027+52 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0										Fill		Fill, black, dry, loose	
	5		S1	4-4-4-7	0.3	16					Fill		Fill, black, dry, loose	
			S2	6-4-4-4	0.1	4					ML		Silt (ml), black/tan, moist, loose	
	10		S3	6-5-4-4	0.3	16								
			S4	8-7-32-45	1.0	50		4.9	NV	NP	SM		Silty sand (sm) with gravel, red/tan, dry, dense	
	15													
			S5	50/5"	0.4	21							Decomposed rock, red/tan, dry, very dense Refusal at 18.4'	
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Paoli
Project Number:)11043

Log of Boring ML5
Sheet 1 of 1

Date(s)r Drilled)8/6/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)9.3'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)521'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 1019+65 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0										SM		Silty sand (sm) with gravel, tan, dry, medium dense	
	5		S1	8-12-15-11	1.0	50					SM		Silty sand (sm) with gravel, tan, dry, medium dense	
			S2	7-7-9-9	1.2	58		9.0	NV	NP			Decomposed rock, red/blue, dry, very dense Refusal at 9.3'	
	10		S3	24-47-50/4"	1.0	50								
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Daylesford, Pennsylvania
Project Number:)11043

Log of Boring ML6
Sheet 1 of 1

Date(s)r Drilled)8/6/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)519'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 982+20 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0										ML		Silt (ml) with gravel, tan, moist, loose	
	5		S1	2-2-4-6	1.5	75					ML		Silt (ml) with gravel, tan, moist, medium dense	
			S2	6-7-10-9	1.2	58							Silt (ml) with gravel, tan, moist, medium dense	
	10		S3	9-11-11-15	1.3	63								
			S4	9-10-12-14	1.7	83					ML		Silt (ml) with sand, tan/white, moist, medium dense	
	15													
			S5	8-9-15-19	2.0	100		21.5	NV	NP	ML		Silt (ml) with sand, tan/white, moist, medium dense	
	20													
			S6	10-13-17-24	2.0	100					ML		Silt (ml) with decomposed rock, tan/white, moist, medium dense Boring Terminated at 25'	
	25													
	30													

BORING LOGS

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 3 OF 20

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-4202.DWG
Ref. No.:	2011-059
Sheet No:	473 OF 565

ET-4202

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Project:)Paoli to Zoo Transmission Line
Project Location:)Berwyn, Pennsylvania
Project Number:)11043

Log of Boring ML7
Sheet 1 of 1

Date(s)r Drilled)8/7/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)9.8'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)506'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 947+65 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	6–9–13–23	1.0	50					ML		Silt (ml) with decomposed rock, tan, dry, medium dense	
			S2	43–17–17–19	1.5	75							Decomposed rock, blue/gray, dry, dense	
			S3	15–18–30–50/4"	1.0	50							Decomposed rock, blue/gray, dry, dense	
	10												Refusal at 9.8'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Berwyn, Pennsylvania
Project Number:)11043

Log of Boring ML8
Sheet 1 of 1

Date(s)r Drilled)8/8/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)497'
Groundwater Levelr and Date Measured)23'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 923+46 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	5–6–3–3	1.2	58					ML		Silt (ml) with gravel, tan, dry, loose	
			S2	3–3–3–5	1.7	83					SM		Silty sand (sm) with gravel, tan, moist, loose	
			S3	15–15–13–13	1.0	50					SM		Silty sand (sm) with gravel, tan, moist, medium dense	
	10													
	15		S4	8–10–10–9	1.7	83					SM		Silty sand (sm) with gravel, red/tan, moist, medium dense	
			S5	7–8–8–8	1.2	58		20.1	NV	NP	SM		Silty sand (sm), red, moist, medium dense	
	20												▽	
	25		S6	5–8–11–15	1.3	67					SM		Silty sand (sm) with gravel and decomposed rock, red, wet, medium dense	
													Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Berwyn, Pennsylvania
Project Number:)11043

Log of Boring ML9
Sheet 1 of 1

Date(s)r Drilled)8/7/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)501'
Groundwater Levelr and Date Measured)23'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 928+58 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	3–3–5–5	1.5	75					ML		Silt (ml), brown, moist, loose	
			S2	8–5–3–4	0.0	0							No recovery	
			S3	4–3–2–1	0.0	0							No recovery	
	10													
	15		S4	10–9–9–7	0.0	0							No recovery	
			S5	5–9–14–17	1.7	83							Decomposed rock, red/tan/gray, moist, medium dense	
	20												▽	
	25		S6	6–11–14–18	1.7	83							Decomposed rock, red/tan/gray, wet, medium dense	
													Boring Terminated at 25'	
	30													

BORING LOGS

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 4 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	

File No.:	2011-059-ET-4203.DWG
Ref. No.:	2011–059
Sheet No:	474 OF 565

ET–4203

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Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP9
Sheet 1 of 1

Date(s)r Drilled)10/8/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)4.5
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)202'
Groundwater Leverl and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 912+16 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Decomposed rock, tan/orange/brown, dry	
	5		S-2		0.5	13							Decomposed rock, tan/orange/brown, dry Boring terminated at 4.5'	
	10													
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Berwyn, Pennsylvania
Project Number:)11043

Log of Boring ML10
Sheet 1 of 1

Date(s)r Drilled)8/8/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)8.3'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)481'
Groundwater Leverl and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 904+14 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	10-14-13-13	1.0	50							Decomposed rock, blue/gray/white, dry, medium dense	
			S2	8-5-16-50/5"	1.2	58							Decomposed rock, blue/gray/white, dry, medium dense	
			S3	50/4"	0.3	17							Decomposed rock, blue/gray/white, dry, very dense	
	10		R1		69	7 RQD							Gray and Brown Schist Auger Refusal at 8.3'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP4
Sheet 1 of 1

Date(s)r Drilled)10/3/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)9.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)475'
Groundwater Leverl and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 891+12 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, ballast, black, moist	
	5		S-2		3.0	79		4.6	NV	NP	SP-SM		Poorly graded sand with silt and gravel (sp-sm), tan/white, dry	
			S-3		0.3	9							Decomposed rock, tan/blue, dry	
	10												Boring Terminated at 9'	
	15													
	20													
	25													
	30													

BORING LOGS

NOTES:

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 5 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4204.DWG
Ref. No.:	2011-059
Sheet No:	475 OF 565

ET-4204

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Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP5
Sheet 1 of 1

Date(s)r Drilled)10/4/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)15.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)473'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 888+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Silt (ml) with gravel, ballast and fill, black/gray, moist	
	5		S-2		3.0	79							Decomposed rock, brown/tan/gray, moist	
	10		S-3		3.8	100		23.2	NV	NP	ML		Sandy silt (ml), tan, moist	
	15		S-4		3.0	100					ML		Sandy silt (ml) with gravel and decomposed rock, tan, moist	
													Boring terminated at 15'	
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP6
Sheet 1 of 1

Date(s)r Drilled)10/4/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)16.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)471'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 885+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Silty sand (sm) with gravel, ballast and fill, tan/gray, moist	
	5		S-2		3.3	86		18.3	NV	NP	SM		Silty sand (sm), brown/red, moist	
	10		S-3		0.0	0							No recovery	
	15		S-4		2.8	75					ML		Silt (ml) with decomposed rock, tan, moist	
													Boring terminated at 16'	
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP7
Sheet 1 of 1

Date(s)r Drilled)10/7/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)12.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)468'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 882+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill with ballast, black, moist	
	5		S-2		3.6	94		18.7	NV	NP	SM		Silty sand (sm) with gravel, tan/red, moist	
	10		S-3		2.7	70							Decomposed rock, blue/gray, dry	
													Boring terminated at 12'	
	15													
	20													
	25													
	30													

BORING LOGS

NOTES:

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 6 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4205.DWG
Ref. No.:	2011-059
Sheet No:	476 OF 565

ET-4205

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP8
Sheet 1 of 1

Date(s) Drilled)10/7/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)12.0
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)466'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 879+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												No recovery	
	5		S-2		3.5	92		18.7	NV	NP	SM		Silty sand (sm) with gravel, tan, moist	
	10		S-3		3.0	79							Decomposed rock, red/tan/white, dry	
	15												Boring terminated at 12'	
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Devon, Pennsylvania
Project Number:)11043

Log of Boring ML11
Sheet 1 of 1

Date(s) Drilled)8/9/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)25'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)462'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 872+79 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	4–3–4–4	0.0	0							No recovery	
			S2	4–4–3–4	0.1	4					Fill		Fill, black, dry, loose	
	10		S3	6–6–5–4	0.2	8					ML		Sandy silt (ml), red, dry, medium dense	
	15		S4	2–2–3–3	1.5	75					ML		Sandy silt (ml) with gravel, tan, moist, loose	
	20		S5	4–7–10–10	1.7	83		20.3	NV	NP	ML		Sandy silt (ml), tan, moist, medium dense	
	25		S6	12–8–13–9	2.0	100					ML		Sandy silt (ml) with gravel, tan, moist, medium dense	
													Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Devon, Pennsylvania
Project Number:)11043

Log of Boring ML12
Sheet 1 of 1

Date(s) Drilled)8/9/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)19.5'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)462'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 872+40 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	11–10–14–14	1.7	83							Decomposed rock, red/yellow, dry, medium dense	
			S2	13–19–23–17	1.2	58							Decomposed rock, tan, dry, dense	
	10		S3	28–33–34–44	1.3	67							Decomposed rock, tan/red/blue, dry, very dense	
	15		S4	20–22–25–25	2.0	100							Decomposed rock, tan/red/blue, dry, dense	
	20		S5	32–39–50/5"	1.4	71							Decomposed rock, tan/red/blue, dry, very dense	
													Refusal at 19.5'	
	25													
	30													

BORING LOGS

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 7 OF 20

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-4206.DWG
Ref. No.:	2011–059
Sheet No:	477 OF 565

ET–4206

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Project:)Paoli to Zoo Transmission Line
Project Location:)Devon, Pennsylvania
Project Number:)11043

Log of Boring ML13
Sheet 1 of 1

Date(s) Drilled)8/9/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)19.9'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)462'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 871+50 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	12-14-17-25	1.3	67							Decomposed rock, red/yellow, dry, dense	
			S2	25-32-30-32	1.7	83							Decomposed rock, red/yellow, dry, very dense	
	10		S3	16-17-26-31	1.8	92							Decomposed rock, red/yellow, dry, dense	
	15		S4	17-20-28-31	2.0	100							Decomposed rock, red/yellow, dry, dense	
	20		S5	20-29-33-50/5"	1.9	96							Decomposed rock, red/yellow, dry, very dense	
													Refusal at 19.9'	
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP3
Sheet 1 of 1

Date(s) Drilled)10/2/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)9.0
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)460'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 867+23 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, ballast, black, moist	
	5		S-2		3.5	92		5.4	NV	NP	SM		Silty sand (sm) with gravel, tan/blue/red, dry	
			S-3		1.0	26							Decomposed rock, tan/red, dry	
	10												Boring Terminated at 9'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Devon, Pennsylvania
Project Number:)11043

Log of Boring ML14
Sheet 1 of 1

Date(s) Drilled)8/12/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)8.5'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)446'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 854+17 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	9-9-12-18	1.0	50					ML		Silt (ml) with gravel, tan, dry, medium dense	
			S2	20-23-28-38	1.0	50							Decomposed rock, tan/white, dry, very dense	
	10		S3	50/5.5"	0.4	21							Decomposed rock, tan/white, dry, very dense	
													Refusal at 8.5'	
	15													
	20													
	25													
	30													

BORING LOGS

NOTES:

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 8 OF 20

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4207.DWG
Ref. No.:	2011-059
Sheet No:	478 OF 565

ET–4207

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Project:)Paoli to Zoo Transmission Line
Project Location:)Strafford, Pennsylvania
Project Number:)11043

Log of Boring ML15
Sheet 1 of 1

Date(s)r Drilled)8/12/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)426'
Groundwater Levelr and Date Measured)15'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 817+57 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	11-19-19-19	2.0	100					ML		Silt (ml) with gravel, tan, dry, dense	
			S2	15-14-15-16	1.3	67					ML		Silt (ml) with gravel, tan/gray, dry, medium dense	
	10		S3	8-11-13-11	1.7	83					ML		Silt (ml) with gravel, tan/gray, moist, medium dense	
	15		S4	9-12-12-15	2.0	100		27.2	NV	NP	ML		Sadny silt (ml) with gravel, tan/gray, wet, medium dense ▽	
	20		S5	12-13-15-15	2.0	100		22.9	NV	NP	ML		Sandy silt (ml), tan/gray, wet, medium dense	
	25		S6	2-1-17-29	2.0	100					ML		Sandy silt (ml), brown, wet, medium dense	
													Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Wayne, Pennsylvania
Project Number:)11043

Log of Boring ML16
Sheet 1 of 1

Date(s)r Drilled)8/14/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)7.8'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)401'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 764+75 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	26-28-37-37	2.0	100					ML		Silt (ml) with gravel, tan/brown, dry, very dense	
			S2	35-42-49-50/4"	1.5	75					ML		Silt (ml) with gravel and decomposed rock, tan/brown, dry, very dense	
	10		R1		77	49 RQD							Gray and tan Schist Auger Refusal at 7.8'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)St. Davids, Pennsylvania
Project Number:)11043

Log of Boring ML17
Sheet 1 of 1

Date(s)r Drilled)8/14/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)398'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 730+75 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	13-17-9-8	1.0	50					ML		Sandy silt (ml) with gravel, brown, moist, medium dense	
			S2	10-10-10-9	0.1	4					ML		Sandy silt (ml) with gravel, brown, moist, medium dense	
	10		S3	13-14-26-26	0.67	33					ML		Sandy silt (ml) with gravel, brown/white, moist, medium dense	
	15		S4	8-14-14-27	2.0	100		24.1	NV	NP	ML		Sandy silt (ml) with decomposed rock, brown/tan/white, moist, medium dense	
	20		S5	18-17-18-25	0.3	17		24.0	NV	NP	SM		Silty sand (sm), tan/brown, moist, dense	
	25		S6	21-28-28-32	1.3	67					SM		Silty sand (sm) with decomposed rock, brown/tan/white, dry, very dense	
													Boring Terminated at 25'	
	30													

BORING LOGS

NOTES:

1. BORINGS PERFORMED BY FIDELIS ENGINEERING.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 9 OF 20

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File No.:	2011-059-ET-4208.DWG
Ref. No.:	2011–059
Sheet No:	479 OF 565

ET–4208

Project:)Paoli to Zoo Transmission Line
Project Location:)Radnor, Pennsylvania
Project Number:)11043

Log of Boring ML18
Sheet 1 of 1

Date(s)r Drilled)8/15/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)14.4'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)399'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 703+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	3-3-3-5	1.3	67					ML		Sandy silt (ml), brown dry, loose	
			S2	4-4-5-6	1.0	50					ML		Sandy silt (ml), brown dry, loose	
)	10		S3	6-6-6-9	0.83	42		23.6	NV	NP	ML		Sandy silt (ml), brown, moist, medium dense	
)	15		S4	10-16-50/5"	1.2	58							Decomposed rock, white, dry, very dense Refusal at 14.4'	
)	20													
)	25													
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Radnor, Pennsylvania
Project Number:)11043

Log of Boring ML19
Sheet 1 of 1

Date(s)r Drilled)8/15/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)409'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 691+13 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	4-5-6-7	1.7	83					ML		Sandy silt (ml), brown, moist, medium dense	
			S2	11-11-12-10	1.0	50					ML		Sandy silt (ml), brown, moist, medium dense	
)	10		S3	11-8-9-11	1.7	83					ML		Sandy silt (ml), brown, moist, medium dense	
)	15		S4	8-7-9-11	2.0	100					ML		Sandy silt (ml), brown/black, moist, medium dense	
)	20		S5	4-7-11-13	2.0	100		42.1	NV	NP	ML		Sandy silt (ml), brown/black, moist, medium dense	
)	25		S6	10-18-21-22	2.0	100					ML		Sandy silt (ml) with gravel, brown/gray, moist, dense Boring Terminated at 25'	
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Radnor, Pennsylvania
Project Number:)11043

Log of Boring ML20
Sheet 1 of 1

Date(s)r Drilled)8/16/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)20.5'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)419'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 670+70 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	12-10-7-7	1.7	83					ML		Silt (ml) with gravel, black, dry, medium dense	
			S2	12-30-34-31	1.5	75					SM		Sand (sm) with gravel, gray, dry, very dense	
)	10		S3	27-22-31-35	0.5	25							Decomposed rock, white, dry, very dense	
)	15		S4	17-20-30-30	1.7	83		14.8	NV	NP	ML		Silt (ml) with sand, tan, dry, dense	
)	20		S5	27-29-31-30	1.0	50					SM		Sand (sm) with decomposed rock, white, dry, very dense Refusal at 20.5'	
)	25													
)	30													

BORING LOGS

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 10 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4209.DWG
Ref. No.:	2011-059
Sheet No:	480 OF 565

ET-4209

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Project:)Paoli to Zoo Transmission Line
Project Location:)Villanova, Pennsylvania
Project Number:)11043

Log of Boring ML21
Sheet 1 of 1

Date(s)r Drilled)8/19/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)429'
Groundwater Levelr and Date Measured)24'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 638+97 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	2–3–6–2	0.5	25					ML		Silt (ml) with gravel, brown, moist, loose	
			S2	5–6–8–9	1.0	50					ML		Silt (ml) with gravel, tan, moist, medium dense	
			S3	7–6–6–6	1.8	92					ML		Silt (ml) with gravel, tan, moist, medium dense	
	10													
	15		S4	8–9–12–12	2.0	100					SM		Silty sand (sm) with gravel, brown, moist, medium dense	
			S5	9–11–14–17	1.7	83		16.0	NV	NP	SM		Silty sand (sm) with gravel, brown, moist, medium dense	
	20													
	25		S6	11–13–16–23	0.1	4					SM		Silty sand (sm) with gravel, brown, moist, medium dense ▽	
													Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Villanova, Pennsylvania
Project Number:)11043

Log of Boring ML22
Sheet 1 of 1

Date(s)r Drilled)8/19/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)24.8'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)427'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 632+93 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	2–2–1–2	0.1	4					ML		Silt (ml), brown, moist, very loose	
			S2	3–2–2–2	0.0	0							No recovery	
	10		S3	3–6–7–6	0.3	17					SM		Silty sand (sm) with gravel, brown, moist, medium dense	
	15		S4	5–11–10–50/2"	1.0	50		18.8	NV	NP	SM		Silty sand (sm) with gravel, brown, wet, medium dense	
			S5	31–18–24–28	1.5	75					SM		Silty sand (sm) with decomposed rock, brown, wet, dense	
	20													
	25		S6	34–31–49–50/3"	1.8	88							Decomposed rock, brown, moist, very dense	
													Refusal at 24.8'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Rosemont, Pennsylvania
Project Number:)11043

Log of Boring ML23
Sheet 1 of 1

Date(s)r Drilled)8/20/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)13.5'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)393'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 577+47 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	4–5–7–13	0.3	13					SM		Silty sand (sm), tan, dry, medium dense	
			S2	18–23–25–23	1.0	50					SM		Silty sand (sm) with decomposed rock, tan, dry, dense	
	10		S3	16–15–15–22	2.0	100		14.8	NV	NP	SM		Silty sand (sm) with decomposed rock, tan, dry, medium dense	
	15		S4	50/5.5"	0.4	21					SM		Silty sand (sm) with decomposed rock, tan, dry, very dense	
													Refusal at 13.5'	
	20													
	25													
	30													

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 11 OF 20

Recommended:	DP	Drawn:	VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4210.DWG
Ref. No.:	2011–059
Sheet No:	481 OF 565

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Project:)Paoli to Zoo Transmission Line
Project Location:)Bryn-Mawr, Pennsylvania
Project Number:)11043

Log of Boring ML24
Sheet 1 of 1

Date(s)r Drilled)8/21/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)5.9'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)420'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 533+37 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
) 415	0													
) 410	5	S1		32-34-50-50/5"	1.0	50							Decomposed Rock, tan/gray, dry, very dense	
													Refusal at 5.9'	
) 405	10													
) 400	15													
) 395	20													
) 390	25													
) 385	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Haverford, Pennsylvania
Project Number:)11043

Log of Boring ML25
Sheet 1 of 1

Date(s)r Drilled)8/21/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)20'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)379'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 487+18 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
) 415	0													
) 410	5	S1		5-5-5-5	1.2	58					ML		Silt (ml), tan, moist, loose	
		S2		4-7-8-8	0.7	33					ML		Silt (ml), tan, moist, medium dense	
) 405	10	S3		9-15-17-15	0.4	21					ML		Silt (ml), tan/black, moist, dense	
) 400	15	S4		17-33-39-39	2.0	100					SM		Silty sand (sm) with decomposed rock, tan, dry, very dense	
) 395	20	S5		16-18-31-50	2.0	100					SM		Silty sand (sm) with decomposed rock, tan, dry, dense	
													Refusal at 20'	
) 390	25													
) 385	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Ardmore, Pennsylvania
Project Number:)11043

Log of Boring ML26
Sheet 1 of 1

Date(s)r Drilled)8/22/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)13.3'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)356'
Groundwater Levelr and Date Measured)13'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 446+57 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
) 355	0													
) 350	5	S1		9-3-3-5	1.7	83					ML		Silt (ml), tan, moist, loose	
		S2		6-7-10-10	1.6	79		24.1	NV	NP	SM		Silty sand (sm), gray/tan, moist, medium dense	
) 345	10	S3		6-11-11-13	1.8	88					SM		Silty sand (sm) with decomposed rock, gray/tan, moist, medium dense	
) 340	15	S4		50/4	0.3	17					SM		Silty sand (sm) with decomposed rock, gray/tan, moist, very dense	
													Refusal at 13.3'	
) 335	20													
) 330	25													
) 325	30													

BORING LOGS

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PAOLI TO BRYN MAWR TRANSMISSION
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SHEET 12 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	File No.:	2011-059-ET-4211.DWG
				Ref. No.:	2011-059
				Sheet No:	482 OF 565

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Project:)Paoli to Zoo Transmission Line
Project Location:)Wynnewood, Pennsylvania
Project Number:)11043

Log of Boring ML27
Sheet 1 of 1

Date(s)r Drilled)8/22/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)302'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 392+32 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	3-3-2-2	1.0	50					ML		Silt (ml), tan, moist, loose	
			S2	2-3-3-3	1.5	75					ML		Silt (ml), tan, moist, loose	
			S3	5-11-11-3	1.2	58					ML		Silt (ml), tan, moist, medium dense	
	10													
			S4	6-6-7-10	1.8	92					SM		Silty sand (sm), orange, dry, medium dense	
	15													
			S5	11-16-18-19	1.7	83		27.1	NV	NP	SM		Silty sand (sm), tan/gray dry, dense	
	20													
			S6	11-14-17-23	1.9	96					SM		Silty sand (sm) with decomposed rock, tan/gray dry, dense	
	25												Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Narberth, Pennsylvania
Project Number:)11043

Log of Boring ML28
Sheet 1 of 1

Date(s)r Drilled)8/23/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)9.9'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)275'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta.372+11 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	8-11-13-13	0.3	17					ML		Silt (ml), brown, moist, medium dense	
			S2	16-24-30-35	0.3	17					ML		Silt (ml) with gravel, tan, moist, very dense	
	10		S3	29-29-40-50/5"	1.3	67							Decomposed rock, tan/white, dry, very dense	
													Refusal at 9.9'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Merion, Pennsylvania
Project Number:)11043

Log of Boring ML29
Sheet 1 of 1

Date(s)r Drilled)8/26/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)245'
Groundwater Leverlr and Date Measured)16.0'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 323+60 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	2-4-3-15	1.7	83					ML		Silt (ml), brown, moist, loose	
			S2	24-23-30-24	1.5	75							Quartz, white, dry, very dense	
			S3	33-23-15-9	1.7	83		13.2	NV	NP	SM		Silty sand (sm) with gravel, brown, moist, dense	
	10													
			S4	2-3-7-4	1.5	75		43.0	NV	NP	SM		Silty sand (sm), tan, moist, loose	
	15													
			S5	3-3-3-4	1.8	88					ML		Silt (ml) with decomposed rock, tan, wet, loose	
	20													
			S6	4-9-13-18	2.0	100					ML		Silt (ml) with decomposed rock, tan, wet, medium dense	
	25												Boring Terminated at 25'	
	30													

BORING LOGS

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 17 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4216.DWG
Ref. No.:	2011–059
Sheet No:	483 OF 565

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Project: Paoli to Zoo Transmission Line Project Location: Overbrook, Pennsylvania Project Number: 11043	Log of Boring ML30 Sheet 1 of 1

Date(s) Drilled 8/26/13	Logged By K. Fischer	Checked By R. Crossan
Drilling Method 6" HSA	Drill Bit Size/Type 2" o.d. SBS	Total Depth of Borehole 6.4'
Drill Rig Type Truck Rig	Drilling Contractor Accurate Drilling	Approximate Surface Elevation 240'
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) ASTM D1586	Hammer Data 140 lb. –30" drop
Borehole Backfill Cuttings	Location Sta. 272+55 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	31–44–42–40	1.7	83							Decomposed rock, white/blue/gray, dry, very dense	
			S2	50/5"	0.3	17							Decomposed rock, white/blue/gray, dry, very dense	
	10		R1		96	64 RQD							Gray and brown schist Auger Refusal at 6.4'	
	15													
	20													
	25													
	30													

Projects\104\Boring Logs\ to Paoli Boring Logs.bor[PennDot.tpl]

Project:)Paoli to Zoo Transmission Line Project Location:)Philadelphia, Pennsylvania Project Number:)11043	Log of Boring GP1 Sheet 1 of 1

Date(s)r)9/12/13 Drilled	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr)6" HSA Method	Drill Bitr)2" o.d. SBS Size/Type	Total Depthr)25.0 of Borehole
Drill Rigr)Truck Rig Type	Drillingr)Accurate Drilling Contractor	Approximater)201' Surface Elevation
Groundwater Levelr)Not Encountered and Date Measured	Samplingr)ASTM D1586 Method(s)	Hammerr)140 lb. –30" drop Data
Boreholer)Cuttings Backfill	Location)Sta. 225+50 (Between 2 and 4 Track)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, black, dry	
)	5		S–2		3.0	78					ML		Silt (ml) with decomposed rock, tan, moist	
)	10		S–3		3.8	100		20.6	NV	NP	SM		Silty Sand (sm), tan, moist	
)	15		S–4		3.8	100					SM		Silty sand (sm), tan, moist	
)	20		S–5		3.0	78					SM		Silty sand (sm) with decomposed rock, tan, moist	
)			S–6		3.8	100		26.1	NV	NP	ML		Silt (ml), tan, moist	
)	25		S–7		1.0	26							Decomposed rock, tan/brown, moist Boring Terminated at 25'	
)	30													

Project:)Paoli to Zoo Transmission Line Project Location:)Philadelphia, Pennsylvania Project Number:)11043	Log of Boring GP2 Sheet 1 of 1

Date(s)r)9/12/13 Drilled	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr)6" HSA Method	Drill Bitr)2" o.d. SBS Size/Type	Total Depthr)25.0 of Borehole
Drill Rigr)Truck Rig Type	Drillingr)Accurate Drilling Contractor	Approximater)201' Surface Elevation
Groundwater Levelr)Not Encountered and Date Measured	Samplingr)ASTM D1586 Method(s)	Hammerr)140 lb. –30" drop Data
Boreholer)Cuttings Backfill	Location)Sta. 227+50 (Between 2 and 4 Track)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, black, dry	
)	5		S–2		3.8	100					SM		Silty sand (sm) with gravel, tan, dry	
)	10		S–3		3.8	100		25.3	42	15	ML		Silt (ml), tan, moist	
)	15		S–4		3.8	100							Decomposed rock, tan/red/brown, moist	
)	20		S–5		3.8	100							Decomposed rock, tan/red/brown, moist Boring Terminated at 20'	
)	25													
)	30													

BORING LOGS

NOTES:

1. BORINGS PERFORMED BY FIDELIS ENGINEERING.

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Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BORING LOGS
SHEET 18 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4217.DWG
Ref. No.:	2011–059
Sheet No:	484 OF 565

ET–4217

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GENERAL:

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION. IF FIELD CONDITIONS PROHIBIT USE OF CONTRACT DRAWING DESIGN DETAILS, SUBMIT ALTERNATE DESIGN DETAILS FOR APPROVAL.

STRUCTURAL STEEL CONSTRUCTION:

1. PROVIDE STEEL IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) SPECIFICATIONS FOR STRUCTURAL STEEL BUILDING–ALLOWABLE STRESS DESIGN (LATEST VERSION) (INCLUDING FABRICATION AND ERECTION) AND THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION'S MANUAL FOR RAILWAY ENGINEERING, AREMA, (LATEST EDITION).

2. STRUCTURAL STEEL SHAPES:

   A. W SHAPES: ASTM A992 (Fy = 50 ksi).
   B. M AND S SHAPES: ASTM A992 (Fy = 50 ksi).
   C. CHANNELS: ASTM A36 (Fy = 36 ksi).
   D. ANGLES: ASTM A36 (Fy = 36 ksi).
   E. PLATES AND BARS: ASTM A572 (Fy = 50 ksi).
   F. WT SHAPES: CUT FROM ASTM A992 (FY = 50 ksi) W SHAPES.
   G. PIPE: ASTM A53 GRADE B (Fy = 35 ksi).
   H. SQUARE AND RECTANGULAR TUBULAR SECTIONS: ASTM A500 GRADE B (Fy = 46 ksi).

3. ALL STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 UNLESS NOTED OTHERWISE. FOUNDATION ANCHOR ROD, EMBEDMENT PLATE AND ATTACHED HARDWARE SHALL BE COMPLETELY GALVANIZED.

4. BOLTS SHALL BE ASTM A325 AND HOT DIPPED GALVANIZED PER ASTM F2329 UNLESS OTHERWISE NOTED. BOLTS SHALL BE ⅞"ø IN 15/16"ø HOLES UNLESS OTHERWISE NOTED. BOLT HOLES SHALL BE STANDARD ROUND HOLES WITH A DIAMETER 1/16" LARGER THAN THE BOLT DIAMETER UNLESS OTHERWISE NOTED. WHERE SLIP–CRITICAL (SC) CONNECTIONS OR USE OF AN OVERSIZED HOLE (OVS) OR SHORT SLOTTED (SSL) HOLES ARE SHOWN OR APPROVED, WIRE BRUSHING OF FAYING SURFACES TO "CLASS C" AND TENSIONING OF THE BOLTS IN ACCORDANCE WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) IS REQUIRED.

5. ALL BOLTS SHALL BE PRE–TENSIONED PER RCSC'S JUNE 30, 2004'S MIN. BOLT PRE–TENSIONED REQUIREMENTS AND SUBJECTED TO CALIBRATED WRENCH PRETENSIONING IN ACCORDANCE WITH SECTION 9.2.2 OF RSCS.

6. NUTS SHALL BE AMERICAN STANDARD SEMI–FINISHED HEAVY HEXAGONAL CONFORMING TO ANSI B 18.2.2.

7. NUTS AND WASHERS SHALL CONFORM TO ASTM A563 & F436, AND SHALL BE GALVANIZED PER ASTM F2329 UNLESS NOTED OTHERWISE.

8. ALL WELDING IS TO BE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE AMERICAN WELDING SOCIETY (INCLUDING THE STRUCTURAL STEEL WELDING CODE D1.1, LATEST EDITION) WELD METAL SHALL MATCH BASE METAL USING PROPER SERIES E70XX ELECTRODES PER AWS A5.1 AND A5.17.

9. FIELD WELDS SHALL NOT BE PERMITTED UNLESS AUTHORIZED BY THE ENGINEER.

10. SUBMIT ELECTRONIC VERSIONS (PDF) OF SHOP DRAWINGS FOR REVIEW TO THE ENGINEER PRIOR TO FABRICATION. REVIEW OF SHOP DRAWINGS IS FOR THE PURPOSE OF REVIEWING THE GENERAL CONFORMANCE TO THE OVERALL STRUCTURAL DESIGN.

11. HAND MARKS SHALL BE STAMPED ONTO EACH MEMBER ½" HIGH, 1/32" MIN INDENTATION.

12. FOUNDATION ANCHOR RODS SHALL BE SHIPPED ON A SEPARATE SKID FOR EACH FOUNDATION LOCATION AND SHALL BE SHIPPED WITH THREAD PROTECTORS ON EACH END.

13. FOUNDATION ANCHOR RODS SHALL CONFORM TO ASTM A449, THREADS SHALL BE UNC COARSE SERIES, ANCHOR RODS SHALL BE FULLY GALVANIZED PER ASTM F2329.

14. PROVIDE (2) 3" DIAMETER HOLES ON OPPOSITE SIDES OF THE STEEL CAISSON FOR RIGGING AND PLACEMENT. LOCATE THE RIGGING HOLES 5" FROM THE TOP OF THE CAISSON.

15. MINIMUM FILLET WELD SIZES WHERE WELD IS REQUIRED/INDICATED:

    3/16" WHEN THINNER JOINT MEMBER THICKNESS IS < 3/4".
    5/16" WHEN THINNER JOINT MEMBER THICKNESS IS EQUAL TO 3/4" OR > 3/4".

CONCRETE CONSTRUCTION:

1. CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE APPLICABLE AMERICAN CONCRETE INSTITUTE'S LATEST DOCUMENTS.

2. CONCRETE SHALL BE 4500 PSI AIR ENTRAINED AT 5 TO 7%, SLUMP LIMITS OF 4"±1" WITHOUT HIGH RANGE WATER REDUCER ADMIXTURE AND SLUMP LIMITS OF 5 TO 7 INCHES AFTER THE ADMIXTURE IS ADDED.

3. ALL CONCRETE SHALL HAVE A MINIMUM ULTIMATE 28 DAYS COMPRESSIVE STRENGTH OF 4500 PSI WITH MAXIMUM WATER/CEMENT RATIO OF .45. MAXIMUM AGGREGATE SIZE TO BE ¾" CONFORMING TO SIZE NO 67 OF ASTM C33. WATER TO BE CLEAN, FRESH AND POTABLE. CONCRETE SHALL BE MIXED IN ACCORDANCE WITH SPECIFICATIONS FOR READY–MIX CONCRETE ASTM C94. ADMIXTURES TO CONFORM TO ASTM C260 & C494. ADMIXTURES CONTAINING CHLORIDES ARE PROHIBITED.

4. ALLOW MINIMUM OF 7 DAYS OF CONCRETE CURING OF FOUNDATIONS/PIERS PRIOR TO PLACEMENT OF POLES/STRUCTURES. ALLOW MINIMUM OF 14 DAYS OF CONCRETE CURING PRIOR TO PLACEMENT OF WIRE/CABLE ON POLES/STRUCTURES.

5. GROUT SHALL BE NON–SHRINK GROUT MASTER FLOW 713 MANUFACTURED BY MASTER BUILDERS, SIKA GROUT 212 MANUFACTURED BY SIKA CORPORATION OR APPROVED EQUAL.

6. PROTECT FRESHLY PLACED CONCRETE AGAINST PREMATURE DRYING. CURING IS TO BEING IMMEDIATELY FOLLOWING PLACEMENT. MAINTAIN CONCRETE TEMPERATURE ABOVE 50°F AND IN A MOIST CONDITION FOR AT LEAST THE FIRST THREE DAYS.

7. WHEN CONCRETE IS BEING PLACED, USE MECHANICAL VIBRATORS TO CONSOLIDATE THE MIX.

8. PROVIDE 1" CHAMFER OF ALL EXPOSED EDGES OF CONCRETE.

9. REINFORCING BARS: STEEL REINFORCING BARS CONFORMING TO ASTM A615, GR. 60 KSI, DEFORMED.

10. CONCRETE COVER FOR REINFORCEMENT:

CAST AGAINST SOIL	3"
FORMED CONCRETE	2"

FOUNDATIONS:

1. PRELIMINARY REQUIREMENTS:
   A. EXPLORATORY TRENCHES ARE TO BE HAND DUG TO DETERMINE THE PRESENCE OF ANY UNDERGROUND INSTALLATIONS/CABLES. THE TRENCHES SHALL BE IN THE SHAPE OF AN "H" WITH OUTSIDE DIMENSIONS MATCHING THE LIMITS OF THE FOUNDATION EXCAVATION AND DUG TO A DEPTH OF THREE FEET. FILL AND COMPACT THE TRENCHES AFTER CHECKING FOR SUBSURFACE FACILITIES.

2. TEMPORARY SHEETING AND SHORING:
   A. LOCATE 3 FEET DEEP BY 15 INCHES WIDE EXPLORATORY TRENCHES ON THE CONSTRUCTION SHOP DRAWINGS. THE EXTENT OF EACH TRENCH SHALL BE IN THE FORM OF AN "H" WHOSE OUTSIDE DIMENSIONS MATCH THE EXTENT OF THE OUTSIDE FACE OF THE SHEETING DIMENSIONS.
   B. MEASURES SHALL BE TAKEN SO ABSOLUTE USE OF TRACK IS MAINTAINED WHILE DRIVING SHEETING ADJACENT TO RUNNING TRACK.
   C. CAVITIES CREATED BY DRIVING OF SHEET PILING SHALL BE FILLED WITH SAND AND ANY DISTURBED BALLAST SHALL BE RESTORED AND TAMPED IMMEDIATELY.
   D. SHEET PILING SHALL BE CUT OUT AT TOP OF THE TIE DURING CONSTRUCTION AND THEN, AFTER CONSTRUCTION SHALL BE CUT OFF EIGHTEEN INCHES BELOW EXISTING GROUND LINE OR GRADE AND LEFT IN PLACE.
   E. IF TEMPORARY SHEETING AND SHORING IS REQUIRED, IT SHALL BE IN ACCORDANCE WITH AMTRAK'S "REQUIREMENTS FOR TEMPORARY SHEETING AND SHORING TO SUPPORT AMTRAK TRACKS"

3. EXCAVATION AND BACKFILL:
   A. ALL EXCAVATION SHALL CONFORM TO THE LINES, GRADES, SECTIONS AND ELEVATIONS SHOWN ON THE DRAWINGS OR AS MAY BE NEEDED TO PERFORM CONSTRUCTION PROVIDED IT IS SUBMITTED FOR APPROVAL.
   B. RESTORE OVER EXCAVATED AREAS TO THE REQUIRED GRADES BY BACKFILLING WITH LEAN CONCRETE BACKFILL.
   C. THE EXCAVATION SHALL BE COVERED AND RAMPED EACH NIGHT AND BARRICADES AND WARNING LIGHTS PROVIDED.

4. FOUNDATIONS:
   A. FOR PIER TYPE FOUNDATIONS STEEL CASING SHALL BE DRIVEN INTO PLACE TO PROVIDE THE CLOSEST AND BEST CONTACT BETWEEN THE STEEL CASING AND SUPPORTING SOILS ANY GAPS BETWEEN THE CASING AND ADJACENT SOIL SHALL BE GROUTED.
   B. INTERIOR SOIL SHALL BE EXCAVATED BY HAND OR BY POWERED AUGER.
   C. FOUNDATIONS SHALL BE LOCATED WITHIN A RADIUS OF 3" INCHES OR 4.2% OF SHAFT DIAMETER WHICHEVER IS LESS OF THE REQUIRED ALIGNMENT AND WITHIN A SLOPE OF 3/16 INCH PER FOOT OUT OF PLUMB.
   D. FOUNDATIONS AND PIERS SHALL BE INSTALLED TO THE DEPTHS SHOWN ON THE DRAWING. IF BEDROCK IS REACHED BEFORE PIER EMBEDMENT REQUIREMENTS, MIN. OF 5FT OF EMBEDMENT INTO SOUND ROCK IS REQUIRED, HOWEVER TOTAL EMBEDMENT LENGTH NEED NOT EXCEED THE REQUIRED PIER EMBEDMENT LENGTHS.
   E. SOUND ROCK SHALL BE CLASSIFIED USING AN EVALUATION OF THE UNCONFINED COMPRESSIVE STRENGTH OF THE MATERIAL AND THE MEANS BY WHICH IT IS EXCAVATED. AN UNCONFINED COMPRESSIVE STRENGTH OF 18 TONS PER SQUARE FOOT (TSF) SHALL BE USED AS A MINIMUM VALUE FOR SOUND ROCK. IF THE MATERIAL HAS TO BE EXCAVATED USING A CORE BARREL AND NOT A TRADITIONAL AUGER IT SHALL ALSO BE CLASSIFIED AS ROCK. WEATHERED ROCK IS ANY MATERIAL THAT CAN STILL BE EXCAVATED USING A STANDARD AUGER AND HAS AN UNCONFINED COMPRESSIVE STRENGTH LESS THAN 18 TSF. WEATHERED ROCK SHALL NOT BE CONSIDERED PART OF THE ROCK SOCKET.
   F. REMOVE ALL LOOSE MATERIALS AND DE–WATER EXCAVATION AS REQUIRED FOR INSPECTION PRIOR TO CONCRETING.
   G. CONCRETE PIERS AND REBAR CAGES SHALL BE MARKED WITH THEIR IDENTIFYING STRUCTURE NUMBERS.
   H. REBAR CAGE ASSEMBLY SHALL HAVE THE TOP TWO AND BOTTOM BINDER BARS TACK WELDED TO THE VERTICAL BARS TO MAINTAIN THE SHAPE OF THE CAGE. THE REMAINDER OF THE ASSEMBLY SHALL BE TIE WIRED AT A MINIMUM OF TWO WRAPS PER CONNECTION BY A MECHANIZED TIE WIRE DEVICE.

STRUCTURAL ABBREVIATIONS

A.B.	ANCHOR BOLT
B/	BOTTOM OF
BC	BOTTOM OF CURB ELEVATION
C/C	CENTER TO CENTER
CIP	CAST IRON PIPE
℄	CONSTRUCTION JOINT
C.J.	CONTROL JOINT
℄	CENTER LINE
CLR.	CLEAR
COL.	COLUMN
CONC.	CONCRETE
CTSK	COUNTERSUNK
DEG.	DEGREE
DET.	DETAIL
DIA. or ø	DIAMETER
DIM.	DIMENSION
DWG.	DRAWING
DWLS.	DOWELS
EA.	EACH
E.B.	EASTBOUND
E.F.	EACH FACE
ELEC.	ELECTRICAL
E.E.P.	ELECTRICAL EQUIPMENT PAD
EL.	ELEVATION
EMBED.	EMBEDMENT
E.P.	EQUIPMENT PAD
EXIST.	EXISTING
EXP. BOLT	EXPANSION BOLT
EXP. JT.	EXPANSION JOINT
E.W.	EACH WAY
FIN.	FINISH
FIXT.	FIXTURE
FLD.	FIELD
F.F.	FAR FACE
F.L.	FULL LENGTH
FLG.	FLANGE
FLR.	FLOOR
FRMG.	FRAMING
FTG.	FOOTING
GA.	GAGE (DISTANCE)
GA.	GAUGE (THICKNESS)
GALV.	GALVANIZED
GRD.	GRADE, GROUND
GRTG.	GRATING
H.H.N.	HEAVY HEX NUT
HK.	HOOK
HOR.	HORIZONTAL
H.P.	HIGH POINT
HT.	HEIGHT
I.D.	INSIDE DIAMETER
INTERM.	INTERMEDIATE
JT.	JOINT
L	ANGLE
LGT.	LIGHTING
LLBB	LONG LEG BACK TO BACK
LLH	LONG LEG HORIZONTAL
LLOS	LONG LEG OUTSTANDING
LLV	LONG LEG VERTICAL
L.P.	LOW POINT
MATL.	MATERIAL
MAX.	MAXIMUM
MEMB.	MEMBRANE
MET.	METAL
MH	MANHOLE
MIN.	MINIMUM
MISC.	MISCELLANEOUS
N.F.	NEAR FACE (REINF.)
NO.	NUMBER
N.S.	NEAR SIDE (REINF.)
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.H.	OPPOSITE HAND
OPNG.	OPENING
OPP.	OPPOSITE
O.S.	OUTSTANDING
O. TO O.	OUT TO OUT
℗	PLATE
ℙ	PROPERTY LINE
PROJ.	PROJECTION
PT.	POINT
R	RADIUS OR RISER
RD.	ROUND
RECT.	RECTANGULAR
REF.	REFERENCE
REINF.	REINFORCEMENT
REQD.	REQUIRED
REV.	REVISION
R.R.	RAILROAD
R/W	RIGHT–OF–WAY
SCHED.	SCHEDULE
SECT.	SECTION
SHT.	SHEET
SIM.	SIMILAR
SPA.	SPACE
STD.	STANDARD
STIFF.	STIFFENER
STL.	STEEL
STR.	STRUCTURAL
ST. STL.	STAINLESS STEEL
SYM.	SYMMETRICAL
T	TREAD
T/	TOP OF
THD.	THREADED
TEMP.	TEMPORARY
TR	TOP OF RAIL ELEVATION
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
VERT.	VERTICAL
VIF	VERIFY IN FIELD
VOL.	VOLUME
W/	WITH
W.B.	WESTBOUND
WL	WORK LINE
W.P.	WORK POINT, WATERPROOFING
W.S.	WATER STOP
WT.	WEIGHT
W.W.F.	WELDED WIRE FABRIC

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – GENERAL DRAWINGS
STRUCTURAL STEEL AND CONCRETE NOTES

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

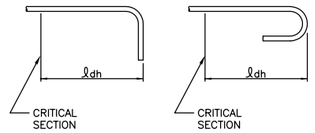
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BASIC DEVELOPMENT LENGTH AND SPLICE LENGTH								
BAR SIZE	BASIC DEVELOPMENT LENGTH, ld				CLASS B SPLICE LENGTH, 1.3 x ld			
	CLEAR SPACING ≥ 4"		CLEAR SPACING < 4"		CLEAR SPACING ≥ 4"		CLEAR SPACING < 4"	
	BASIC	TOP	BASIC	TOP	BASIC	TOP	BASIC	TOP
#3	1'-0"	1'-0"	1'-0"	1'-3"	1'-0"	1'-2"	1'-3"	1'-7"
#4	1'-0"	1'-2"	1'-6"	2'-0"	1'-2"	1'-7"	2'-0"	2'-7"
#5	1'-2"	1'-6"	2'-2"	2'-10"	1'-6"	1'-11"	2'-10"	3'-8"
#6	1'-5"	1'-9"	2'-11"	3'-9"	1'-9"	2'-4"	3'-9"	4'-11"
#7	2'-0"	2'-7"	4'-7"	6'-0"	2'-7"	3'-4"	6'-0"	7'-9"
#8	2'-3"	2'-11"	5'-8"	7'-4"	2'-11"	3'-10"	7'-4"	9'-6"
#9	2'-10"	3'-8"	6'-4"	8'-3"	3'-8"	4'-9"	8'-3"	10'-8"
#10	3'-6"	4'-6"	7'-2"	9'-3"	4'-6"	5'-10"	9'-3"	12'-0"
#11	4'-2"	5'-5"	7'-11"	10'-3"	5'-5"	7'-0"	10'-3"	13'-4"
#14	5'-8"	7'-4"	9'-6"	12'-4"	7'-4"	9'-7"	12'-4"	16'-0"

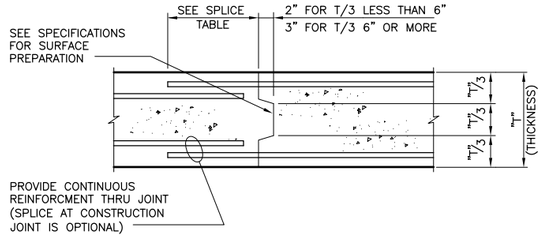
DEVELOPMENT LENGTH OF STANDARD HOOKS		
BAR SIZE	DEVELOPMENT LENGTH, ldh	
	BASIC	W/ CONC COVER
#3	0'-7"	0'-6"
#4	0'-9"	0'-7"
#5	1'-0"	0'-8"
#6	1'-2"	0'-10"
#7	1'-4"	0'-11"
#8	1'-6"	1'-1"
#9	1'-9"	1'-3"
#10	1'-11"	1'-4"
#11	2'-2"	1'-6"
#11	3'-8"	2'-7"



NOTES:

1. NOTES FOR DEVELOPMENT LENGTH AND SPLICE TABLE:
   A) Fy = 60000 PSI
      f'c = 4500 PSI OR GREATER
      UNCOATED BARS
      NORMAL WEIGHT CONCRETE
      CLEAR COVER ≥ 2" AND CLEAR SPACING ≥ 4"
      BARS IN TENSION
   B) FOR CLEAR COVER OR CLEAR SPACING LESS THAN THE VALUES IN "NOTE A" ABOVE, MULTIPLY THE LENGTHS SHOWN IN THE TABLES BY THE APPROPRIATE MULTIPLIERS PROVIDED IN ACI 318.
   C) FOR MATERIALS OR CONDITIONS DIFFERENT FROM THOSE STATED, REFER TO ACI 318, CHAPTER 12 FOR THE APPROPRIATE MULTIPLIERS.
   D) TOP BARS ARE DEFINED AS ALL HORIZONTAL REINFORCEMENT PLACED WITH 12" OR MORE FRESH CONCRETE CAST BELOW THE DEVELOPMENT LENGTH OR SPLICE.
   E) FOR HOOK EMBEDMENTS, CONCRETE COVER INDICATES SIDE COVER (NORMAL TO THE PLANE OF HOOK) OF AT LEAST 2.5", AND FOR 90 DEGREE HOOK WITH COVER ON THE BAR EXTENSION BEYOND THE HOOK OF AT LEAST 2".
   F) FOR EPOXY COATED BARS, MULTIPLY LENGTHS SHOWN BY 1.2. HOWEVER, FOR STRAIGHT BARS WHERE COVER IS LESS THAN 3 x BAR DIAMETER OR CLEAR SPACING IS LESS THAN 6 x BAR DIAMETER, MULTIPLY LENGTHS SHOWN BY 1.5.
2. WHERE SPLICES ARE INDICATED BETWEEN BARS OF DIFFERENT SIZES, THE SPLICE LENGTH SHALL BE BASED ON THE SMALLER BAR SIZE.
3. VERTICAL REINFORCEMENT FOR CONCRETE OR MASONRY SHALL BE SPLICED WITH DOWEL BARS OF THE SAME SIZE AND SPACING FROM THE FOUNDATION USING A STANDARD SPLICE LENGTH.
4. DOWELS SHOWN EXTENDING FROM PREVIOUSLY PLACED CONCRETE SHALL EXTEND ONE SPLICE LENGTH BEYOND THE JOINT, UNLESS DIMENSIONED OTHERWISE. WHERE A DIMENSION IS PROVIDED, THE BAR SPLICING TO THE DOWEL SHALL END ONE SPLICE LENGTH FROM THE END OF THE DOWEL.

1 / – REINFORCEMENT LAP SPLICE AND EMBEDMENT LENGTH TABLE
SCALE: N.T.S.



NOTE: WHERE "T" EXCEEDS 2'–0" SEE SECTIONS.

NOTE:
1. MAX. SPACING OF CONSTRUCTION JOINT = 30'–0" FT.

2 / – CONSTRUCTION JOINT DETAIL FOR WALLS AND SLABS
SCALE: N.T.S.

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30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

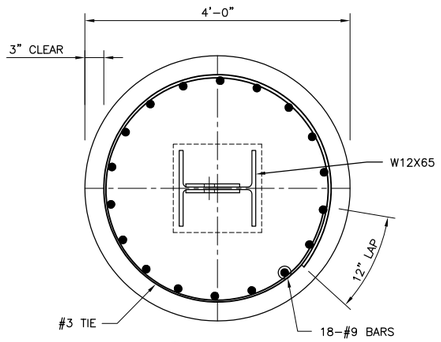
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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL
STRUCTURAL TYPICAL DETAILS

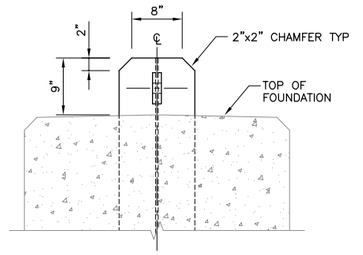
Recommended: AJT | Drawn: TAB | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5001.DWG
Ref. No.:	2011–059
Sheet No:	486 OF 565

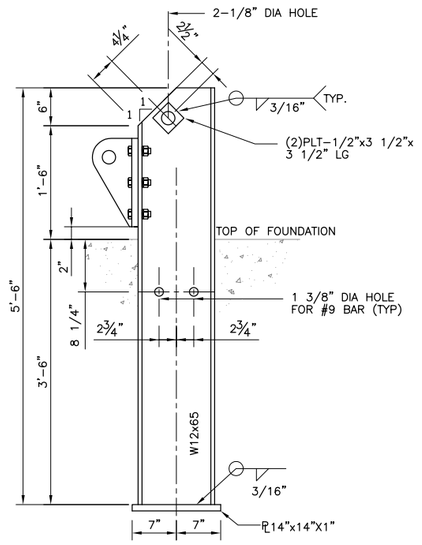
S–5001



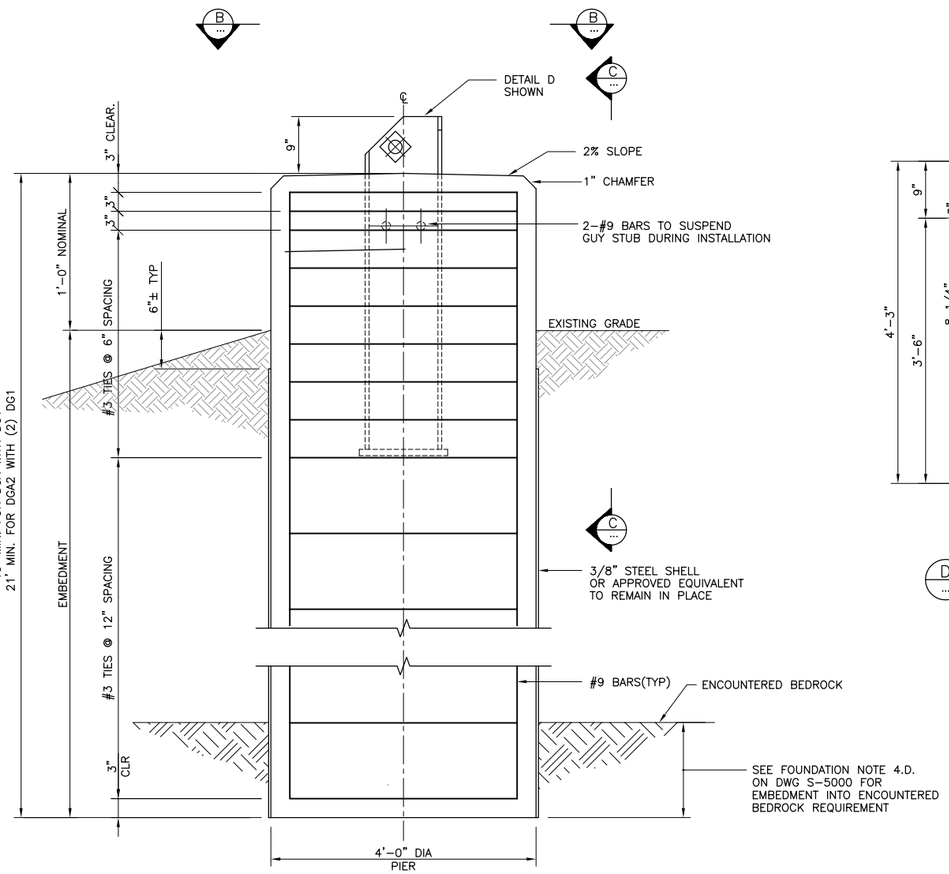
B SECTION
SCALE: 1"=1'-0"



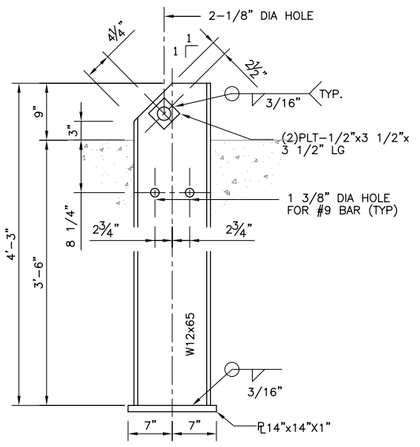
C SECTION
SCALE: 1"=1'-0"



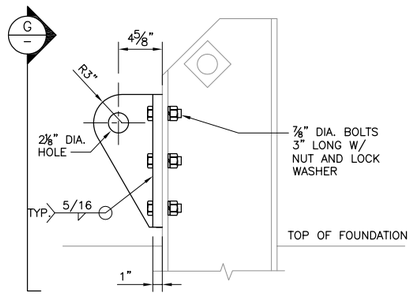
E DOWN GUY STUB DETAIL (TWO HOLES) (DGA2)
SCALE: 1"=1'-0"



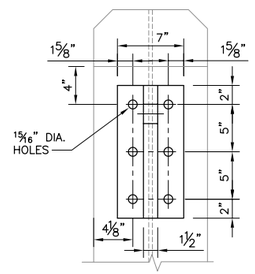
A 48" DIA DOWN GUY ANCHOR DETAIL (DGA & DGA2)
SCALE: 1"=1'-0"



D DOWN GUY STUB DETAIL (DGA)
SCALE: 1"=1'-0"



F DOWN GUY PLATE
SCALE: 1-1/2"=1'-0"



G ELEVATION
SCALE: 1-1/2"=1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

1' 6" 0 1'
SCALE:1-1/2"= 1'-0"

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

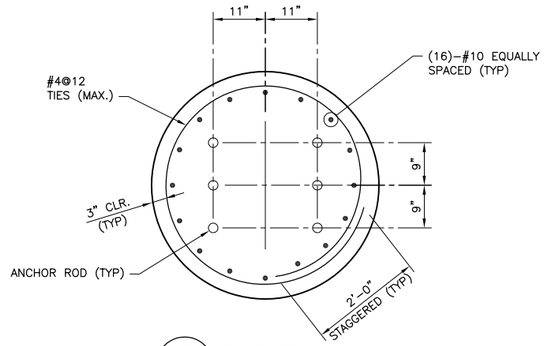
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DRAWINGS
CATENARY DOWN GUY ANCHOR (DGA & DGA2)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

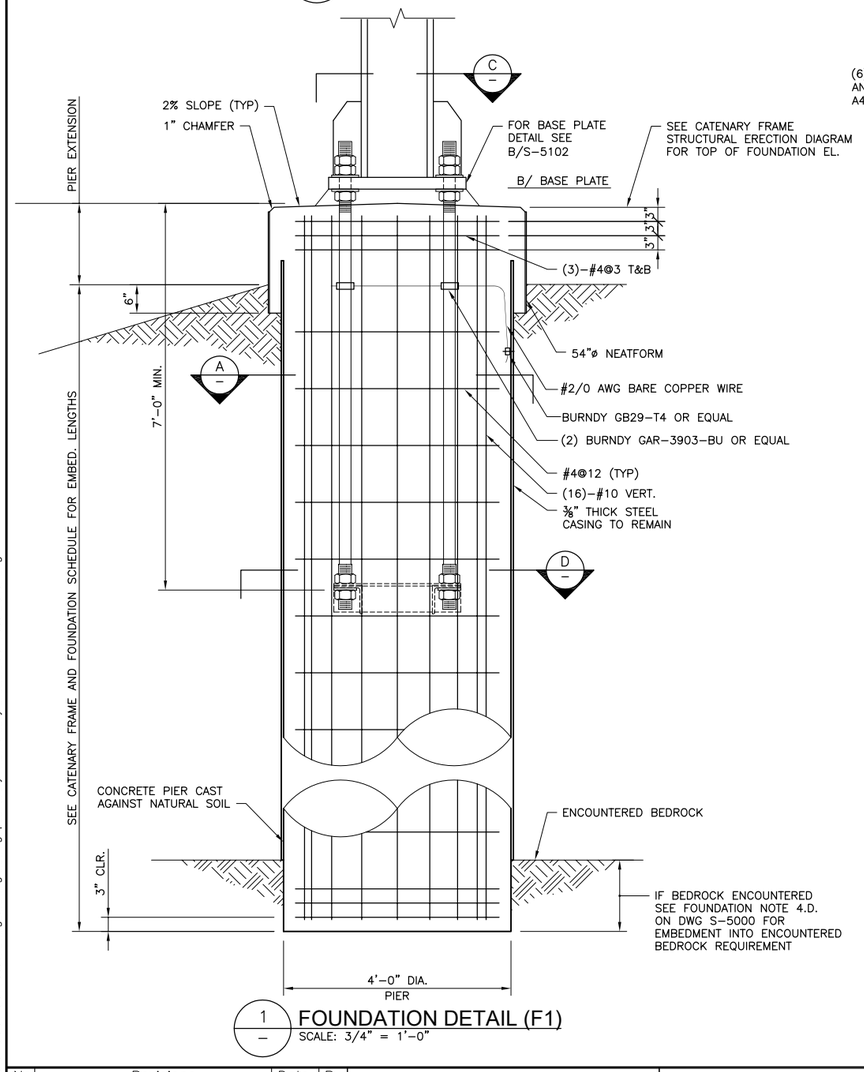
File No.:	2011-059-S-5101.DWG
Ref. No.:	2011-059
Sheet No:	487 OF 565

S-5101

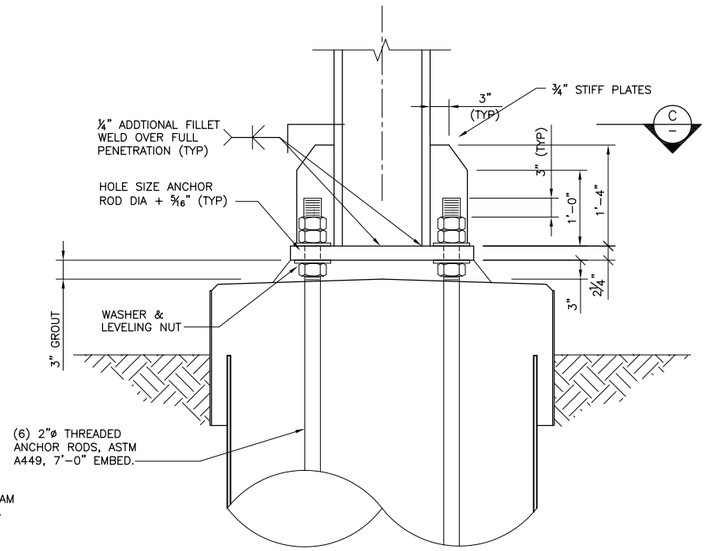
3/14/2016 2:29:36 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5101.dwg



A — SECTION
SCALE: 3/4" = 1'–0"



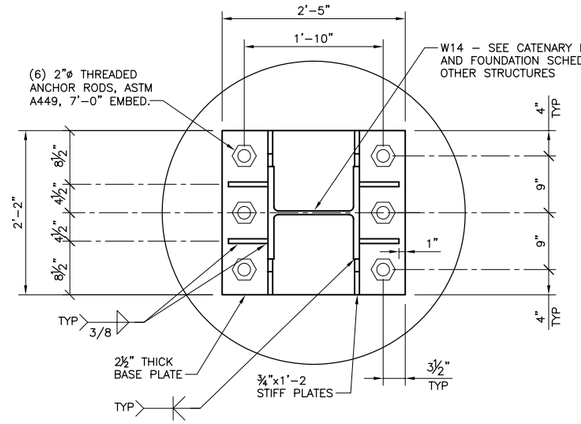
1 — FOUNDATION DETAIL (F1)
SCALE: 3/4" = 1'–0"



B — BASE PLATE DETAIL (BP1)
SCALE: 1" = 1'–0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S–5001.
3. FOR FOUNDATION EMBEDMENT LENGTH SEE CATENARY FRAME AND FOUNDATION SCHEDULE DRAWINGS 494 – S–5115, 495 – S–5116, 496 – S–5117, 497 – S–5118 AND 498 – S–5119.



C — SECTION
SCALE: 1" = 1'–0"

D — ANCHOR PLATE DETAIL
SCALE: 1" = 1'–0"

E — POLE TOP PLATE DETAIL
SCALE: 1" = 1'–0"

1' 6" 0 1'
SCALE:3/4"=1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

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30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103

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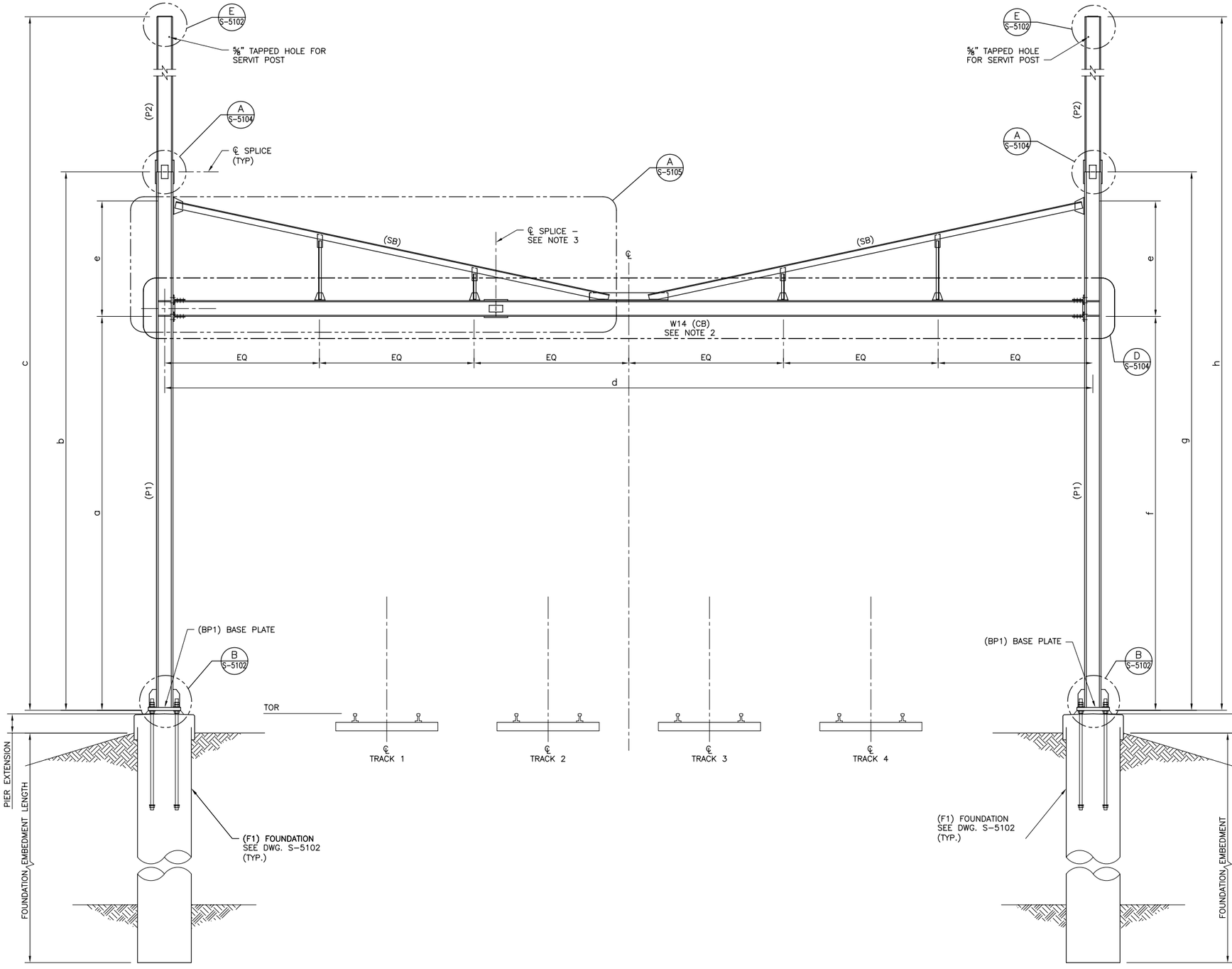
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY FOUNDATION (F1), BASE PLATE (BP1)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5102.DWG
Ref. No.:	2011–059
Sheet No:	488 OF 565

S–5102

3/14/2016 2:29:43 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5102.dwg



TYPICAL CATENARY FRAME
SCALE: 1/4" = 1'-0"
LOOKING WEST

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR CATENARY ID STRUCTURE AND MEMBER SIZES SEE CATENARY SCHEDULE ON DRAWINGS S-5115, S-5116, S-5117, S-5118, AND S-5119.
3. SUGGESTED SPLICE LOCATION OF CB. CONTRACTOR MAY SUBMIT OTHER LOCATIONS TO SUIT EACH CATENARY FRAME AND SUBMIT FOR APPROVAL.
4. FOR STRUCTURE DIMENSIONS AND FOUNDATION EMBEDMENT LENGTH SEE CATENARY FRAME AND FOUNDATION SCHEDULE DRAWINGS S-5115, S-5116, S-5117, S-5118 AND S-5119.
5. FOR POLES WITH W14x159 OR HEAVIER AS A BASE COLUMN P1, LADDER STEP RUNGS SHALL BE INSTALLED ON "S" SIDE OF THE P1 AND P2 POLES. PLEASE SEE DRAWING S-5124 FOR INFORMATION.

4' 2' 0 4'
SCALE: 1/4"= 1'-0"

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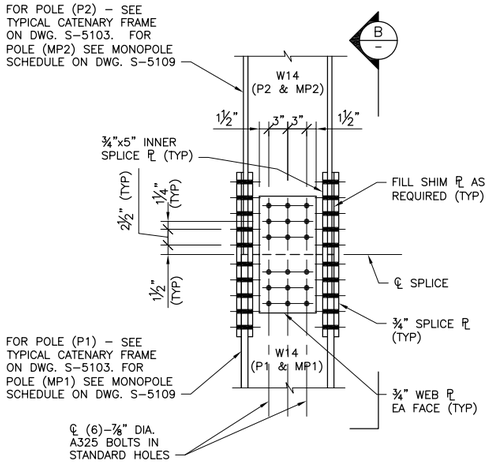
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY FRAME

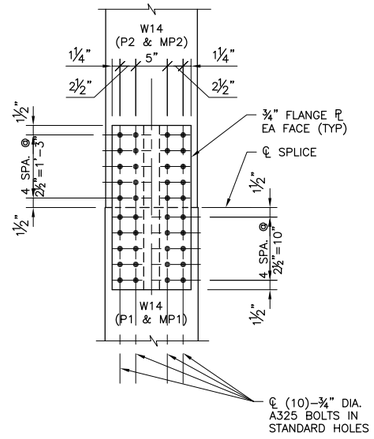
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5103.DWG
Ref. No.:	2011-059
Sheet No:	489 OF 565

S-5103

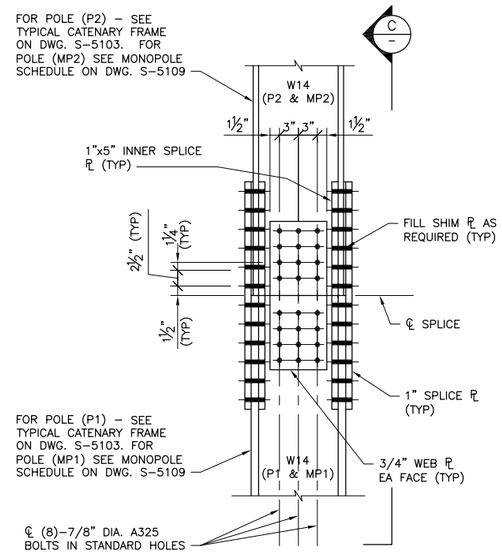
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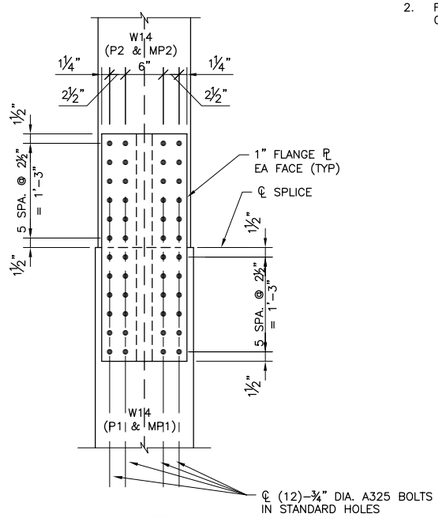


W14x90 AND W14x99 AT POLES (P2) AND (MP2)

B – SECTION
SCALE: 1" = 1'–0"



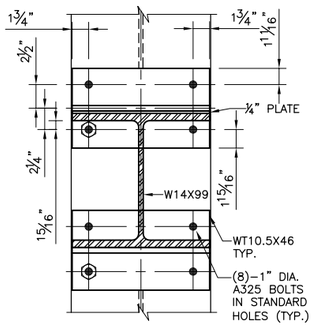
W14x109, W14x120, W14x132 AND W14x145 AT POLES (P2) AND (MP2)



C – SECTION
SCALE: 1" = 1'–0"

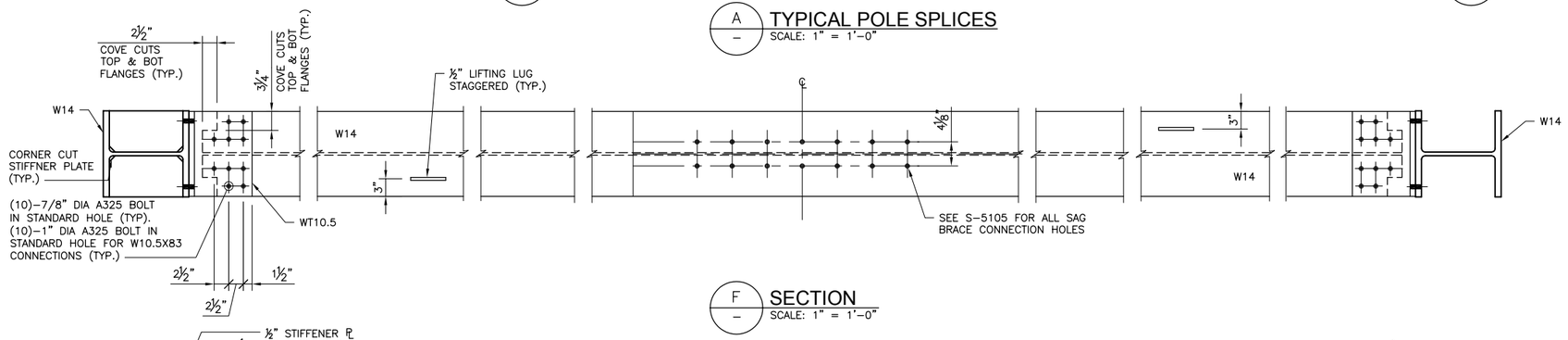
NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR CROSS BEAMS OF W14x109 AND W14x120 USE WT10.5x83 WITH CENTER TO CENTER BOLT SPACING AS SHOWN ON SECTION G OF THIS DRAWING.

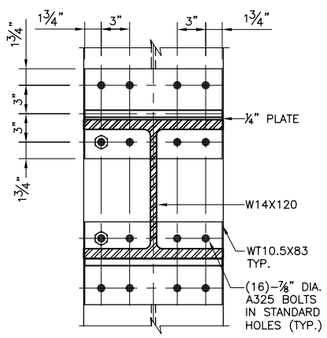


E – SECTION
SCALE: 1 1/2" = 1'–0"

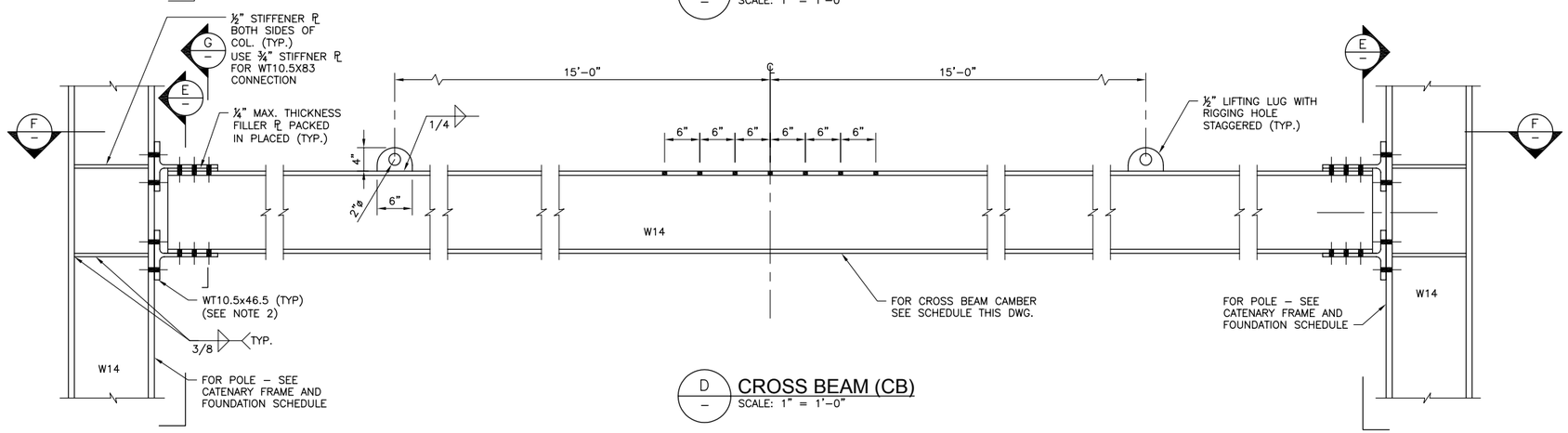
A – TYPICAL POLE SPLICES
SCALE: 1" = 1'–0"



F – SECTION
SCALE: 1" = 1'–0"



G – SECTION
SCALE: 1 1/2" = 1'–0"



D – CROSS BEAM (CB)
SCALE: 1" = 1'–0"

CROSS BEAM CAMBER SCHEDULE

SPAN "d"	MID–SPAN CAMBERS
< 50'	1"
50' TO 60'	1½"
60' TO 65'	2"
65' TO 70'	3"
70' TO 75'	3½"
75' TO 80'	4"
80' TO 85'	5"
85' TO 90'	7"
90' TO 95'	8"

1' 0 1' 2'
SCALE: 1"=1'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY CROSS BEAM (CB) AND POLE SPLICE DETAILS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

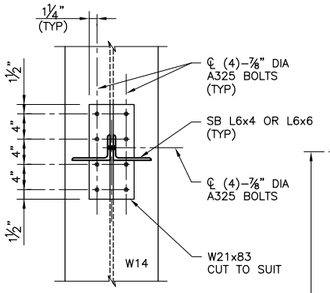
File No.:	2011–059–S–5104.DWG
Ref. No.:	2011–059
Sheet No:	490 OF 565

S–5104

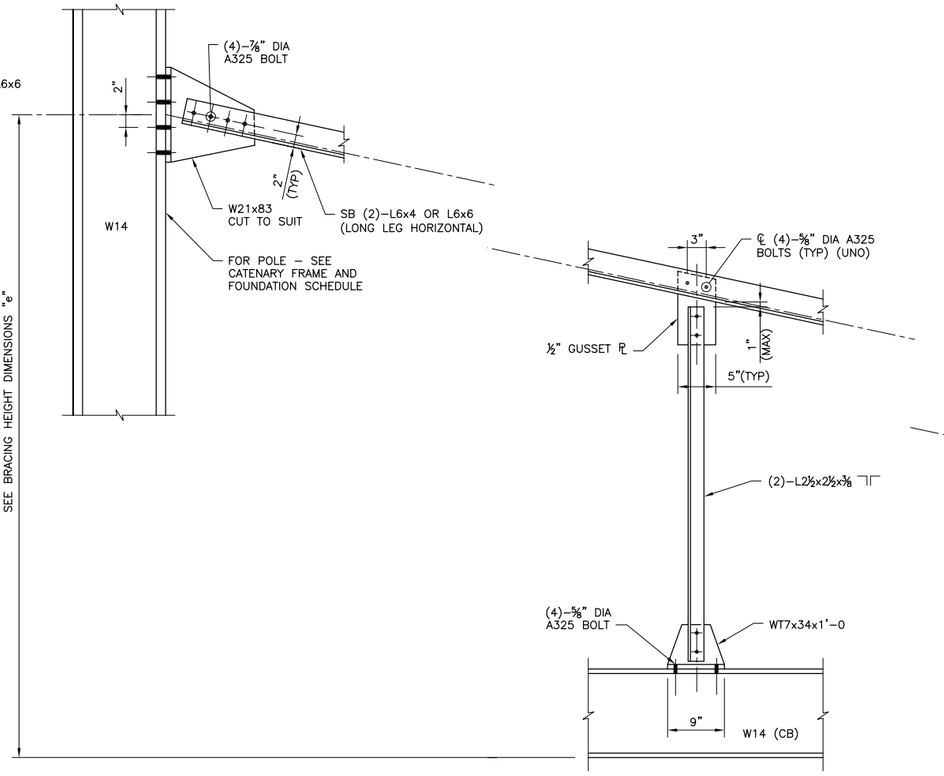
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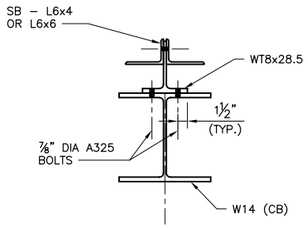
NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FIELD VERIFY DIMENSION PRIOR TO FABRICATION.
3. FOR DIMENSIONS NOT SHOWN SEE TYPICAL CATENARY FRAME ON DWG. S-5103.
4. FOR SAG BRACE SIZES SEE CATENARY FRAME TABLES ON DRAWINGS S-5115, S-5116, S-5117, S-5118 AND S-5119.

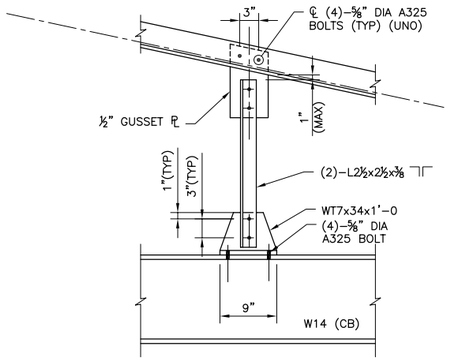


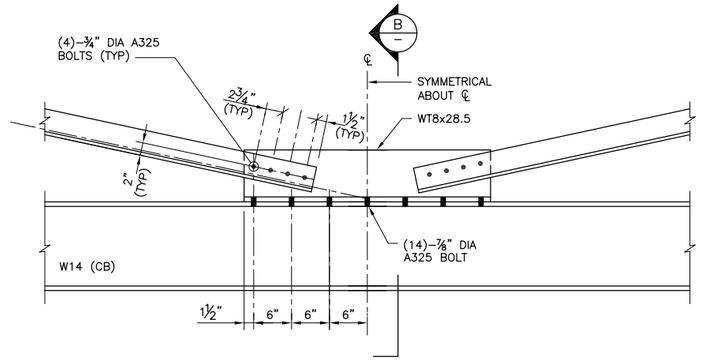
D — SECTION
SCALE: 1" = 1'-0"





B — SECTION
SCALE: 1" = 1'-0"





A — SAG BRACE (SB1)
SCALE: 1" = 1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

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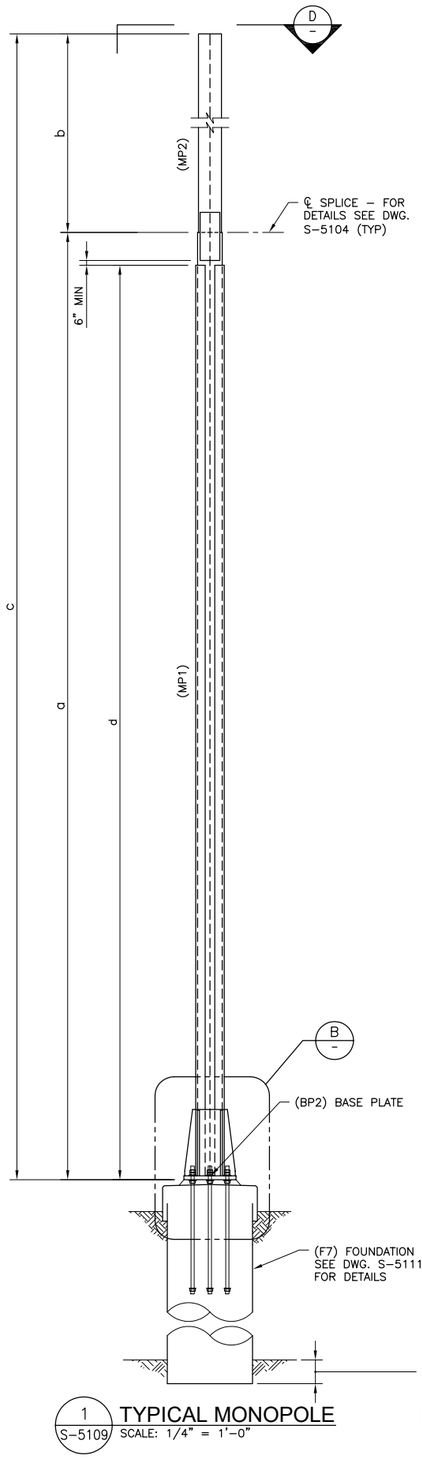
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DRAWINGS
STRUCTURE T-235 AND T-236 SECTIONS AND DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

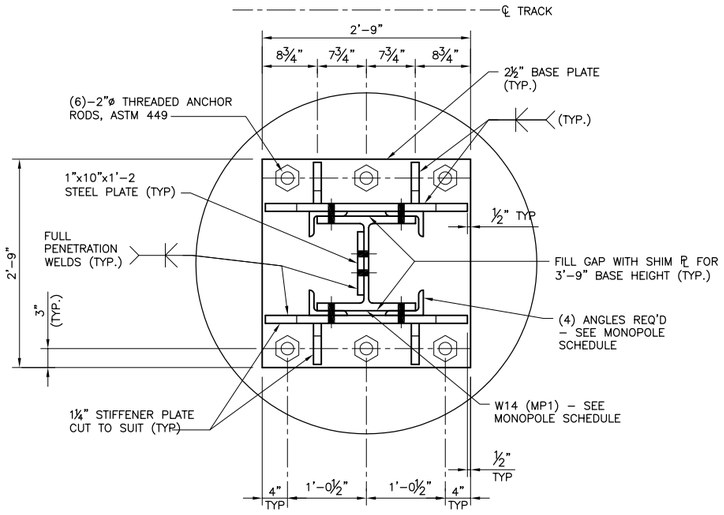
File No.:	2011-059-S-5105.DWG
Ref. No.:	2011-059
Sheet No:	491 OF 565

S-5105

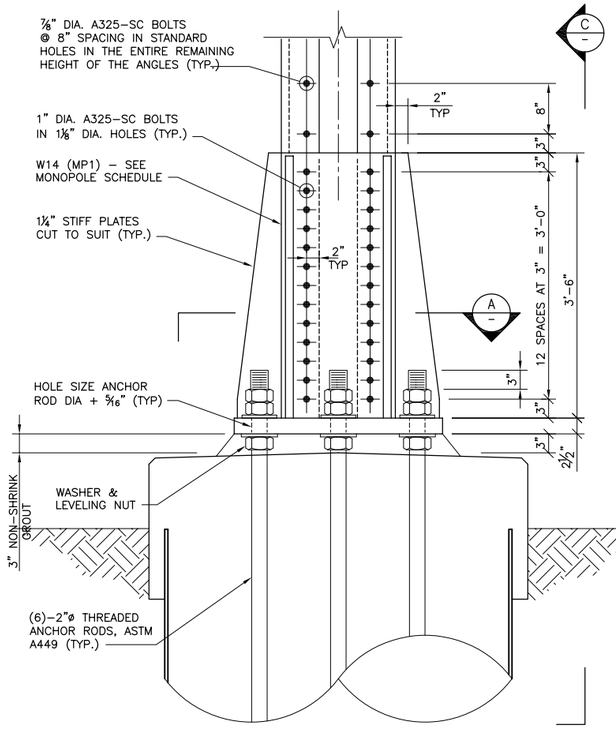
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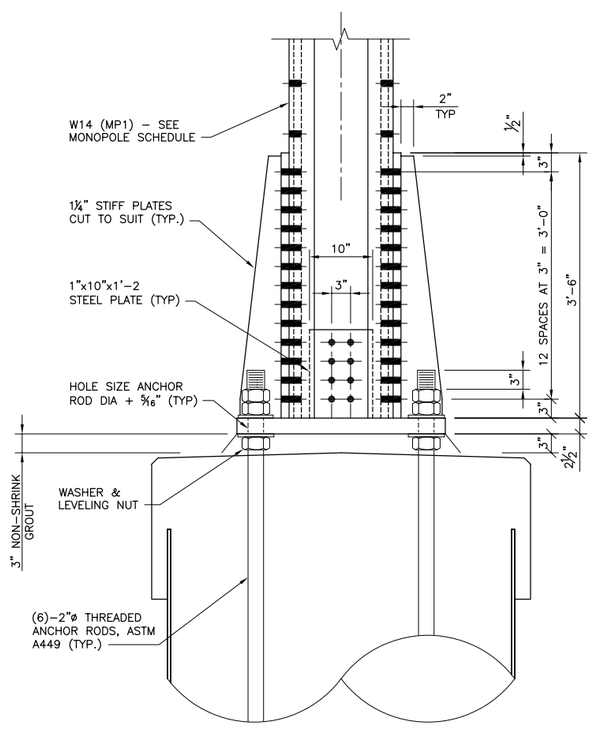
1 S–5109 **TYPICAL MONOPOLE**
SCALE: 1/4" = 1'–0"



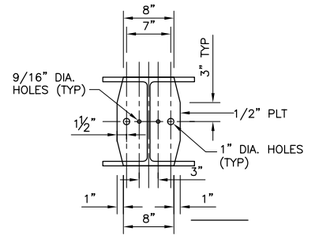
A S–5109 **SECTION**
SCALE: 1" = 1'–0"



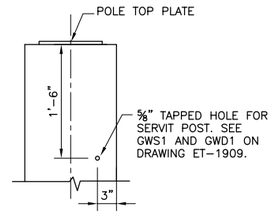
B S–5109 **BASE PLATE DETAIL (BP2)**
SCALE: 1" = 1'–0"



C S–5109 **SECTION**
SCALE: 1" = 1'–0"



D S–5109 **SECTION**
SCALE: 1" = 1'–0"



E S–5109 **SECTION**
SCALE: 1" = 1'–0"

4' 2' 0 4'
SCALE: 1/4"= 1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S–5001.
3. FOR CATENARY ID STRUCTURE SEE CATENARY SCHEDULE ON DWGS S–5120, S–5121, AND S–5122.
4. FOR STRUCTURE DIMENSIONS SEE MONOPOLE SCHEDULE THIS DWG. FOR FOUNDATION DETAILS NOT SHOWN SEE DWG. S–5111.

MONOPOLE SCHEDULE

STRUCTURE	DIMENSIONS				POLE (MP1) ANGLES	POLE (MP1)	POLE (MP2)	PIER EXT.	TOP OF FOUND.
	a	b	c	d					
T–291 SOUTH	50'–0"	63'–7¾"	113'–7¾"	48'–0"	L6x4x¾	W14x159	W14x99	2'–0"	419.00'
T–291 NORTH	50'–0"	61'–7¾"	111–7¾"	48'–0"	L6x4x¾	W14x159	W14x99	2'–0"	421.00'
T–293 SOUTH	50'–0"	67'–7½"	117'–7½"	48'–0"	L6x4x¾	W14x159	W14x99	4'–6"	414.00'
T–293 NORTH	50'–0"	64'–7½"	114'–7½"	48'–0"	L6x4x¾	W14x159	W14x99	2'–1"	417.00'

100% DESIGN SUBMISSION

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No	Revisions	Date	By

AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
MONOPOLES (MP1 & MP2)

Recommended: AJT	Drawn: TAB	Checked: RW	Date: 03/17/16

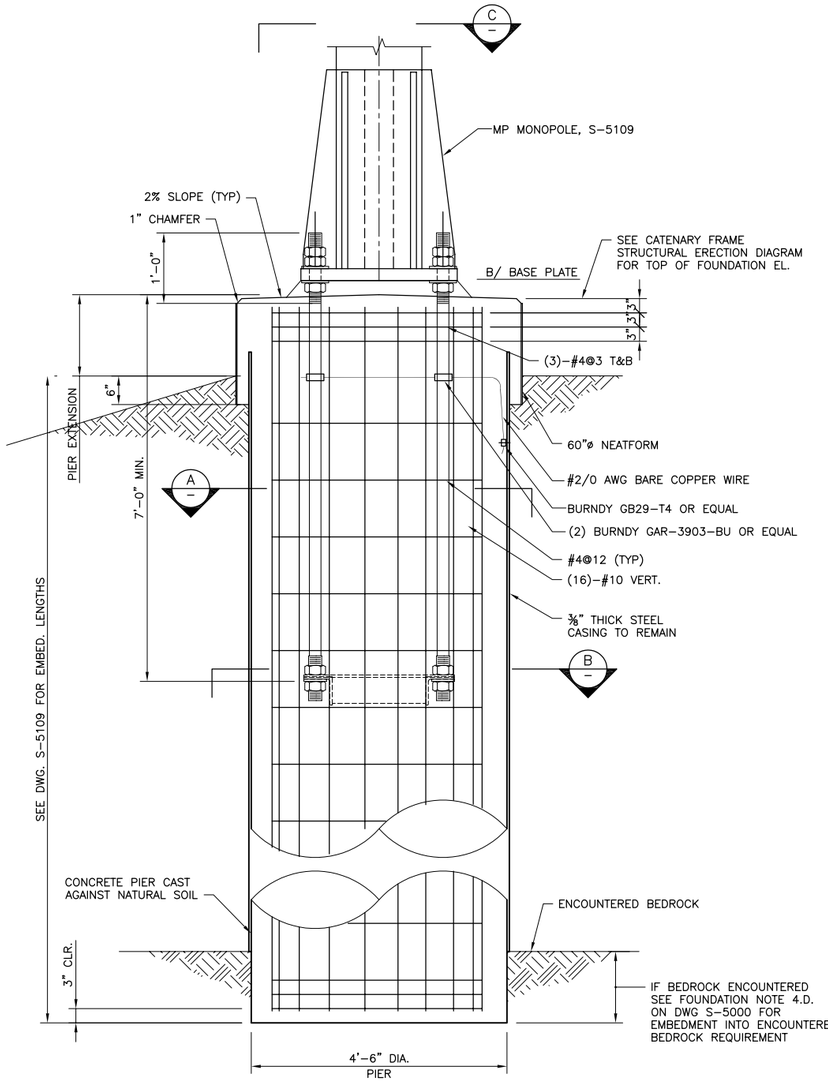
File No.:	2011–059–S–5109.DWG
Ref. No.:	2011–059
Sheet No:	492 OF 565

S–5109

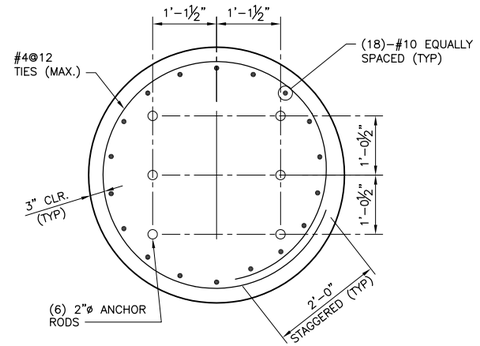
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NOTES:

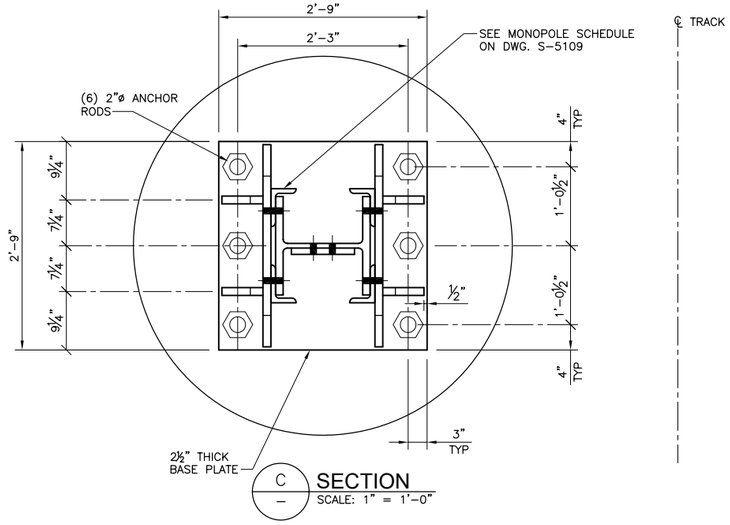
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



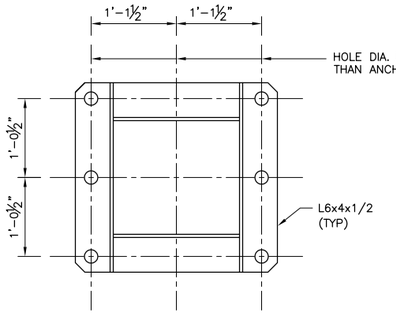
FOUNDATION DETAIL (F7)
SCALE: 3/4" = 1'-0"

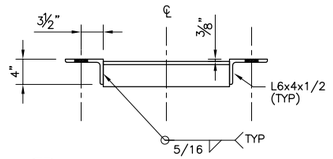


A — SECTION
SCALE: 3/4" = 1'-0"



C — SECTION
SCALE: 1" = 1'-0"





B — ANCHOR PLATE DETAIL
SCALE: 1" = 1'-0"

1' 6" 0 1'
SCALE:3/4"=1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

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Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

Baker

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
CATENARY FOUNDATION (F7)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5111.DWG
Ref. No.:	2011-059
Sheet No:	493 OF 565

S-5111

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ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF(S)	PIER EXT (S)	TOF(N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1205	T-450	W14x109	W14x109	*SEE NOTE 3	(2) L6x4x3/8	W14x99	29'-6"	43'-0"	43'-0"	80'-0"	9'-10 1/2"	29'-6"	43'-0"	43'-0"	550	2'-8"	550	2'-8 1/4"	20'-0"	
ET-1206	T-449	W14x109	W14x109	*SEE NOTE 3	(2) L6x4x3/8	W14x99	29'-9"	45'-0"	45'-0"	85'-0"	10'-6"	29'-9"	45'-0"	45'-0"	549	1'-11 1/2"	549	1'-0"	20'-0"	
ET-1207	T-448	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x109	28'-8"	43'-0"	43'-0"	87'-0"	10'-8 1/2"	28'-8"	43'-0"	80'-8 1/4"	548	3'-0"	548	3'-0"	20'-0"	
ET-1208	T-447	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x109	28'-3"	41'-0"	71'-9"	86'-0"	10'-7"	28'-3"	41'-0"	71'-9"	548	2'-11"	548	4'-0"	20'-0"	7'-0"
ET-1209	T-446	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x109	28'-8"	44'-0"	72'-2"	86'-0"	10'-7"	28'-8"	44'-0"	72'-2"	545	2'-11 1/4"	545	3'-0"	20'-0"	
ET-1210	T-445	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	27'-8 1/4"	42'-0"	71'-2 1/2"	84'-0"	10'-4"	27'-8 1/4"	42'-0"	71'-2 1/2"	544	3'-2 1/2"	544	3'-5 3/4"	20'-0"	
ET-1211	T-444	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x109	27'-10 1/2"	42'-0"	76'-4 1/2"	84'-0"	9'-2'	27'-10 1/2"	42'-0"	76'-4 1/2"	541	2'-0"	541	2'-0"	20'-0"	
ET-1212	T-443	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x109	25'-5 1/2"	42'-0"	82'-11 1/2"	85'-0"	10'-5 1/2"	25'-5 1/2"	42'-0"	78'-11 1/2"	541.75	1'-6 3/4"	541.75	1'-9"	20'-0"	
ET-1215	T-440	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14X120	26'-10 1/2"	44'-0"	87'-0"	95'-0"	11'-7"	12'-3"	40'-0"	69'-4 1/2"	539.39	0'-0"	554	0'-0"	20'-0"	
ET-1217	T-438	W14x132	W14x132	W14x90	(2) L6x4x3/8	W14x109	22'-32"	38'-0"	78'-3"	85'-0"	10'-5 1/2"	13'-2 3/4"	29'-0"	64'-3"	543	0'-11"	552	3'-3 3/4"	20'-0"	14'-0"
ET-1218	T-437	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	23'-9 1/2"	40'-0"	66'-3 1/2"	85'-0"	10'-5 1/2"	15'-9 1/2"	32'-0"	66'-3 1/2"	540	3'-7 1/4"	548	1'-6"	20'-0"	
ET-1219	T-436	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x99	26'-1"	40'-0"	78'-7"	80'-0"	9'-10 1/2"	26'-1"	40'-0"	76'-6 3/4"	536	3'-1 1/2"	536	1'-8 1/2"	20'-0"	14'-0"
ET-1220	T-435	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3"	40'-0"	74'-9"	71'-0"	8'-10 1/4"	29'-3"	40'-0"	74'-9"	531	3'-0"	531	1'-3 1/2"	20'-0"	
ET-1222	T-433	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	32'-11"	44'-0"	78'-5"	71'-0"	8'-10 1/4"	29'-11"	41'-0"	75'-5 1/4"	525	1'-7 1/2"	528	1'-5 3/4"	20'-0"	
ET-1224	T-431	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	31'-4 1/2"	43'-0"	76'-10 1/2"	71'-0"	8'-10 1/4"	31'-4 1/2"	43'-0"	75'-0"	525	4'-1 1/2"	525	2'-11 3/4"	20'-0"	
ET-1225	T-430	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-0 3/4"	42'-0"	74'-6 3/4"	71'-0"	8'-10 1/4"	30'-0 3/4"	42'-0"	74'-6 3/4"	526	3'-0"	526	3'-10 1/2"	20'-0"	
ET-1227	T-428	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7"	41'-0"	75'-1"	72'-0"	8'-11 3/4"	31'-7"	45'-0"	70'-1"	524	2'-4 1/4"	522	4'-2 3/7"	20'-0"	
ET-1228	T-427	W14x145	W14x145	W14x90	(2) L6x6x3/8	W14x90	31'-8 1/2"	44'-0"	75'-2 1/2"	71'-0"	8'-10 1/4"	31'-8 1/2"	44'-0"	60'-2 1/2"	523	2'-0"	523	5'-4"	20'-0"	14'-0"
ET-1229	T-426	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	30'-2"	41'-0"	74'-8"	68'-0"	8'-6 1/4"	30'-2"	41'-0"	59'-8"	523	3'-0"	523	7'-7 1/4"	18'-0"	
ET-1230	T-425	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4 1/2"	40'-0"	74'-4 1/4"	68'-0"	8'-6 1/4"	29'-4 1/2"	40'-0"	59'-4 1/4"	523	1'-0"	523	3'-4"	18'-0"	
ET-1231	T-424	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10"	43'-0"	74'-4"	68'-0"	8'-6 1/4"	28'-10"	43'-0"	59'-4"	523	1'-8 3/4"	523	4'-0"	18'-0"	
ET-1232	T-423	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-7"	38'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-7"	41'-0"	59'-1"	526	2'-6 3/4"	523	1'-1"	20'-0"	
ET-1233	T-422	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	25'-8"	40'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-8"	40'-0"	59'-1"	526	2'-6 3/4"	523	2'-1"	20-0"	14'-0"
ET-1235	T-420	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-6"	40'-0"	72'-0"	68'-0"	8'-6 1/4"	30'-6"	41'-0"	61'-0"	525	1'-1 1/4"	521	2'-7 3/4"	20'-0"	
ET-1236	T-419	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-6"	40'-0"	71'-11 3/4"	70'-0"	8'-9"	28'-6"	41'-0"	58'-11 3/4"	525	3'-7 3/4"	523	3'-0"	20'-0"	
ET-1237	T-418	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-7"	40'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-7"	40'-0"	59'-1"	526	2'-6 3/4"	523	2'-1"	20'-0"	
ET-1238	T-417	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-7"	40'-0"	72'-1"	71'-0"	8'-10 1/4"	30'-7"	41'-0"	61'-1"	525	1'-4 1/4"	521	2'-0"	18'-0"	
ET-1239	T-416	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-6 1/2"	40'-0"	73'-0 1/2"	71'-0"	8'-10 1/4"	27'-6 1/2"	40'-0"	58'-0 1/2"	524	3'-0"	524	2'-1 1/2"	18'-0"	
ET-1240	T-415	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-6 3/4"	40'-0"	75'-0 3/4"	71'-0"	8'-10 1/4"	29'-6 3/4"	40'-0"	60'-0 3/4"	522	0'-10 3/4"	522	1'-6"	20'-0"	
ET-1241	T-414	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-2 1/2"	40'-0"	69'-8 1/2"	71'-0"	8'-10 1/4"	29'-2 1/2"	40'-0"	59'-8 1/2"	522	3'-7 3/4"	522	2'-0"	20-0"	
ET-1242	T-413	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10 1/4"	40'-0"	65'-4 1/4"	71'-0"	8'-10 1/4"	28'-10 1/4"	40'-0"	65'-4 1/4"	522	5'-4 1/4"	522	2'-9"	20'-0"	
ET-1243	T-412	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	30'-8"	41'-0"	61'-8"	72'-0"	8'-11 3/4"	28'-8"	40'-0"	59'-8"	520	3'-10 3/4"	522	3'-0"	20'-0"	
ET-1244	T-411	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-0"	40'-0"	58'-6"	71'-0"	8'-10 1/4"	28'-0"	40'-0"	58'-6"	523	4'-0"	523	2'-0"	20'-0"	
ET-1245	T-410	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-9"	41'-0"	57'-3/4"	71'-0"	8'-10 1/4"	23'-9"	38'-0"	54'-3 1/4"	524	3'-1"	527	4'-4 1/2"	20'-0"	
ET-1246	T-409	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	23'-5"	38'-0"	53'-11 1/2"	71'-0"	8'-10 1/4"	23'-5"	38'-0"	53'-11 1/2"	527	5'-5 1/4"	527	3'-11 3/4"	20'-0"	
ET-1247	T-408	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-5 1/2"	40'-0"	64'-5 1/2"	71'-0"	8'-10 1/4"	26'-5 1/2"	40'-0"	64'-5 1/2"	524	3'-6 1/2"	524	4'-0 3/4"	20'-0"	
ET-1248	T-407	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-2"	41'-0"	74'-0 1/4"	72'-0"	8'-11 3/4"	29'-2"	41'-0"	74'-0 1/4"	520	1'-0"	520	1'-0"	20'-0"	
ET-1249	T-406	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-7 1/2"	40'-0"	74'-7 1/2"	72'-0"	8'-11 3/4"	28'-7 1/2"	40'-0"	74'-7 1/2"	518	3'-0"	518	3'-0"	20'-0"	
ET-1250	T-405	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	68'-0"	72'-0"	8'-11 3/4"	29'-0"	40'-0"	68'-0"	516	2'-0"	516	2'-0"	20'-0"	
ET-1251	T-404	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 1/2"	40'-0"	67'-3 3/4"	72'-0"	8'-11 3/4"	28'-3 1/2"	40'-0"	67'-3 3/4"	515	3'-0"	515	4'-0"	20'-0"	
ET-1252	T-403	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	67'-6"	72'-0"	8'-11 3/4"	28'-6"	40'-0"	67'-6"	513	5'-10"	513	4'-2"	20'-0"	
ET-1253	T-402	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	41'-0"	76'-3"	72'-0"	8'-11 3/4"	30'-3"	41'-0"	76'-3"	510	3'-11 1/2"	510	2'-0"	20'-0"	
ET-1255	T-400	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-9 1/2"	39'-0"	72'-9 1/2"	71'-0"	8'-10 1/4"	28'-9 1/2"	41'-0"	74'-9 1/2"	512	2'-6"	510	3'-0"	20'-0"	
ET-1256	T-399	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 3/4"	40'-0"	71'-3 3/4"	71'-0"	8'-10 1/4"	25'-3 3/4"	40'-0"	68'-3 3/4"	509	3'-0"	512	3'-2"	20'-0"	
ET-1257	T-398	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-1 3/4"	40'-0"	68'-7 3/4"	71'-0"	8'-10 1/4"	26'-1 3/4"	40'-0"	68'-7 3/4"	510	3'-0"	510	3'-6 1/4"	20'-0"	
ET-1258	T-397	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	22'-5 1/2"	40'-0"	75'-10 3/4"	71'-0"	8'-10 1/4"	22'-5 1/2"	40'-0"	75'-10 3/4"	509	3'-11"	509	4'-3"	20'-0"	7'-0"
ET-1259	T-396	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	18'-2 3/4"	N/A	32'-2 1/2"	69'-0"	8'-7 1/2"	21'-2 3/4"	N/A	35'-2 1/2"	510	4'-6 1/2"	507	1'-0"	18'-0"	
ET-1260	T-395	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	17'-11"	40'-0"	75'-11"	69'-0"	8'-7 1/2"	17'-11"	40'-0"	75'-11"	510	4'-0"	510	3'-2 1/4"	20'-0"	7'-0"
ET-1261	T-394	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-3"	40'-0"	75'-3"	71'-0"	8'-10 1/4"	23'-3"	40'-0"	75'-3"	508	2'-0"	508	2'-10"	20'-0"	
ET-1262	T-393	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	22'-9"	40'-0"	70'-9"	71'-0"	8'-10 1/4"	22'-9"	40'-0"	70'-9"	507	2'-3 1/2"	507	2'-0"	20-0"	
ET-1263	T-392	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-11 3/4"	40'-0"	69'-0 1/4"	71'-0"	8'-10 1/4"	21'-11 3/4"	40'-0"	69'-0 1/4"	505	1'-11"	505	3'-8"	18'-0"	
ET-1265	T-390	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-5"	40'-0"	71'-0 3/4"	71'-0"	8'-10 1/4"	27'-5"	40'-0"	71'-0 3/4"	499	2'-0"	499	1'-0"	20'-0"	
ET-1266	T-389	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	24'-11 1/4"	40'-0"	77'-5 1/4"	72'-0"	8'-11 3/4"	22'-11 1/4"	40'-0"	60'-5 1/4"	497	3'-0"	499	2'-0"	20'-0"	
ET-1267	T-388	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	25'-4 1/4"	42'-0"	74'-10 1/4"	71'-0"	8'-10 1/4"	24'-4 1/4"	42'-0"	58'-10 1/4"	497	4'-0"	498	2'-0"	20'-0"	
ET-1268	T-387	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	27'-2"	40'-0"	80'-10"	69'-0"	8'-7 1/2"	21'-2"	40'-0"	63'-1 1/2"	495	2'-0"	501	2'-9 1/2"	20'-0"	
ET-1269	T-386	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	26'-10 3/4"	40'-0"	76'-4 3/4"	69'-0"	8'-7 1/2"	21'-10 3/4"	40'-0"	71'-4 3/4"	494	2'-0"	499	2'-0"	20'-0"	
ET-1270	T-385	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	27'-1 1/4"	42'-0"	76'-7 1/4"	68'-0"	8'-6 1/4"	24'-1 1/4"	40'-0"	73'-7 1/4"	493	2'-0"	496	1'-0"	20'-0"	
ET-1271	T-384	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x99	25'-2 1/4"	40'-0"	74'-8 1/4"	68'-0"	8'-6 1/4"	25'-2 1/4"	40'-0"	74'-8 1/4"	494	4'-0"	494	2'-0"	20'-0"	
ET-1272	T-383	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x99	24'-11 1/2"	40'-0"	74'-5 1/2"	68'-0"	8'-6 1/4"	24'-11 1/2"	40'-0"	74'-5 1/2"	493	4'-0"	493	3'-0"	20'-0"	
ET-1273	T-382	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 3/4"	40'-0"	74'-9"	69'-0"	8'-7 1/2"	28'-3 3/4"	40'-0"	74'-9"	491	3'-11 1/2"	491	3'-0"	20'-0"	

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. SEE DWG S–5103 FOR TYPICAL CATENARY FRAME.
3. PRE–DRILL COLUMNS FOR FUTURE EXTENSION.

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No	Revisions	Date	By

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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL FRAME & FOUNDATIONS CATENARY FRAME AND FOUNDATION SCHEDULE (1 OF 5)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5115.DWG
Ref. No.:	2011–059
Sheet No:	494 OF 565

S–5115

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1274	T-381	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-6 1/2"	41'-0"	77'-0 1/2"	71'-0"	8'-10 1/4"	25'-6 1/2"	40'-0"	72'-0 1/2"	487	2'-0"	492	2'-11 1/4"	20'-0"	
ET-1275	T-380	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 1/2"	40'-0"	74'-2 1/2"	71'-0"	8'-10 1/4"	24'-2 1/2"	40'-0"	70'-2 1/2"	488	2'-11 1/2"	492	3'-3"	20'-0"	
ET-1276	T-379	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-5 1/4"	40'-0"	74'-5 1/4"	71'-0"	8'-10 1/4"	24'-5 1/4"	40'-0"	70'-5 1/4"	486	2'-3 3/4"	490	4'-0 3/4	20'-0"	
ET-1277	T-378	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-8 1/4"	40'-0"	67'-8 1/4"	71'-0"	8'-10 1/4"	29'-8 1/4"	40'-0"	67'-8 1/4"	484	3'-6 1/2"	484	2'-6"	20'-0"	
ET-1278	T-377	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1"	40'-0"	62'-1"	71'-0"	8'-10 1/4"	29'-1"	40'-0"	62'-1"	480	3'-7 1/4"	480	4'-10"	20'-0"	
ET-1279	T-376	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-6 3/4"	40'-0"	56'-6 3/4"	71'-0"	8'-10 1/4"	21'-6 3/4"	40'-0"	53'-6 3/4"	484	3'-0"	487	3'10 3/4"	20'-0"	
ET-1280	T-375	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-11"	40'-0"	56'-11"	71'-0"	8'-10 1/4"	22'-11"	40'-0"	54'-11"	482	1'-6 1/4"	484	2'-1 1/2"	20'-0"	
ET-1281	T-374	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-8 1/4"	40'-0"	57'-8 1/4"	72'-0"	8'-11 3/4"	25'-8 1/4"	40'-0"	57'-8 1/4"	479	4'-0"	479	1'-0"	20'-0"	
ET-1282	T-373	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-5 3/4"	40'-0"	61'-5 3/4"	72'-0"	8'-11 3/4"	29'-5 3/4"	40'-0"	61'-5 3/4"	473	3'-11 1/4"	473	2'-0"	20'-0"	
ET-1283	T-372	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-1 1/4"	42'-0"	62'-1 1/4"	71'-0"	8'-10 1/4"	31'-1 1/4"	44'-0"	62'-1 1/4"	470	3'-7 1/4"	470	1'-0"	20'-0"	
ET-1284	T-371	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-7 1/2"	40'-0"	59'-7 1/2"	71'-0"	8'-10 1/4"	28'-7 1/2"	40'-0"	59'-7 1/2"	470	4'-7 1/4"	470	3'-0"	18'-0"	
ET-1285	T-370	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-7 3/4"	43'-0"	62'-7 3/4"	71'-0"	8'-10 1/4"	31'-7 3/4"	43'-0"	62'-7 3/4"	465	3'-4"	465	1'-8 3/4"	18'-0"	
ET-1286	T-369	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	71'-0"	8'-10 1/4"	29'-0"	40'-0"	60'-0"	466	1'-0"	466	1'-0"	18'-0"	
ET-1287	T-368	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/2"	40'-0"	58'-2 1/2"	71'-0"	8'-10 1/4"	24'-2 1/2"	40'-0"	55'-2 1/2"	466	3'-0"	469	5'-8 1/2'	20'-0"	
ET-1288	T-367	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-9 1/2"	41'-0"	69'-9 1/2"	71'-0"	8'-10 1/4"	21'-9 1/2"	40'-0"	62'-9 1/2"	463	1'-11 1/4"	470	3'-10 1/4"	20'-0"	
ET-1289	T-366	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	27'-2 1/4"	40'-0"	79'-2 1/4"	68'-0"	8'-6 1/4"	23'-2 1/4"	40'-0"	75'-2 1/4"	462	2'-0"	466	2'-9 1/2"	20'-0"	7'-0"
ET-1290	T-365	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	22'-4 3/4"	N/A	34'-0"	71'-0"	8'-10 1/4"	17'-4 3/4"	N/A	29'-0"	461	2'-0"	466	3'-3"	18'-0"	
ET-1291	T-364	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	25'-6 1/4"	40'-0"	78'-6 1/4"	71'-0"	8'-10 1/4"	20'-6 1/4"	40'-0"	78'-6 1/4"	461	2'-0"	466	3-3"	20'-0"	7'-0"
ET-1292	T-363	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	26'-9"	40'-0"	68'-9"	72'-0"	8'-11 3/4"	26'-9"	40'-0"	83'-9"	459	4'-0"	459	2'-0"	20'-0"	
ET-1293	T-362	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1 1/2"	42'-0"	60'-1 1/2"	72'-0"	8'-11 3/4"	29'-1 1/2"	42'-0"	70'-1 1/2"	456	4'-0"	456	2'-0"	18'-0"	
ET-1294	T-361	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-1 3/4"	41'-0"	59'-7 3/4"	71'-0"	8'-10 1/4"	29'-1 3/4"	41'-0"	59'-7 3/4"	455	3'-0"	455	1'-9 1/2"	18'-0"	
ET-1295	T-360	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/4"	42'-0"	59'-9 1/4"	71'-0"	8'-10 1/4"	29'-3 1/4"	42'-0"	59'-9 1/4"	453	4'-0"	453	2'-0"	18'-0"	
ET-1296	T-359	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-11"	41'-0"	59'-11"	71'-0"	8'-10 1/4"	26'-11"	40'-0"	65'-11"	451	3'-0"	453	2'-0"	20'-0"	
ET-1297	T-358	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-11 3/4"	39'-0"	59'-5 3/4"	68'-0"	8'-6 1/4"	25'-11 3/4"	40'-0"	72'-5 3/4"	450	3'-4"	452	2'-0"	18'-0"	
ET-1298	T-357	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3"	40'-0"	59'-9"	68'-0"	8'-6 1/4"	28'-3"	40'-0"	74'-9"	448.23	3'-6 3/4"	448.23	1'-2 3/4"	18'-0"	
ET-1299	T-356	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-4 3/4"	40'-0"	59'-4 3/4"	68'-0"	8'-6 1/4"	27'-4 3/4"	40'-0"	67'-4 3/4"	447	3'-0"	447	3'-0"	20'-0"	
ET-1300	T-355	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-8 1/4"	40'-0"	59'-8 1/4"	71'-0"	8'-10 1/4"	28'-8 1/4"	40'-0"	59'-8 1/4"	445	3'-0"	445	2'-9"	20'-0"	
ET-1301	T-354	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-9 3/4"	40'-0"	59'-9 3/4"	71'-0"	8'-10 1/4"	28'-9 3/4"	40'-0"	59'-9 3/4"	443	4'-0"	443	1'-10"	20'-0"	
ET-1302	T-353	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	72'-0"	8'-11 3/4"	29'-0"	40'-0"	60'-0"	441	4'-0"	441	0'-8"	18'-0"	
ET-1303	T-352	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	72'-0"	8'-11 3/4"	27'-0"	40'-0"	58'-0"	439	3'-0"	441	1'-0"	18'-0"	
ET-1304	T-351	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-6 3/4"	40'-0"	59'-10 3/4"	71'-0"	8'-10 1/4"	28'-6 3/4"	40'-0"	59'-10 3/4"	437	4'-2 1/4"	437	0'-10 1/2"	20'-0"	
ET-1305	T-350	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-4 1/4"	40'-0"	59'-8 1/2"	71'-0"	8'-10 1/4"	26'-4 1/4"	40'-0"	59'-8 1/2"	435	2'-9"	435	2'-6"	20'-0"	
ET-1306	T-349	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	28'-2 1/2"	N/A	43'-9"	73'-0"	9'-1"	28'-2 1/2"	N/A	43'-9"	432	2'-0"	432	4'-0"	18'-0"	
ET-1307	T-348	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4"	40'-0"	69'-8 1/4"	71'-0"	8'-10 1/4"	29'-4"	40'-0"	69'-8 1/4"	431	5'-0"	431	5'-3 1/2"	20'-0"	
ET-1308	T-347	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-1 1/2"	40'-0"	74'-1 1/2"	71'-0"	8'-10 1/4"	28'-1 1/2"	40'-0"	74'-1 1/2"	432	4'-0"	432	3'-0"	20'-0"	
ET-1309	T-346	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4"	40'-0"	74'-10"	71'-0"	8'-10 1/4"	29'-4"	40'-0"	74'-10"	430	4'-0"	430	3'-0"	20'-0"	
ET-1310	T-345	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7 1/4"	40'-0"	75'-1 1/4"	72'-0"	8'-11 3/4"	29'-7 1/4"	40'-0"	75'-1 1/4"	428	4'-8 1/4"	428	4'-0"	20'-0"	
ET-1311	T-344	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	43'-0"	76'-3"	72'-0"	8'-11 3/4"	30'-3"	43'-0"	76'-3"	425	3'-0"	425	4'-0"	20'-0"	
ET-1312	T-343	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-10 3/4"	42'-0"	74'-11 3/4"	72'-0"	8'-11 3/4"	29'-10 3/4"	42'-0"	74'-11 3/4"	425	5'-0"	425	4'-0"	20'-0"	
ET-1313	T-342	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10 3/4"	40'-0"	70'-4 1/4"	72'-0"	8'-11 3/4"	28'-10 3/4"	40'-0"	70'-4 1/4"	425	5-11 1/2"	425	3'-11 1/2"	20'-0"	
ET-1314	T-341	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-4 1/2"	42'-0"	71'-10 1/2"	72'-0"	8'-11 3/4"	29'-4 1/2"	42'-0"	70'-0"	422	2'-0"	422	3'-0"	20'-0"	
ET-1315	T-340	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	29'-6 1/4"	41'-0"	84'-3"	71'-0"	8'-10 1/4"	29'-6 1/4"	41'-0"	79'-3"	421	1'-0 1/4"	421	4'-0"	20'-0"	7'-0"
ET-1315A	T-339A	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	23'-11 1/4"	N/A	37'-4"	71'-0"	8'-10 1/4"	26'-11 1/4"	N/A	40'-4"	422	2'-0"	419	2'-0"	18'-0"	
ET-1317	T-338	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	25'-6"	40'-0"	81'-6"	71'-0"	8'-10 1/4"	25'-6"	40'-0"	76'-6"	422	2'-0"	422	3'-0"	20'-0"	7'-0"
ET-1317A	T-337A	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	23'-11 1/4"	N/A	35'-11 1/4"	71'-0"	8'-10 1/4"	26'-11 1/4"	N/A	38'-11 1/4"	422	2'-8 3/4"	419	2'-0"	18'-0"	
ET-1318	T-337	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 3/4"	40'-0"	75'-0 3/4"	71'-0"	8'-10 1/4"	28'-2 3/4"	40'-0"	70'-0 3/4"	419	1'-0"	419	3'-0"	20'-0"	
ET-1319	T-336	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/2"	40'-0"	69'-8 1/2"	71'-0"	8'-10 1/4"	27'-2 1/2"	40'-0"	69'-8 1/2"	418	1'-11 1/4"	418	3'-0"	18'-0"	
ET-1321	T-334	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-7 3/4"	40'-0"	71'-1 3/4"	71'-0"	8'-10 1/4"	28'-7 3/4"	40'-0"	71'-1 3/4"	415	1'-11 1/4"	415	2'-11 3/4"	18'-0"	
ET-1322	T-333	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0 1/4"	40'-0"	67'-7 3/4"	71'-0"	8'-10 1/4"	29'-0 1/4"	40'-0"	67'-7 3/4"	413	5'-0"	413	3'-0"	18'-0"	
ET-1323	T-332	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	30'-11 1/2"	45'-0"	62'-11 1/2"	72'-0"	8'-11 3/4"	30'-11 1/2"	45'-0"	62'-11 1/2"	408	3'-0"	408	3'-9 1/4"	18'-0"	
ET-1324	T-331	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-5"	42'-0"	63'-11"	72'-0"	8'-11 3/4"	30'-5"	42'-0"	63'-11"	405	2'-6 3/4"	405	3'-0"	20'-0"	
ET-1325	T-330	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-5"	43'-0"	60'-11"	71'-0"	8'-10 1/4"	28'-5"	43'-0"	60'-11"	406	2'-11 1/4"	406	2'-5"	20'-0"	
ET-1327	T-328	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-9 1/2"	43'-0"	60'-9 1/2"	72'-0"	8'-11 3/4"	29'-9 1/2"	43'-0"	60'-9 1/2"	403	1'-0"	403	3'-0"	18'-0"	
ET-1328	T-327	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-6 1/2"	40'-0"	59'-6 1/2"	72'-0"	8'-11 3/4"	28'-6 1/2"	40'-0"	59'-6 1/2"	403	3'-0"	403	2'-0"	18'-0"	
ET-1329	T-326	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-6 3/4"	40'-0"	59'-6 3/4"	71'-0"	8'-10 1/4"	28'-6 3/4"	40'-0"	59'-6 3/4"	402	3'-0"	402	2'-0"	18'-0"	
ET-1330	T-325	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-3"	41'-0"	60'-5 1/2"	71'-0"	8'-10 1/4"	29'-3"	41'-0"	60'-5 1/2"	400	3'-0"	400	3'-8 3/4"	18'-0"	
ET-1331	T-324	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-7"	43'-0"	62'-7"	71'-0"	8'-10 1/4"	31'-7"	43'-0"	62'-7"	397	2'-9"	397	3'-8 3/4"	18'-0"	
ET-1332	T-323	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-1 1/4"	43'-0"	69'-11 1/2"	71'-0"	8'-10 1/4"	31'-1 1/4"	43'-0"	61'-11 1/2"	397	4'-11 1/4"	397	1'-6"	18'-0"	
ET-1333	T-322	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	74'-9	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	399	3'-9 1/2"	399	3'-0"	18'-0"	
ET-1334	T-321	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	75'-0"	71'-0"	8'-10 1/4"	28'-6"	40'-0"	59'-6"	399	4'-3 1/2"	399	3'-0"	18'-0"	
ET-1335	T-320	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	67'-6"	71'-0"	8'-10 1/4"	28'-6"	40'-0"	59'-6"	399	3'-0"	399	2'-0"	18'-0"	
ET-1336	T-319	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-2"	40'-0"	58'-2"	71'-0"	8'-10 1/4"	27'-2"	40'-0"	58'-2"	400	4'-0"	400	3'-0"	18'-0"	
ET-1337	T-318	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'	40'-0"	59'-0"	71'-0"	8'-10 1/4"	28'	40'-0"	59'-0"	399	3'-0"	399	3'-0"	18'-0"	

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (2 OF 5)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5116.DWG
Ref. No.:	2011-059
Sheet No:	495 OF 565

S-5116

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ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1338	T-317	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	26'-11 3/4"	40'-0"	57'-11 3/4"	71'-0"	8'-10 1/4"	26'-11 3/4"	40'-0"	57'-11 3/4"	400	5'-0"	400	3'-0"	18'-0"	
ET-1339	T-316	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x99	26'-9 3/4"	40'-0"	57'-9 3/4"	84'-0"	10'-4"	26'-9 3/4"	40'-0"	57'-9 3/4"	400	3'-0"	400	3'-0"	20'-0"	
ET-1340	T-315	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-11"	40'-0"	58'-11"	71'-0"	8'-10 1/4"	23'-11"	40'-0"	54'-11"	399	2'-0"	403	4'-8 3/4"	20'-0"	
ET-1341	T-314	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-8 1/4"	40'-0"	56'-2 3/4"	71'-0"	8'-10 1/4"	25'-8 1/4"	40'-0"	56'-2 3/4"	402	3'-8 1/2"	402	3'-0"	18'-0"	
ET-1342	T-313	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-6"	40'-0"	55'-6"	71'-0"	8'-10 1/4"	24'-6"	40'-0"	55'-6"	403	3'-0"	403	4'-0"	18'-0"	
ET-1343	T-312	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	24'-6 1/2"	40'-0"	56'-6 1/2"	72'-0"	8'-11 3/4"	24'-6 1/2"	40'-0"	56'-6 1/2"	402	4'-0"	402	3'-0"	18'-0"	
ET-1344	T-311	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-6"	40'-0"	59'-0"	73'-0"	9'-1"	25'-6"	40'-0"	59'-0"	400	2'-0"	400	1'-8 1/4"	20'-0"	
ET-1345	T-310	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-3"	40'-0"	59'-9"	74'-0"	9'-2 1/2"	26'-3"	40'-0"	59'-9"	399	4'-4 1/4"	399	2'-0 1/4"	20'-0"	
ET-1346	T-309	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-3"	40'-0"	59'-2 1/2"	75'-0"	9'-4"	26'-3"	40'-0"	59'-2 1/2"	400	4'-1"	400	5'-0"	20'-0"	
ET-1347	T-308	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	26'-1 3/4"	40'-0"	60'-0"	76'-0"	9'-5 1/2"	26'-1 1/2"	40'-0"	60'-0"	399	6'-4 1/2"	399	3'-0"	20'-0"	
ET-1348	T-307	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	26'-2"	40'-0"	59'-2"	75'-0"	9'-4"	26'-2"	40'-0"	59'-2"	400	7'-3 3/4"	400	3'-0"	18'-0"	
ET-1349	T-306	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-5 3/4"	40'-0"	60'-5 3/4"	74'-0"	9'-2 1/2"	27'-5 3/4"	40'-0"	58'-5 3/4"	400	3'-0"	402	2'-0"	20'-0"	
ET-1350	T-305	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	26'-1 1/4"	40'-0"	69'-10 3/4"	73'-0"	9'-1"	26'-1 1/4"	40'-0"	69'-10 3/4"	405	4'-0"	405	2'-0"	20'-0"	
ET-1352	T-303	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/2"	42'-0"	60'-9 1/2"	72'-0"	8'-11 3/4"	27'-3 1/2"	40'-0"	58'-9 1/2"	404	4'-0"	406	2'-10 1/2"	20'-0"	
ET-1353	T-302	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-7"	42'-0"	61'-7"	72'-0"	8'-11 3/4"	29'-7"	42'-0"	61'-7"	405	4'-0"	405	1'-10 1/2"	18'-0"	
ET-1354	T-301	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-9"	41'-0"	59'-9"	72'-0"	8'-11 3/4"	29'-9"	41'-0"	59'-9"	407.61	3'-7 1/4"	407.61	1'-7 1/4"	20'-0"	
ET-1355	T-300	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	28'-10 1/2"	42'-0"	59'-10 1/2"	80'-0"	9'-10 1/2"	28'-10 1/2"	42'-0"	59'-10 1/2"	409	8'-0 1/4"	409	4'-5 1/4"	20'-0"	
ET-1356	T-299	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	28'-4 1/2"	41'-0"	58'-9 3/4"	83'-0"	10'-2 1/2"	28'-4 1/2"	41'-0"	58'-9 3/4"	412	3'-5 3/4"	412	3'-0"	20'-0"	
ET-1357	T-298	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-7 3/4"	40'-0"	57'-8 1/2"	71'-0"	8'-10 1/4"	26'-7 3/4"	40'-0"	57'-8 1/2"	415	2'-0"	415	2'-0"	20'-0"	
ET-1358	T-297	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-3 1/2"	40'-0"	55'-3 1/2"	71'-0"	8'-10 1/4"	24'-3 1/2"	40'-0"	55'-3 1/2"	419	4'-9 1/4"	419	4'-10 1/4"	18'-0"	
ET-1359	T-296	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	25'-5 1/4"	40'-0"	56'-10 1/4"	71'-0"	8'-10 1/4"	25'-5 1/4"	40'-0"	56'-10 1/4"	419	3'-0"	419	2'-0"	18'-0"	
ET-1360	T-295	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	26'-5 3/4"	40'-0"	68'-5 3/4"	71'-0"	8'-10 1/4"	26'-5 3/4"	40'-0"	68'-5 3/4"	419	2'-0"	419	2'-0"	20'-0"	
ET-1361	T-294	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	27'-9"	40'-0"	84'-9"	72'-0"	8'-11 3/4"	27'-9"	40'-0"	84'-9"	419.06	5'-0 1/4"	419.06	3'-0 1/4"	20'-0"	
ET-1363	T-292	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	30'-3"	N/A	42'-3"	74'-0"	9'-2 1/2"	28'-3"	N/A	40'-3"	418	2'-8 3/4"	420	2'-2 3/4"	18'-0"	
ET-1365	T-290	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	28'-4 1/2"	41'-0"	84'-10 3/4"	79'-6"	9'-9 3/4"	25'-4 1/2"	39'-10 1/4"	81'-10 3/4"	422	4'-0"	425	2'-0"	20'-0"	
ET-1366	T-289	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	29'-6 3/4"	N/A	41'-0 1/2"	75'-0"	9'-4"	27'-6 3/4"	N/A	39'-0 1/2"	422	4'-0"	424	1'-0"	18'-0"	
ET-1367	T-288	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-3"	40'-0"	79'-9 1/2"	75'-0"	9'-4"	28'-3"	40'-0"	79'-9 1/2"	424	3'-11 1/2"	424	4'-11 1/2"	20'-0"	7'-0"
ET-1369	T-286	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	29'-11 3/4'	42'-0"	81'-11 3/4"	75'-0"	9'-4"	27'-11 3/4"	40'-0"	79'-11 3/4"	423	8'-11 3/4"	425	3'-0"	20'-0"	7'-0"
ET-1370	T-285	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-8 1/2"	41'-0"	74'-8 1/2"	75'-0"	9'-4"	27'-8 1/2"	41'-0"	74'-8 1/2"	427	4'-0"	427	3'-0"	20'-0"	
ET-1371	T-284	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-2"	40'-0"	72'-4"	75'-0"	9'-4"	29'-2"	40'-0"	72'-4"	428	3'-0"	428	3'-0"	20'-0"	
ET-1372	T-283	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0"	40'-0"	71'-6"	75'-0"	9'-4"	28'-0"	40'-0"	71'-6"	431	3'-0"	431	3'-0"	18'-0"	
ET-1373	T-282	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0"	40'-0"	70'-6"	73'-0"	9'-1"	27'-0"	40'-0"	70'-6"	434	2'-0"	434	2'-0"	18'-0"	
ET-1374	T-281	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-4 1/2"	40'-0"	69'-11 3/4"	71'-0"	8'-10 1/4"	27'-4 1/2"	40'-0"	69'-11 3/4"	435	2'-0"	435	2'-0"	18'-0"	
ET-1375	T-280	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-10 1/4"	40'-0"	68'-10 1/4"	71'-0"	8'-10 1/4"	25'-10 1/4"	40'-0"	68'-10 1/4"	436	2'-0"	436	1'-6"	18'-0"	
ET-1376	T-279	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/4"	40'-0"	70'-2 1/4"	71'-0"	8'-10 1/4"	25'-2 1/4"	40'-0"	68'-2 1/4"	434	2'-0"	436	2'-6 3/4"	20-0"	
ET-1377	T-278	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0 1/2"	40'-0"	73'-0 1/2"	71'-0"	8'-10 1/4"	25'-0 1/2"	40'-0"	71'-0 1/2"	433	2'-0"	435	2'-8"	20'-0"	
ET-1378	T-277	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x109	23'-10 3/4"	40'-0"	79'-8 1/4"	79'-6"	9'-9 3/4"	19'-10 3/4"	40'-0"	75'-8 1/4"	433	1'-6 1/4"	437	2'-1 1/2"	20'-0"	7'-0"
ET-1380	T-275	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	29'-3 1/2"	41'-0"	80'-9 1/2"	71'-0"	8'-10 1/4"	29'-3 1/2"	41'-0"	80'-9 1/2"	431	2'-3 1/4"	431	1'-7"	20'-0"	
ET-1381	T-274	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x99	27'-4 1/2"	40'-0"	84'-10 1/2"	71'-0"	8'-10 1/4"	27'-4 1/2"	40'-0"	69'-10 1/2"	431	1'-10 3/4"	431	3'-11"	20'-0"	15'-0"
ET-1382	T-273	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-7 3/4"	40'-0"	86'-7 3/4"	70'-0"	8'-9"	28'-7 3/4"	40'-0"	71'-7 3/4"	429	2'-0"	429	2'-0"	20'-0"	
ET-1383	T-272	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-11 1/4"	40'-0"	88'-5 1/4"	69'-0"	8'-7 1/2"	28'-11 1/4"	40'-0"	73'-5 1/4"	429	2'-0"	429	3'-0"	20'-0"	
ET-1385	T-271	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	29'-7"	40'-0"	88'-7 3/4"	69'-0"	8'-7 1/2"	29'-7"	40'-0"	73'-7 3/4"	428	3'-0"	428	2'-0"	20'-0"	
ET-1385A	T-270A	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x109	27'-5"	40'-0"	83'-10"	79'-0"	9'-9 1/4"	27'-5"	40'-0"	68'-10"	428	3'-0"	428	2'-0"	20'-0"	
ET-1386	T-270	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	28'-7 1/2"	40'-0"	80'-1 1/2"	70'-0"	8'-9"	28'-7 1/2"	40'-0"	65'-1 1/2"	426	3'-0"	426	4'-0"	20'-0"	
ET-1387	T-269	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-9 1/2"	40'-0"	74'-3 1/2"	71'-0"	8'-10 1/4"	27'-9 1/2"	40'-0"	64'-3 1/2"	425	4'-0"	425	4'-0"	20'-0"	
ET-1388	T-268	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1"	40'-0"	75'-7"	72'-0"	8'-11 3/4"	29'-1"	40'-0"	68'-7"	422	3'-0"	422	4'-9 1/2"	20'-0"	
ET-1389	T-267	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0 1/2"	40'-0"	74'-2 1/2"	72'-0"	8'-11 3/4"	28'-0 1/2"	40'-0"	74'-2 1/2"	422	4'-0"	422	3'-0"	20'-0"	
ET-1390	T-266	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0 1/4"	41'-0"	73'-0 1/4"	72'-0"	8'-11 3/4"	27'-0 1/4"	41'-0"	73'-0 1/4"	421	2'-0"	421	1'-0"	20'-0"	
ET-1391	T-265	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-10 3/4"	41'-0"	72'-10 1/2"	72'-0"	8'-11 3/4"	24'-10 3/4'	40'-0"	70'-10 1/2"	419	2'-0"	421	2'-10 1/2"	20'-0"	
ET-1392	T-264	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-4 1/4"	41'-0"	74'-4 1/4"	72'-0"	8'-11 3/4"	25'-4 1/4"	40'-0"	71'-4 1/4"	415	2'-0"	418	3'-0 1/4"	20'-0"	
ET-1393	T-263	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	31'-3"	42'-0"	77'-9"	71'-0"	8'-10 1/4"	31'-3"	42'-0"	77'-9"	409	2'-0"	409	4'-8"	20'-0"	
ET-1394	T-262	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 1/2"	40'-0"	74'-8 1/2"	72'-0"	8'-11 3/4"	28'-2 1/2"	40'-0"	74'-8 1/2"	410	4'-0"	410	3'-6 1/2"	20'-0"	
ET-1395	T-261	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	28'-0 1/4"	40'-0"	74'-3 1/4"	78'-5 3/4"	9'-8 3/4"	28'-0 1/4"	40'-0"	67'-6 1/4"	408	1'-3 1/2"	408	3'-11 3/4"	20'-0"	
ET-1396	T-260	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	30'-8 1/4"	43'-0"	76'-11 1/4"	71'-9"	8'-11 1/4"	27'-8 1/4"	40'-0"	59'-2 1/4"	403	4'-0"	406	0'-11 1/2"	20'-0"	
ET-1397	T-259	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-6 1/4"	40'-0"	69'-8 1/2"	71'-3"	8'-10 3/4"	27'-6 1/4"	42'-0"	59'-0 1/4"	408	5'-4 1/4"	404	3'-0"	20-0"	
ET-1398	T-258	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-5 1/4"	42'-0"	74'-11 1/4"	71'-0"	8'-10 1/4"	30'-5 1/4"	42'-0"	59'-11 1/4"	401	3'-0"	401	0'-0"	20'-0"	
ET-1399	T-257	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	30'-3 1/2"	42'-0"	70'-9 1/2"	72'-0"	8'-11 3/4"	30'-3 1/2"	42'-0"	62'-9 1/2"	395	4'-10"	395	2'-6 1/2"	18'-0"	
ET-1400	T-256	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-10 3/4"	42'-0"	62'-4 3/4"	72'-0"	8'-11 3/4"	26'-10 3/4"	39'-0"	59'-4 3/4"	393	3'-0"	396	3'-6 1/2"	18'-0"	
ET-1401	T-255	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	27'-7"	39'-0"	59'-7"	77'-0"	9'-6 3/4"	27'-7"	39'-0"	59'-7"	395	3'-9 3/4"	395	7'-2 1/2"	20'-0"	
ET-1402	T-254	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	27'-6"	39'-0"	69'-6"	71'-0"	8'-10 1/4"	27'-6"	39'-0"	59'-6"	395	2'-10 3/4"	395	5'-9 1/2"	20-0"	
ET-1403	T-253	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	27'-8 1/2"	40'-0"	69'-7"	71'-0"	8'-10 1/4"	27'-8 1/2"	40'-0"	59'-7"	395	2'-10 3/4"	395	2'-0"	20-0"	
ET-1404	T-252	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-11"	40'-0"	69'-11"	71'-0"	8'-10 1/4"	27'-11"	40'-0"	59'-11"	395	3'-10 3/4"	395	4'-0"	20-0"	
ET-1405	T-251	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7"	41'-0"	61'-7"	72'-0"	8'-11 3/4"	29'-7"	41'-0"	61'-7"	394	4'-8 1/2"	394	4'-9 3/4"	20'-0"	

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

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IN ASSOCIATION WITH

Baker
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (3 OF 5)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5117.DWG
Ref. No.:	2011-059
Sheet No:	496 OF 565

S-5117

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1406	T-250	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-0 1/2"	41'-0"	62'-0 1/2"	73'-0"	9'-1"	30'-0 1/2"	41'-0"	62'-0 1/2"	395	3'-9 1/4"	395	3'-11 13/4"	20'-0"	
ET-1407	T-249	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-1"	42'-0"	62'-3 3/4"	72'-0"	8'-11 3/4"	31'-1"	42'-0"	62'-3 3/4"	396	4'-0"	396	3'-9 3/4"	18'-0"	
ET-1408	T-248	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-7 3/4"	43'-0"	71'-1 3/4"	72'-0"	8'-11 3/4"	28'-7 3/4"	40'-0"	60'-1 3/4"	397	4'-0"	400	3'-9 3/4"	18'-0"	
ET-1409	T-247	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	27'-7"	40'-0"	73'-10 1/2"	72'-0"	8'-11 3/4"	27'-7"	40'-0"	70'-10 1/2"	403	2'-0"	403	3'-9 3/4"	20'-0"	
ET-1410	T-246	W14X120	W14x120	W14x99	(2) L6x6x3/8	W14x99	27'-6 3/4"	40'-0"	83'-4 1/2"	72'-0"	8'-11 3/4"	25'-6 3/4"	40'-0"	76'-4 1/2"	405	2'-0"	407	1'-6 1/2"	20'-0"	7'-0"
ET-1413	T-243	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	25'-8 1/2"	40'-0"	80'-11 1/2"	72'-0"	8'-11 3/4"	25'-8 1/2"	39'-0"	75'-11 1/2"	409	3'-0"	409	3'-10 1/2"	20'-0"	14'-0"
ET-1414	T-242	W14x145	W14x145	W14x90	(2) L6x6x3/8	W14x99	24'-8 1/2"	40'-0"	81'-8 1/2"	71'-0"	8'-10 1/4"	24'-8 1/2"	40'-0"	76'-8 1/2"	409	2'-5 3/4"	409	3'-3"	20'-0"	14'-0"
ET-1416	T-240	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x99	27'-11 1/2"	42'-0"	90'-11 1/2"	71'-0"	8'-10 1/4"	27'-11 1/2"	42'-0"	75'-11 1/2"	409	3'-6 3/4"	409	2'-1 1/4"	20'-0"	20'-0"
ET-1417	T-239	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x109	29'-3"	41'-0"	86'-9"	71'-0"	8'-10 1/4"	29'-3"	41'-0"	71'-9"	408.57	1'-6 3/4"	408.57	1'-6 3/4"	20'-0"	20'-0"
ET-1418	T-238	W14x176	W14x176	W14x90	(2) L6x4x3/8	W14x120	26'-10"	40'-0"	75'-4"	74'-0"	9'-2 1/2"	26'-10"	40'-0"	69'-4"	413	3'-0"	413	2'-0 3/4"	25'-0"	
ET-1419	T-237	W14x176	W14x176	W14x132	(2) L6x6x3/8	W14x132	27'-10 3/4"	40'-0"	76'-10 3/4"	71'-0"	8'-10 1/4"	27'-10 3/4"	40'-0"	76'-10 3/4"	413	3'-3"	413	3'-4"	25'-0"	
ET-1422	T-234	W14x120	W14x120	W14x99	(2) L6x4x3/8	W14x99	25'-3"	40'-0"	74'-5"	71'-0"	8'-10 1/4"	25'-3"	40'-0"	74'-5"	418	4'-1"	418	3'-7 3/4"	20'-0"	
ET-1423	T-233	W14x132	W14x132	W14x109	(2) L6x6x3/8	W14x90	26'-0"	40'-0"	71'-3 1/2"	71'-0"	8'-10 1/4"	26'-0"	40'-0"	71'-3 1/2"	419	4'-0"	419	2'-6 3/4"	20-0"	20'-0"
ET-1425	T-231	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-5"	40'-0"	70'-11"	71'-0"	8'-10 1/4"	25'-5"	40'-0"	70'-11"	419.5	5'-4 1/2"	419.5	2'-10"	18'-0"	
ET-1426	T-230	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	23'-4"	40'-0"	65'-10"	71'-0"	8'-10 1/4"	23'-4"	40'-0"	65-10"	421	5'-0"	421	4'-11"	18'-0"	14'-0"
ET-1427	T-229	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	23'-8 3/4"	40'-0"	66'-8 3/4"	71'-0"	8'-10 1/4"	23'-8 3/4"	40'-0"	66'-8 3/4"	419	6'-0"	419	4'-7"	18'-0"	
ET-1428	T-228	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	19'-4 1/4"	40'-0"	73'-10 1/4"	71'-0"	8'-10 1/4"	21'-4 1/4"	40'-0"	75'-10 1/4"	418	5'-0"	416	4'-1"	20'-0"	7'-0"
ET-1429	T-227	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	20'-4 1/2"	N/A	31'-4 1/2"	71'-0"	8'-10 1/4"	20'-4 1/2"	N/A	31'-4 1/2"	416	3'-0"	416	3'-0"	18'-0"	
ET-1430	T-226	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	21'-9"	34'-0"	71'-3"	71'-0"	8'-10 1/4"	24'-9"	37'-0"	74'-3"	417	4'-2"	414	5'-0"	20'-0"	7'-0"
ET-1431	T-225	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	22'-6"	40'-0"	65'-6"	71'-0"	8'-10 1/4"	25'-6"	41'-0"	68'-6"	415	4'-0 1/4"	412	2'-6 3/4"	18'-0"	
ET-1432	T-224	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-3"	40'-0"	56'-3"	71'-0"	8'-10 1/4"	27'-3"	40'-0"	58'-3"	410	1'-0"	408	2'-0"	20'-0"	
ET-1433	T-223	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-9"	38'-0"	55'-8 3/4"	71'-0"	8'-10 1/4"	26'-9"	40'-0"	57'-8 3/4"	408	3'-7 1/2"	406	2'-8"	20'-0"	
ET-1434	T-222	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-5"	40'-0"	56'-5"	71'-0"	8'-10 1/4"	25'-5"	40'-0"	56'-5"	405	2'-11 1/4"	405	3'-9 1/4"	18'-0"	
ET-1435	T-221	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-5 1/2"	40'-0"	65'-11 1/2"	72'-0"	8'-11 3/4"	27'-5 1/2"	40'-0"	57'-11 1/2"	401	2'-8 1/2"	401	4'-0"	20'-0"	
ET-1436	T-220	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-6 1/4"	42'-0"	78'-6 1/4"	70'-0"	8'-9"	28'-6 1/4"	40'-0"	61'-6 1/4"	393	3'-2 3/4"	395	2'-0"	20'-0"	
ET-1437	T-219	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-11 1/4"	42'-0"	71'-11 1/4"	72'-0"	8'-11 3/4"	28'-11 1/4"	40'-0"	69'-11 1/4"	390	3'-0"	392	2'-0"	20'-0"	
ET-1438	T-218	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-6 1/4"	40'-0"	59'-6 1/4"	71'-0"	8'-10 1/4"	27'-6 1/4"	40'-0"	74'-6 1/4"	392	6'-0 1/2"	392	2'-9 1/2"	18'-0"	
ET-1439	T-217	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/2"	40'-0"	59'-9 1/2"	71'-0"	8'-10 1/4"	28'-3 1/2"	40'-0"	73'-9 1/2"	389	3'-0"	390	2'-0"	18'-0"	
ET-1440	T-216	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	27'-6"	40'-0"	60'-0"	71'-0"	8'-10 1/4"	26'-6"	40'-0"	67'-0"	386	4'-9 3/4"	387	3'-0"	20'-0"	
ET-1441	T-215	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	34'-9 3/4"	46'-0"	66'-9 3/4"	80'-0"	9'-10 1/2"	26'-9 3/4"	41'-0"	58'-9 3/4"	378	3'-10 1/2"	386	0'-10 1/4"	20'-0"	
ET-1442	T-214	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-4 1/4"	40'-0"	60'-2 1/2"	71'-0"	8'-10 1/4"	29'-4 1/4"	40'-0"	60'-2 1/2"	382	2'-4"	382	1'-4 3/4"	18'-0"	
ET-1443	T-213	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	31'-2"	42'-0"	63'-2"	71'-0"	8'-10 1/4"	28'-2"	40'-0"	60'-2"	377	3'-7 1/2"	380	3'-4 1/4"	20'-0"	
ET-1444	T-212	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-10 1/4"	40'-0"	60'-10 1/4"	71'-0"	8'-10 1/4"	28'-10 1/4"	40'-0"	60'-10 1/4"	377	4'-11"	377	4'-2 1/4"	18'-0"	
ET-1445	T-211	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-7 3/4"	40'-0"	60'-7 3/4"	71'-0"	8'-10 1/4"	29'-7 3/4"	40'-0"	60'-7 3/4"	375	6'-0 1/4"	375	4'-2"	18'-0"	
ET-1446	T-210	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-8 1/2"	41'-0"	68'-8 1/2"	71'-0"	8'-10 1/4"	28'-8 1/2"	40'-0"	60'-8 1/2"	373	6'-4 1/4"	373	4'-1 3/8"	18'-0"	
ET-1447	T-209	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-10"	42'-0"	77'-10"	72'-0"	8'-11 3/4"	30'-10"	47'-0"	62'-10"	369	4'-8"	369	6'-0"	20'-0"	
ET-1448	T-208	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	33'-10"	45'-0"	79'-10"	69'-0"	8'-7 1/2"	28'-10"	40'-0"	59'-10"	365	6'-7 1/4"	370	3'-11 1/2"	20'-0"	
ET-1449	T-207	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-1 1/4"	42'-0"	74'-1 1/4"	68'-0"	8'-6 1/4"	28'-1 1/4"	42'-0"	59'-1 1/4"	369	3'-7 1/2"	369	4'-0"	18'-0"	
ET-1450	T-206	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-8 3/4"	39'-0"	74'-8 3/4"	68'-0"	8'-6 1/4"	28'-8 3/4"	41'-0"	67'-8 3/4"	366	1'-0"	366	3'-0"	20'-0"	
ET-1451	T-205	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-1"	40'-0"	73'-3"	66'-6"	8'-4"	29'-1"	40'-0"	75'-3"	365	1'-5 1/2"	363	2'-0"	20'-0"	
ET-1461	T-195	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	25'-8"	40'-0"	81'-1 3/4"	71'-0"	8'-10 1/4"	25'-8"	40'-0"	81'-1 3/4"	353	1'-6 1/2"	353	3'-7 1/4"	20'-0"	
ET-1462	T-194	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	31'-3 1/4"	43'-0"	75'-5 1/4"	71'-0"	8'-10 1/4"	31'-3 1/4"	44'-0"	75'-5 1/4"	351	3'-9"	351	3'-6 1/4"	20'-0"	7'-0"
ET-1465	T-191	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	24'-0 1/4"	40'-0"	75'-9 1/4"	71'-0"	8'-10 1/4"	24'-0 1/4"	40'-0"	90'-9 1/4"	348	3'-0"	348	2'-6 3/4"	20'-0"	7'-0"
ET-1466	T-190	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x99	22'-10 1/2"	40'-0"	64'-6 1/2"	71'-0"	8'-10 1/4"	22'-10 1/2"	40'-0"	79'-6 1/2"	347	4'-9"	347	4'-6 1/4"	20'-0"	
ET-1467	T-189	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-10 1/4"	40'-0"	57'-1 1/4"	68'-0"	8'-6 1/4"	25'-10 1/4"	40'-0"	72'-1 1/4"	342	4'-0"	342	2'-9 1/2"	18'-0"	
ET-1468	T-188	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	29'-6"	40'-0"	61'-0"	68'-0"	8'-6 1/4"	31'-6"	42'-0"	78'-0"	336	3'-1 1/2"	334	3'-1 1/2"	20'-0"	
ET-1469	T-187	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	30'-5 1/2"	41'-0"	60'-11 1/2"	69'-0"	8'-7 1/2"	30'-5 1/2"	42'-0"	75'-11 1/2"	334	3'-5 3/4"	334	1'-11"	20'-0"	
ET-1470	T-186	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	69'-0"	8'-7 1/2"	28'-9"	40'-0"	74'-9"	332.97	2'-10 3/4"	332.97	0'-10 3/4"	20'-0"	
ET-1471	T-185	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	69'-0"	8'-7 1/2"	28'-9"	40'-0"	74'-9"	330.53	2'-6 1/4"	330.53	1'-6 1/4"	20'-0"	
ET-1472	T-184	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	68'-0"	8'-6 1/4"	28'-9"	40'-0"	74'-9"	328.06	2'-11 1/2"	328.06	1'-11 1/2"	20'-0"	
ET-1473	T-183	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-6"	41'-0"	59'-0"	67'-0"	8'-4 3/4"	28'-6"	41'-0"	74'-0"	326	1'-10 3/4"	326	2'-10 3/4"	20'-0"	
ET-1474	T-182	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-7 3/4"	40'-0"	59'-1 3/4"	67'-0"	8'-4 3/4"	28'-7 3/4"	40'-0"	74'-1 3/4"	323	2'-11"	323	1'-11"	20'-0"	
ET-1475	T-181	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	42'-0"	60'-3"	68'-0"	8'-6 1/4"	30'-3"	42'-0"	75'-3"	319	2'-5 1/2"	319	2'-11"	20'-0"	
ET-1476	T-180	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0"	41'-0"	58'-6"	71'-0"	8'-10 1/4"	27'-0"	41'-0"	65'-6"	318	2'-0"	319	2'-2 3/4"	20'-0"	
ET-1477	T-179	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-7 3/4"	40'-0"	59'-1 3/4"	71'-0"	8'-10 1/4"	28'-7 3/4"	40'-0"	59'-1 3/4"	315	1'-0"	315	2'-0"	20'-0"	
ET-1478	T-178	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	311.72	1'-8 1/2"	311.72	1'-8 3/4"	18'-0"	
ET-1479	T-177	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-2"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	29'-2"	40'-0"	59'-9"	308.57	2'-6 3/4"	308.57	2'-6 3/4"	18'-0"	
ET-1480	T-176	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	305.6	2'-7 1/4"	305.6	4'-2 3/4"	18'-0"	
ET-1481	T-175	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-9"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	30'-9"	42'-0"	61'-9"	300.6	5'-2 3/4"	300.6	1'-7"	18'-0"	
ET-1482	T-174	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-9"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	29'-9"	42'-0"	61'-9"	297.62	6'-2 3/4"	297.62	4'-10 1/4"	18'-0"	
ET-1483	T-173	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-2 3/4"	42'-0"	61'-8 3/4"	71'-0"	8'-10 1/4"	30'-2 3/4"	42'-0"	61'-8 3/4"	295	7'-0"	295	6'-2 1/2"	18'-0"	
ET-1484	T-172	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-3"	42'-0"	62'-9"	71'-0"	8'-10 1/4"	31'-3"	42'-0"	62'-9"	292	4'-7 1/4"	292	4'-6 1/2"	18'-0"	
ET-1485	T-171	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-3"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	30'-3"	42'-0"	61'-9"	290.76	6'-3 1/2"	290.76	6'-3 3/4"	18'-0"	

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (4 OF 5)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5118.DWG
Ref. No.:	2011-059
Sheet No:	497 OF 565

S-5118

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1486	T-170	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-9"	42'-0"	71'-9"	71'-0"	8'-10 1/4"	30'-9"	42'-0"	71'-9"	288.71	4'-10 3/4"	288.71	3'-8 1/2"	18'-0"	
ET-1488	T-168	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	27'-8"	40'-0"	69'-11"	71'-0"	8'-10 1/4"	27'-8"	40'-0"	69'-11"	289	5'-2 1/4"	289	4'-0"	20'-0"	
ET-1489	T-167	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	26'-1 1/4"	40'-0"	69'-7 1/4"	71'-0"	8'-10 1/4"	26'-1 1/4"	40'-0"	69'-7 1/4"	288	3'-7 1/4"	288	3'-0"	20'-0"	
ET-1490	T-166	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	22'-7 3/4"	40'-0"	76'-1 3/4"	71'-0"	8'-10 1/4"	22'-7 3/4"	40'-0"	76'-1 3/4"	290	3'-10"	290	3'-1"	20'-0"	7'-0"
ET-1491	T-165	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	20'-7 1/4"	N/A	31'-1 1/4"	71'-0"	8'-10 1/4"	20'-7 1/4"	N/A	31'-1 1/4"	289	1'-8 3/4"	289	1'-0"	18'-0"	
ET-1492	T-164	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	19'-4"	N/A	31'-1"	71'-0"	8'-10 1/4"	19'-4"	N/A	31'-1"	290	1'-8 1/2"	290	1'-7 3/4"	18'-0"	
ET-1493	T-163	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	19'-3"	40'-0"	72'-9"	71'-0"	8'-10 1/4"	19'-3"	40'-0"	72'-9"	292	3'-4 3/4"	292	4'-6"	20'-0"	7'-0"
ET-1494	T-162	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-10 1/2"	40'-0"	60'-4 1/2"	71'-0"	8'-10 1/4"	21'-10 1/2"	40'-0"	60'-4 1/2"	287	3'-4 3/4"	287	4'-6"	20'-0"	
ET-1495	T-161	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	19'-5 1/2"	40'-0"	57'-11 1/2"	71'-0"	8'-10 1/4"	19'-5 1/2"	40'-0"	57'-11 1/2"	287	3'-4 3/4"	287	4'-6"	20'-0"	
ET-1496	T-160	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-5 3/4"	40'-0"	59'-11 3/4"	71'-0"	8'-10 1/4"	21'-5 3/4"	40'-0"	59'-11 3/4"	282	3'-4 3/4"	282	4'-4 3/4"	20'-0"	
ET-1497	T-159	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	24'-0 1/4"	40'-0"	62'-6 1/4"	72'-0"	8'-11 3/4"	24'-0 1/4"	40'-0"	62'-6 1/4"	277	2'-11 3/4"	277	3'-7 1/4"	20'-0"	
ET-1499	T-157	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	21'-4 1/2"	40'-0"	60'-10 1/2"	72'-0"	8'-11 3/4"	21'-4 1/2"	40'-0"	60'-10 1/2"	276	4'-10"	276	3'-8 1/4"	20'-0"	
ET-1500	T-156	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	19'-6"	40'-0"	67'-0"	72'-0"	8'-11 3/4"	21'-6"	40'-0"	62'-0"	275	4'-3 3/4"	273	3'-0"	20'-0"	
ET-1501	T-155	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	20'-7 3/4"	40'-0"	83'-1 3/4"	72'-0"	8'-11 3/4"	20'-7 3/4"	40'-0"	76'-1 3/4"	272	3'-7 1/4"	272	2'-3 1/4"	20'-0"	7'-0"
ET-1504	T-152	W14x159	W14x159	W14x120	(2) L6x6x3/8	W14x99	29'-3 1/4"	40'-0"	94'-3 1/4"	72'-0"	8'-11 3/4"	26'-3 1/4"	40'-0"	76'-3 1/4"	266	2'- 1/2"	269	3'-1 1/4"	20'-0"	7'-0"
ET-1505	T-151	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x90	28'-3"	40'-0"	86'-9"	72'-0"	8'-11 3/4"	28'-3"	40'-0"	71'-9"	262.87	2'-8 1/2"	262.87	1'-8 1/2"	20'-0"	
ET-1506	T-150	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-11 1/4"	40'-0"	71'-5 1/4"	72'-0"	8'-11 3/4"	23'-11 1/4"	40'-0"	64'-5 1/4"	263.5	3'-8 1/4"	263.5	3'-6"	20'-0"	
ET-1507	T-149	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-3"	40'-0"	67'-9"	70'-0"	8'-9"	27'-3"	40'-0"	74'-9"	257.32	2'-3 3/4"	257.32	0'-11 3/4"	20'-0"	
ET-1508	T-148	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-4 1/2"	40'-0"	64'-10 1/2"	72'-0"	8'-11 3/4"	26'-4 1/2"	40'-0"	66'-10 1/2"	257	2'-7 3/4"	255	2'-4 1/2"	20'-0"	
ET-1509	T-147	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-6 3/4"	40'-0"	64'-0 3/4"	71'-0"	8'-10 1/4"	26'-6 3/4"	40'-0"	58'-0 3/4"	254	2'-4 1/2"	252	3'-1 1/2"	20'-0"	
ET-1510	T-146	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-11"	40'-0"	74'-8"	70'-0"	8'-9"	27'-11"	40'-0"	59'-8"	247	0'-9 1/4"	247	1'-1 3/4"	18'-0"	
ET-1511	T-145	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-10 1/4"	40'-0"	74'-10 1/4"	71'-0"	8'-10 1/4"	27'-10 1/4"	40'-0"	59'-10 1/4"	245	0'-10"	245	2'-6 3/4"	18'-0"	
ET-1512	T-144	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-8 3/4"	42'-0"	74'-8 3/4"	71'-0"	8'-10 1/4"	27'-8 3/4"	42'-0"	59'-8 3/4"	243	0'-11 3/4"	243	2'-7 1/4"	18'-0"	
ET-1513	T-143	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-9 1/2"	42'-0"	74'-3 1/2"	71'-0"	8'-10 1/4"	27'-9 1/2"	42'-0"	59'-3 1/2"	241	1'-2"	241	3'-2"	20'-0"	
ET-1514	T-142	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	24'-7 1/4"	40'-0"	71'-1 1/4"	71'-0"	8'-10 1/4"	24'-7 1/4"	40'-0"	56'-1 1/4"	242	1'-11 3/4"	242	2'-9 1/2"	20-0"	
ET-1515	T-141	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-10 1/4"	40'-0"	74'-4 1/4"	71'-0"	8'-10 1/4"	26'-10 1/4"	43'-0"	69'-4 1/4"	241	2'-10 1/4"	238	3'-0"	20'-0"	
ET-1517	T-139	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	25'-7 1/2"	40'-0"	78'-1 1/2"	72'-0"	8'-11 3/4"	25'-7 1/2"	40'-0"	68'-1 1/2"	236	1'-10 1/2"	236	6'-0"	20'-0"	
ET-1518	T-138	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-11"	40'-0"	74'-11"	72'-0"	8'-11 3/4"	32'-11"	46'-0"	74'-11"	232	1'-0 3/4"	226	3'-4 1/4"	20'-0"	
ET-1519	T-137	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	26'-9"	40'-0"	77'-3 1/2"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	79'-3 1/2"	227	1'-5 1/2"	225	5'-1 1/4"	20'-0"	
ET-1520	T-136	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	24'-11"	N/A	38'-5"	69'-0"	8'-7 1/2"	24'-11"	N/A	38'-5"	224	0'-9 3/4"	224	5'-1"	18'-0"	
ET-1521	T-135	W14x120	W14x120	W14x109	(2) L6x6x3/8	W14x90	24'-7"	40'-0"	80'-4 1/2"	74'-10"	9'-3 3/4"	27'-7"	43'-0"	83'-4 1/2"	223	2'-3"	220	4'-1 3/4"	20'-0"	7'-0"
ET-1523	T-132	W14x132	W14x132	W14x109	(2) L6x6x3/8	W14x99	24'-10 1/2"	40'-0"	80'-4 1/2"	82'-0"	10'-1 1/4"	24'-10 1/2"	40'-0"	80'-4 1/2"	220	1'-0"	220	2'-0"	20'-0"	7'-0"
ET-1524	T-131	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x99	27'-1 1/2"	40'-0"	71'-7 1/2"	76'-0"	9'-5 1/2"	27'-1 1/2"	40'-0"	71'-7 1/2"	216	2'-2 1/4"	216	1'-0 1/4"	20'-0"	7'-0"
ET-1525	T-130	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	28'-11 1/4"	40'-0"	71'-5 1/4"	73'-0"	9'-1"	28'-11 1/2"	40'-0"	71'-5 1/4"	214	2'-8"	214	0'-9 1/4"	20'-0"	
ET-1527	T-128	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	29'-4 1/2"	42'-0"	65'-10 1/2"	85'-0"	10'-5 1/2"	26'-4 1/2"	40'-0"	62'-10 1/2"	211	2'-2 3/4"	214	2'-9"	20'-0"	
ET-1528	T-127	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-9 1/2"	42'-0"	65'-9 1/2"	71'-0"	8'-10 1/4"	29'-9 1/2"	42'-0"	65'-9 1/2"	207.97	0'-7"	207.97	2'-5 3/4"	20'-0"	14'-0"
ET-1530	T-125	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	28'-9 1/2"	42'-0"	71'-9 1/2"	76'-0"	9'-5 1/2"	28'-9 1/2"	42'-0"	71'-9 1/2"	204.67	6'-1 1/4"	204.67	2'-8 3/4"	20'-0"	
ET-1531	T-124	w14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	29'-3 1/2"	42'-0"	65'-9 1/2"	82'-0"	10'-1 1/4"	29'-3 1/2"	42'-0"	65'-9 1/2"	202.75	1'-11"	202.75	4'-6"	20'-0"	14'-0"
ET-1533	T-122A	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x109	28'-9 1/2"	42'-0"	59'-9 1/2"	87'-0"	10'-8 1/4"	28'-9 1/2"	42'-0"	59'-9 1/2"	200.87	0'-9"	200.87	0'-11 1/2"	20'-0"	
ET-1535	T-121A	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	28'-9"	42'-0"	59'-3"	84'-0"	10'-4"	28'-9"	42'-0"	59'-3"	199	0'-11 1/2"	199	3'-1 3/4"	20'-0"	
ET-1536	T-120A	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	28'-9 1/2"	42'-0"	64'-9 1/2"	79'-0"	9'-9 1/4"	28'-9 1/2"	42'-0"	64'-9 1/2"	196.44	1'-5 1/4"	196.44	4'-11"	20'-0"	
ET-1537	T-118A	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	27'-10 1/4"	39'-0"	63'-10 1/4"	76'-0"	9'-5 1/2"	27'-10 1/4"	39'-0"	63'-10 1/4"	195	1'-5 1/2"	195	4'-10"	20'-0"	
ET-1539	T-116A	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	27'-2 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	27'-2 1/2"	40'-0"	84'-3"	190	1'-0"	190	2'-6 3/4"	20'-0"	7'-0"
ET-1540	T-115A	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x99	27'-9 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	27'-9 1/2"	40'-0"	84'-10"	187	1'-9 1/2"	187	0'-6 1/4"	20'-0"	
ET-1541	T-113A	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x99	27'-2 3/4"	40'-0"	40'-0"	76'-0"	9'-5 1/2"	27'-2 3/4"	40'-0"	85'-6 1/4"	186	1'-10 1/4"	186	1'-5 1/2"	20'-0"	
ET-1542	T-112A	W14x145	W14x145	W14x120	(2) L6x6x3/8	W14x109	26'-0 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	26'-0 1/2"	40'-0"	94'-4"	185	1'-7 3/4"	185	4'-11"	20'-0"	7'-0"
ET-1543	T-111	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x99	25'-4 1/2"	37'-0"	37'-0"	76'-0"	9'-5 1/2"	25'-4 1/2"	37'-0"	37'-0"	184	3'-8 1/4"	184	0'-0"	20'-0"	
ET-1544	T-110	W14x145	W14x145	W14x120	(2) L6x6x3/8	W14x109	27'-3 1/4"	40'-0"	40'-0"	77'-0"	9'-6 3/4"	27'-3 1/4"	40'-0"	95'-6 3/4"	181	1'-6 3/4"	181	1'-0"	20'-0"	7'-0"
ET-1545	T-109	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	28'-6"	40'-0"	40'-0"	77'-0"	9'-6 3/4"	28'-6"	40'-0"	92'-9 1/2"	176.6	2'-0"	176.6	1'-7 3/4"	20'-0"	
ET-1546	T-108	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	20'-1"	31'-4 1/2"	31'-4 1/2"	74'-0"	9'-2 1/2"	25'-0 3/4"	40'-0"	86'-4 3/4"	182	5'-1"	177	2'-0"	20'-0"	
ET-1547	T-107	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	28'-1 3/4"	40'-0"	40'-0"	74'-0"	9'-2 1/2"	28'-1 3/4"	40'-0"	89'-5 1/4"	171	1'-0"	171	0'-10 1/4"	20'-0"	
ET-1548	T-106	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x99	27'-11 3/4"	41'-0"	41'-0"	77'-0"	9'-6 3/4"	27'-11 3/4"	41'-0"	90'-4 1/2"	167	3'-0"	167	1'-4"	20'-0"	

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

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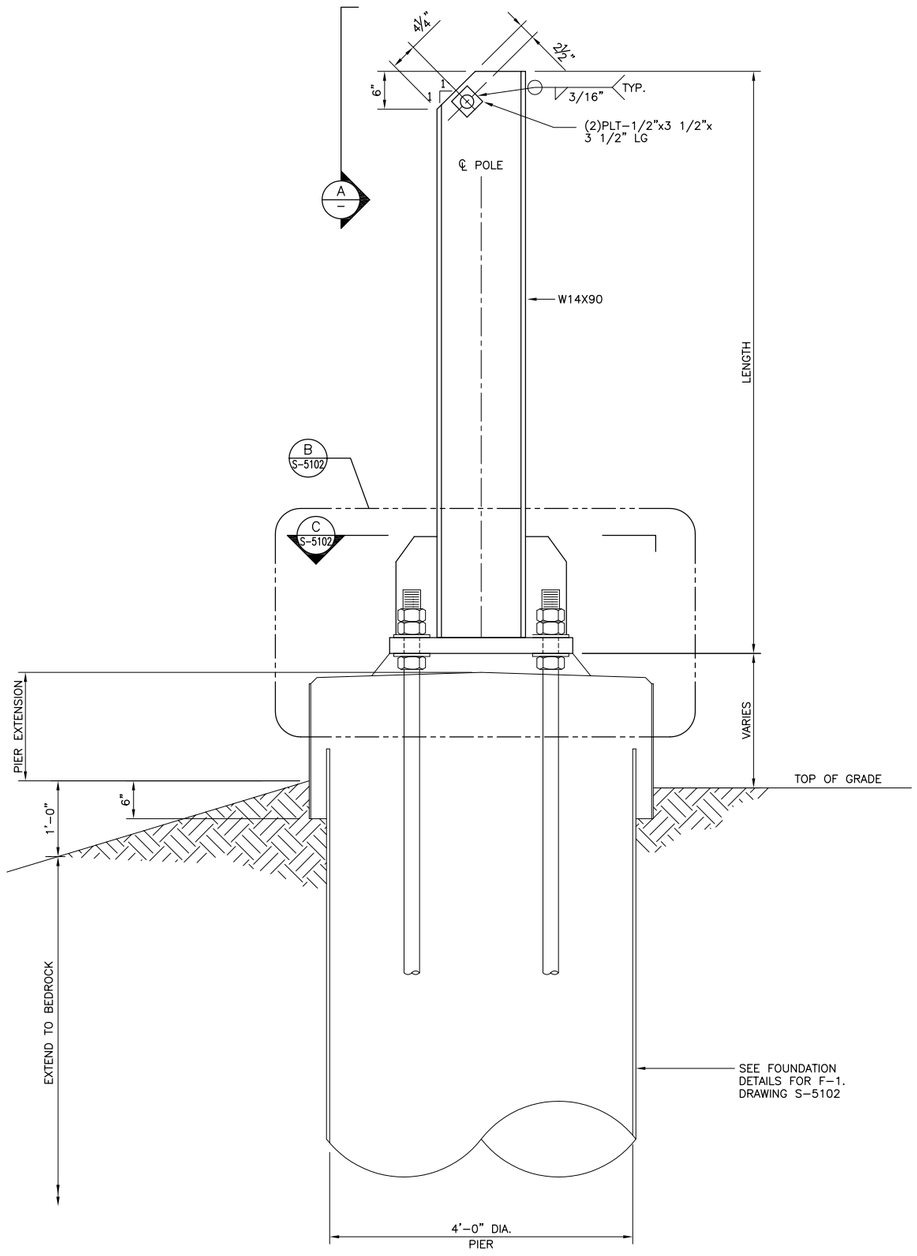
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL FRAME & FOUNDATIONS CATENARY FRAME AND FOUNDATION SCHEDULE (5 OF 5)

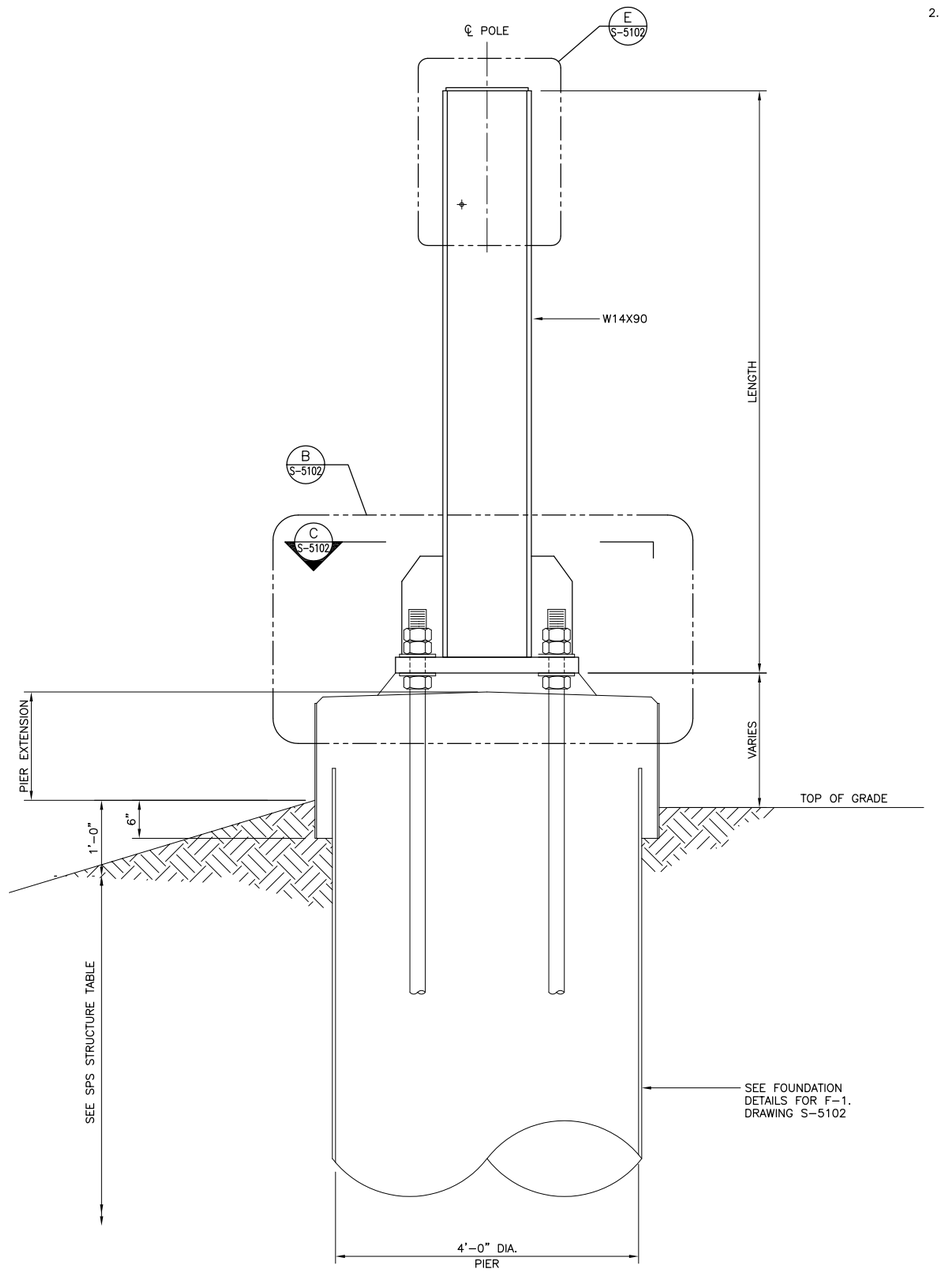
Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5119.DWG
Ref. No.:	2011-059
Sheet No:	498 OF 565

S-5119



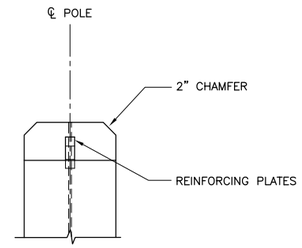
DOWNGUY STUB POLE DETAIL (DGP)
SCALE: 1" = 1'-0"



SPS POLE DETAIL
SCALE: 1" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



A SECTION
SCALE: 1"=1'-0"

DOWNGUY STUB POLE SCHEDULE			
STRUCTURE	NORTH OR SOUTH	LENGTH	TOF
T-274	NORTH	10'	430.00
T-274	SOUTH	10'	430.00

SPS STRUCTURES			
STRUCTURE	POLE LENGTH	PIER EMBEMDENT	REMARKS
SPS-1	40'-0"	15'-0"	
SPS-2	40'-0"	15'-0"	
SPS-3	40'-0"	15'-0'	

1' 0 1' 2'
SCALE: 1"=1'-0"

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL FRAME & FOUNDATIONS
DOWNGUY STUB POLE DETAIL (DGP)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

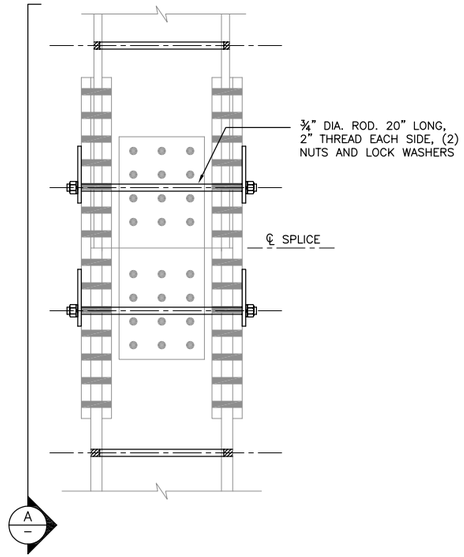
File No.:	2011-059-S-5123.DWG
Ref. No.:	2011-059
Sheet No:	499 OF 565

S-5123

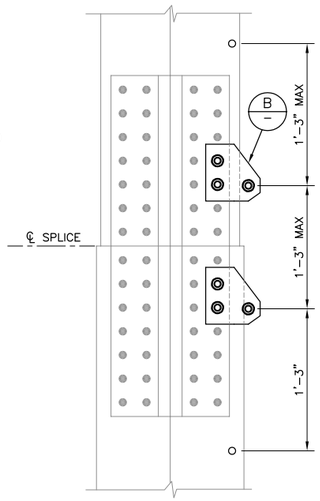
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NOTES:

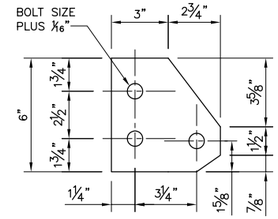
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



POLE STEP DETAIL
SCALE: 1 1/2" = 1'-0"

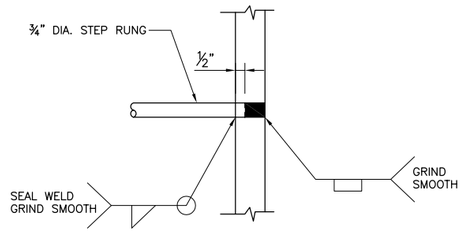


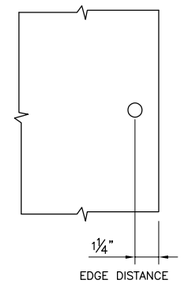
A ELEVATION
SCALE: 1 1/2"=1'-0"



⅜" THICK PLATE

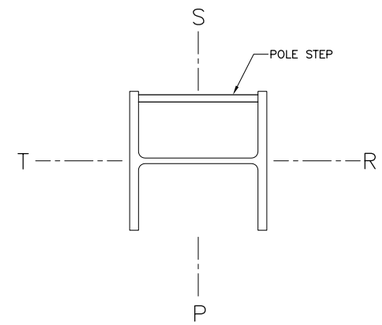
B PLATE FOR POLE STEP AT SPLICE
SCALE: 3"=1'-0"





NOTE:
PROVIDE ¾" DIA. STEP RUNG AT 1'-3" MAX. SPACING ON "S" SIDE OF POLE. STEPS SHALL START 20' ABOVE GRADE. POLES STEPS TO BE OMITTED FROM TOP 3' OF POLE. STEP RUNGS APPLY FOR POLES WITH W14x159 OR HEAVIER AS A BASE COLUMN.

C POLE STEP
SCALE: 3"=1'-0"



POLE ORIENTATION
SCALE: 1 1/2" = 1'-0"

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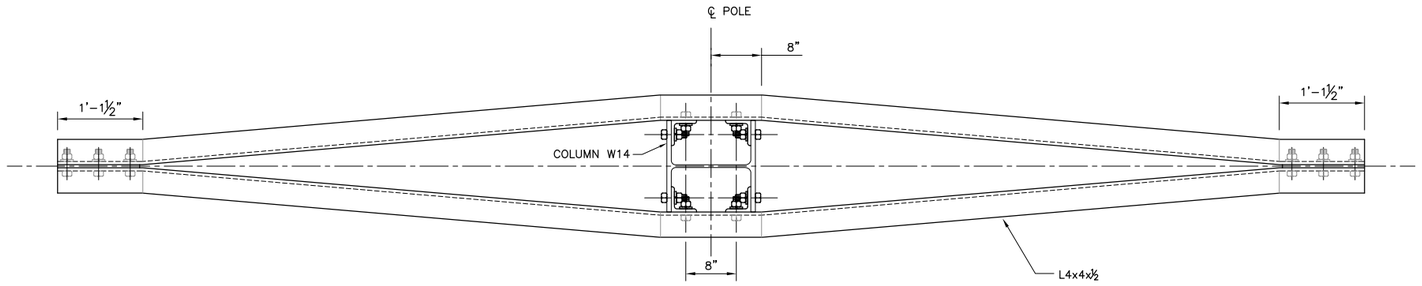
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
POLE STEP DETAILS (PSD1)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

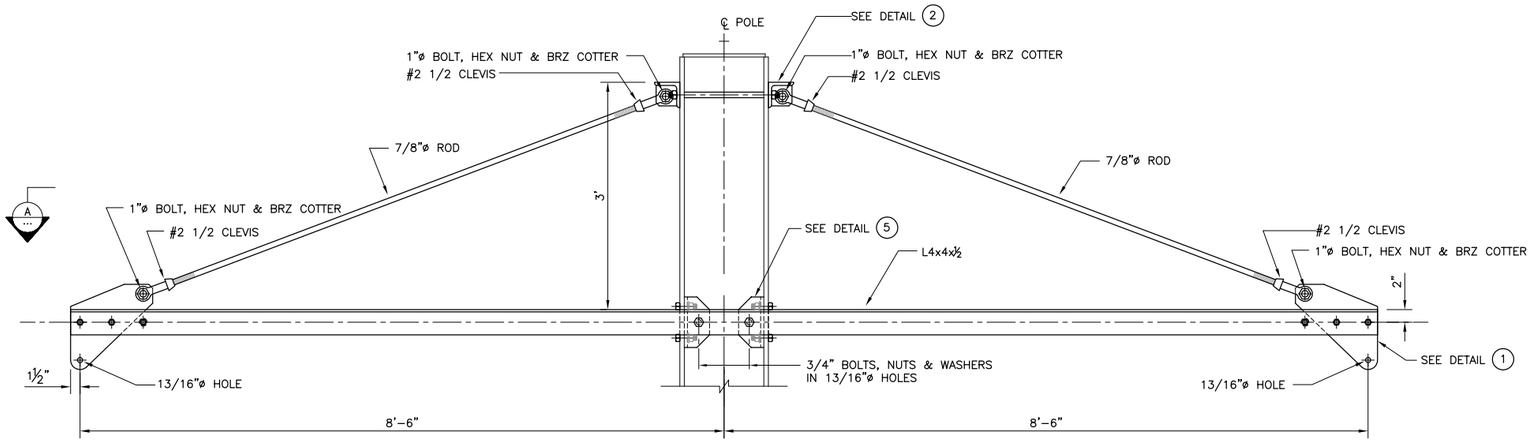
File No.:	2011-059-S-5124.DWG
Ref. No.:	2011-059
Sheet No:	500 OF 565

S-5124

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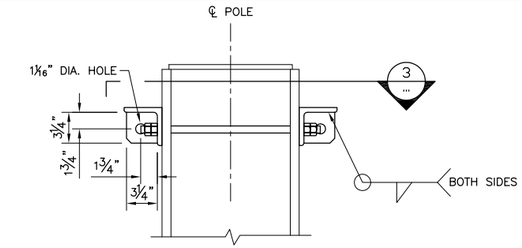
A SECTION
SCALE: 1"=1'-0"



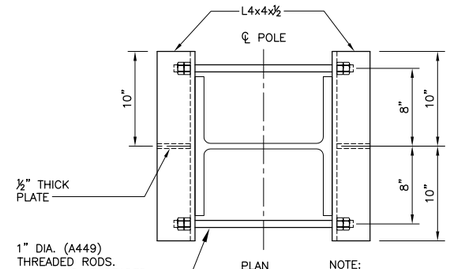
TRANSMISSION ARM BRACKET (BA1)

1' 0 1' 2'

SCALE: 1"=1'-0"

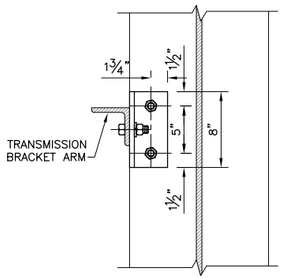


2 DETAIL
SCALE: 1 1/2"=1'-0"

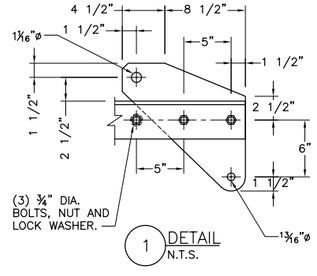


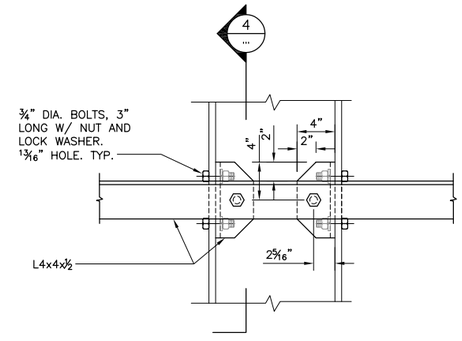
NOTE:
THIS CONFIGURATION FITS COLUMN SIZES W14X90, W14X99, W14X109, AND W14X120

3 DETAIL
SCALE: 1 1/2"=1'-0"



4 DETAIL
SCALE: 1 1/2"=1'-0"





5 DETAIL
SCALE: 1 1/2"=1'-0"

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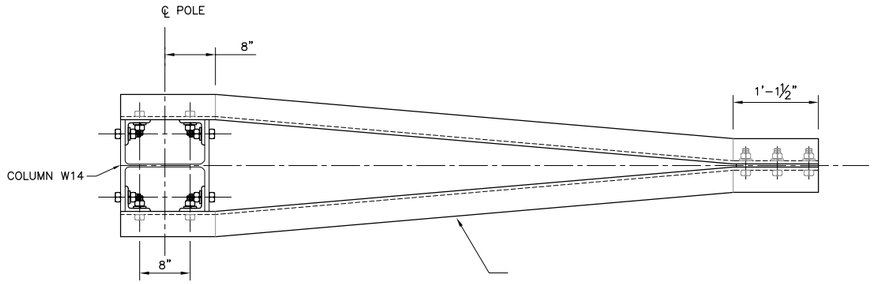
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA1)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

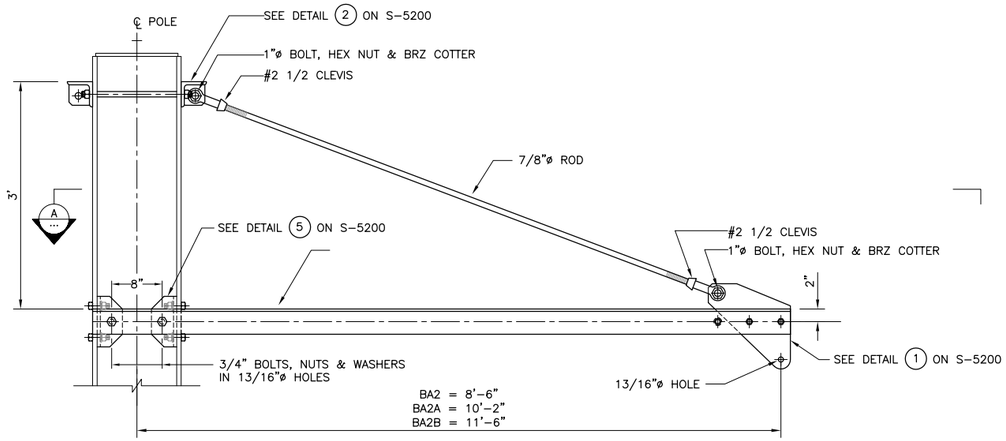
File No.:	2011-059-S-5200.DWG
Ref. No.:	2011-059
Sheet No:	501 OF 565

S-5200

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A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA2, BA2A & BA2B)

1' 0 1' 2'

SCALE: 1"=1'-0"

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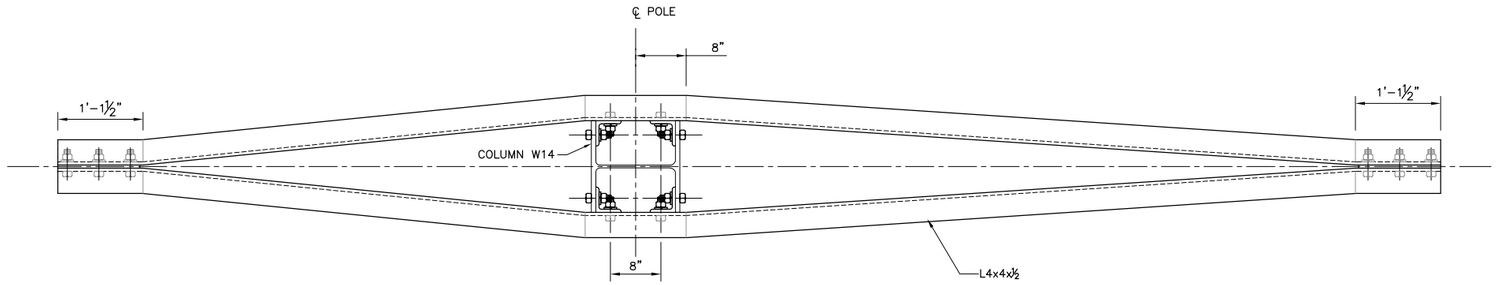
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA2, BA2A & BA2B)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

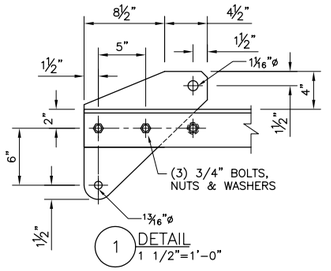
File No.:	2011-059-S-5201.DWG
Ref. No.:	2011-059
Sheet No:	502 OF 565

S-5201

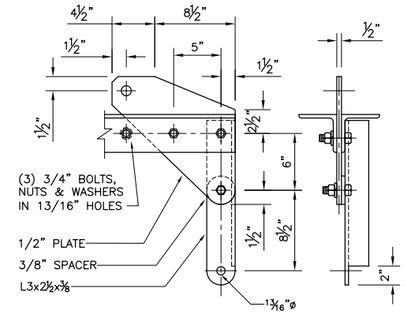
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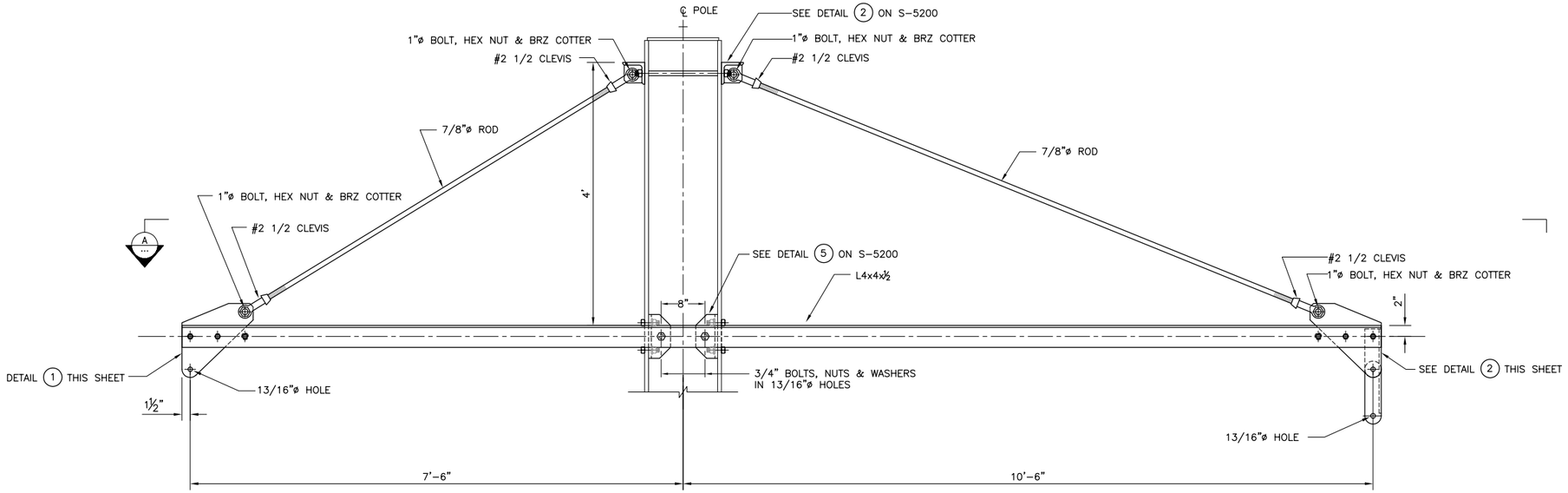
A SECTION
SCALE: 1"=1'-0"



1 DETAIL
1 1/2"=1'-0"



2 DETAIL
1 1/2"=1'-0"



TRANSMISSION ARM BRACKET (BA3)

1' 0 1' 2'

SCALE: 1"=1'-0"

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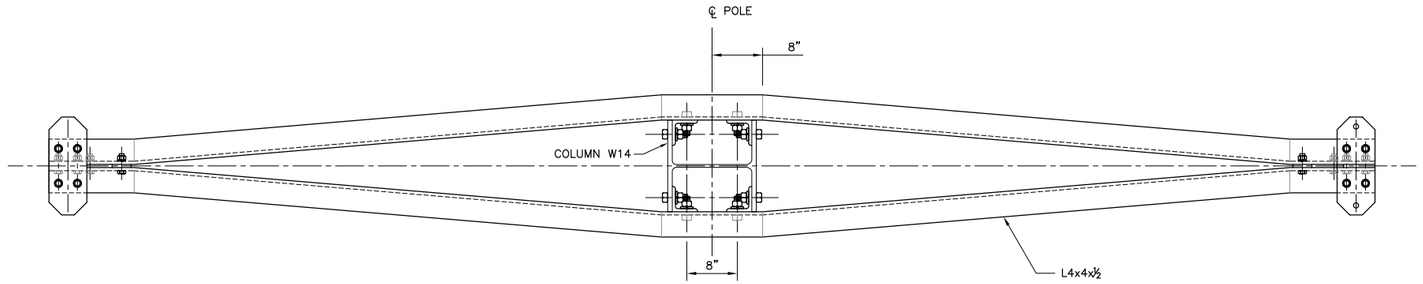
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA3)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

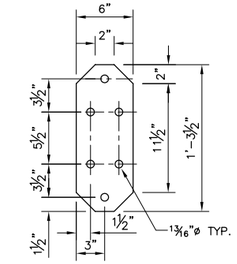
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Ref. No.:	2011-059
Sheet No:	503 OF 565

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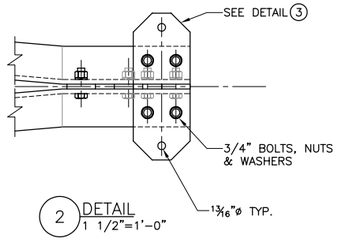
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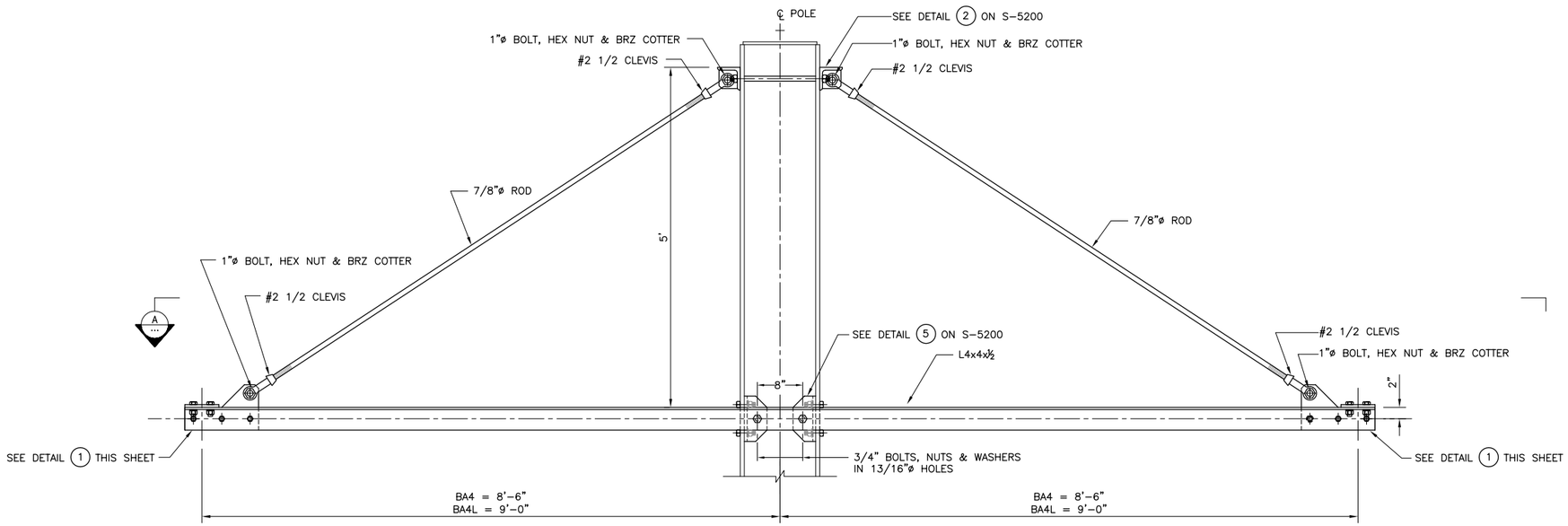
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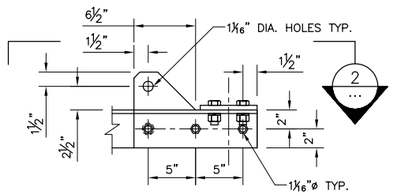


3 DETAIL
1 1/2"=1'-0"



2 DETAIL
1 1/2"=1'-0"





1 DETAIL
1 1/2"=1'-0"

TRANSMISSION ARM BRACKET (BA4 & BA4L)

1' 0 1' 2'

SCALE: 1"=1'-0"

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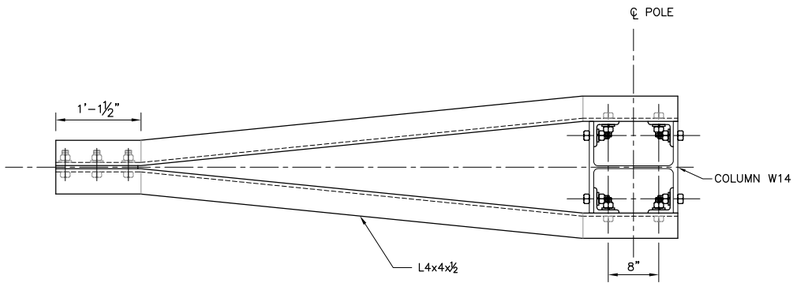
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA4 & BA4L)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

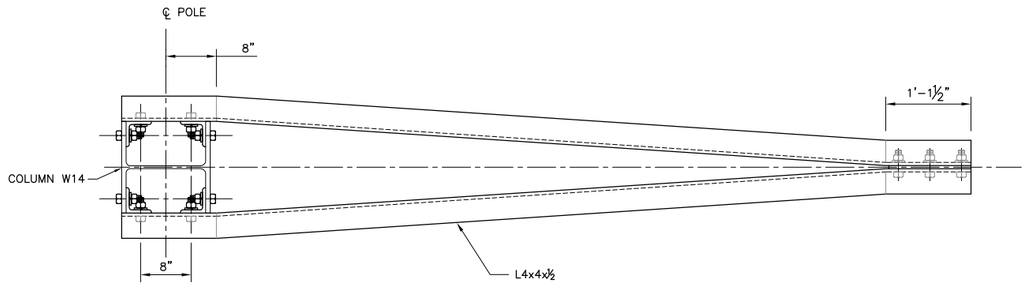
File No.:	2011-059-S-5203.DWG
Ref. No.:	2011-059
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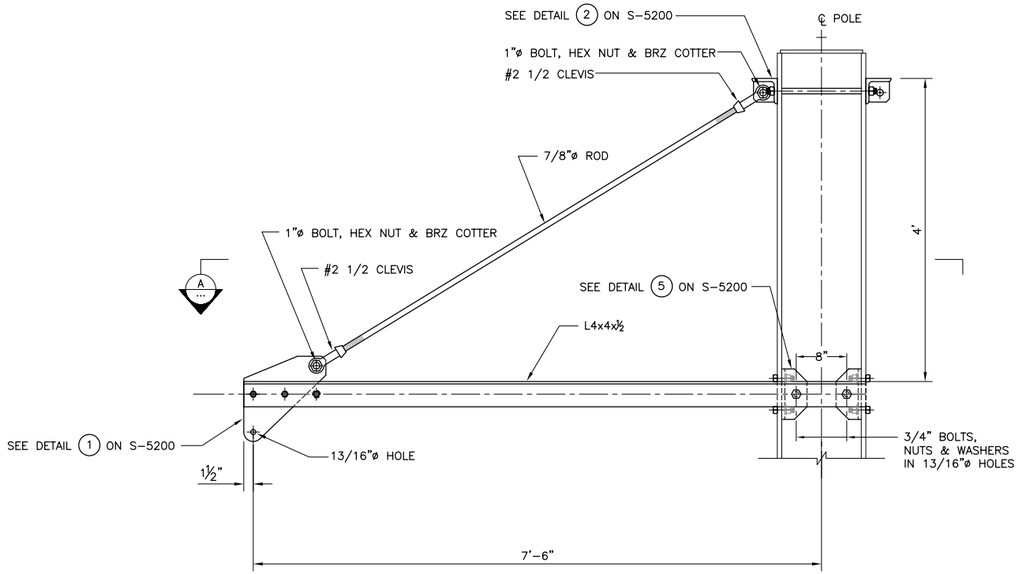
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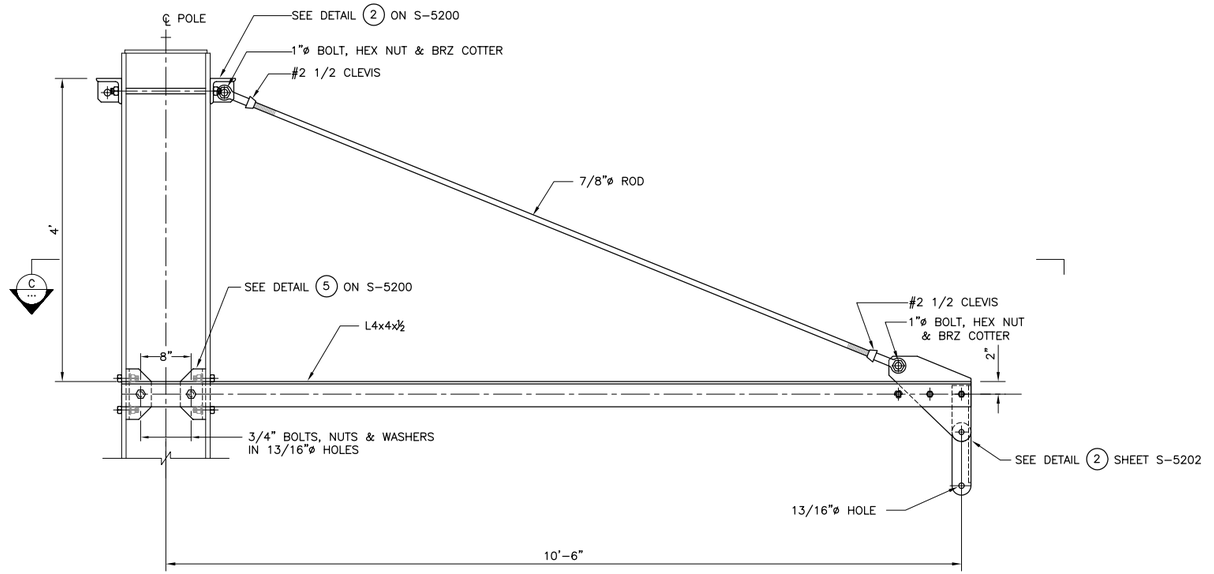
C SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA5)

1' 0 1' 2'

SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA6)

1' 0 1' 2'

SCALE: 1"=1'-0"

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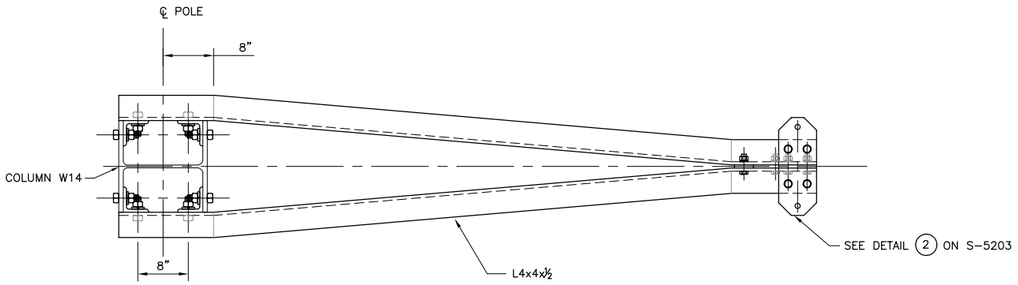
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA5&6)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

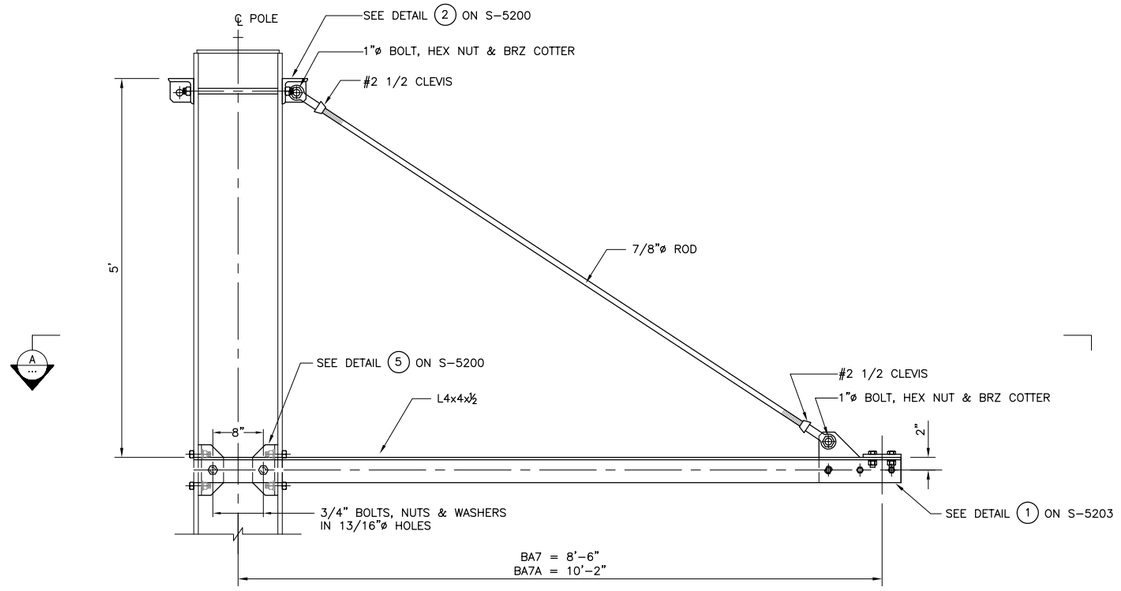
File No.:	2011-059-S-5204.DWG
Ref. No.:	2011-059
Sheet No:	505 OF 565

S-5204

3/14/2016 2:31:52 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5204.dwg



A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA7 & BA7A)

1' 0 1' 2'

SCALE: 1"=1'-0"

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

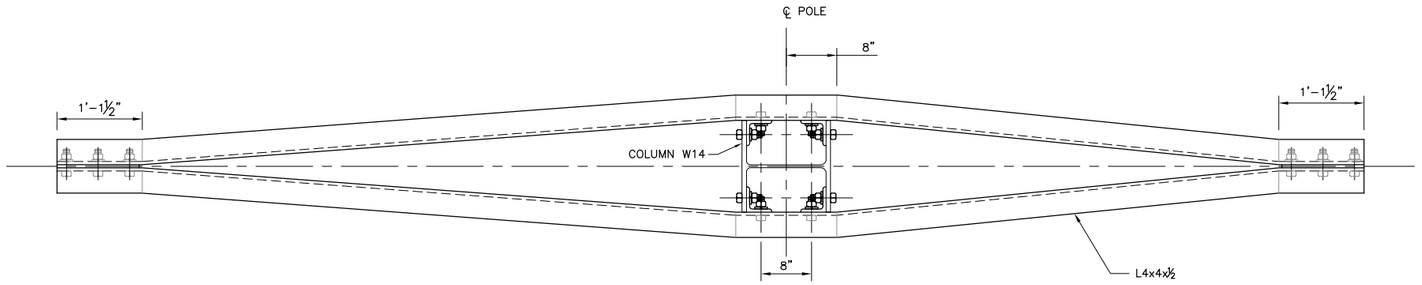
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA7 & BA7A)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

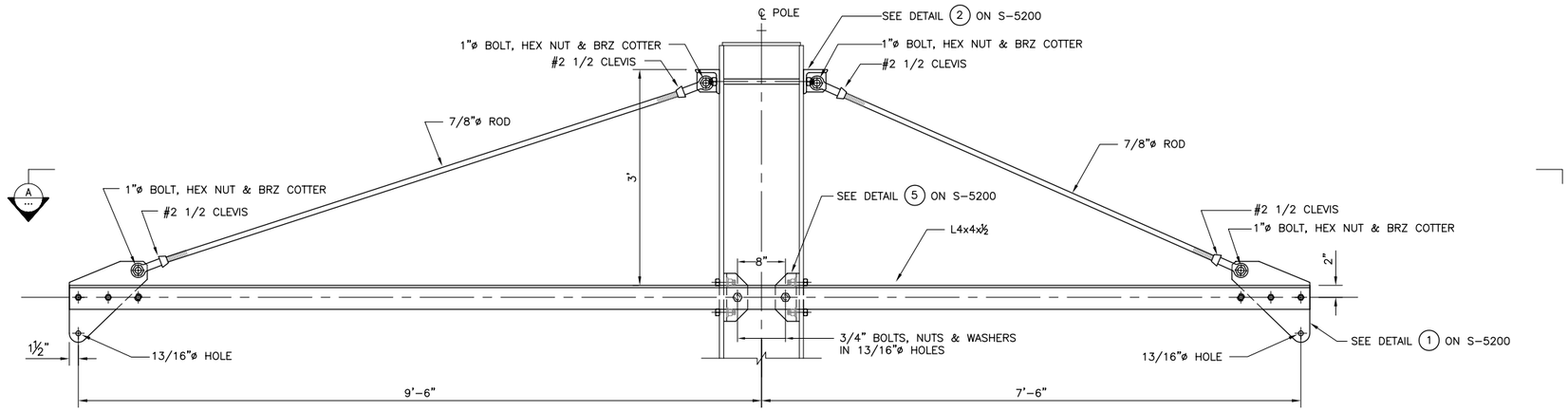
File No.:	2011-059-S-5205.DWG
Ref. No.:	2011-059
Sheet No:	506 OF 565

S-5205

3/14/2016 2:31:58 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5205.dwg



A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA8)

1' 0 1' 2'

SCALE: 1"=1'-0"

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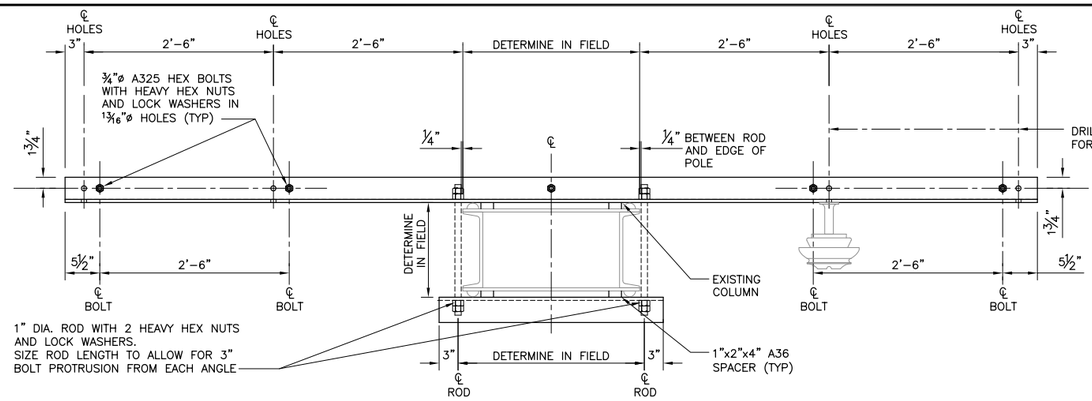
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA8)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5206.DWG
Ref. No.:	2011-059
Sheet No:	507 OF 565

S-5206

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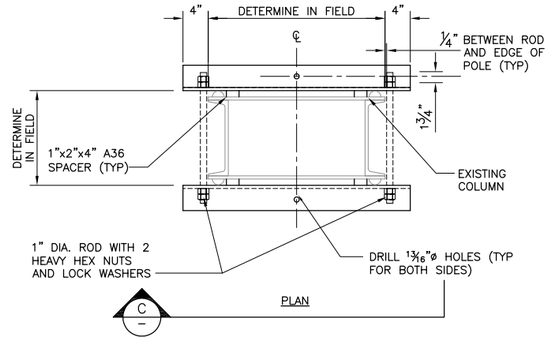


PLAN

A

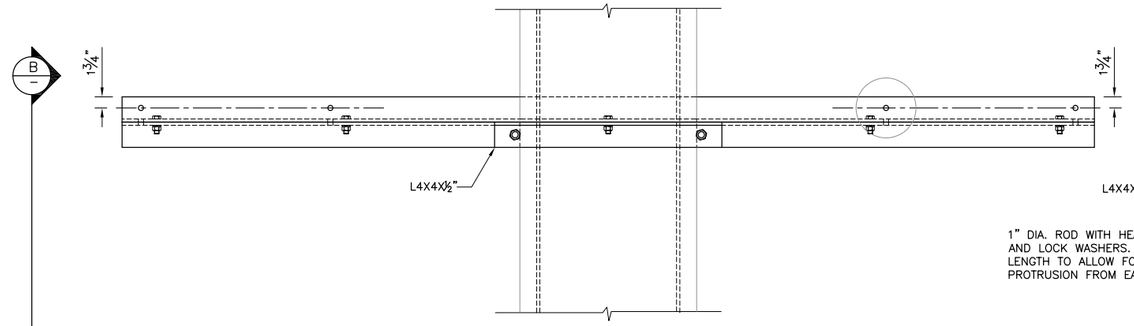
NOTES:

1. CONTRACTOR SHALL FIELD VERIFY COLUMN DIMENSIONS AND SIZE BRACKET ACCORDINGLY.

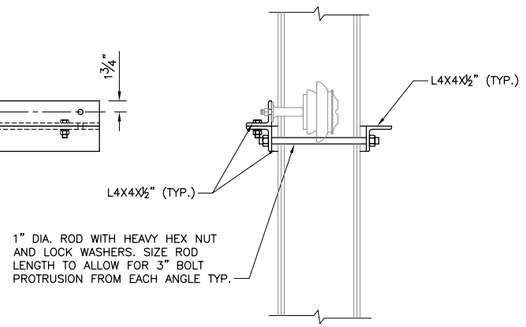


PLAN

C

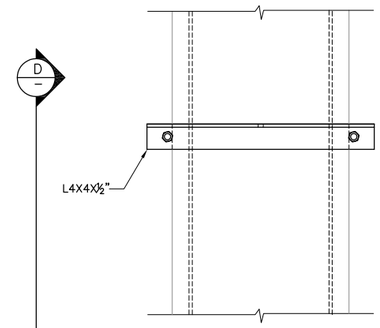


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SCALE: 1"=1'–0"

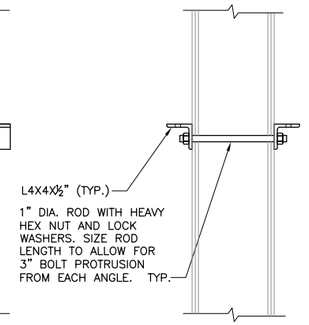


B SECTION
SCALE: 1"=1'–0"

1 S-5211 SIGNAL POWER BRACKET (SPB1)
SCALE: 1"=1'–0"

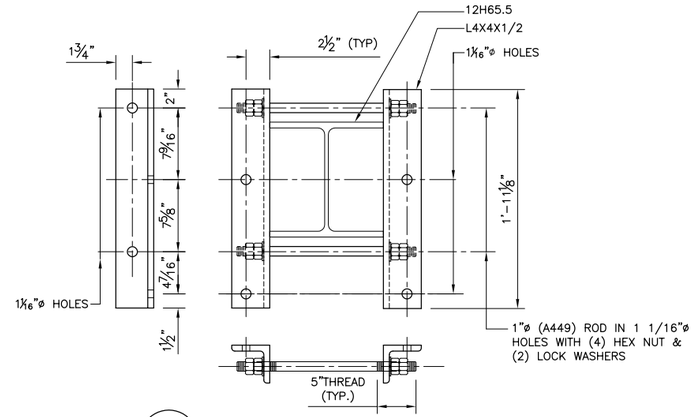


C SECTION
SCALE: 1"=1'–0"

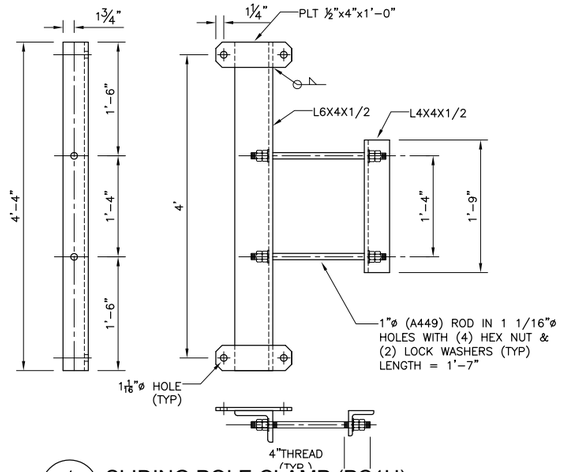


D SECTION
SCALE: 1"=1'–0"

3 S-5211 SLIDING POLE CLAMP (PC1G)
SCALE: 1"=1'–0"



2 S-5211 SLIDING POLE CLAMP (PC1D)
SCALE: 1"=1'–0"



4 S-5211 SLIDING POLE CLAMP (PC1H)
SCALE: 1"=1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

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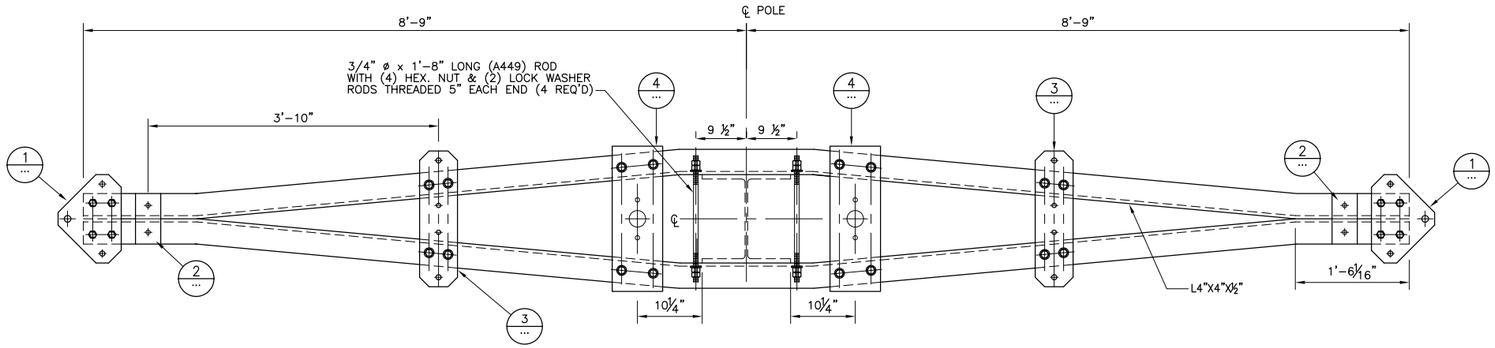
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
MISCELLANEOUS SIGNAL POWER BRACKETS

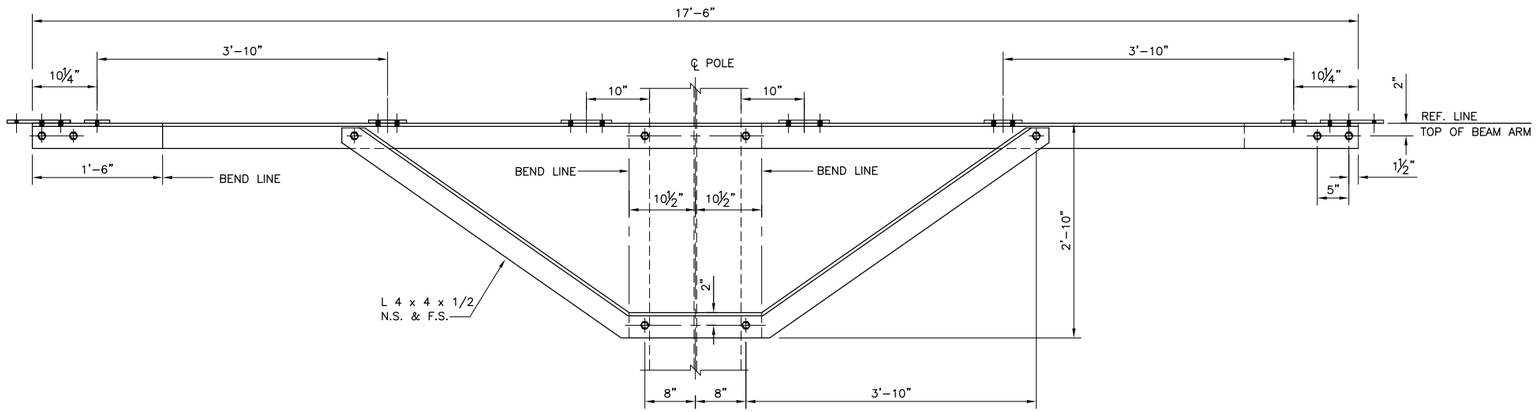
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5211.DWG
Ref. No.:	2011–059
Sheet No:	508 OF 565

S–5211

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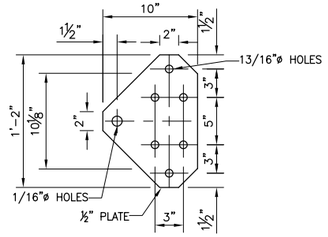


ALL BOLT HOLES 13⁄16" DIA. U.O.N.
ALL BOLTS ¾" DIA. U.O.N

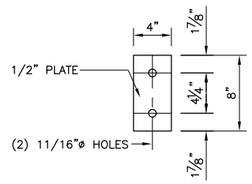
A / S-5212 CROSS TRACK FEEDER BRACKET (CA-1)

1' 0 1' 2'

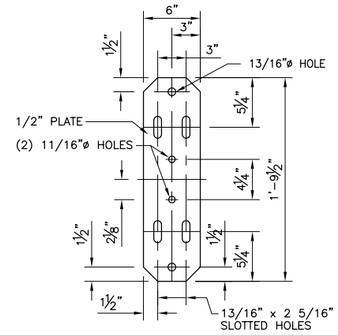
SCALE: 1"=1'–0"



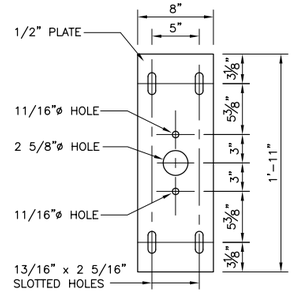
1 FEEDER SUPPORT PLATE
N.T.S.



2 FRONT SUPPORT PLATE
N.T.S.



3 REAR SUPPORT PLATE
N.T.S.



4 BEARING PLATE
N.T.S.

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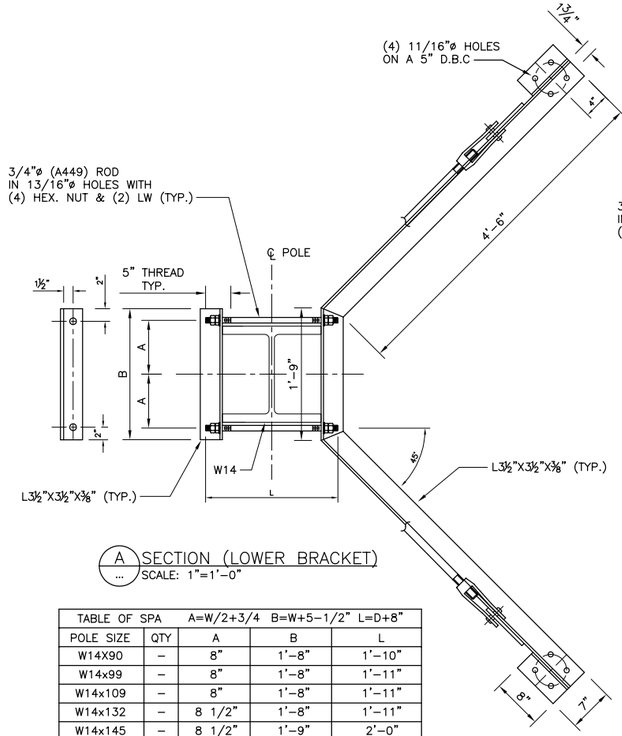
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
CROSS TRACK FEEDER ARM (CA–1)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5212.DWG
Ref. No.:	2011–059
Sheet No:	509 OF 565

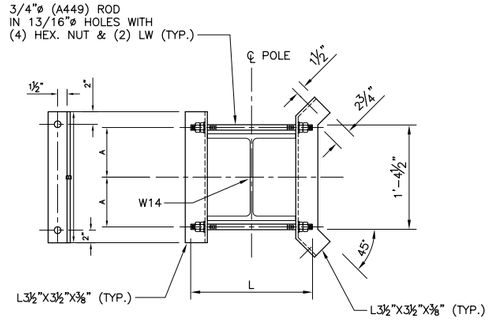
S–5212

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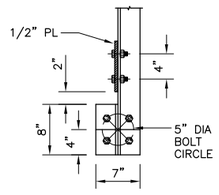


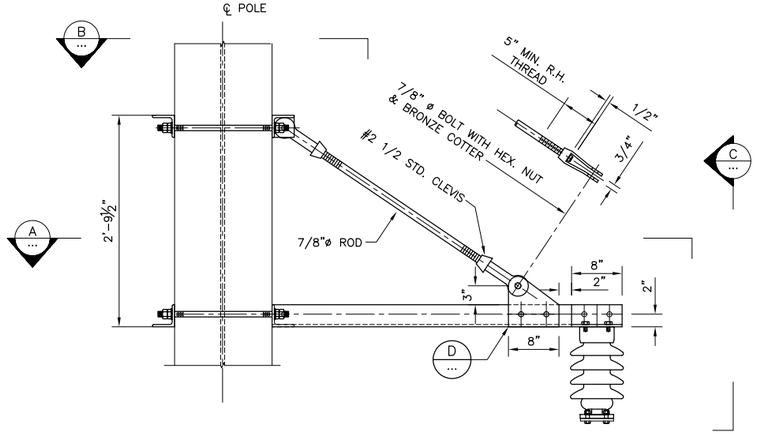
A SECTION (LOWER BRACKET)
SCALE: 1"=1'-0"

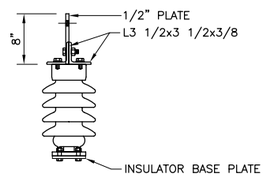
TABLE OF SPA		A=W/2+3/4	B=W+5-1/2"	L=D+8"
POLE SIZE	QTY	A	B	L
W14X90	–	8"	1'-8"	1'-10"
W14x99	–	8"	1'-8"	1'-11"
W14x109	–	8"	1'-8"	1'-11"
W14x132	–	8 1/2"	1'-8"	1'-11"
W14x145	–	8 1/2"	1'-9"	2'-0"
W14x159	–	8 1/2"	1'-9"	2'-0"



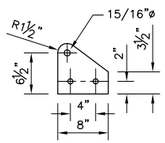
B SECTION (UPPER BRACKET)
SCALE: 1"=1'-0"







C SECTION
SCALE: 1"=1'-0"



D 1/2' PLATE
N.T.S.

1 S-5213 SPIDER ARM BRACKET (SPA)

1' 0 1' 2'

SCALE: 1"=1'-0"

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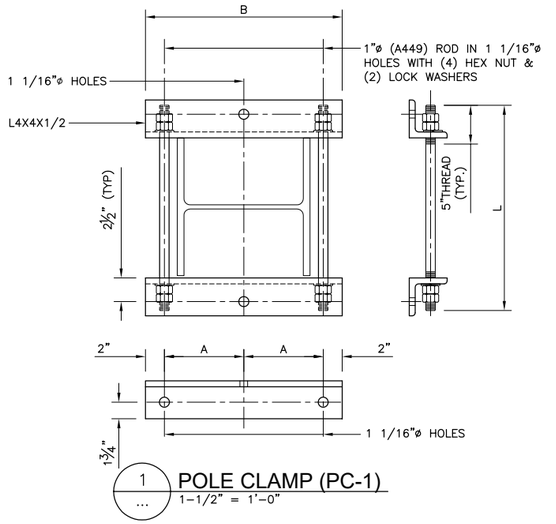
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SPIDER ARM BRACKET (SPA-1)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5213.DWG
Ref. No.:	2011-059
Sheet No:	510 OF 565

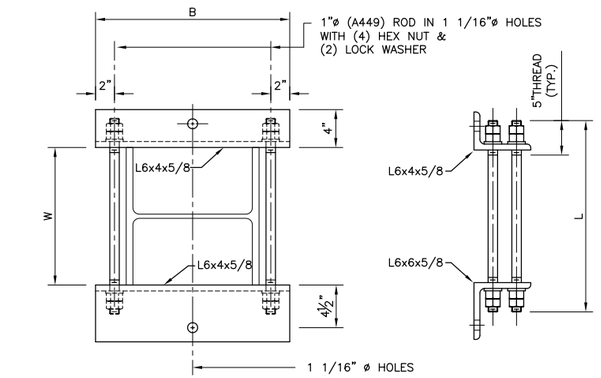
S-5213

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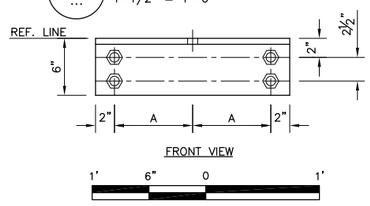


1 POLE CLAMP (PC-1)
1–1/2" = 1'–0"

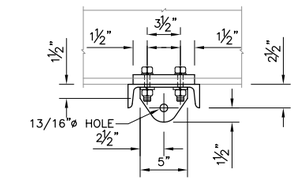
TABLE OF DIMENSIONS FOR PC1 AND PC2			
POLE SIZE	A	B	L
W14X90	8"	1'–8"	1'–11"
W14x99	8"	1'–8"	1'–11"
W14x109	8"	1'–8"	1'–11"
W14x132	8"	1'–8"	1'–11"
W14x145	8 1/2"	1'–9"	2'–0"
W14x159	8 1/2"	1'–9"	2'–0"



2 POLE CLAMP (PC-2)
1–1/2" = 1'–0"



SCALE:1–1/2"= 1'–0"



B SECTION
N.T.S.

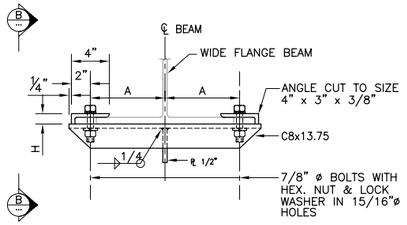


TABLE OF CSC1	A=W/2+5/8		H=T+3/8	
BEAM SIZE	FLG WIDTH W	FLG THK	A	H
W14X90	14.52"	0.710	7 7/8"	1 1/8"

3 SLIDING BRACKET (CSC1)
1–1/2" = 1'–0"



SCALE:1–1/2"= 1'–0"

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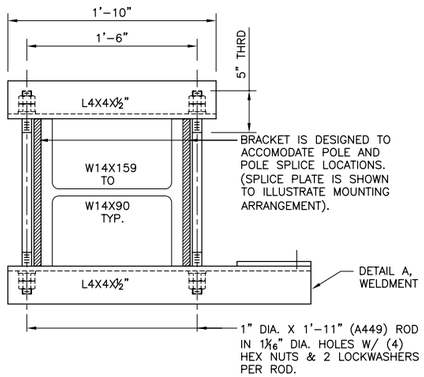
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SLIDING BRACKET DETAILS

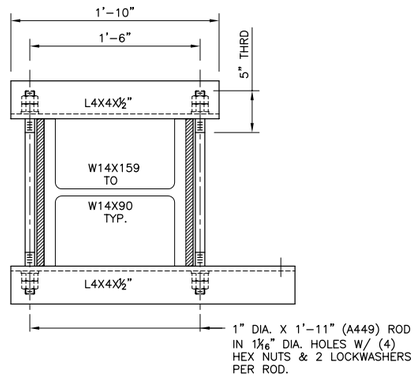
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

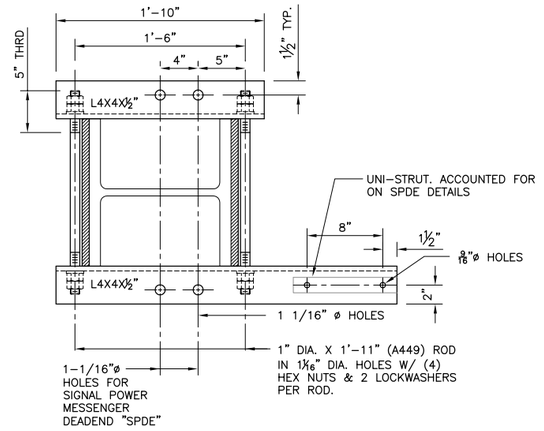
File No.:	2011-059-S-5214.DWG
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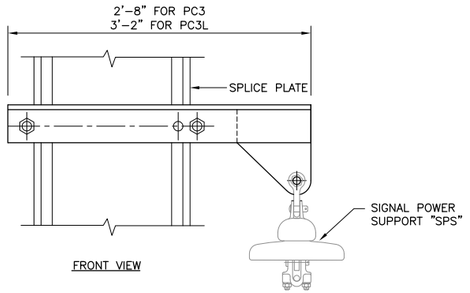
S–5214

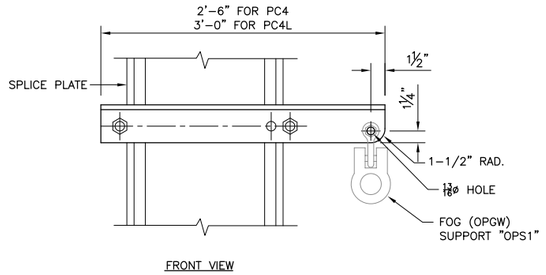
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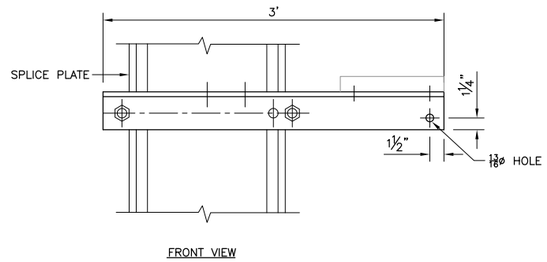












1 POLE CLAMPS (PC3 & PC3L)
1–1/2" = 1'–0"

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

2 POLE CLAMPS (PC4 & PC4L)
1–1/2" = 1'–0"

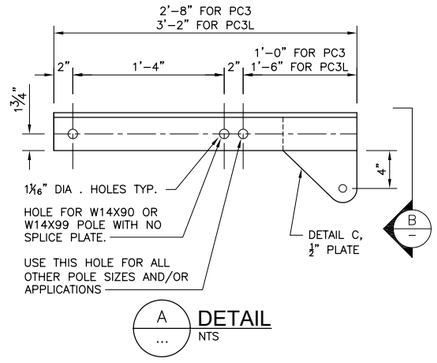
1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

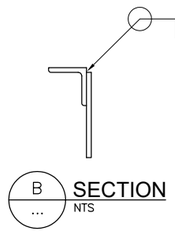
3 POLE CLAMP (PC5)
1–1/2" = 1'–0"

1' 6" 0 1'

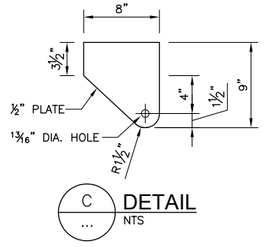
SCALE:1–1/2"= 1'–0"



A DETAIL
NTS



B SECTION
NTS



C DETAIL
NTS

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IN ASSOCIATION WITH

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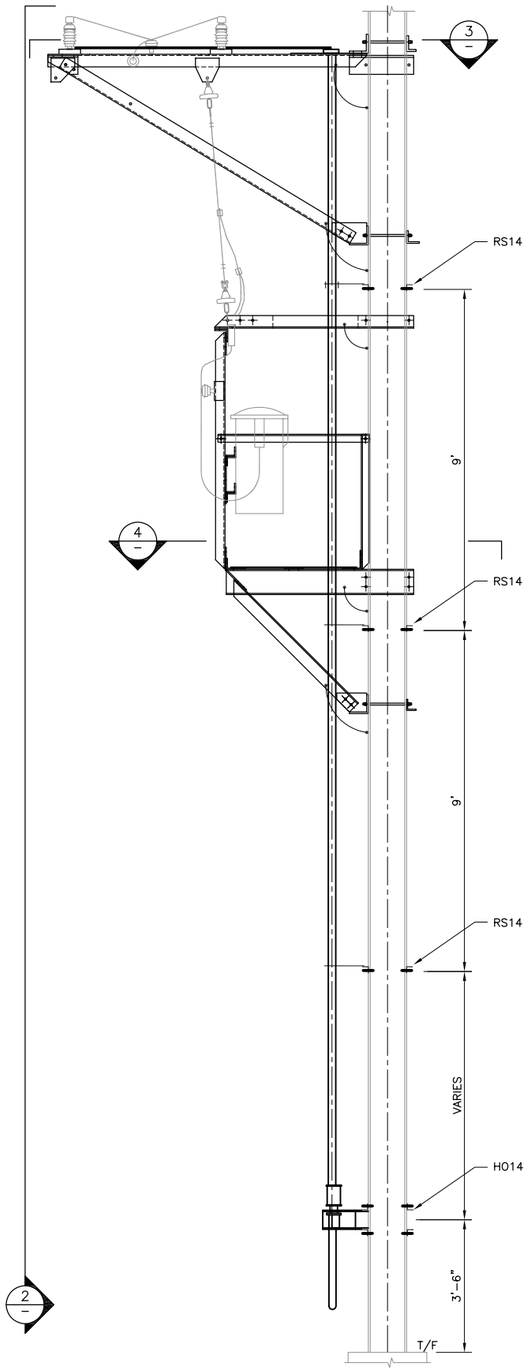
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SLIDING BRACKET DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5215.DWG
Ref. No.:	2011–059
Sheet No:	512 OF 565

S–5215

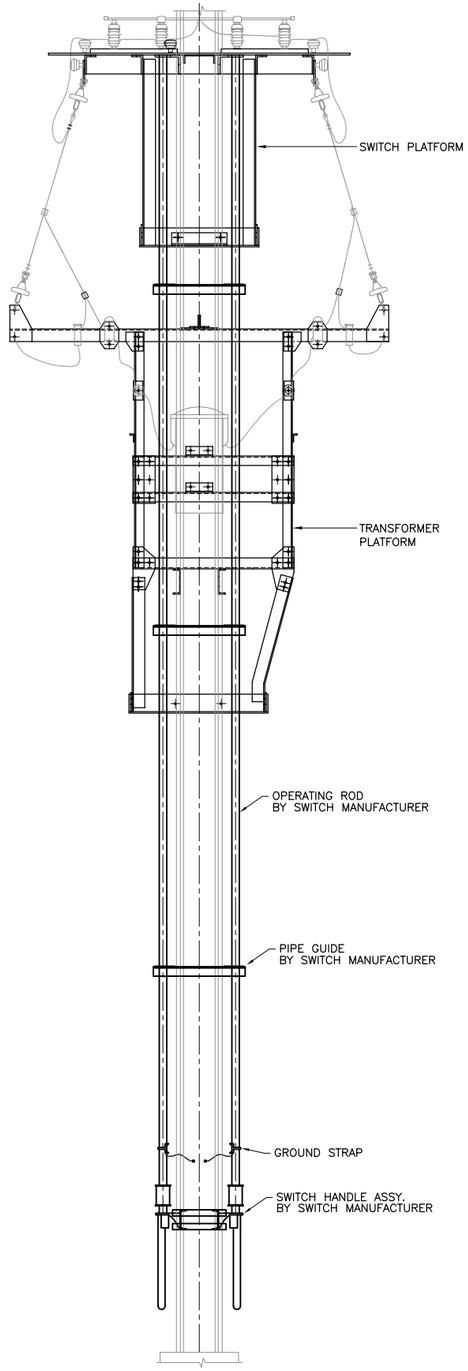
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3/14/2016
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1 DISCONNECT SWITCH PLATFORM

2' 1' 0 2'

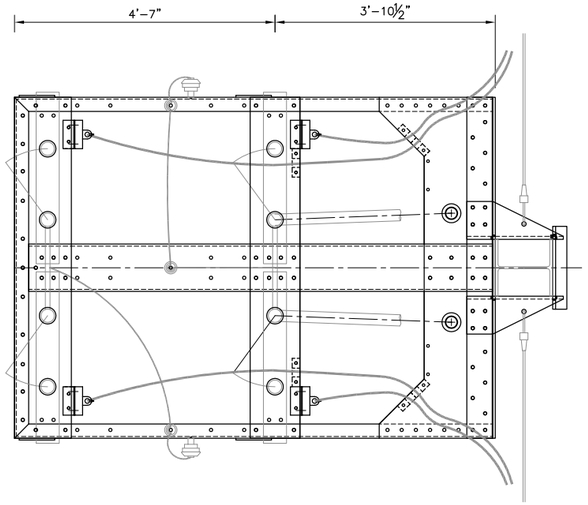
SCALE: 1/2"= 1'-0"



2 ELEVATION

2' 1' 0 2'

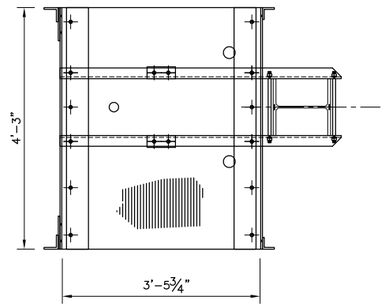
SCALE: 1/2"= 1'-0"



3 DISCONNECT SWITCH PLATFORM

1' 6" 0 1'

SCALE:3/4"=1'-0"



4 TRANSFORMER PLATFORM

1' 6" 0 1'

SCALE:3/4"=1'-0"

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
RS14	ROD SUPPORT	S-5225	3
HO14	HAND OPERATOR	S-5225	1
LAD	LADDER ASSEMBLY	S-5224	1
–	SIGNAL POWER SWITCH PLATFORM	S-5220	1
–	SIGNAL POWER TRANSF. PLATFORM	S-5217	1

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL DETAILS

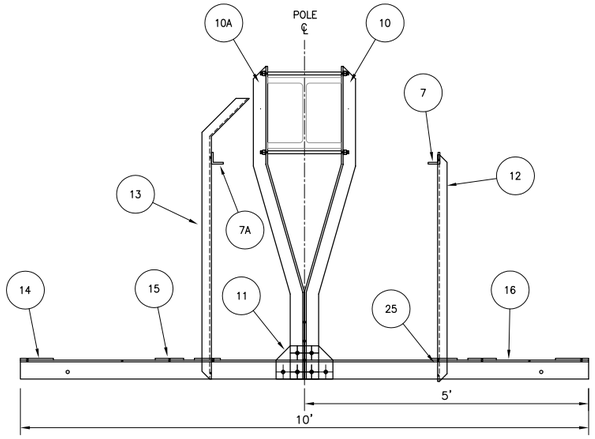
MANUAL OPERATED DISCONNECT SWITCH DETAILS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

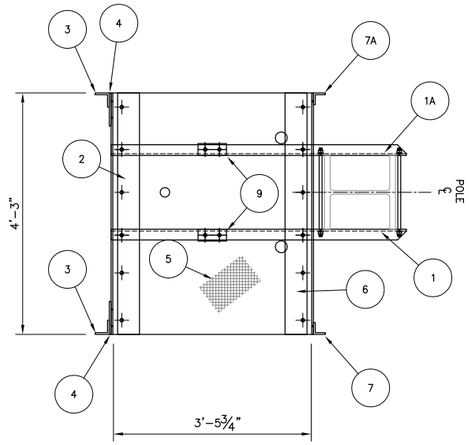
File No.:	2011-059-S-5216.DWG
Ref. No.:	2011-059
Sheet No:	513 OF 565

S-5216

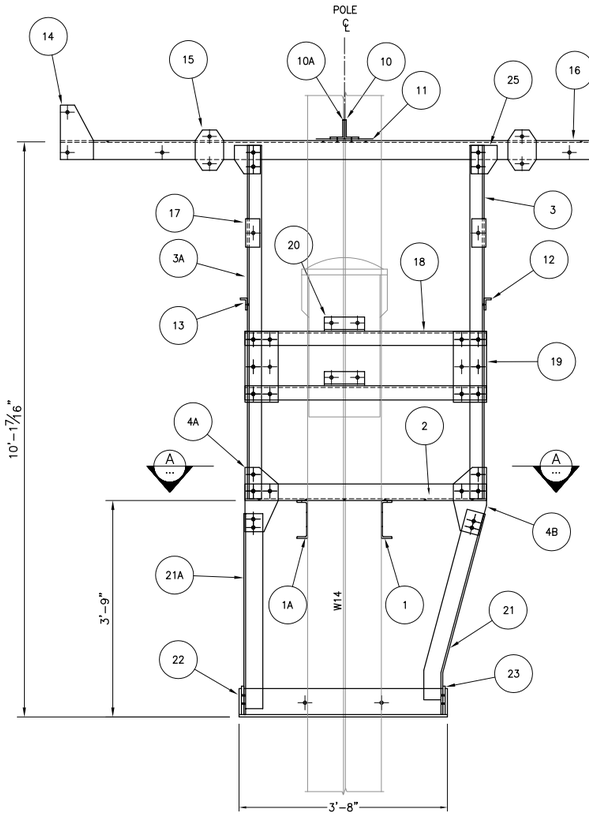
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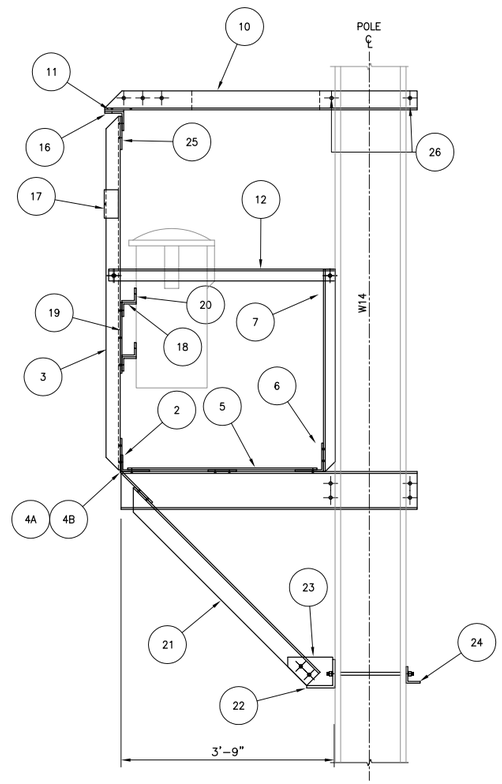
PLAN VIEW
SCALE: 3/4"=1'-0"



A SECTION
SCALE: 3/4"=1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4"=1'-0"



ELEVATION FACING ALONG TRACK
SCALE: 3/4"=1'-0"

BILL OF MATERIAL (STP-14)

ITEM NO.	DESCRIPTION	QTY.
1	PLATFORM SUPPORT CHANNEL C 8 x 11.5	1
2	PLATE SUPPORT ANGLE 6x3 1/2x 3/8 x 4'-3"	1
3	X-ARM SUPPORT ANGLE 3 x 3 x 3/8 x 6'-2 5/8"	1
4A	CONNECTION PLATE 7 x 3/8	1
4B	CONNECTION PLATE 7 x 3/8	1
5	STEEL GRATING, McNICHOLS #SGW-125A-2 OR EQUAL, 3'-5 3/8"x4'-3"	1
6	PLATE SUPPORT ANGLE 6 x 6 x 3/8 x 4'-3"	1
7	HAND RAIL 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	1
8	-	-
9	PL 2 1/2" x 3/8 x 0'-6"	2
10	L 4 x 3 x 3/8	1
11	PL 7 x 3/8 x 1'-0"	1
12	L 2 1/2 x 2 x 3/8 x 3'-11 7/8"	1
13	L 2 1/2 x 2 x 3/8 x 5'-1" ±	1
14	PL 11 1/2 x 3/8 x 0'-7"	2
15	PL 6 x 3/8 x 0'-8 1/2"	2
16	L 4 x 4 x 3/8 x 10'-0"	1
17	L 3 x 3 x 3/8 x 0'-6"	2
18	L 3 x 3 x 3/8 x 4'-3"	2
19	PL 7 x 3/8 x 1'-3"	2
20	L 3 x 3 x 3/8 x 0'- 8 1/2"	2
21	L 4 x 4 x 3/8	1
22	L 6 x 6 x 1/2 x 3'-8"	1
23	PL 6 x 1/2 x 0'-9 1/2"	2
24	L 3 1/2 x 3 x 3/8	1
25	PLATE 6 x 5 1/2" x 3/8"	2
26	CLAMPING BOLT 1" ø 18" LONG, 4" THREAD	8
	WITH NUTS & LOCK WASHERS	
3A	X-ARM SUPPORT ANGLE 3 x 3 x 3/8 x 6'-2 5/8"	1
7A	HAND RAIL 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	1
10A	L 4 x 3 x 3/8	1
21A	L 4 x 4 x 3/8	1
1A	PLATFORM SUPPORT CHANNEL C 8 x 11.5	1
	5/8"ø BOLTS WITH NUTS AND WASHERS 1 3/4" LONG	27
	3/4"ø BOLTS WITH NUTS AND WASHERS 2 1/4" LONG	40
	5/8"ø FLAT HEADED CTS'K BOLT 1 11/16" LONG	2

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING ET-5216.
2. FOR POLE SIZE, POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5218 AND S-5219.
4. VENDOR SHALL DELIVER SIGNAL POWER TRANSFORMER AND DISCONNECT SWITCH PLATFORMS LOOSELY ASSEMBLED.

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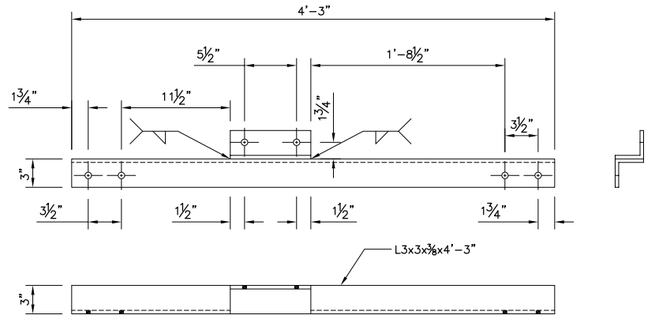
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
6.9KV SIGNAL POWER TRANSFORMER PLATFORM

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

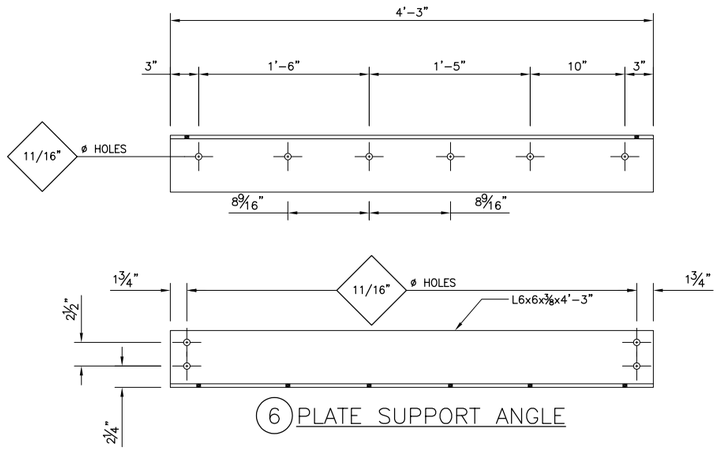
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Ref. No.:	2011-059
Sheet No:	514 OF 565

S-5217

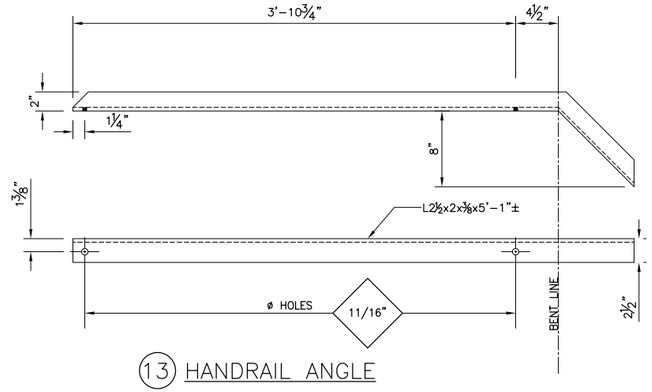
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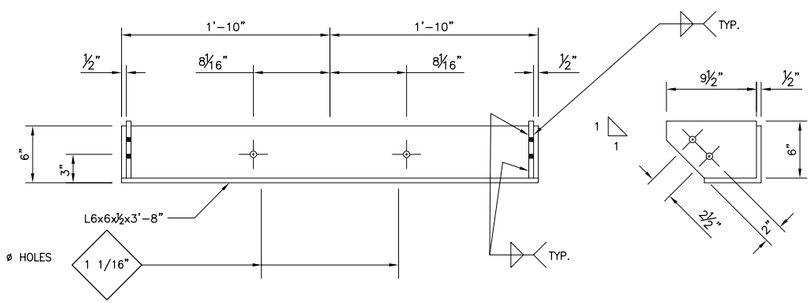
(18) TRANSFORMER SUPPORT ANGLE AND ITEM (20)



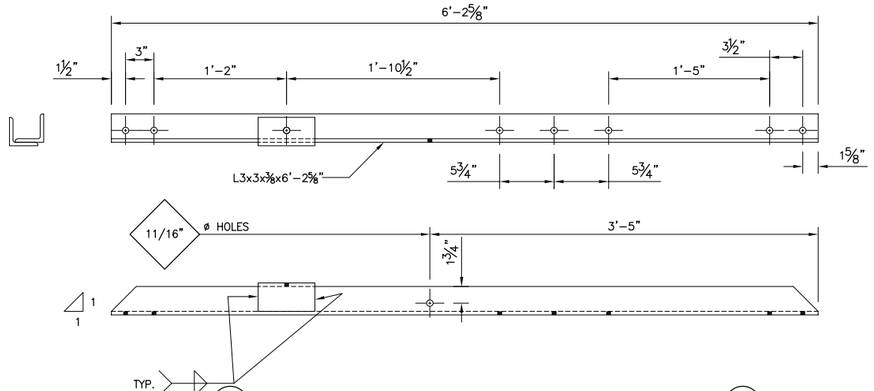
(6) PLATE SUPPORT ANGLE



(13) HANDRAIL ANGLE

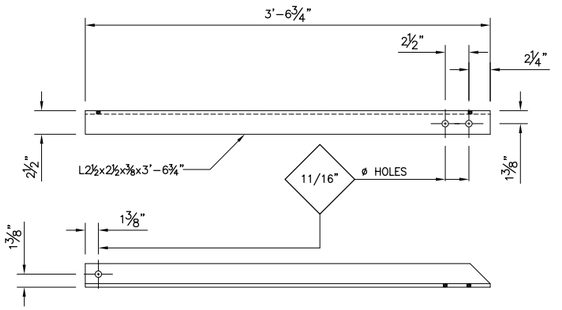


(22) CLAMP ANGLE AND ITEM (23)



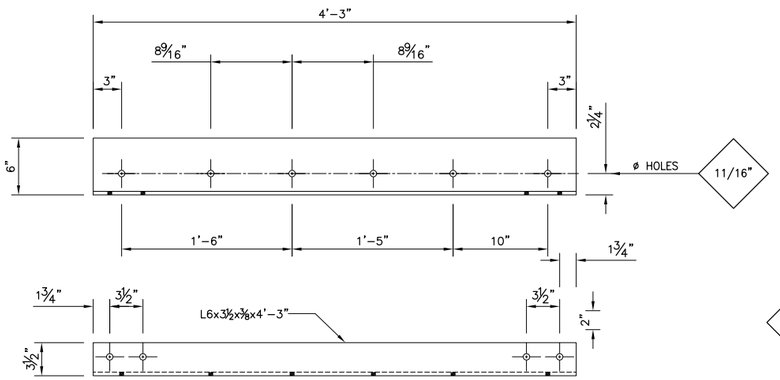
(3) CROSS ARM SUPPORT ANGLE AND ITEM (17)

(3A) AS DRAWN OPPOSITE HAND

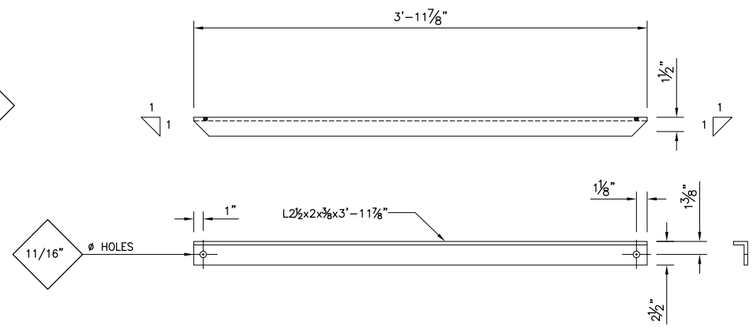


(7) HANDRAIL SUPPORT ANGLE

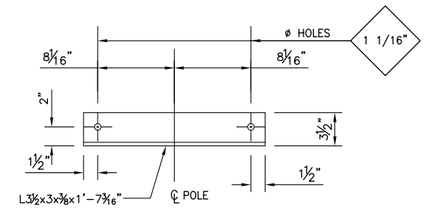
(7A) AS DRAWN OPPOSITE HAND



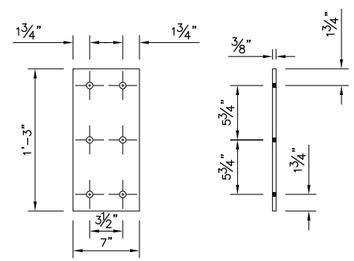
(2) CLAMP ANGLE



(12) HANDRAIL ANGLE



(24) CLAMP ANGLE



(19) CONNECTION PLATE

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

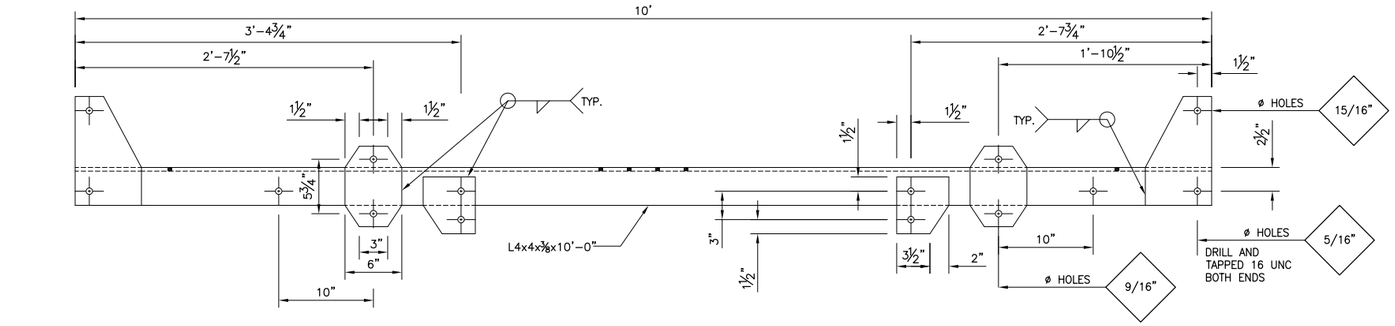
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER TRANSFORMER PLATFORM (SHEET 1 OF 2)

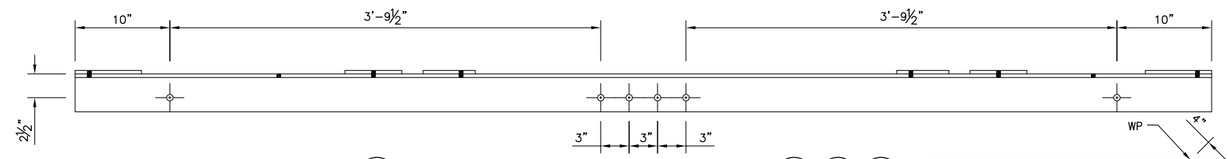
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File No.:	2011-059-S-5218.DWG
Ref. No.:	2011-059
Sheet No:	515 OF 565

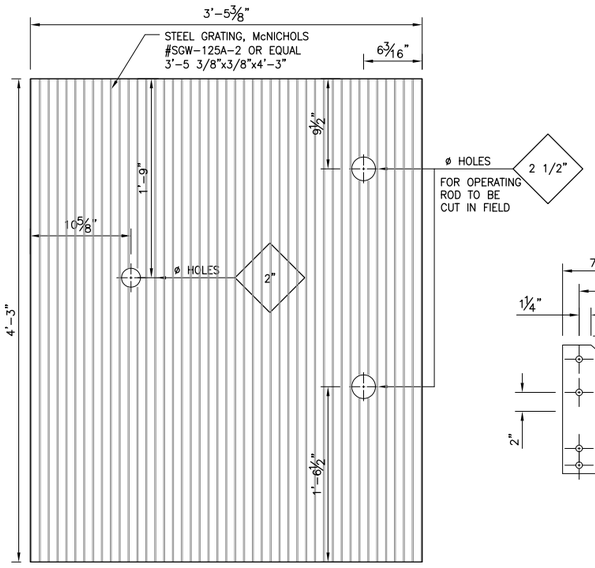
S-5218

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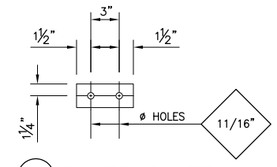




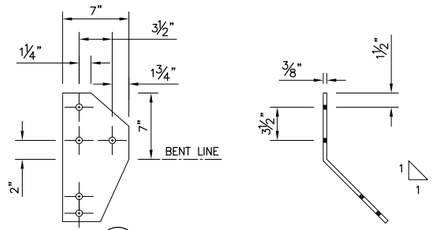
16 CROSS ARM ANGLE AND ITEMS 14 15 25



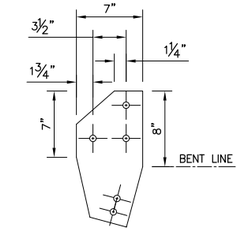
5 STEEL GRATING



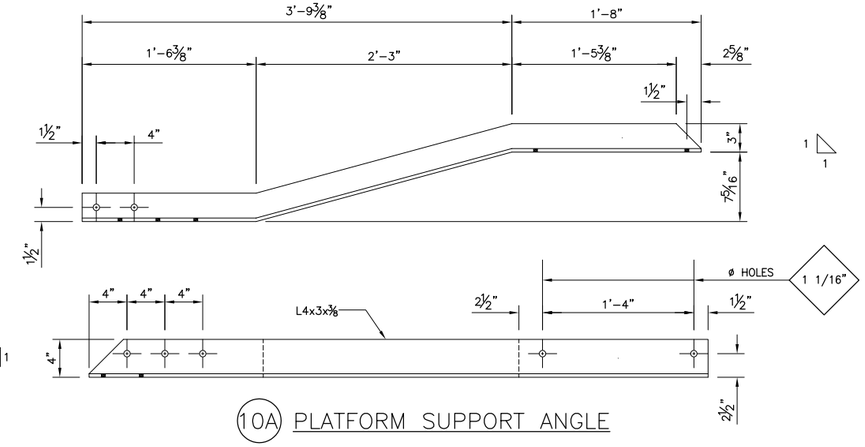
9 FILLER PLATE



4A CONNECTION PLATE

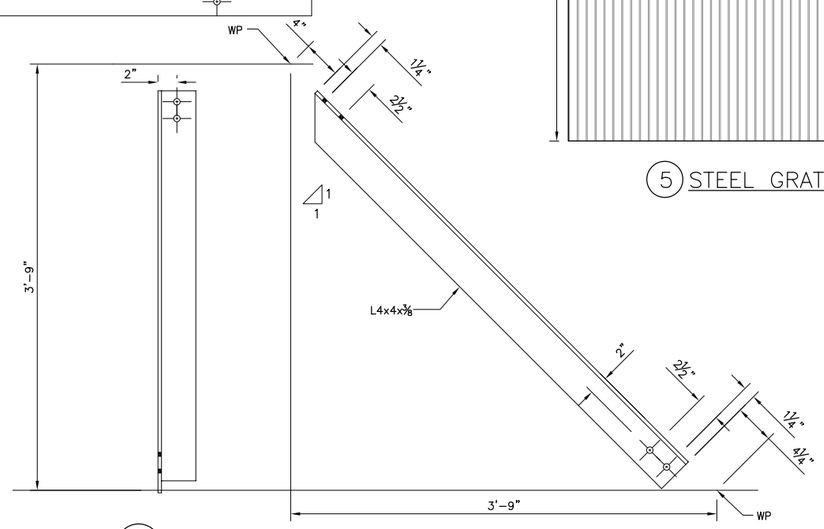


4B CONNECTION PLATE

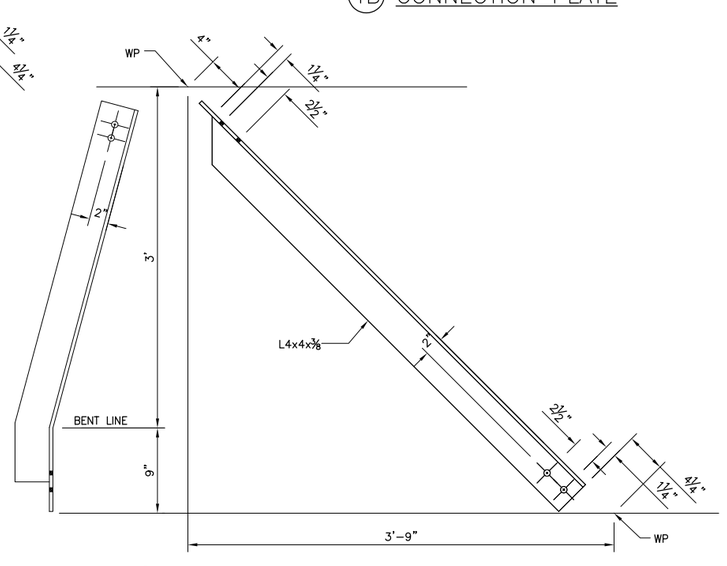


10A PLATFORM SUPPORT ANGLE

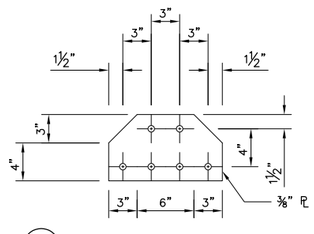
10 PLATFORM SUPPORT ANGLE



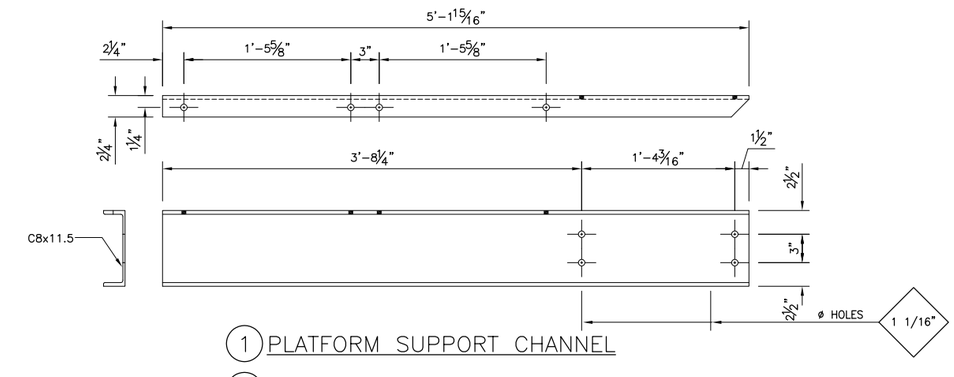
21A PLATFORM BRACING ANGLE



21 PLATFORM BRACING ANGLE



11 CONNECTION PLATE



1 PLATFORM SUPPORT CHANNEL

1A AS DRAWN OPPOSITE HAND

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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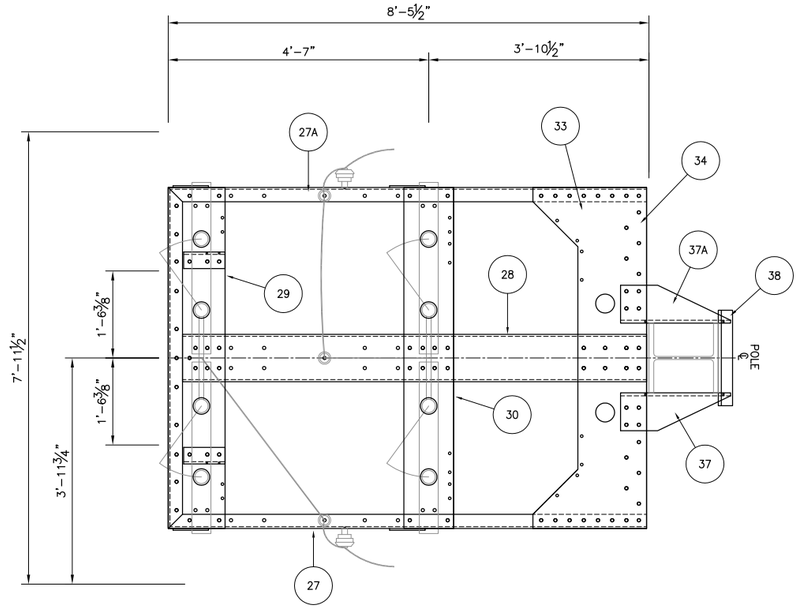
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER TRANSFORMER PLATFORM (SHEET 2 OF 2)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

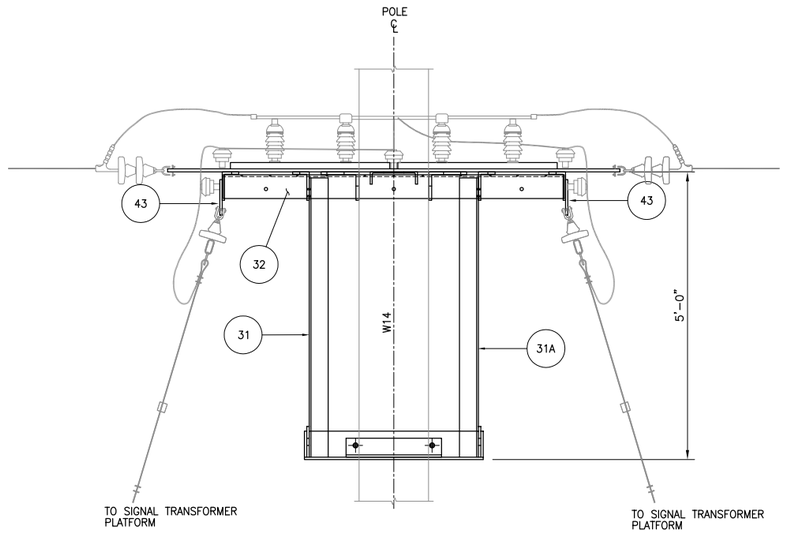
File No.:	2011-059-S-5219.DWG
Ref. No.:	2011-059
Sheet No:	516 OF 565

S-5219

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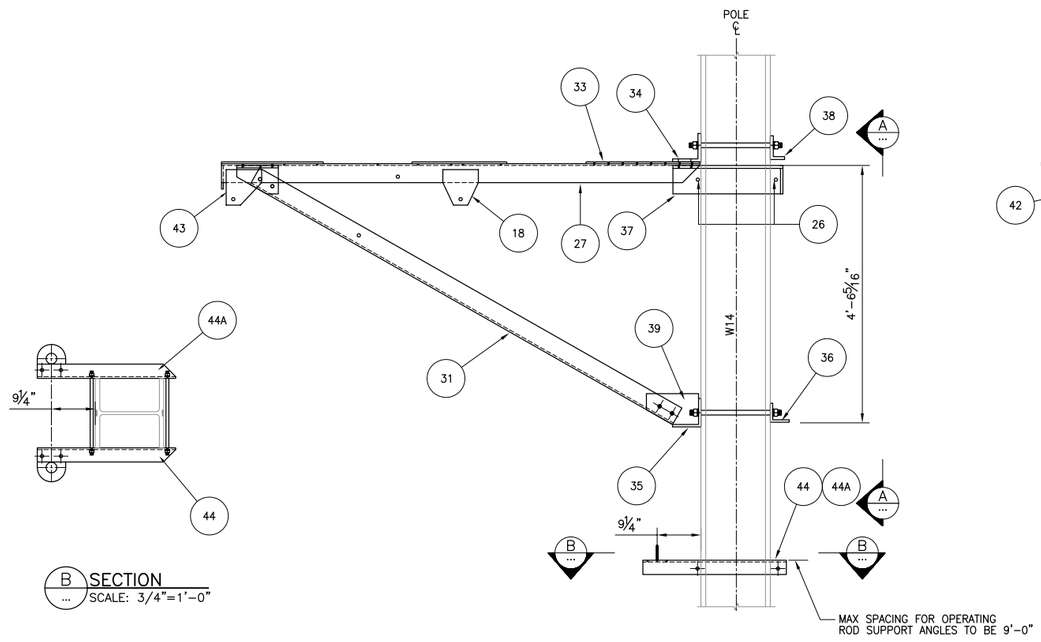


PLAN VIEW
SCALE: 3/4"=1'-0"



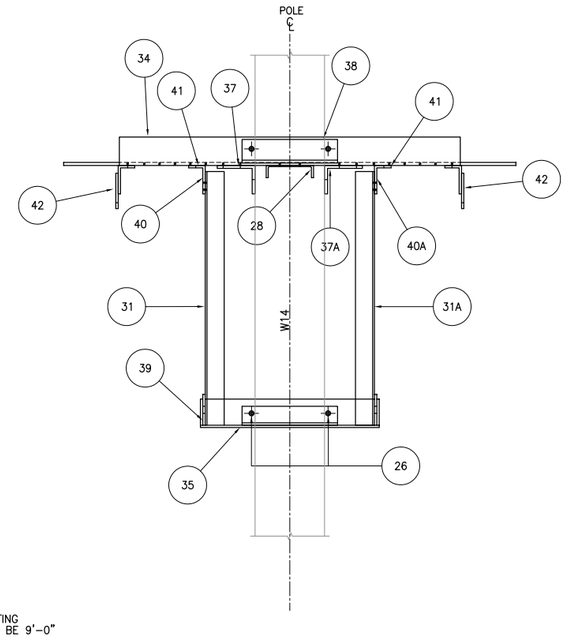
ELEVATION FACING ACROSS TRACK
SCALE: 3/4"=1'-0"

BILL OF MATERIAL (SSP-14)		
ITEM	DESCRIPTION	QTY
26	CLAMPING BOLT 1"ø, 18" LONG 4" THREAD	6
	WITH NUTS AND WASHERS	
27	L 4 x 3 x 3/8 x 8'-5"	1
28	C 10 x 15.3 x 8'-2"	1
29	PL 12 x 3/8 x 7'-11 1/2"	1
30	PL 10 1/2 x 3/8 x 7'-11 1/2"	1
31	L 4 x 4 x 3/8 x 8'-6 7/8"	1
32	L 5 x 3 x 3/8 x 6'-0"	1
33	PL 14 1/2 x 3/8 x 6'-0"	1
34	L 6 x 6 x 5/8 x 6'-0"	1
35	L 6 x 6 x 1/2 x 3'-2"	1
36	L 4 x 4 x 1/2 x 1'-8 3/16"	1
37	L 8 x 6 x 5/8 x 1'-8 3/8"	1
38	L 5 x 3 x 5/8 x 1'-8 3/16"	1
39	PL 11 x 6 1/2 x 1/2	2
40	L 6 x 3 1/2 x 1/2 x 8 3/4	1
41	PL 3 1/2 x 3/8 x 8 3/4	2
42	PL 7 1/2 x 7 1/2 x 1/2	2
43	PL 7 1/2 x 7 1/2 x 1/2	2
38A	L 8 x 6 x 5/8 x 1'-8 3/8"	1
42A	PL 6 x 3 1/2 x 1/2 x 9 1/2	1
27A	L 4 x 3 x 3/8 x 8'-5"	1
31A	L 4 x 4 x 3/8 x 8'-11 1/2"	1
–	3/4" ø BOLTS 2 1/4" LG. W/ NUTS & WASHERS	90
44&44A	ANGLES, 1 SET, 3 x 3 x 3/8 x 2'-3 1/4"	4
45	CLAMPING BOLT 3/4"ø, 18" LONG 4" THREAD	8
	WITH NUTS AND LOCK WASHERS	



ELEVATION FACING ALONG TRACK
SCALE: 3/4"=1'-0"

B SECTION
SCALE: 3/4"=1'-0"



A SECTION
SCALE: 3/4"=1'-0"

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5216.
2. FOR POLE SIZE, SEE POLE SCHEDULE ON STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5221 AND S-5222.
4. VENDOR SHALL DELIVER SIGNAL POWER TRANSFORMER AND DISCONNECT SWITCH PLATFORMS LOOSELY ASSEMBLED.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

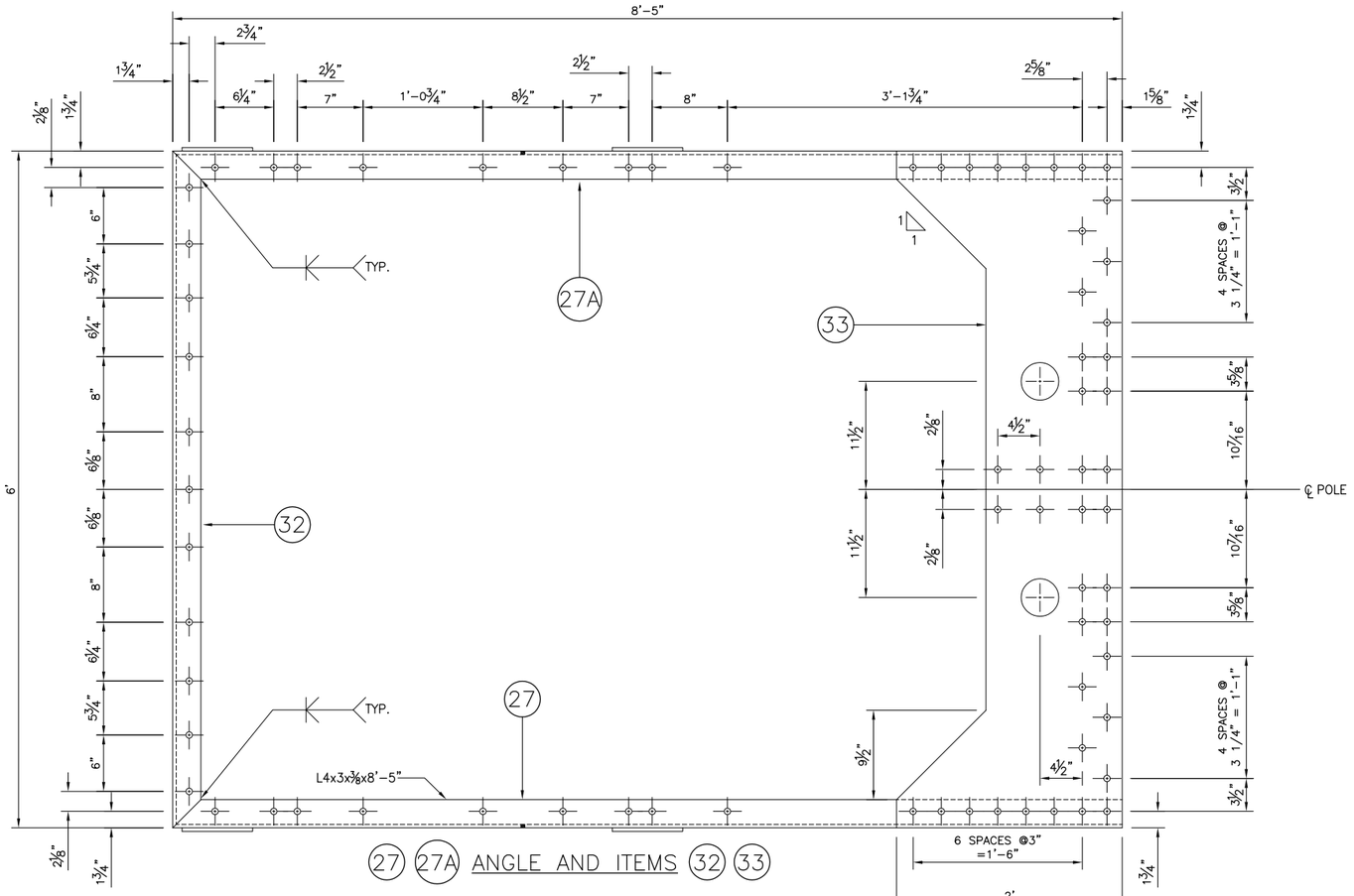
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER DISCONNECT SWITCH PLATFORM

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

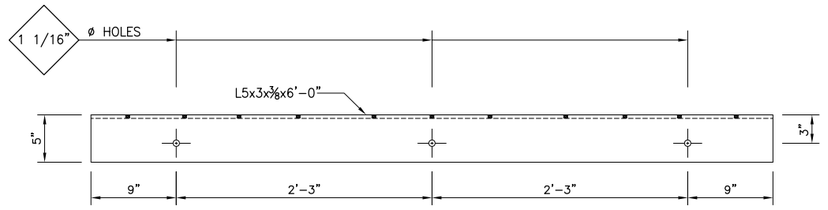
File No.:	2011-059-S-5220.DWG
Ref. No.:	2011-059
Sheet No:	517 OF 565

S-5220

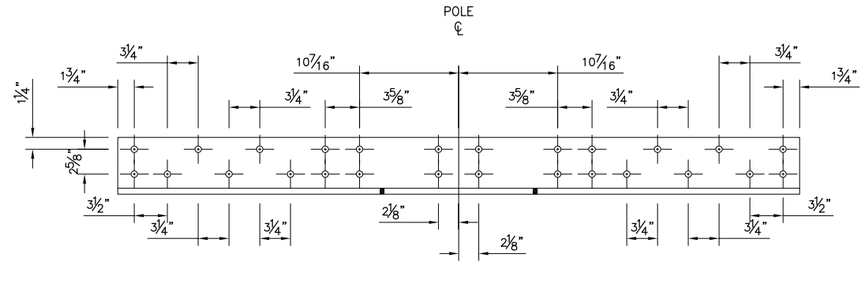
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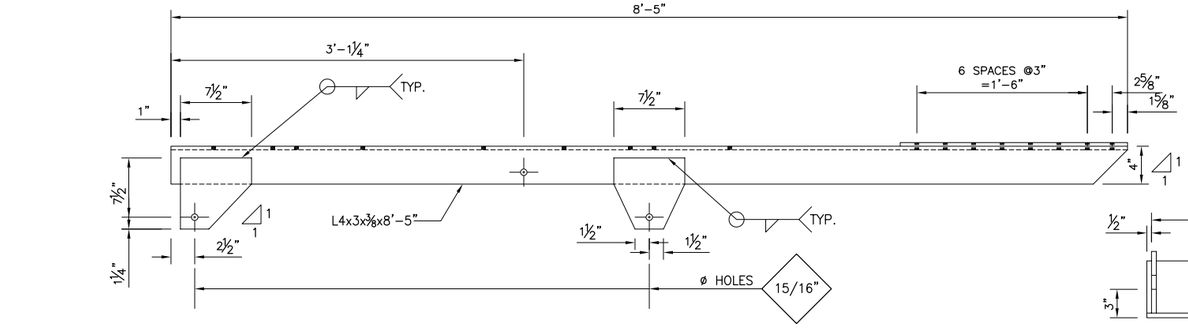
(27) (27A) ANGLE AND ITEMS (32) (33)



(32) ANGLE

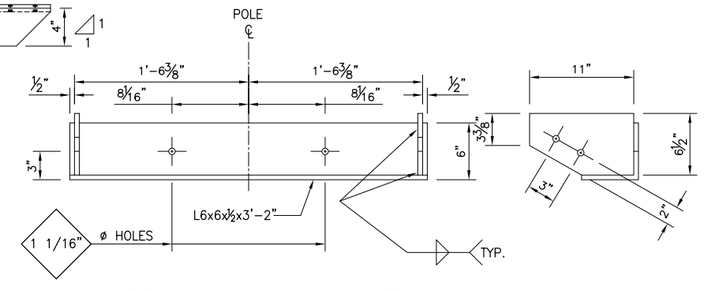


(34) ANGLE

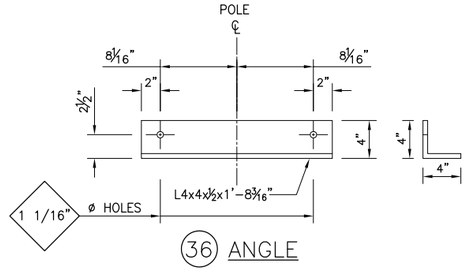


(27) ANGLE AND ITEMS (42) (43)

(27A) AS DRAWIN OPPOSITE HAND



(35) ANGLE AND ITEM (39)



(36) ANGLE

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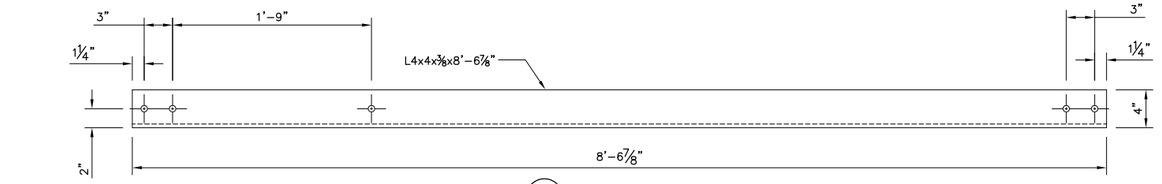
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER DISCONNECT SWITCH PLATFORM (SHEET 1 OF 2)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5221.DWG
Ref. No.:	2011-059
Sheet No:	518 OF 565

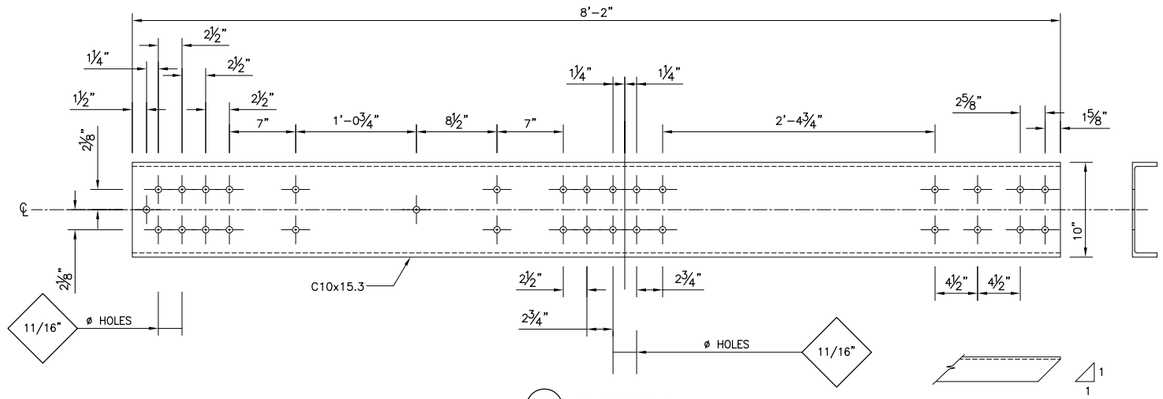
S-5221

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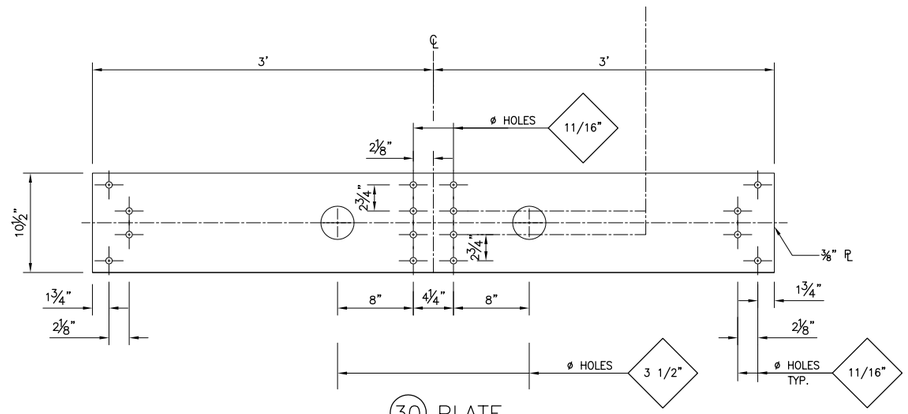


31 ANGLE

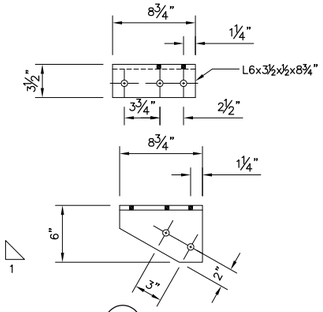
31A AS DRAWN OPPOSITE HAND



28 CHANNEL

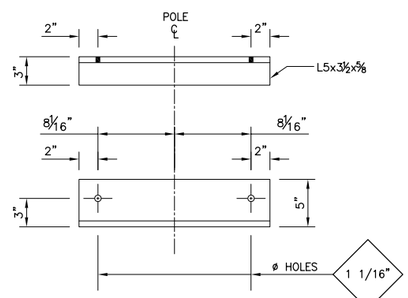


30 PLATE

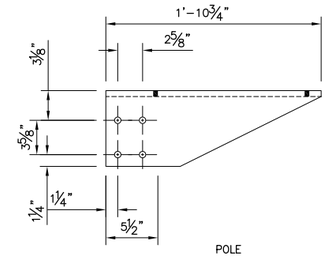


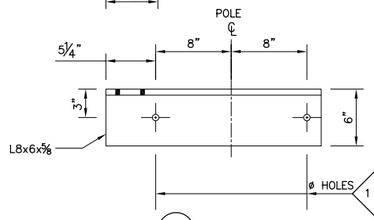
40 ANGLE

40A AS DRAWN OPPOSITE HAND



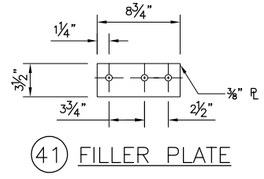
38 ANGLE



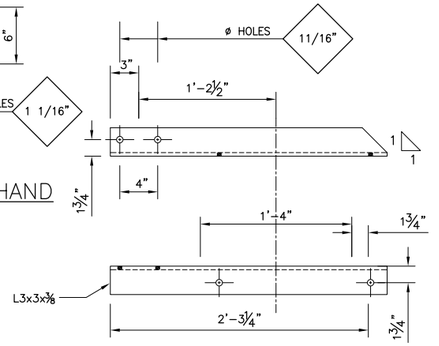


37 ANGLE

37A AS DRAWN OPPOSITE HAND

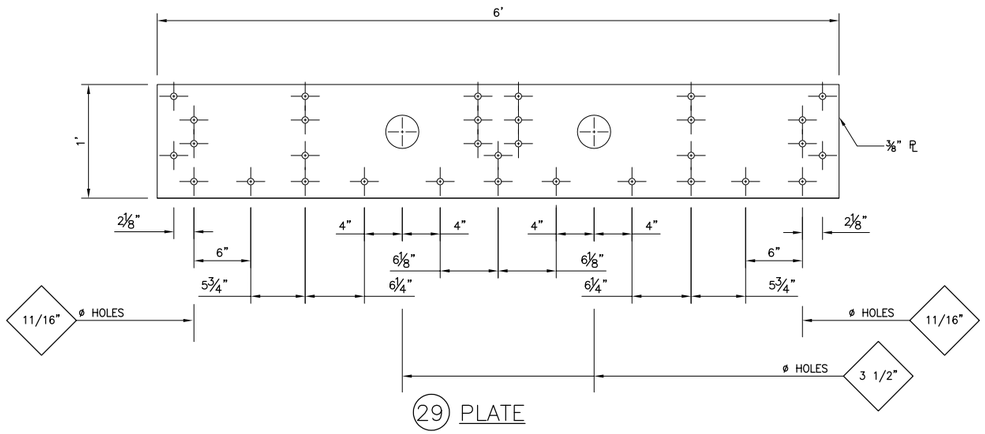


41 FILLER PLATE



44 OPERATING ROD SUPPORT ANGLE

44A AS DRAWN OPPOSITE HAND



29 PLATE

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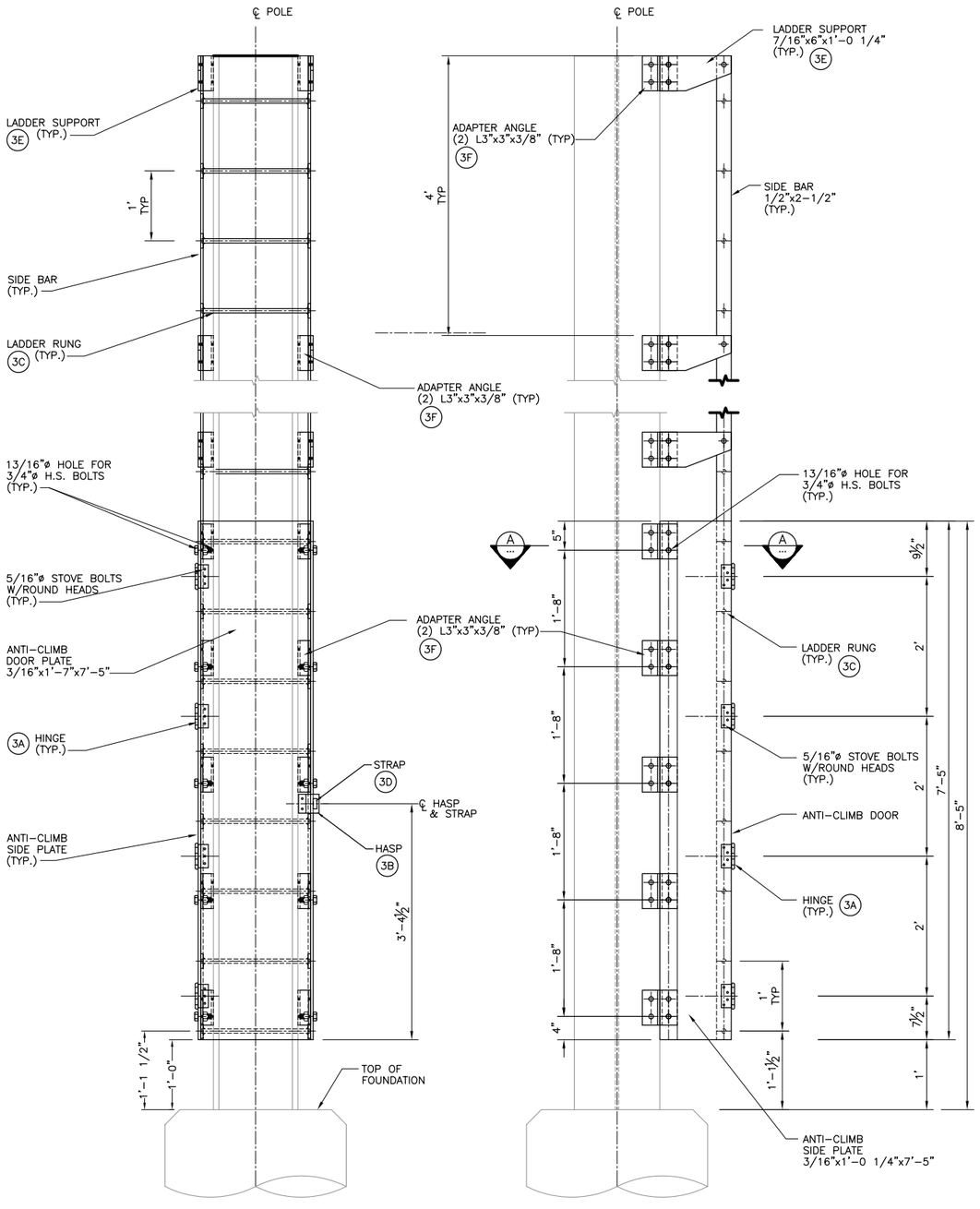
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER DISCONNECT SWITCH PLATFORM (SHEET 2 OF 2)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

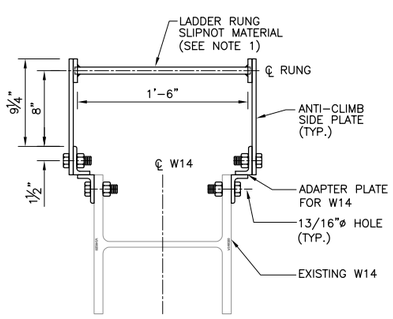
File No.:	2011-059-S-5222.DWG
Ref. No.:	2011-059
Sheet No:	519 OF 565

S-5222

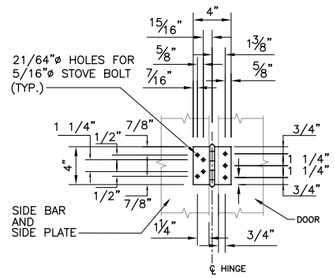
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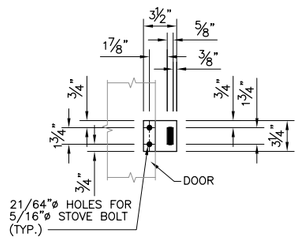
LADDER ASSEMBLY (LAD)
SCALE: 1"=1'-0"



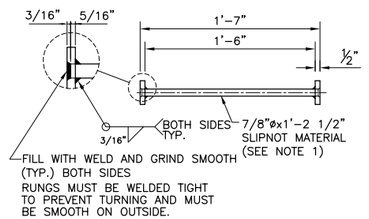
A SECTION
SCALE: 1/2"=1'-0"



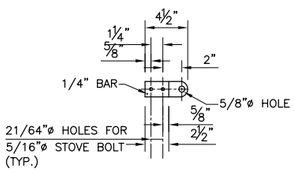
3A HINGE DETAIL
SCALE: 1/2"=1'-0"



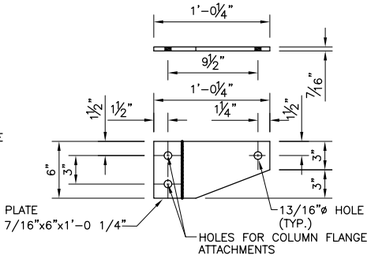
3B HASP DETAIL
SCALE: 1/2"=1'-0"



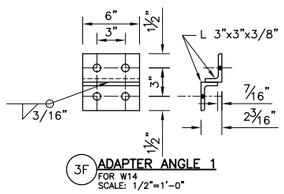
3C LADDER RUNG DETAIL
SCALE: 1/2"=1'-0"



3D STRAP DETAIL
SCALE: 1/2"=1'-0"



3E LADDER SUPPORT DETAIL
SCALE: 1/2"=1'-0"



3F ADAPTER ANGLE 1
FOR W14
SCALE: 1/2"=1'-0"

NOTE:

1. RUNGS TO BE SLIPNOT MATERIAL
   1-800-754-7668
   OR APPROVED EQUAL.

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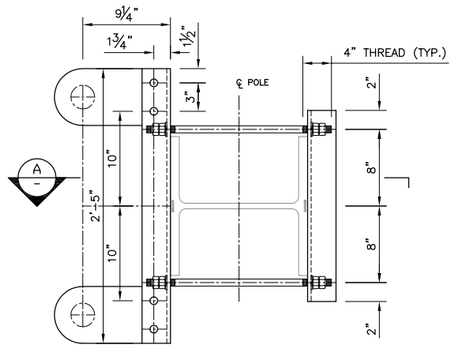
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
LADDER DETAILS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

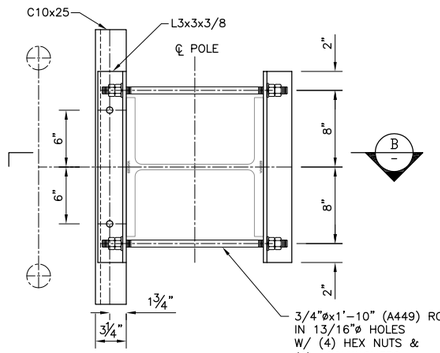
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Ref. No.:	2011-059
Sheet No:	520 OF 565

S-5224

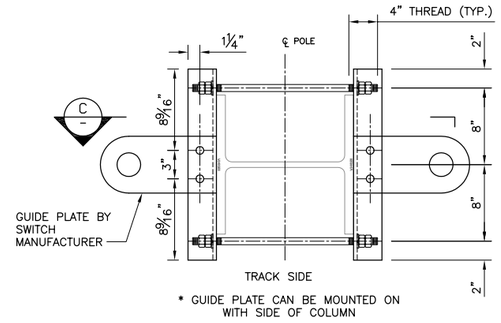
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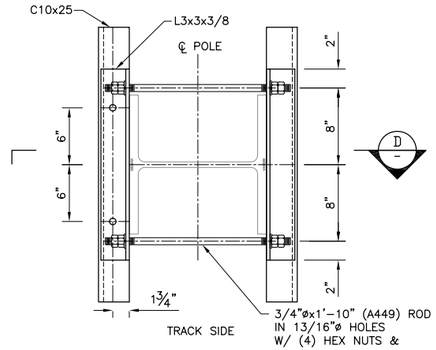
1 S-5225 DOUBLE ROD SUPPORT (DRS14)
1 1/2" = 1'-0"



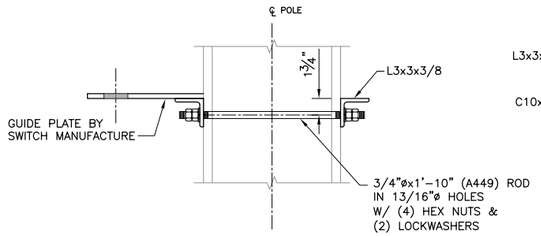
2 S-5225 HAND OPERATOR SUPPORT (HO14)
1 1/2" = 1'-0"



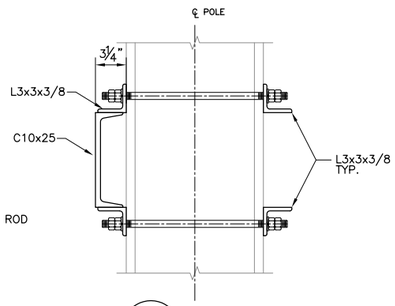
3 S-5225 ROD SUPPORT (RS14)
1 1/2" = 1'-0"



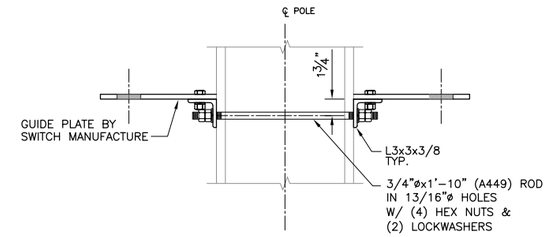
4 S-5225 MOTOR OPERATOR SUPPORT (MOS14)
1 1/2" = 1'-0"



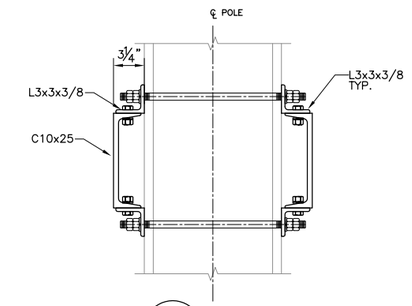
A S-5225 SECTION
1 1/2" = 1'-0"



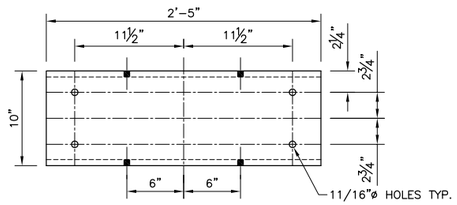
B S-5225 SECTION
1 1/2" = 1'-0"



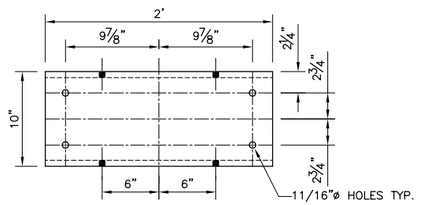
C S-5225 SECTION
1 1/2" = 1'-0"



D S-5225 SECTION
1 1/2" = 1'-0"



E S-5225 CHANNEL DETAIL FOR HAND OPERATOR
1 1/2" = 1'-0"



F S-5225 CHANNEL DETAIL FOR MOTOR OPERATOR
1 1/2" = 1'-0"

3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5225.dwg
2:33:21 PM

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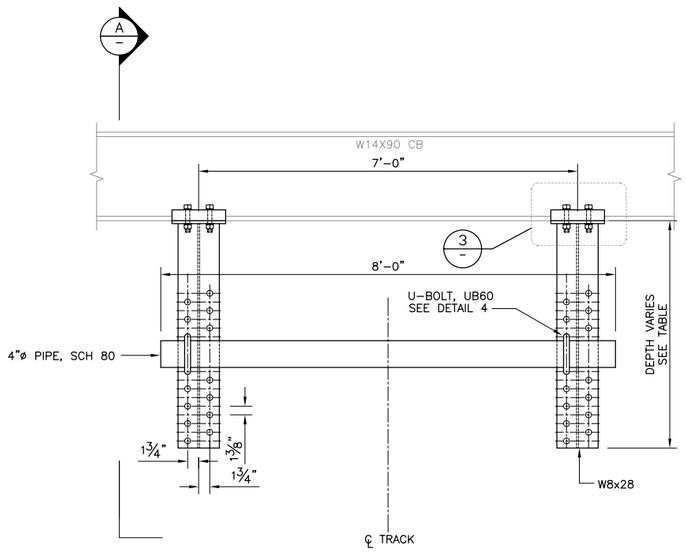
Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
OPERATING ROD AND CONDUIT SUPPORT

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5225.DWG
Ref. No.:	2011-059
Sheet No:	521 OF 565

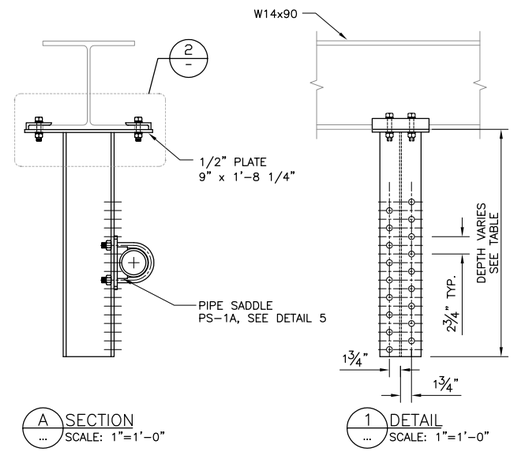
S-5225



UNDER BRIDGE BRACKET ASSEMBLY (UBA1)

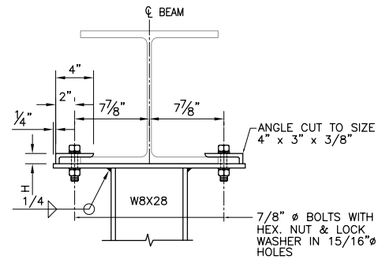
1' 0 1' 2'

SCALE: 1"=1'-0"

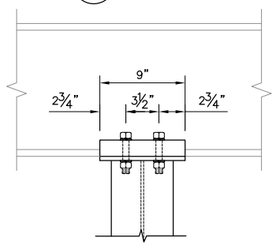


A SECTION
SCALE: 1"=1'-0"

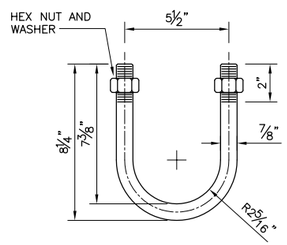
1 DETAIL
SCALE: 1"=1'-0"



2 DETAIL
SCALE: 1 1/2"=1'-0"

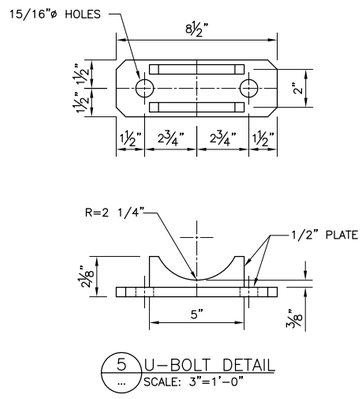


3 DETAIL
SCALE: 1 1/2"=1'-0"



4 U-BOLT DETAIL
SCALE: 3"=1'-0"

U-BOLT (UB60)



5 U-BOLT DETAIL
SCALE: 3"=1'-0"

PIPE SADDLE (PS1A)

BRACKET DEPTH TABLE				
STRUCTURE	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T-441	5'-6"	5'-6"	5'-6"	5'-6"
T-396	2'-6"	2'-6"	2'-6"	2'-6"
T-395	2'-6"	2'-6"	2'-6"	2'-6"
T-365	3'-6"	3'-6"	3'-6"	3'-6"
T-339A	3'-8"	3'-8"	3'-8"	4'-6"
T-228	3'-6"	3'-6"	3'-6"	3'-6"
T-227	3'-0"	3'-0"	3'-0"	3'-0"
T-165	5'-4"	5'-0"	5'-0"	5'-0"
T-164	5'-6"	5'-0"	5'-0"	5'-0"

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PHILADELPHIA, PA 19103

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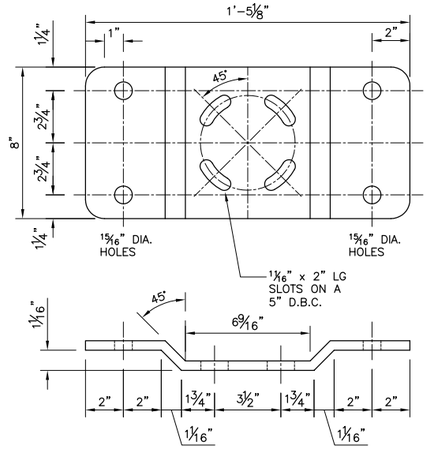
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
UNDER BRIDGE BRACKET ASSEMBLY (UBA1)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

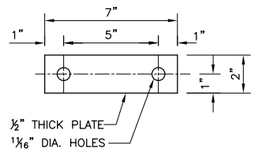
File No.:	2011-059-S-5228.DWG
Ref. No.:	2011-059
Sheet No:	522 OF 565

S-5228

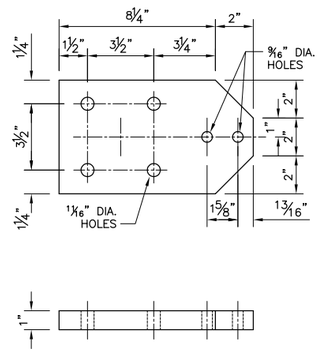
2:33:27 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5228.dwg



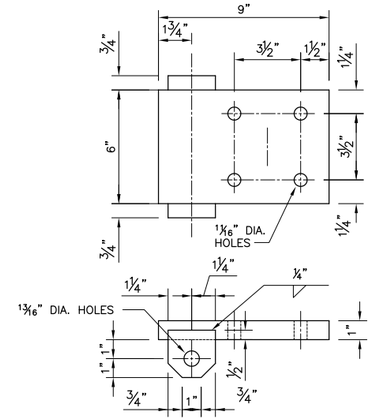
1 S-5229 BENT PLATE (TP1)
SCALE: 3"=1'-0"



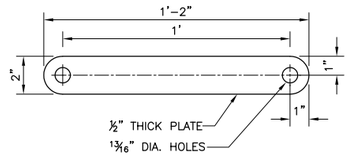
2 S-5229 TOP PLATE (TP2)
SCALE: 3"=1'-0"



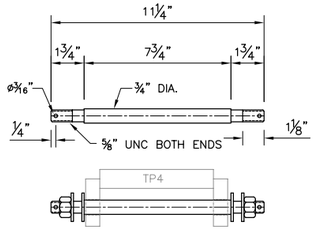
3 S-5229 PLATE FOR PULL OFF ARMS (TP3)
SCALE: 3"=1'-0"



4 S-5229 PLATE FOR PULL OFF ARMS (TP4)
SCALE: 3"=1'-0"



5 S-5229 STEEL STRAP FOR TDA3 (PART #215)
SCALE: 3"=1'-0"



NOTE:
INCLUDE (2) HEX NUTS, (4) FLAT WASHERS, (2) COTTER PINS

6 S-5229 GALVANIZED 3/4" DIA. BOLT (PART #261)
SCALE: 3"=1'-0"

1' 6" 0 1'

SCALE: 3"= 1'-0"

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
MISC STEEL DETAILS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5229.DWG
Ref. No.:	2011-059
Sheet No:	523 OF 565

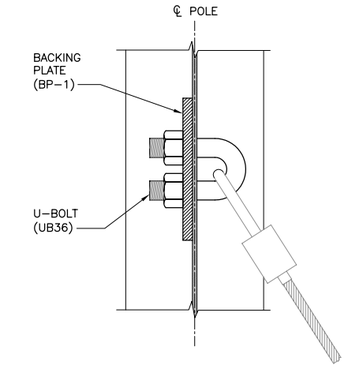
S-5229

3/14/2016 2:33:32 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5229.dwg

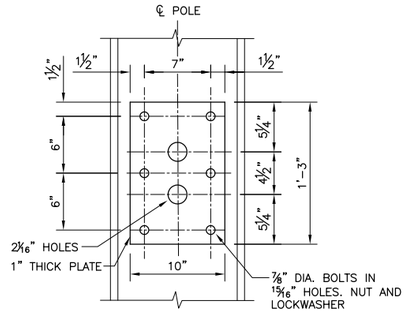
DG SCHEDULE		
	DISTANCE FROM TOP OF POLE	
STRUCTURE #	NORTH POLE	SOUTH POLE
T-447	1'-6"	1'-6"
T-397	1'-6"	1'-6"
T-395	1'-6"	1'-6"
T-366	1'-6"	1'-6"
T-364	1'-6"	1'-6"
T-340	1'-6"	1'-6"
T-338	1'-6"	1'-6"
T-288	1'-6"	1'-6"
T-286	1'-6"	1'-6"
T-277	1'-6"	1'-6"
T-274	1'-6"	4'-0"
T-246	1'-6"	1'-6"

DG-1 SCHEDULE		
	DISTANCE FROM BOTTOM OF POLE BASE PL	
STRUCTURE #	NORTH POLE	SOUTH POLE
T-438	20'-0"	20'-0"
T-436		22'-4"
T-427		27'-10"
T-427		30'-4"
T-422		22'-4"
T-243	20'-1"	20'-1"
T-242	20'-10"	20'-10"
T-240	24'-6"	
T-240	21'-0"	
T-239		26'-4"
T-239		23'-4"
T-236	30'-7"	30'-7"

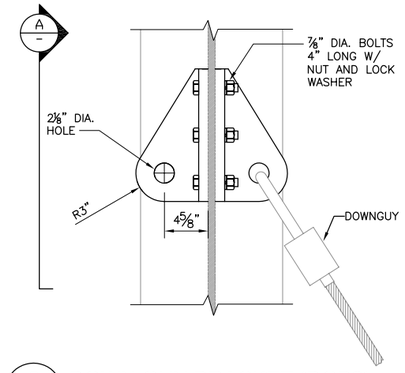
DOWN GUY SCHEDULE



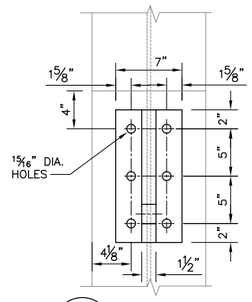
1 / S-5230 DOWN GUY CONNECTION DETAIL
SCALE: 1 1/2"=1'-0"



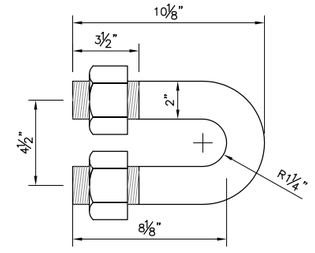
2 / S-5230 DOWN GUY BACKING PLATE (BP1)
SCALE: 1 1/2"=1'-0"



3 / S-5230 DOWN GUY BRACKET (DGB2)
SCALE: 1 1/2"=1'-0"



A / S-5230 SECTION
SCALE: 1 1/2"=1'-0"



4 / S-5230 U-BOLT DETAIL (UB36)
SCALE: 3"=1'-0"

1' 6" 0 1'
SCALE: 1-1/2"= 1'-0"

1' 6" 0 1'
SCALE: 3"= 1'-0"

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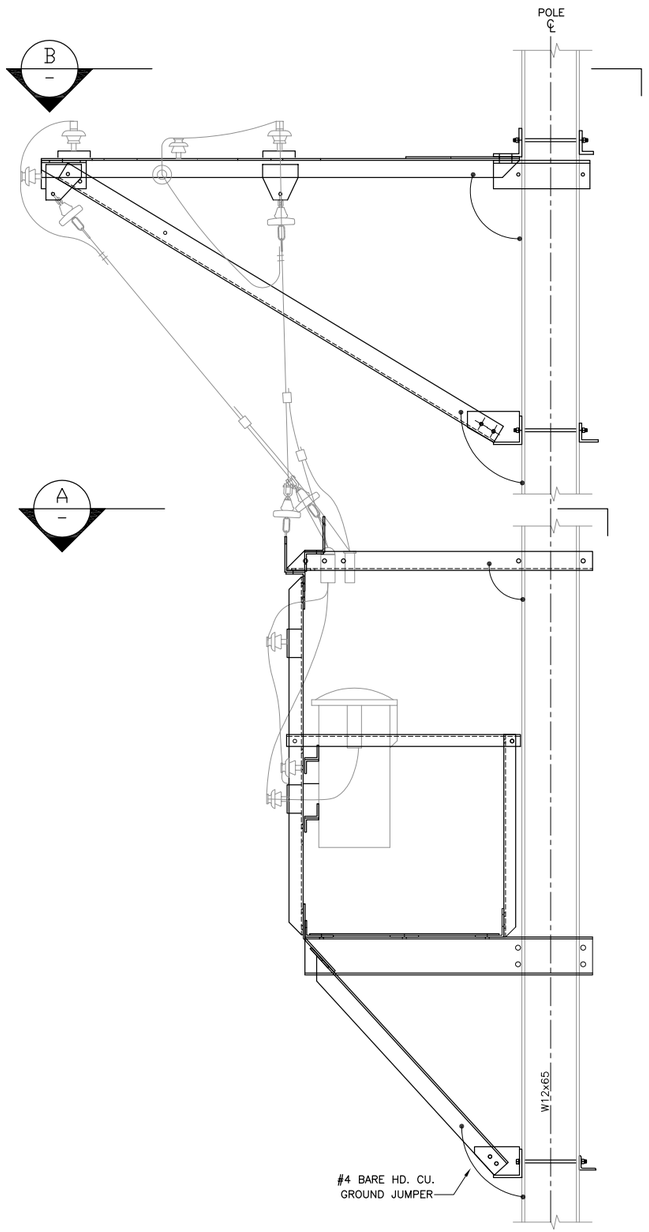
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
DOWNGUY SCHEDULE AND DETAILS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

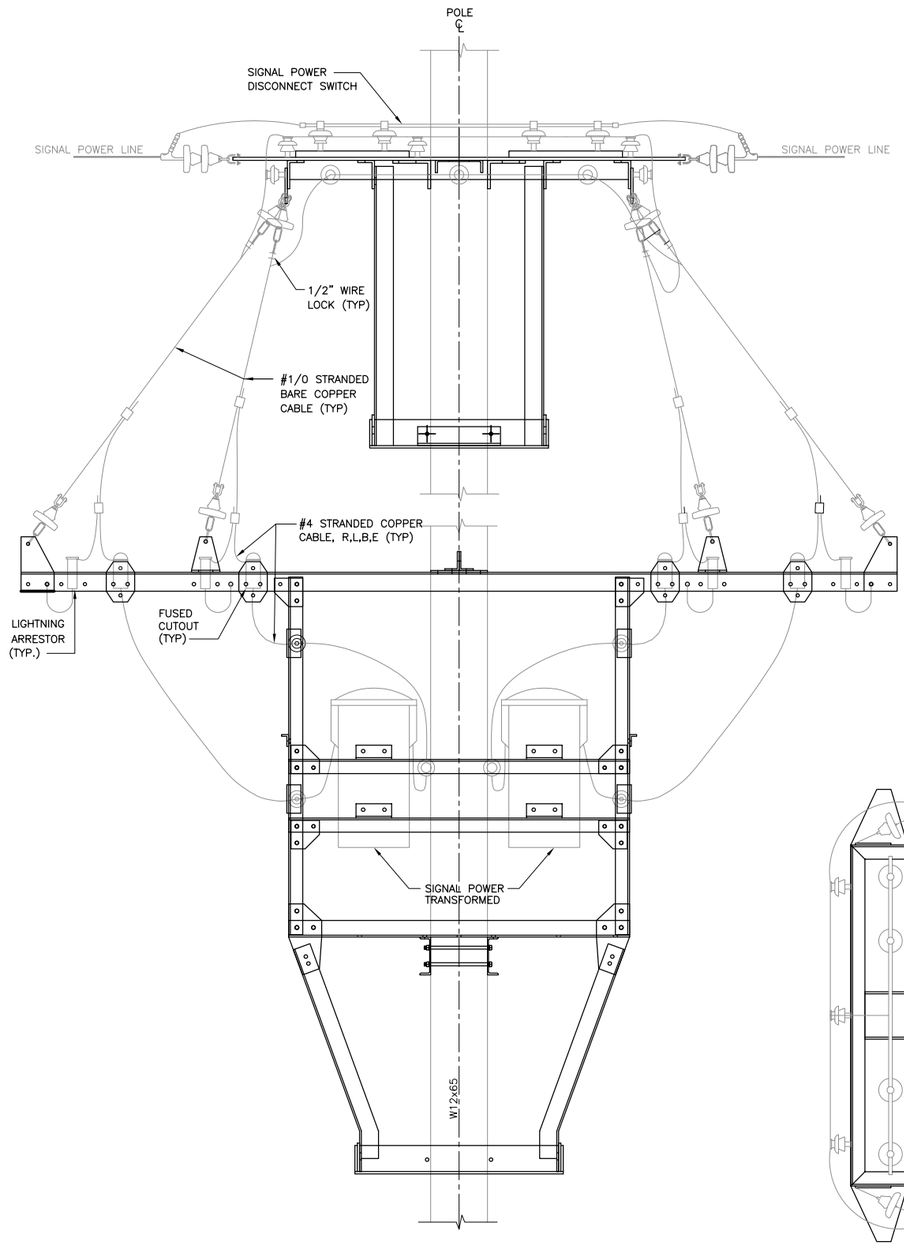
File No.:	2011-059-S-5230.DWG
Ref. No.:	2011-059
Sheet No:	524 OF 565

S-5230

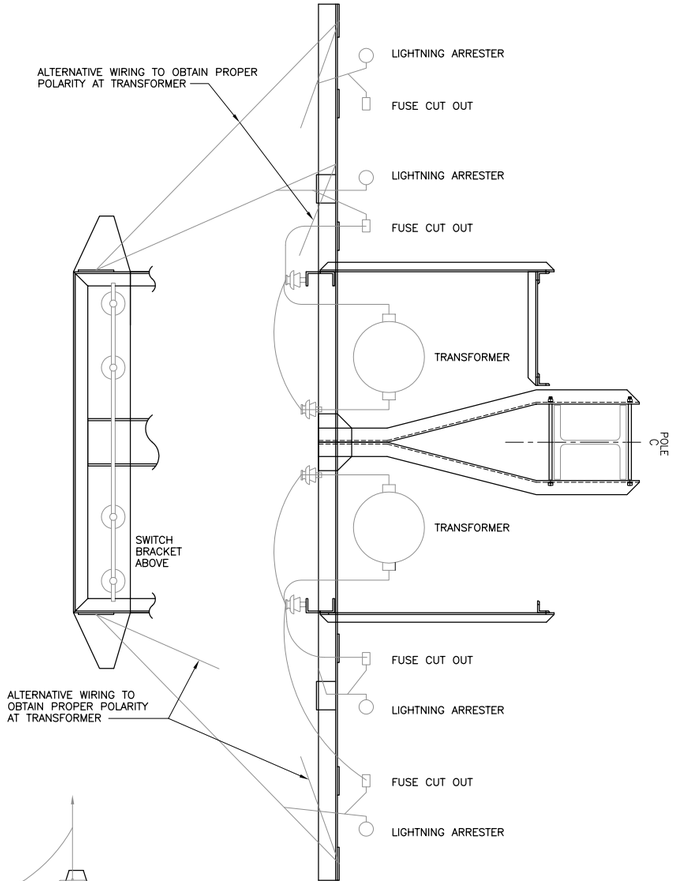
3/14/2016 2:33:38 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5230.dwg



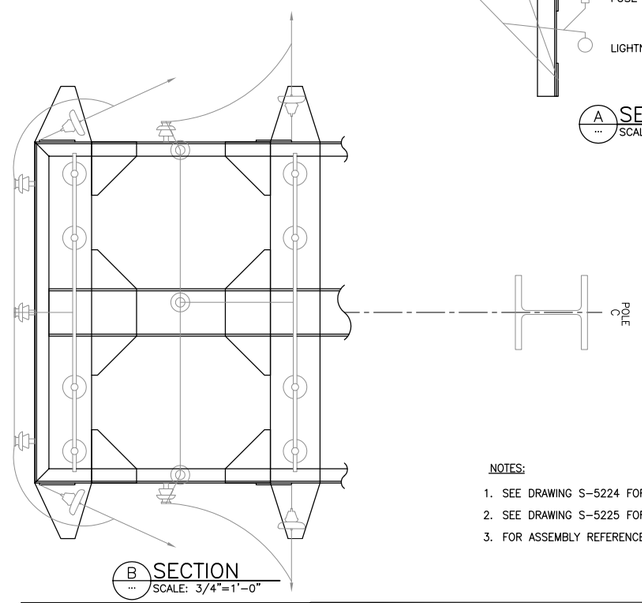
ELEVATION FACING ALONG TRACK
SCALE: 3/4" = 1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4" = 1'-0"



A SECTION
SCALE: 3/4"=1'-0"



B SECTION
SCALE: 3/4"=1'-0"

NOTES:

1. SEE DRAWING S-5224 FOR LADDER DETAILS.
2. SEE DRAWING S-5225 FOR OPERATOR MOUNTING AND ROD SUPPORT.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5236 AND S-5237.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

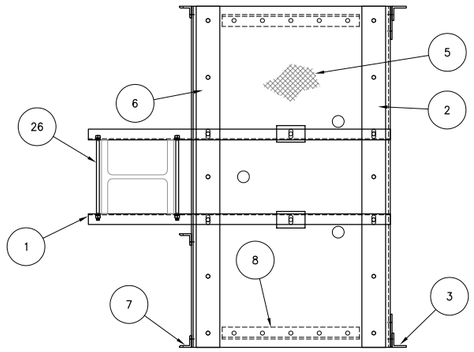
STRUCTURAL - TYPICAL DETAILS - DUAL SWITCH SIGNAL POWER DISCONNECT ARRANGEMENT

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

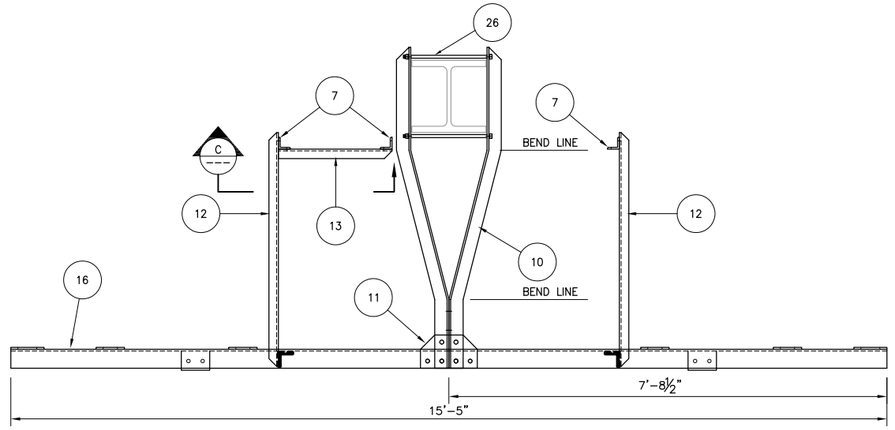
File No.:	2011-059-S-5231.DWG
Ref. No.:	2011-059
Sheet No:	525 OF 565

S-5231

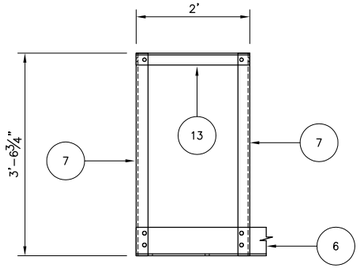
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3/14/2016
2:33:44 PM



A SECTION
SCALE: 3/4" = 1'-0"

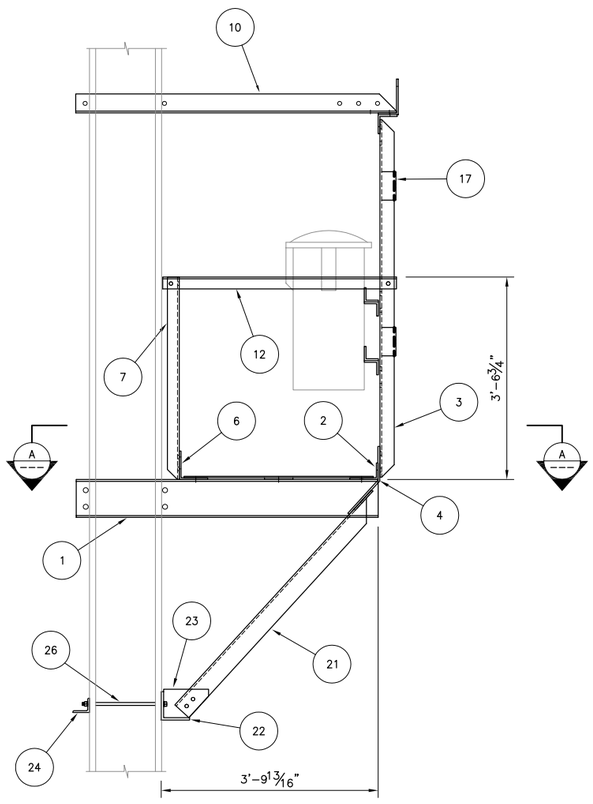


TOP VIEW
SCALE: 3/4" = 1'-0"

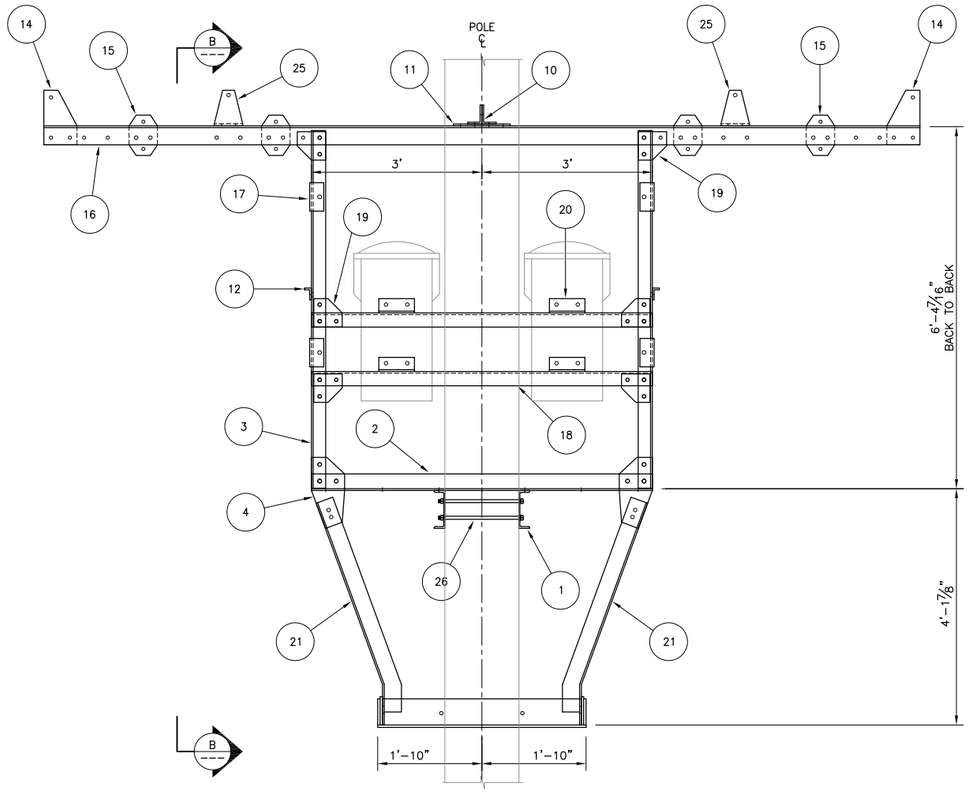


C SECTION
SCALE: 3/4" = 1'-0"

BILL OF MATERIAL			
ITEM NO.	MARK NUMBER	DESCRIPTION	QTY.
1	019-1/1	C8 x 11.5	2
2	019-1/2	L 6 x 3 1/2 x 3/8 x 6'-0"	1
3	019-1/3	L 3 x 3 x 3/8 x 6'-3 1/2"	2
4	019-1/4	PL 7 x 3/8	2
5	019-1/5	PL 3'-4" x 5/16 x 6'-0" (NON-SKID)	1
6	019-1/6	L 6 x 6 x 3/8 x 6'-0"	1
7	019-1/7	L 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	3
8	019-1/8	L 2 1/2 x 2 1/2 x 3/8 x 2'-5" (STIFFENER ANGLE)	2
9	019-1/9	PL 3 1/2 x 3/8 x 0'-6"	2
10	020-1/10	L 4 x 3 x 3/8	2
11	020-1/11	PL 7 x 3/8 x 1'-0"	1
12	020-1/12	L 2 1/2 x 2 x 3/8 x 4'-1 3/8"	2
13	020-1/13	L 2 1/2 x 2 x 3/8 x 2'-0"	1
14	020-1/14	PL 11 1/2 x 3/8 x 0'-7"	2
15	020-1/15	PL 6 x 3/8 x 0'-8 1/2"	4
16	020-1/16	L 4 x 4 x 3/8 x 15'-5"	1
17	019-1/17	L 3 x 3 x 3/8 x 0'-6"	4
18	020-1/18	L 3 x 3 x 3/8 x 6'-0"	2
19	020-1/19	PL 6 x 3/8 x 0'-6"	6
20	020-1/20	L 3 x 3 x 3/8 x 0'-8 1/2"	4
21	020-1/21	L 4 x 4 x 3/8	2
22	012-1/22	L 6 x 6 1/2 x 3'-8"	1
23	020-1/23	PL 6 x 1/2 x 0'-9 1/2"	2
24	020-1/24	L 3 1/2 x 3 x 3/8 x 1'-10"	1
25	020-1/25	L 8 x 4 x 1/2 x 0'-6"	2
26	-----	CLAMPING BOLT 1"ø A325/NUTS & LOCK WASHERS	8
27	-----	LADDER	1



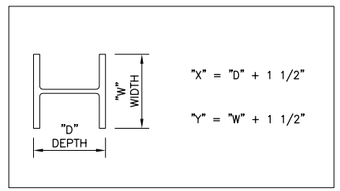
B SECTION
SCALE: 3/4" = 1'-0"



ELEVATION FACING TRACK
SCALE: 3/4" = 1'-0"

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5231.
2. FOR POLE SIZE, POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5233 AND S-5234.
4. STEEL TO BE ASTM A-36 AND GALVANIZED IN ACCORDANCE WITH ASTM A-123.
5. STEEL FABRICATION SHALL COMPLY TO AISC STEEL CONSTRUCTION MANUAL LATEST EDITION.



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National Railroad Passenger Corporation
30TH Street Station—Philadelphia, Pennsylvania 19104

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Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

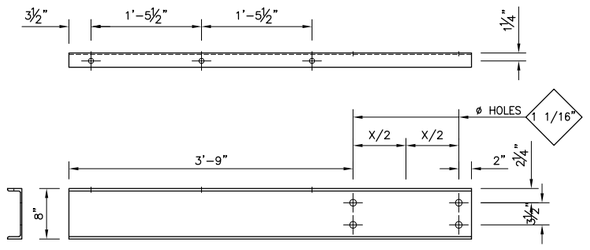
STRUCTURAL – TYPICAL DETAILS – SIGNAL POWER TRANSFORMERS PLATFORM

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

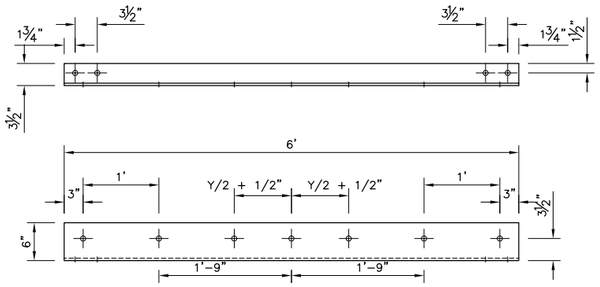
File No.:	2011-059-S-5232.DWG
Ref. No.:	2011-059
Sheet No:	526 OF 565

S-5232

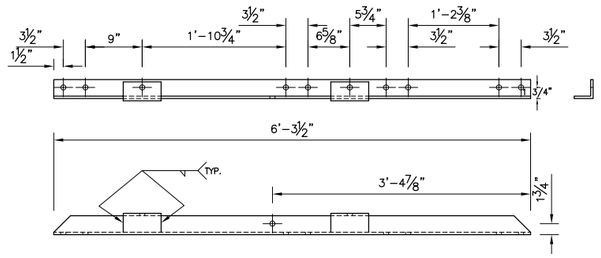
3/14/2016 2:33:49 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5232.dwg



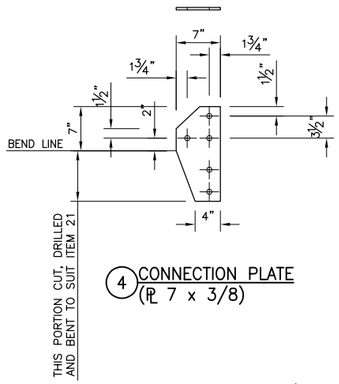
1 PLATFORM SUPPORT CHANNEL
(C 8 x 11.5)



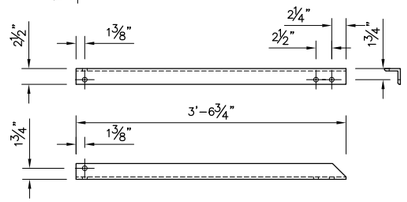
2 PLATFORM SUPPORT ANGLE
(L 6 x 3 1/2 x 3/8 x 6'-0")



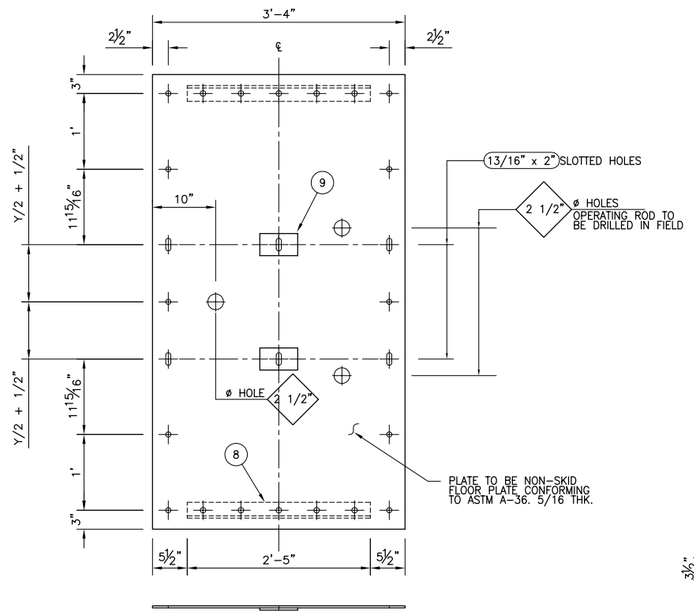
3 CROSS ARM SUPPORT ANGLE & ITEM 17
(L 3 x 3 x 3/8 x 6'-3 1/2")



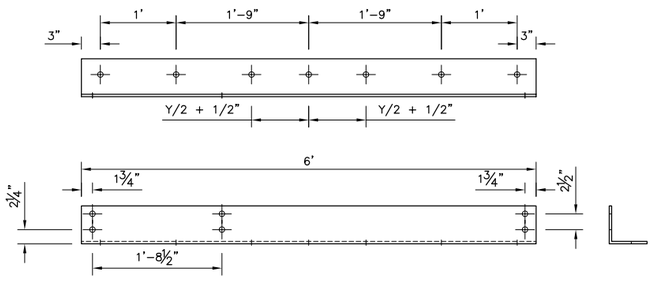
4 CONNECTION PLATE
(PL 7 x 3/8)



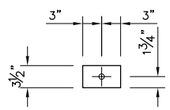
7 HANDRAIL SUPPORT ANGLE
(L 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4")



5 NON-SKID PLATE & ITEM 8
(PL 3'-4 x 5/16 x 6'-0")



6 PLATE SUPPORT ANGLE
(L 6 x 6 x 3/8 x 6'-0")



9 FILLER PLATE
(PL 3 1/2 x 3/8 x 0-6")

NOTES:

1. BOLT HOLES TO BE 13/16" ø, UNLESS OTHERWISE NOTED.

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National Railroad Passenger Corporation
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Two Commerce Square, 2001 Market St, Suite 600
Philadelphia, PA 19103

IN ASSOCIATION WITH

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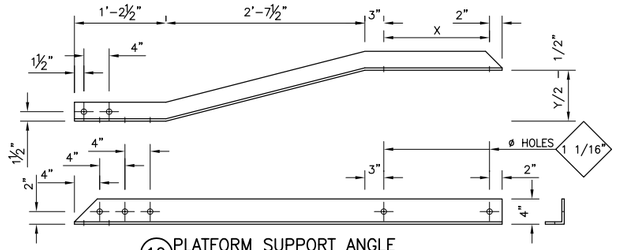
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – TRANSFORMER PLATFORM ASSEMBLY DETAILS (SHEET 1 OF 2)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

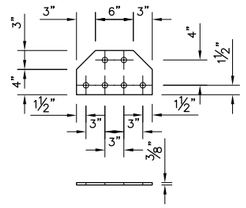
File No.:	2011-059-S-5233.DWG
Ref. No.:	2011-059
Sheet No:	527 OF 565

S-5233

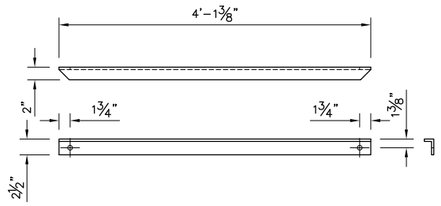
3/14/2016 2:33:54 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5233.dwg



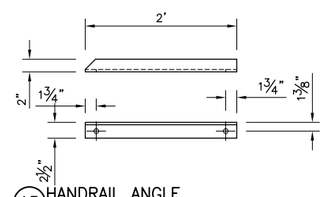
(10) PLATFORM SUPPORT ANGLE
(L 4 x 3 x 3/8)



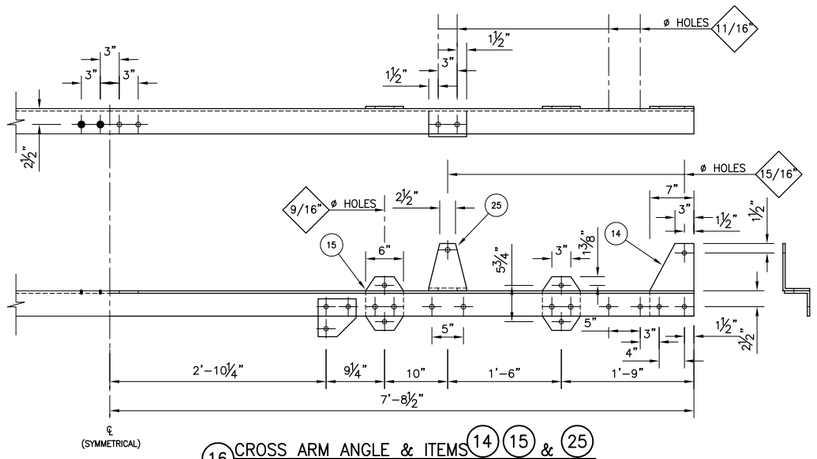
(11) CONNECTION PLATE
(PL 7 x 3/8 x 1'-0")



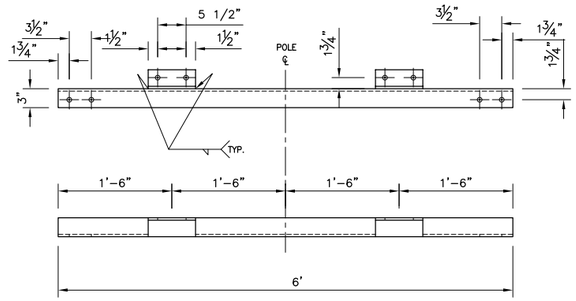
(12) HANDRAIL ANGLE
(L 2 1/2 x 2 x 3/8 x 4'-1 3/8")



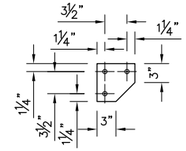
(13) HANDRAIL ANGLE
(L 2 1/2 x 2 x 3/8 x 2'-0")



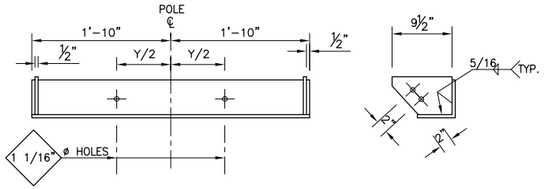
(16) CROSS ARM ANGLE & ITEMS (14) (15) & (25)
(L 4 x 4 x 3/8 x 15'-5")



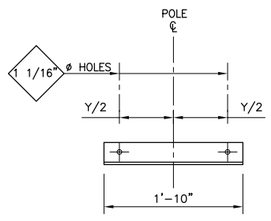
(18) TRANSFORMER SUPPORT ANGLE & ITEM (20)
(L 3 x 3 x 3/8 x 6'-0")



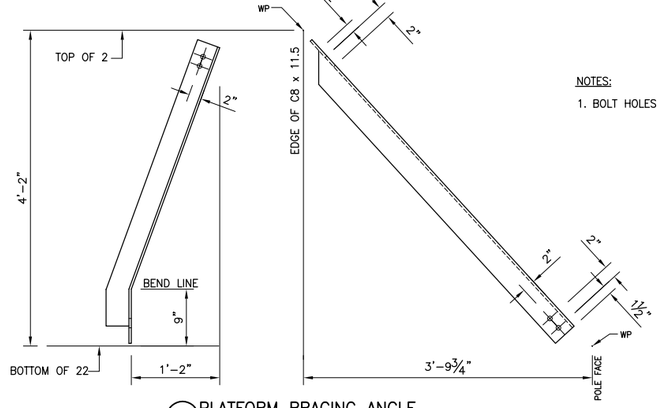
(19) CONNECTION PLATE
(PL 6 x 3/8 x 6)



(22) CLAMP ANGLE & ITEM (23)
(L 6 x 6 x 1/2 x 3'-8")



(24) CLAMP ANGLE
(L 3 1/2 x 3 x 3/8 x 1'-10")



(21) PLATFORM BRACING ANGLE
(L 4 x 4 x 3/8)

NOTES:

1. BOLT HOLES TO BE 13/16" ø, UNLESS OTHERWISE NOTED.

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30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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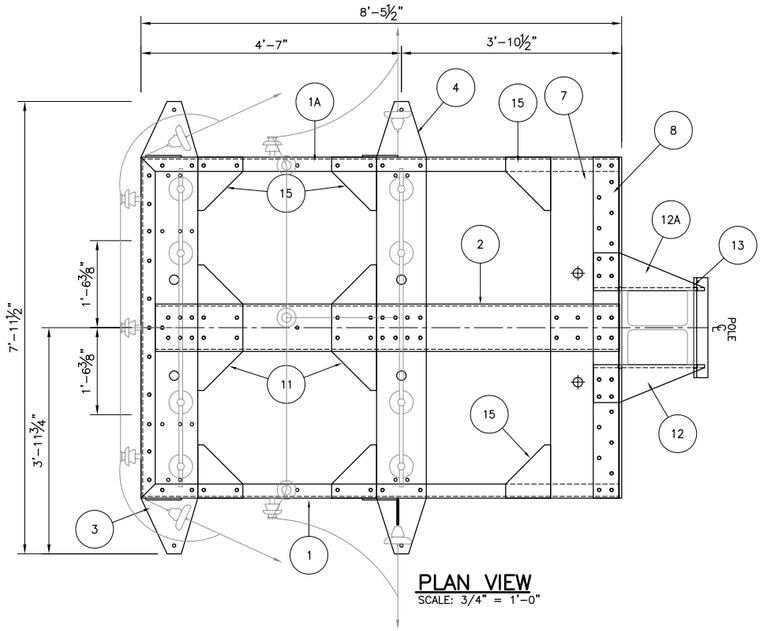
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – TRANSFORMER PLATFORM ASSEMBLY DETAILS (SHEET 2 OF 2)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

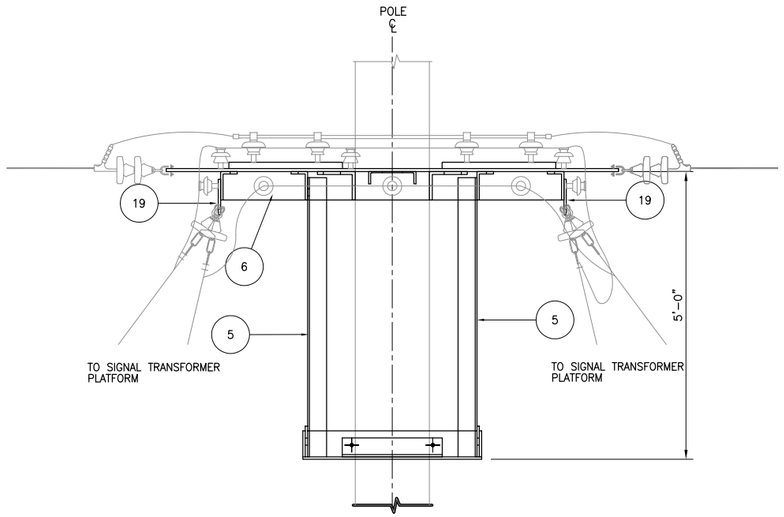
File No.:	2011-059-S-5234.DWG
Ref. No.:	2011–059
Sheet No:	528 OF 565

S–5234

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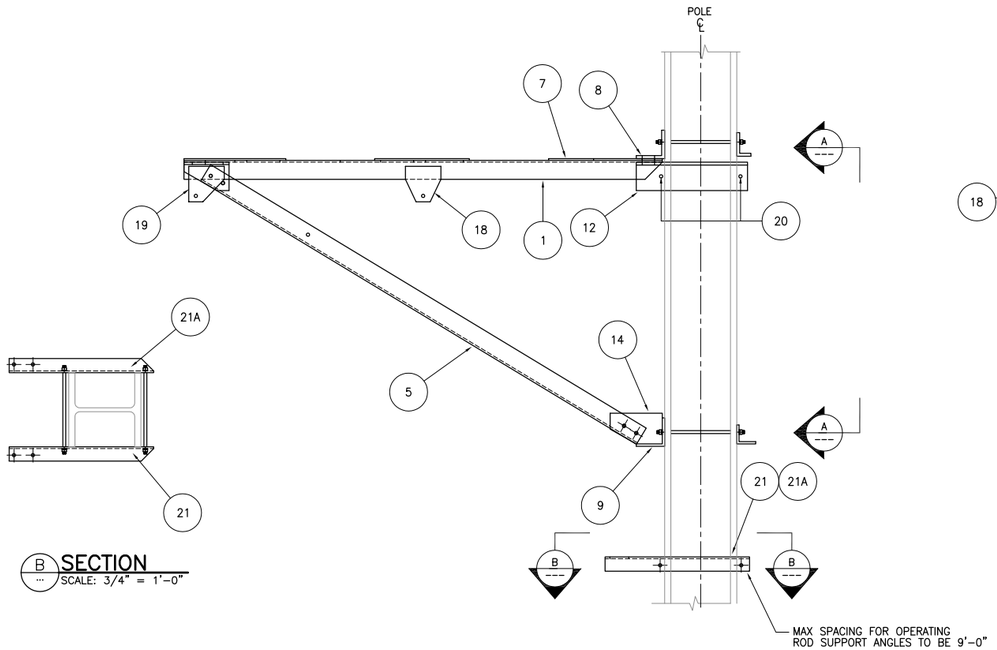
PLAN VIEW
SCALE: 3/4" = 1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4" = 1'-0"

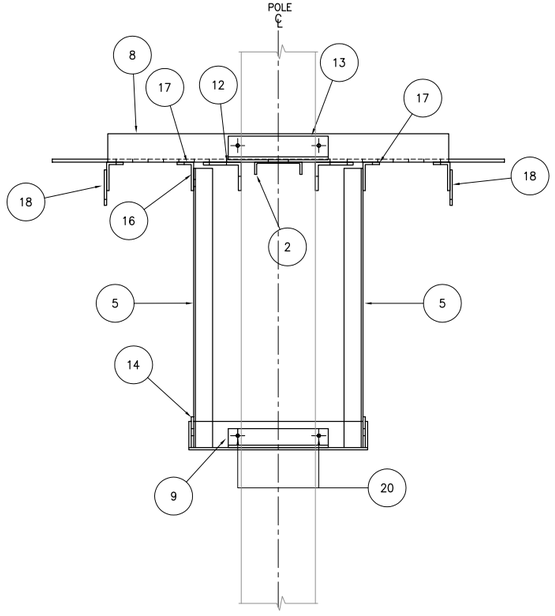
BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	QTY
1	022-1/1	L 4 x 3 x 3/8 x 8'-5"	1
2	023-1/2	C 10 x 15.3 x 8'-2"	1
3	023-1/3	PL 12 x 3/8 x 7'-11 1/2"	1
4	023-1/4	PL 10 1/2 x 3/8 x 7'-11 1/2"	1
5	015-1/5	L 4 x 4 x 3/8 x 8'-11 1/2"	1
6	022-1/6	L 5 x 3 x 3/8 x 6'-0"	1
7	022-1/7-Y	PL 14 1/2 x 3/8 x 6'-0"	1
8	022-1/8-Y	L 6 x 6 x 5/8 x 6'-0"	1
9	022-1/9-Y	L 6 x 6 x 1/2 x 3'-2"	1
10	022-1/10-Y	L 4 x 4 x 1/2 x 1'-5 1/2"	1
11	023-1/11	PL 9 1/2 x 3/8 x 2'-3"	2
12	023-1/12-X	L 8 x 6 x 5/8 x 1'-8 3/8"	1
13	023-1/13-Y	L 5 x 3 1/2 x 5/8 x 1'-5 1/2"	1
14	022-1/14	PL 11 x 6 1/2 x 1/2	2
15	022-1/15	PL 9 1/2 x 3/8 x 11 1/4	6
16	022-1/16	L 6 x 3 1/2 x 1/2 x 9 1/2	1
17	023-1/17	PL 3 1/2 x 3/8 x 8 3/4	2
18	022-1/18	PL 7 1/2 x 7 1/2 x 1/2	2
19	022-1/19	PL 7 1/2 x 7 1/2 x 1/2	2
20	-----	CLAMPING BOLT 1"ø, 18" LONG 4" THREAD	6
		WITH NUTS AND WASHERS	--
12A	023-1/1	L 8 x 6 x 5/8 x 1'-8 3/8"	1
--	-----	-------	--
16A	023-1/1	PL 6 x 3 1/2 x 1/2 x 9 1/2	1
1A	022-1/1	L 4 x 3 x 3/8 x 8'-5"	1
5A	023-1/1	L 4 x 4 x 3/8 x 8'-11 1/2"	1
-	-----	3/4" ø BOLTS 2 1/4" LG. W/ NUTS & WASHERS	90
21&21A	023-1/1	ANGLES, 1 SET, 3 x 3 x 3/8 x 2'-6 1/2"	4
22	-----	CLAMPING BOLT 3/4"ø, 18" LONG 4" THREAD	8
		WITH NUTS AND LOCK WASHERS	

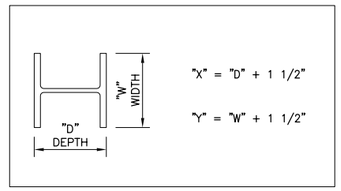


ELEVATION FACING ALONG TRACK
SCALE: 3/4" = 1'-0"

B SECTION
SCALE: 3/4" = 1'-0"



A SECTION
SCALE: 3/4" = 1'-0"



NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5231.
2. FOR POLE SIZE, SEE POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5236 AND S-5237.

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
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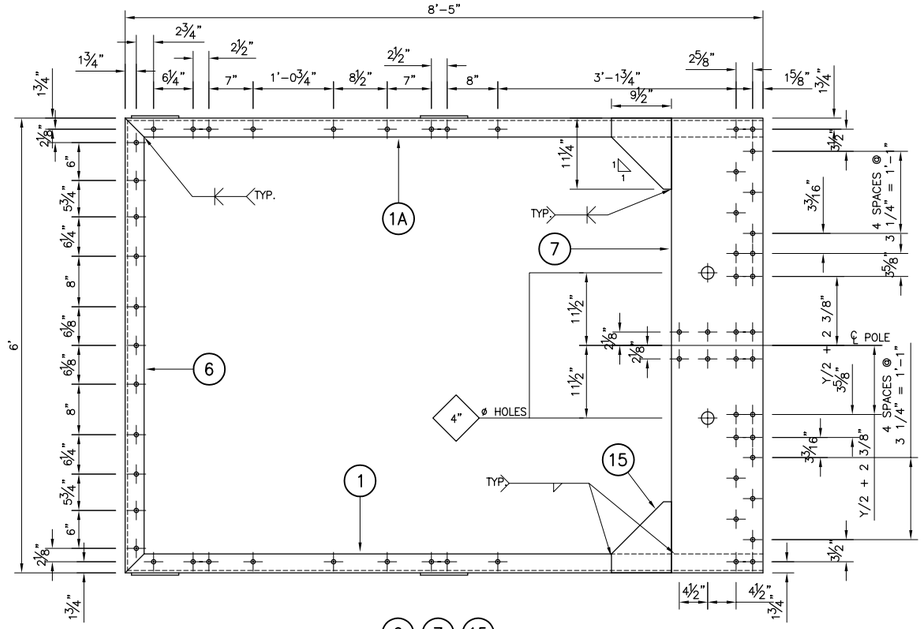
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
SIGNAL POWER DISCONNECT SWITCH PLATFORM

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

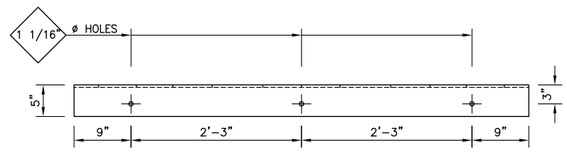
File No.:	2011-059-S-5235.DWG
Ref. No.:	2011-059
Sheet No:	529 OF 565

S-5235

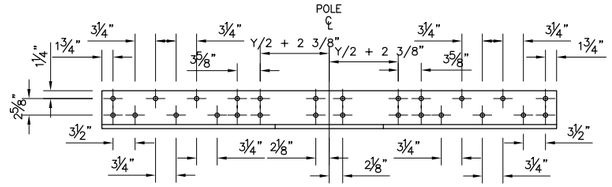
2:34:04 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5235.dwg

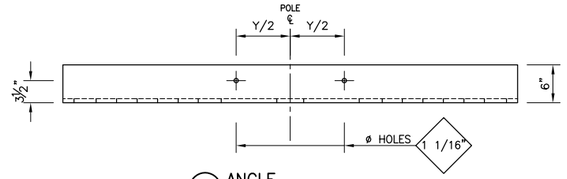


1 1A ANGLE AND ITEMS 6 7 15
(4 x 3 x 3/8 x 8'–5")

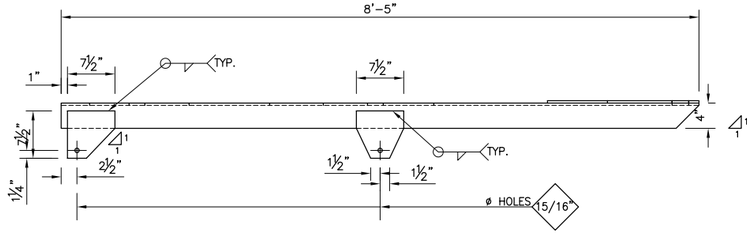


6 ANGLE
(5 x 3 x 3/8 x 6'–0")

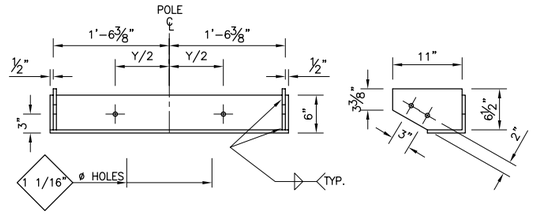




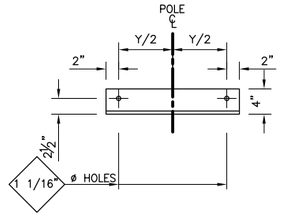
8 ANGLE
(6 x 6 x 5/8 x 6'–0")



1 ANGLE AND ITEMS 18 19
(4 x 3 x 3/8 x 8'–5")
1A AS DRAWN OPPOSITE HAND



9 ANGLE AND ITEM 14
(6 x 6 x 1/2 x 3'–2")



10 ANGLE
(4 x 4 x 1/2 x 1'–5 1/2")

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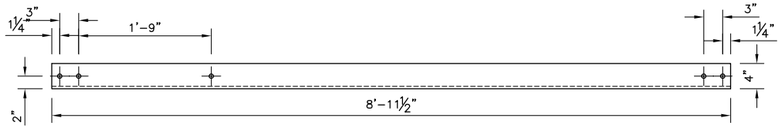
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – DISCONNECT SWITCH PLATFORM ASSEMBLY DETAILS (SHEET 1 OF 2)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5236.DWG
Ref. No.:	2011–059
Sheet No:	530 OF 565

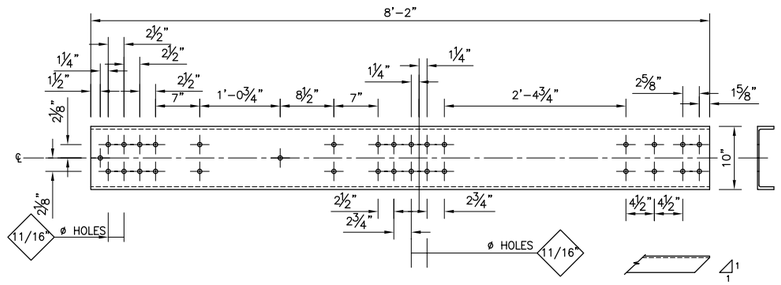
S–5236

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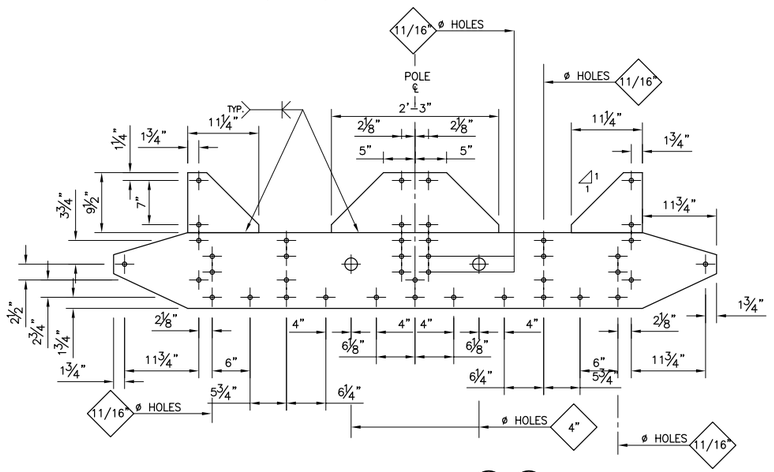


5 ANGLE
(4 x 4 x 3/8 x 8'-11 1/2")

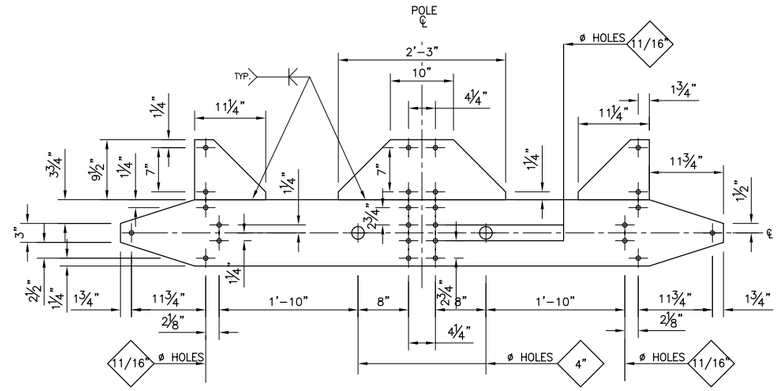
5A AS DRAWN OPPOSITE HAND



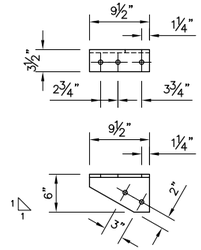
2 CHANNEL
(C 10x15.3)



3 PLATE AND ITEMS (11) (15)
(1'-0" x 3/8 x 7'-11 1/2")

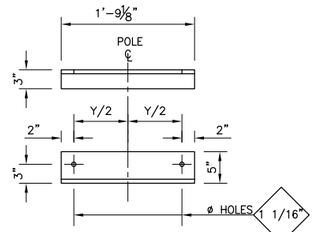


4 PLATE AND ITEMS (11) (15)
(10 1/2 x 3/8 x 7'-11 1/2")

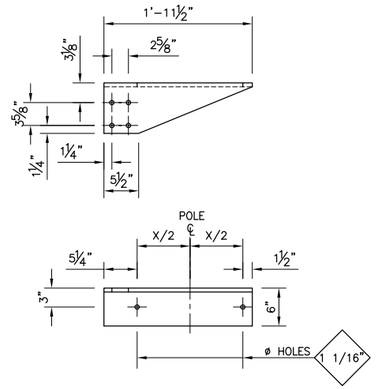


16 ANGLE
(6 x 3 1/2 x 1/2 x 9 1/2)

16A AS DRAWN OPPOSITE HAND

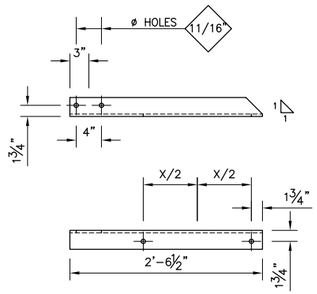


13 ANGLE
(5 x 3 1/2 x 5/8)



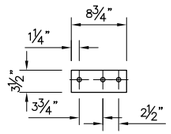
12 ANGLE
(8 x 6 x 5/8)

12A AS DRAWN OPPOSITE HAND



21 OPERATING ROD SUPPORT ANGLE
(3 x 3 x 3/8 x 2'-6 1/2")

21A AS DRAWN OPPOSITE HAND



17 FILLER PLATE
(3 1/2 x 3/8 x 8 3/4)

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

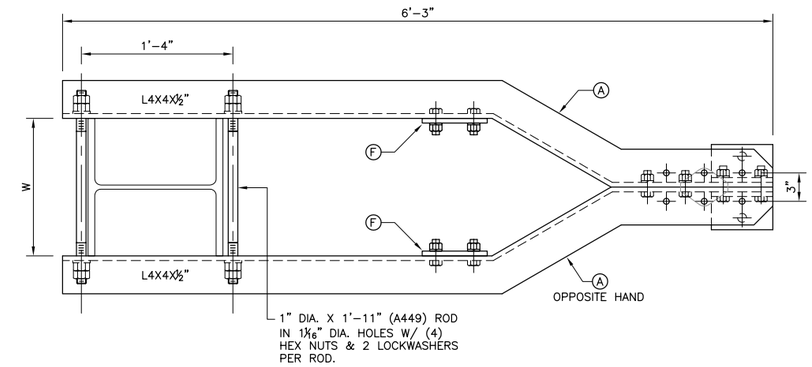
STRUCTURAL – TYPICAL DETAILS – DISCONNECT SWITCH PLATFORM ASSEMBLY DETAILS (SHEET 2 OF 2)

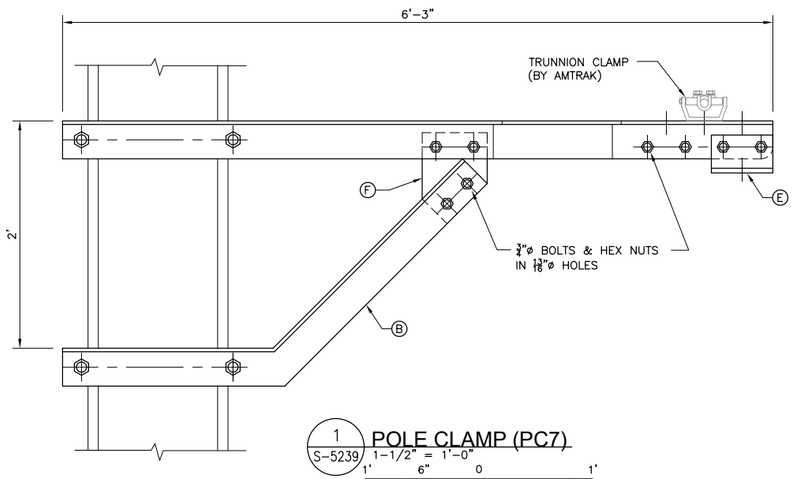
Recommended:	Drawn:	Checked:	Date:
DP	VJC	MJM	03/17/16

File No.:	2011-059-S-5237.DWG
Ref. No.:	2011–059
Sheet No:	531 OF 565

S–5237

TABLE OF PC7	
POLE SIZE	W
W14X90	14.52"
W14x120	14.67"
W14x145	15.50"

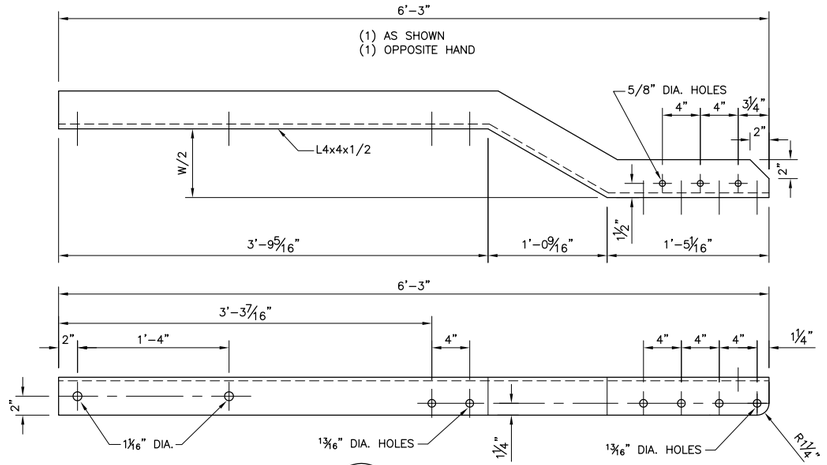




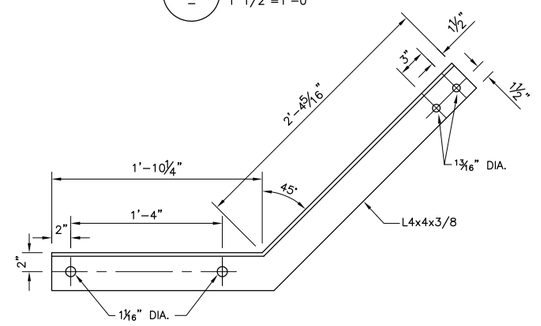
1 S-5239 POLE CLAMP (PC7)
1-1/2" = 1'-0"

1' 6" 0 1'

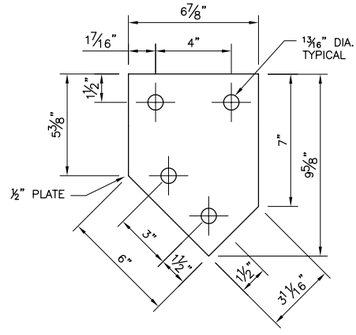
SCALE:1-1/2"= 1'-0"



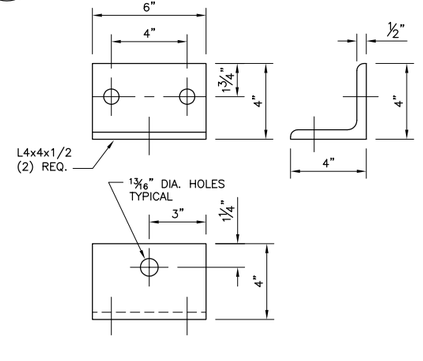
A – DETAIL A
1 1/2"=1'-0"



B – DETAIL B
1 1/2"=1'-0"



C – DETAIL F
3"=1'-0"



D – DETAIL E
3"=1'-0"

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

1' 6" 0 1'

SCALE: 3"= 1'-0"

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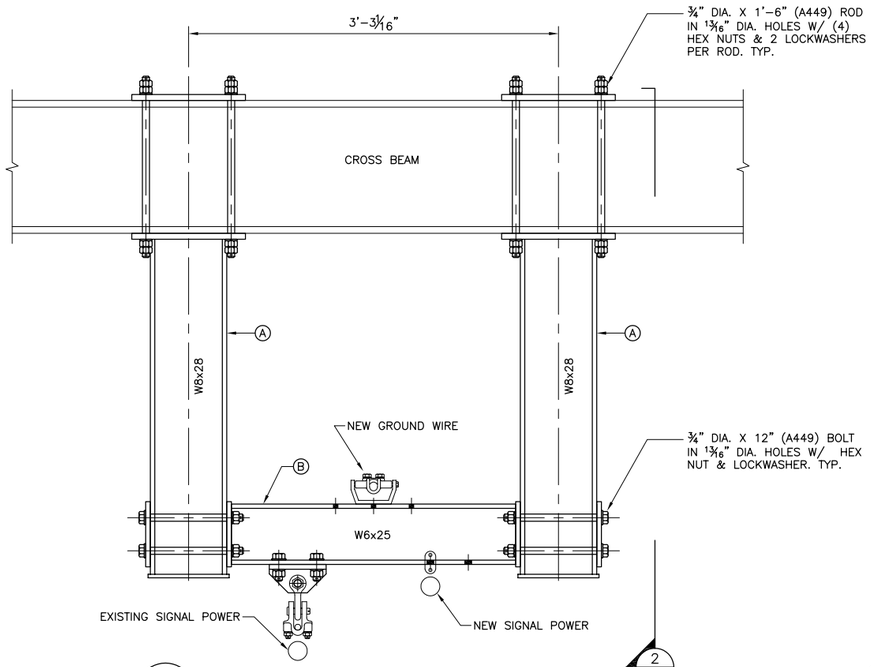
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
SIGNAL POWER BRACKETS

Recommended: RSW | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-S-5239.DWG
Ref. No.:	2011-059
Sheet No:	532 OF 565

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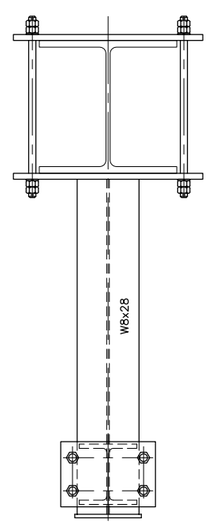
2:34:21 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5239.dwg



1 S-5240 UNDER BRIDGE SIGNAL POWER (UBSP)

1' 6" 0 1'

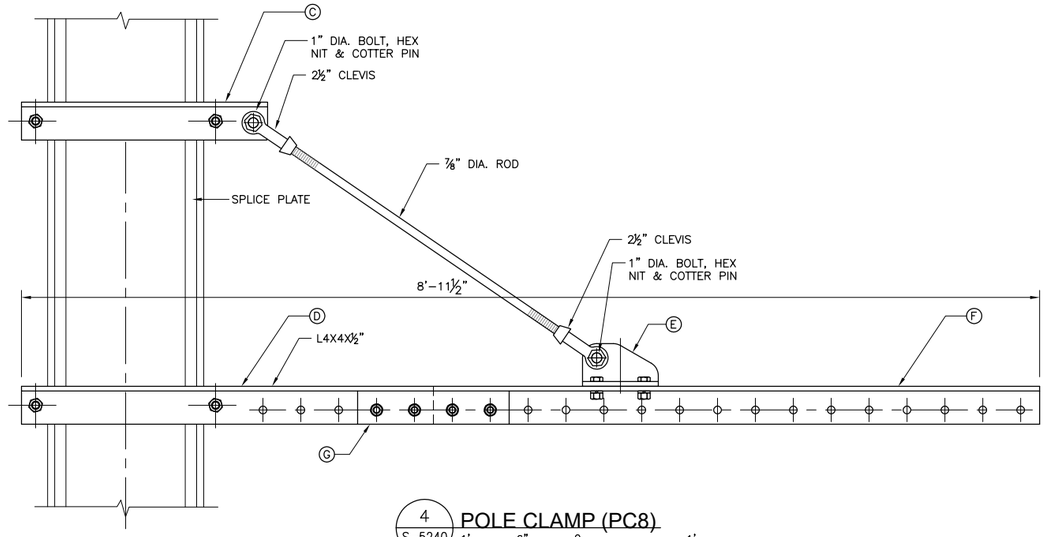
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2 S-5240 ELEVATION

1' 6" 0 1'

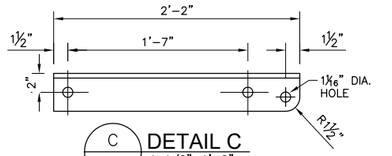
SCALE:1-1/2"= 1'-0"



4 S-5240 POLE CLAMP (PC8)

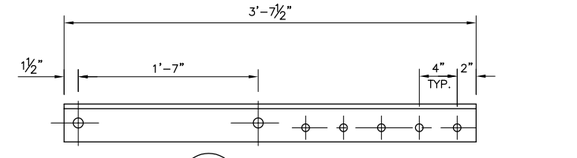
1' 6" 0 1'

SCALE:1-1/2"= 1'-0"



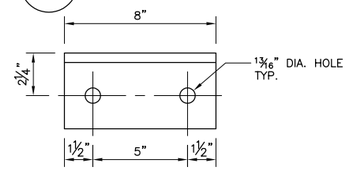
C DETAIL C

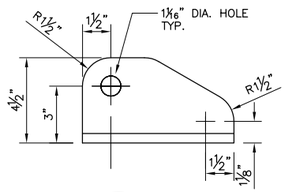
1 1/2"=1'-0"



D DETAIL D

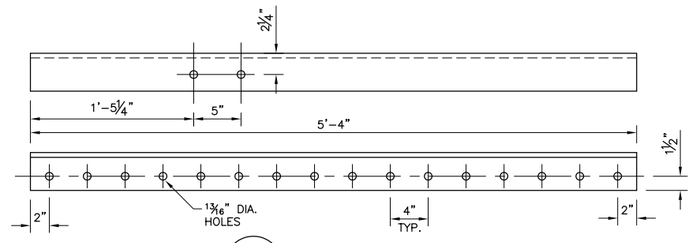
1 1/2"=1'-0"





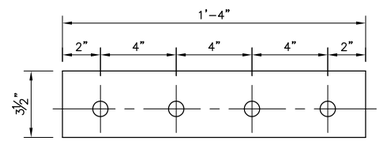
E DETAIL E

3"=1'-0"



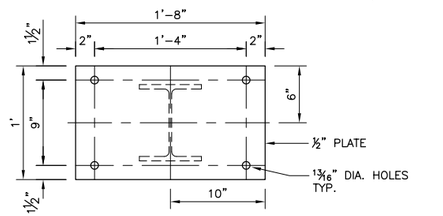
F DETAIL F

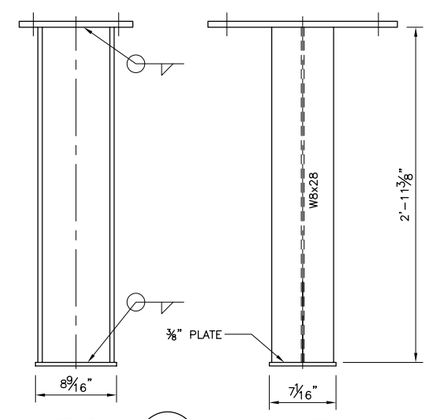
1 1/2"=1'-0"



G DETAIL G

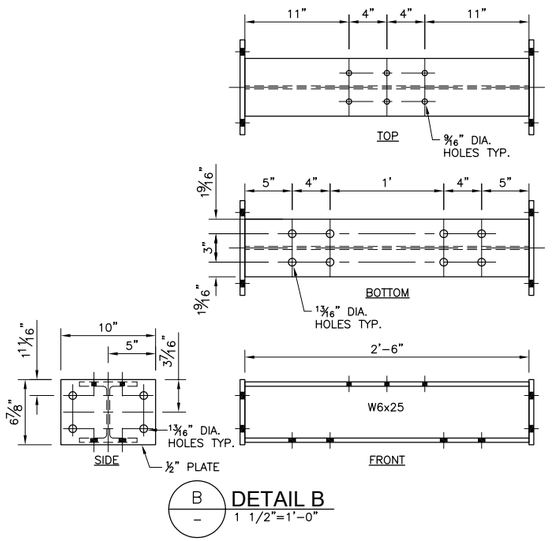
3"=1'-0"





A DETAIL A

1 1/2"=1'-0"



B DETAIL B

1 1/2"=1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL
UNDER BRIDGE SIGNAL POWER (UBSP)

Recommended: RSW	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-S-5240.DWG
Ref. No.:	2011-059
Sheet No:	533 OF 565

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NOTES:

1. REFER TO DRAWING S-5402 FOR 138 KV GANTRY FRAMING ELEVATIONS.
2. SEE CIVIL DRAWINGS FOR COORDINATES TO LOCATE FOUNDATIONS.
3. THE SIGNAL POWER HOUSE BUILDING MANUFACTURER TO PROVIDE COMPLETE OF STAIRS TO SUIT. THE STAIRS SHALL BE HOT DIPPED GALVANIZED SUPPORT MEMBERS WITH GRATING THREADS AND LANDING EQUIPPED WITH RAILING ON BOTH SIDES. STAIRS SHALL MEET IBC 2009 REQUIREMENTS SEE SPECIFICATION.

TO HARRISBURG

TO PHILADELPHIA

N

EXISTING 138KV GANTRY

1 S-5403 GANTRY FOUNDATION F6

PROPOSED 138KV GANTRY 1 S-5402

9'-2½"

TIE-WRAP STRUCTURE 1 S-5409

ELEV. 542'

93'-11"

26'-3"

12'-3"

12' CLEAR

1 S-5407 SIGNAL POWER STRUCTURE

G S-5407 252 BREAKER FOUNDATION TYP.

TRANSFORMER FOUNDATION TYP. E S-5407

3'-7" (TYP)

PECO TRANSFORMER MOUNTING PAD 1 S-5410

TIE-WRAP STRUCTURE 1 S-5409

3'-7" (TYP)

EXISTING CONTROL BUILDING

STAIR LANDING CONCRETE PAD TYP. 3 S-5408

SEE NOTE 3 (TYP)

5'-6"

7'-6"

1¼"ø RAILING (TYP)

SIGNAL POWER HOUSE

5'-6"

SIGNAL POWER PIERS. TYP. 1 S-5408

5'-6"

ELEV. 543'

CABLE TROUGH

1 S-5401 PAOLI SUBSTATION - STRUCTURAL PROPOSED PLAN

1/8"=1'-0"

8' 4' 0 8'

SCALE:1/8"=1'-0"

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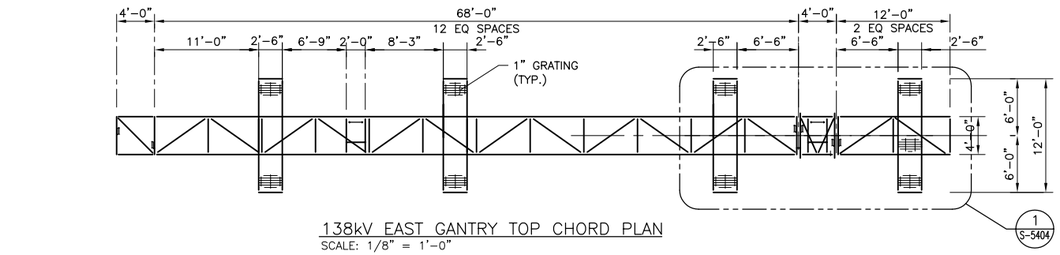
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - PAOLI SUBSTATION
STRUCTURAL PROPOSED PLAN

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

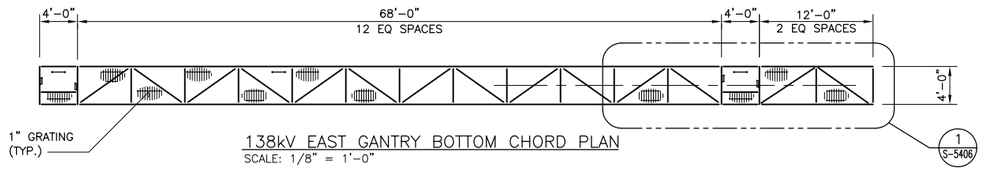
File No.:	2011-059-S-5401.DWG
Ref. No.:	2011-059
Sheet No:	534 OF 565

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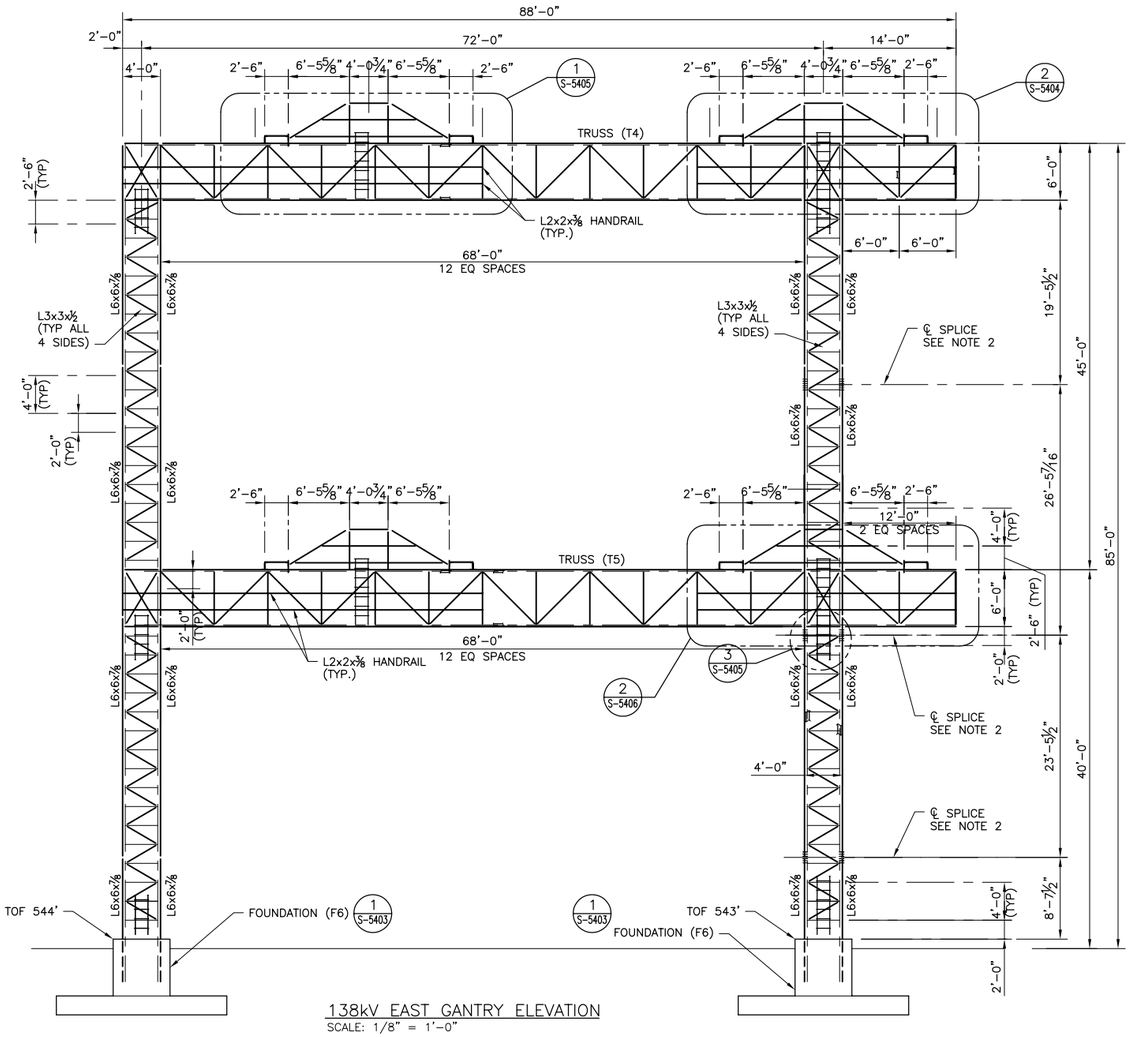
3/15/2016 9:08:48 AM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5401.dwg



138kV EAST GANTRY TOP CHORD PLAN
SCALE: 1/8" = 1'-0"



138kV EAST GANTRY BOTTOM CHORD PLAN
SCALE: 1/8" = 1'-0"



138kV EAST GANTRY ELEVATION
SCALE: 1/8" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SUGGESTED SPLICE LOCATIONS. OTHER SPLICE LOCATIONS MAY BE SUBMITTED FOR APPROVAL. SEE DETAIL 2 ON DRAWING S-5405 FOR SPLICE DETAIL.

8' 4' 0 8'

SCALE:1/8"=1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

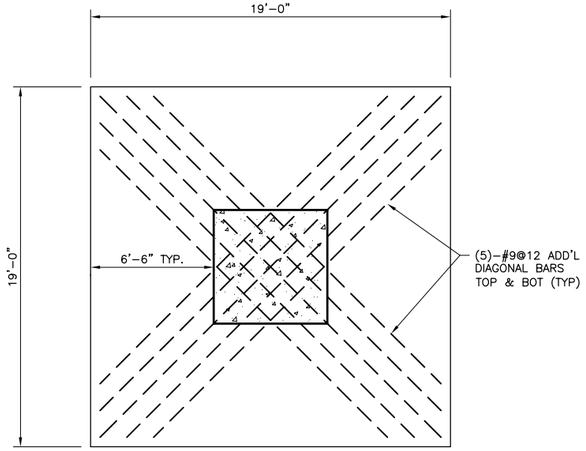
STRUCTURAL – PAOLI SUBSTATION
138 KV GANTRY FRAMING ELEVATIONS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

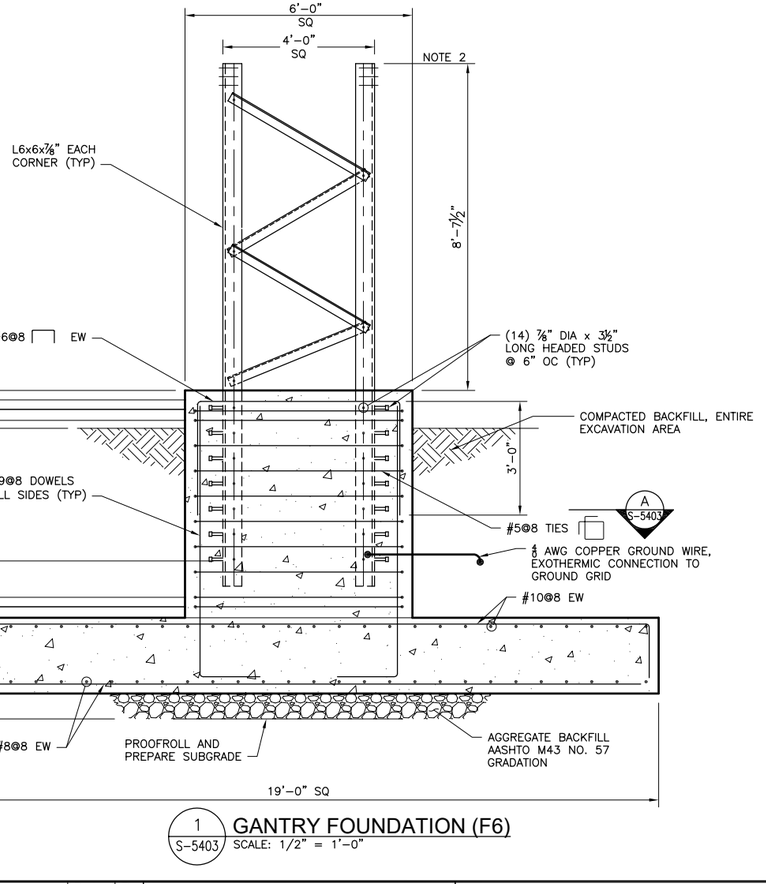
File No.:	2011-059-S-5402.DWG
Ref. No.:	2011-059
Sheet No:	535 OF 565

S-5402

3/14/2016 2:34:50 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5402.dwg



A S-5403 **SECTION**
SCALE: 1/4" = 1'-0"



1 S-5403 **GANTRY FOUNDATION (F6)**
SCALE: 1/2" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.

4' 2' 0 4'
SCALE:1/4"= 1'-0"

2' 1' 0 2'
SCALE: 1/2"= 1'-0"

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

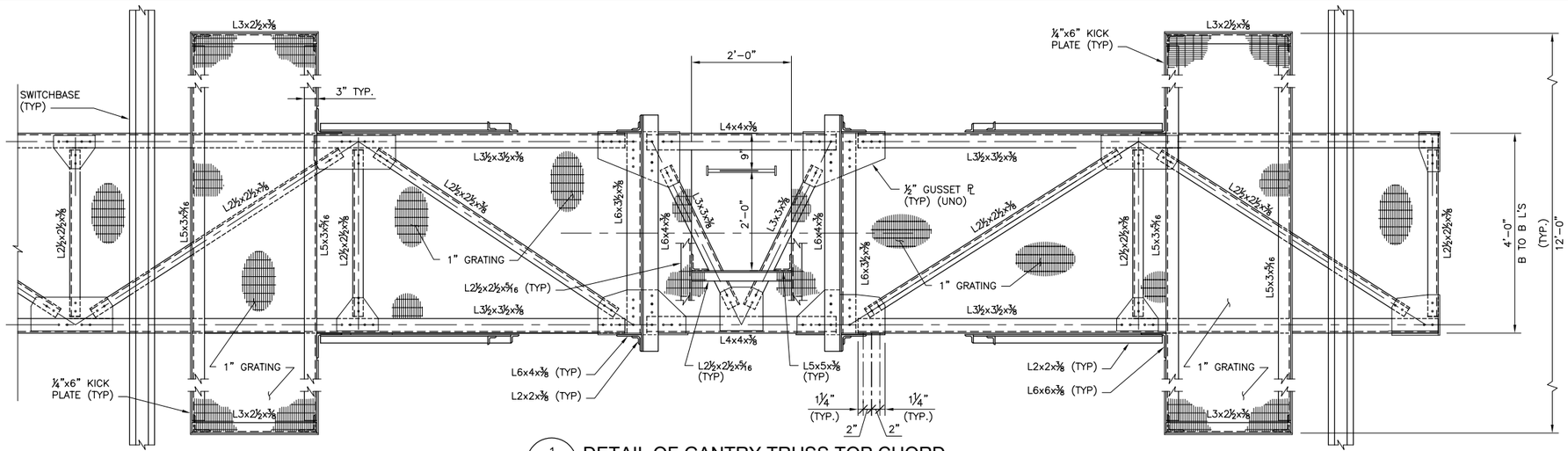
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL – PAOLI SUBSTATION
138 KV GANTRY FOUNDATIONS (F6)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5403.DWG
Ref. No.:	2011-059
Sheet No:	536 OF 565

S-5403

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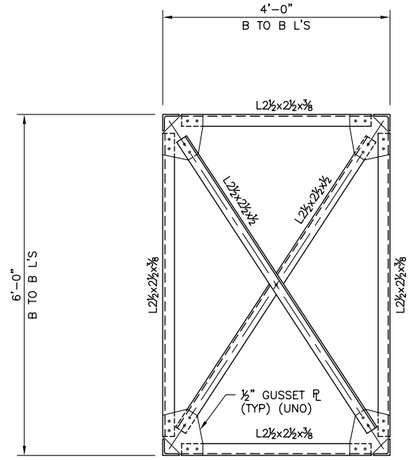


1 — 3/4" = 1'-0"

DETAIL OF GANTRY TRUSS TOP CHORD

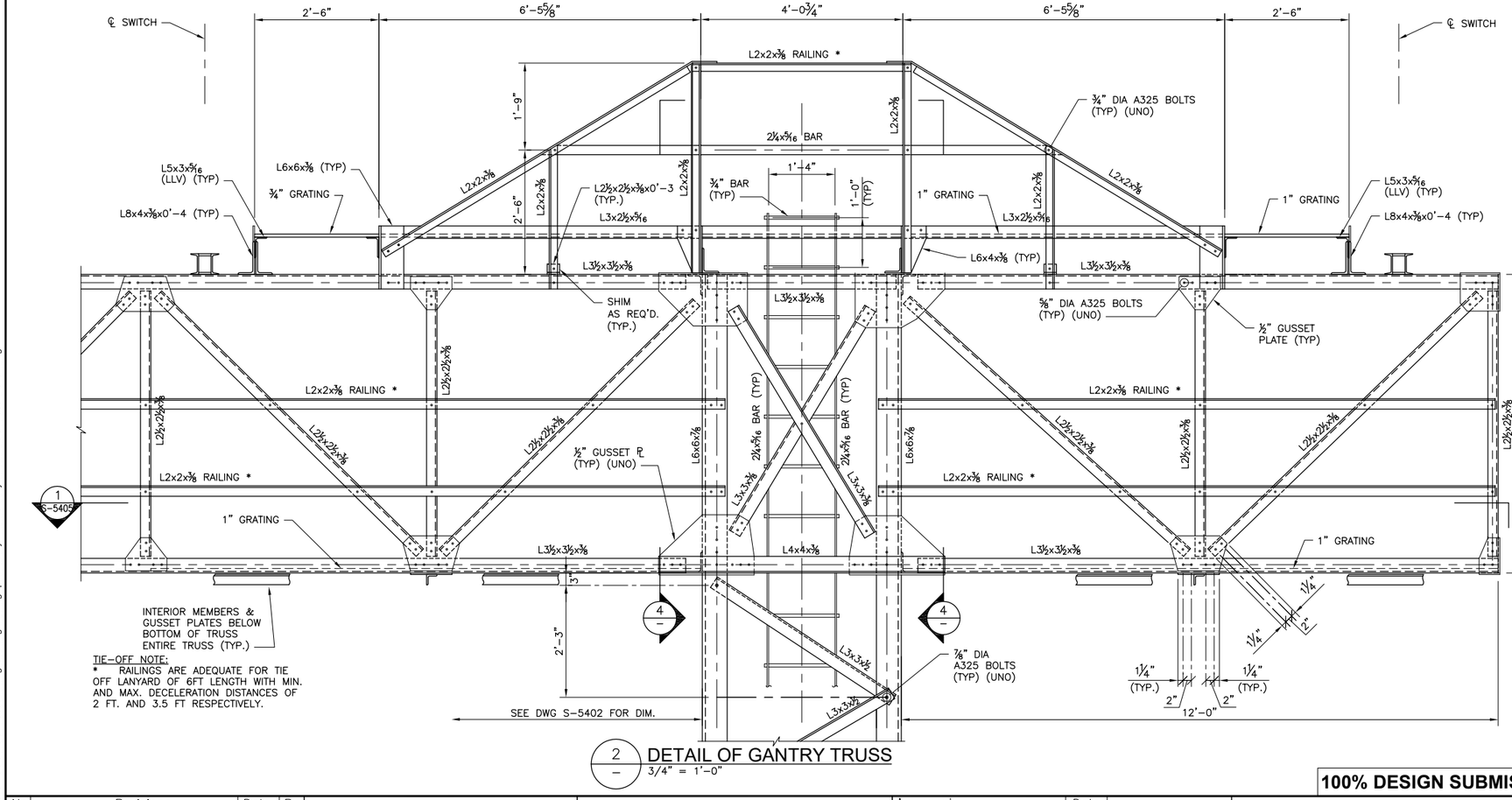
NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.



3 — 3/4" = 1'-0"

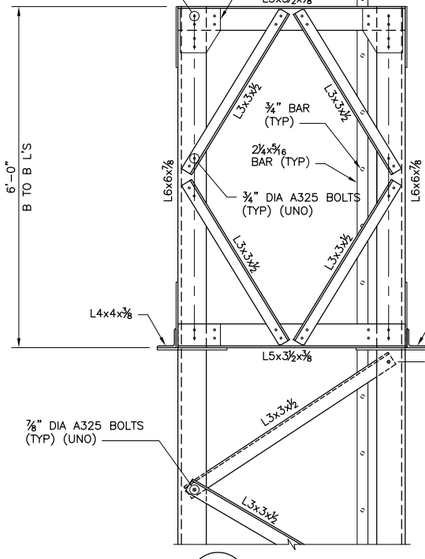
SECTION - TYPICAL TRUSS END DETAIL



TIE-OFF NOTE:
* RAILINGS ARE ADEQUATE FOR TIE OFF LANYARD OF 6FT LENGTH WITH MIN. AND MAX. DECELERATION DISTANCES OF 2 FT. AND 3.5 FT RESPECTIVELY.

2 — 3/4" = 1'-0"

DETAIL OF GANTRY TRUSS



4 — 3/4" = 1'-0"

SECTION

1' 6" 0 1'

SCALE:3/4"=1'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL - PAOLI SUBSTATION

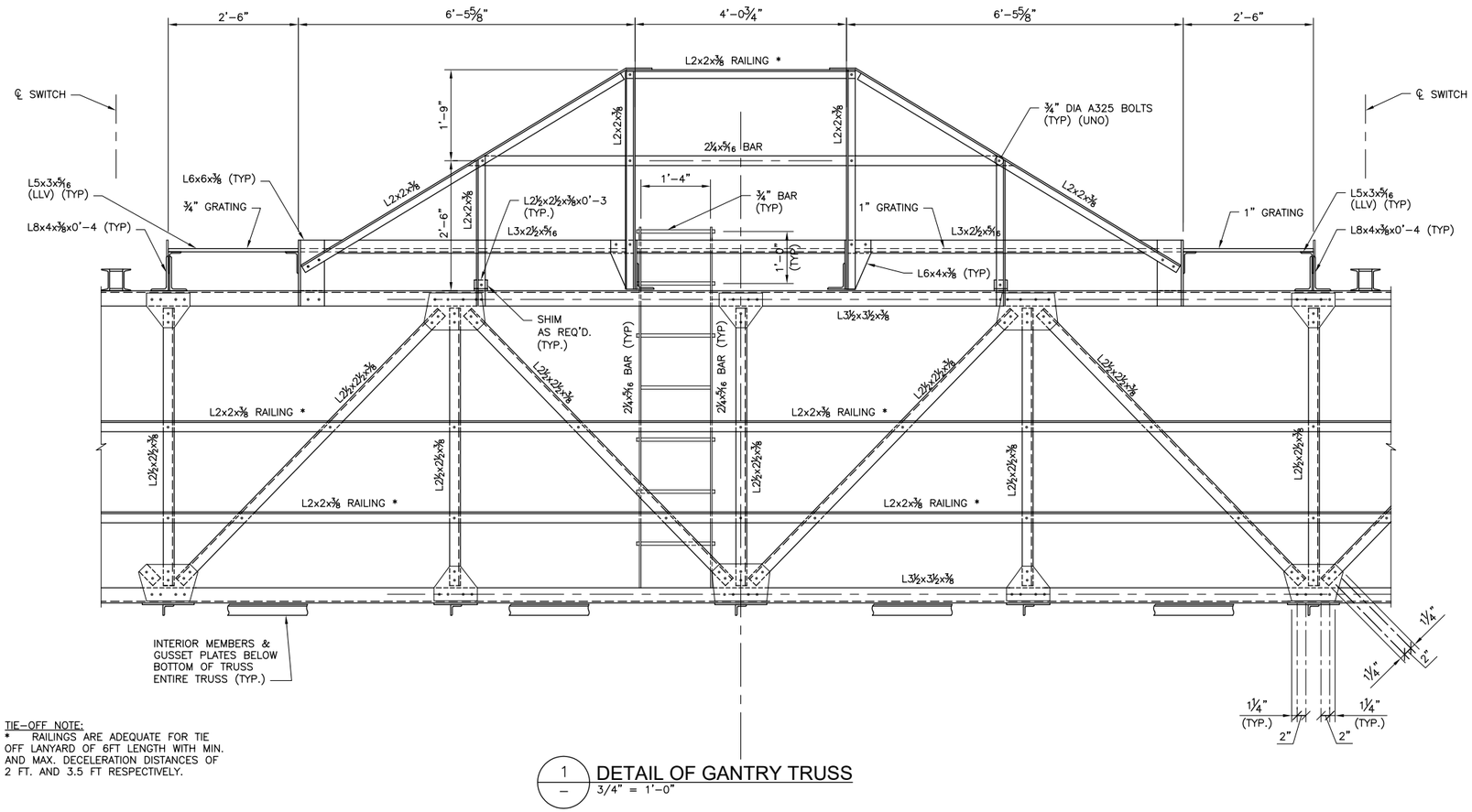
138 KV GANTRY FRAMING SECTIONS & DETAILS (1 OF 3)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5404.DWG
Ref. No.:	2011-059
Sheet No:	537 OF 565

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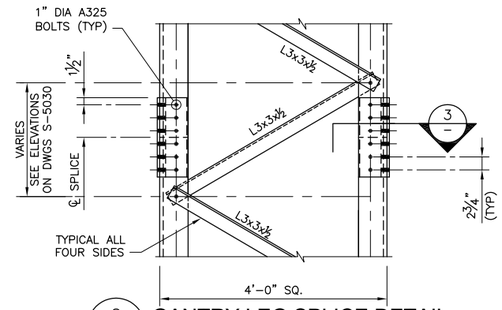


TIE-OFF NOTE:
* RAILINGS ARE ADEQUATE FOR TIE OFF LANYARD OF 6FT LENGTH WITH MIN. AND MAX. DECELERATION DISTANCES OF 2 FT. AND 3.5 FT RESPECTIVELY.

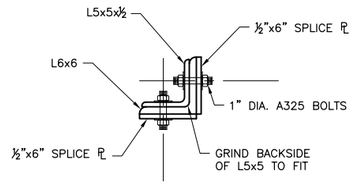
1 — DETAIL OF GANTRY TRUSS
3/4" = 1'-0"

NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.



2 — GANTRY LEG SPLICE DETAIL
3/4" = 1'-0"



3 — SECTION
1 1/2" = 1'-0"

1' 6" 0 1'
SCALE:3/4"=1'-0"

1' 6" 0 1'
SCALE:1-1/2"= 1'-0"

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - PAOLI SUBSTATION
138KV GANTRY FRAMING SECTIONS & DETAILS (2 OF 3)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

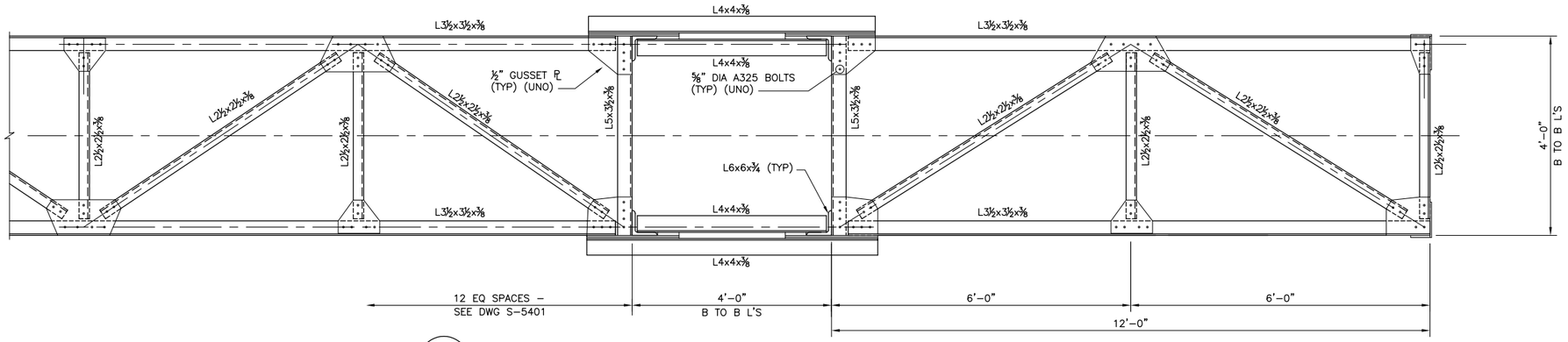
File No.:	2011-059-S-5405.DWG
Ref. No.:	2011-059
Sheet No:	538 OF 565

S-5405

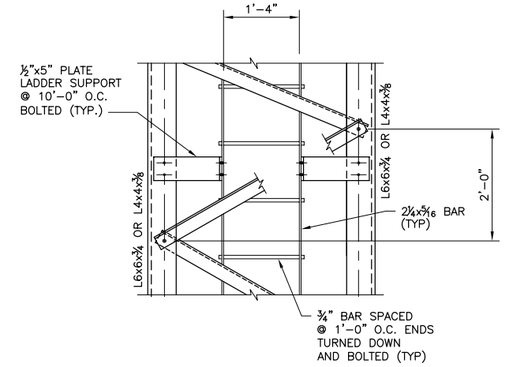
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NOTE:

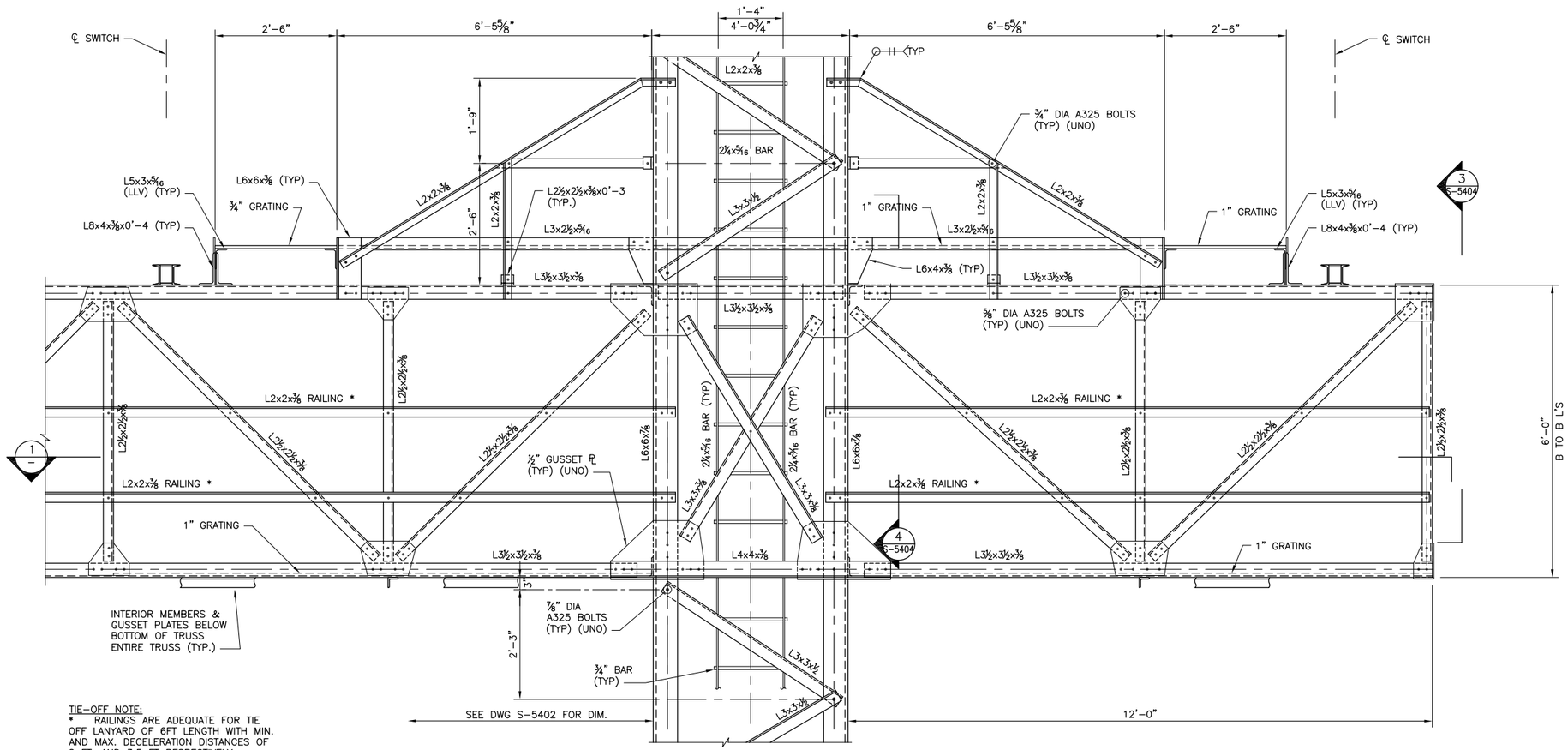
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.



1 — DETAIL OF GANTRY TRUSS BOTTOM CHORD
3/4" = 1'-0"



3 — LADDER CONNECTION TO COLUMN DETAIL
3/4" = 1'-0"



TIE-OFF NOTE:
* RAILINGS ARE ADEQUATE FOR TIE OFF LANYARD OF 6FT LENGTH WITH MIN. AND MAX. DECELERATION DISTANCES OF 2 FT. AND 3.5 FT RESPECTIVELY.

2 — DETAIL OF GANTRY TRUSS
3/4" = 1'-0"

1' 6" 0 1'

SCALE:3/4"=1'-0"

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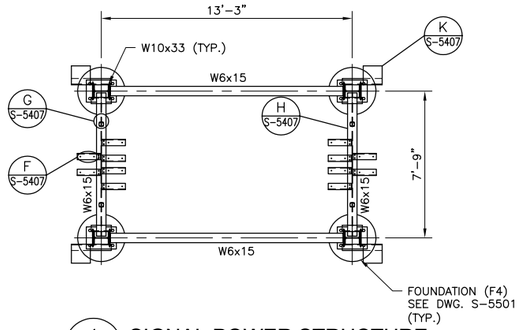
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - PAOLI SUBSTATION
138KV GANTRY FRAMING SECTIONS & DETAILS (3 OF 3)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

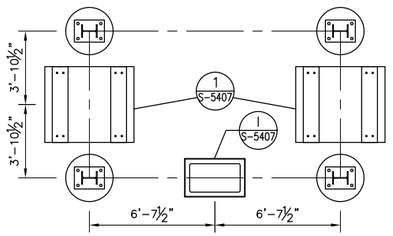
File No.:	2011-059-S-5406.DWG
Ref. No.:	2011-059
Sheet No:	539 OF 565

S-5406

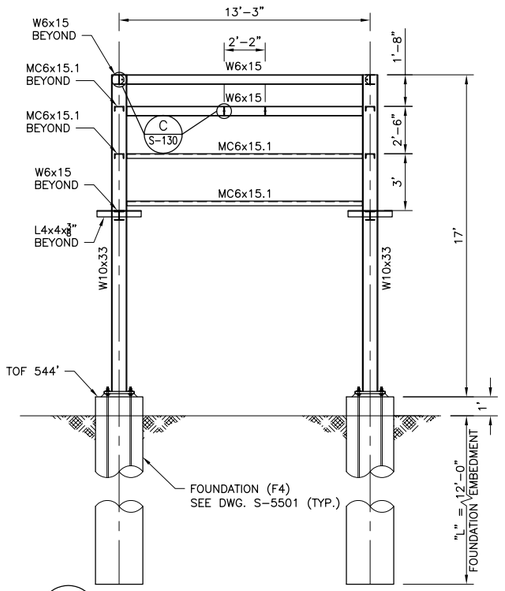
3/14/2016 2:35:18 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5406.dwg



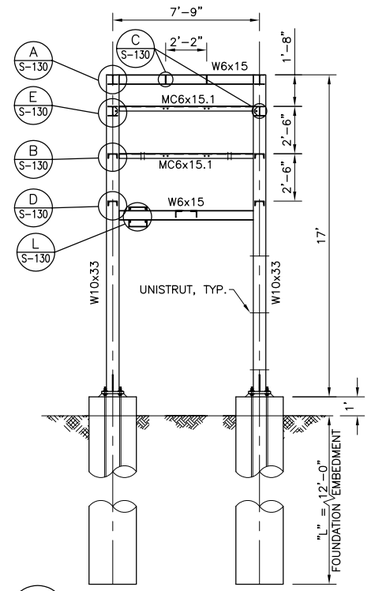
1 / – SIGNAL POWER STRUCTURE
1/4" = 1'-0"



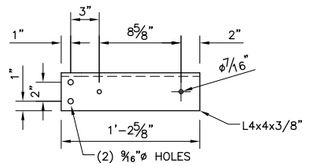
4 / – SIGNAL POWER FOUNDATIONS
1/4" = 1'-0"



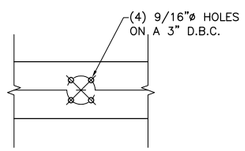
2 / – SIGNAL POWER ELEVATION
1/4" = 1'-0"



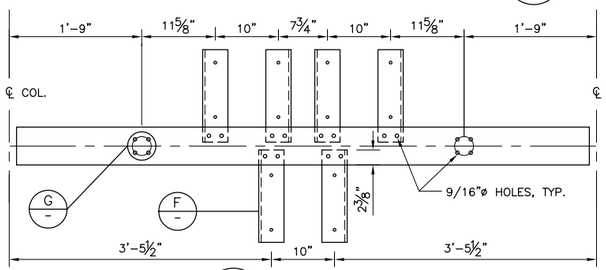
3 / – SIGNAL POWER ELEVATION
1/4" = 1'-0"



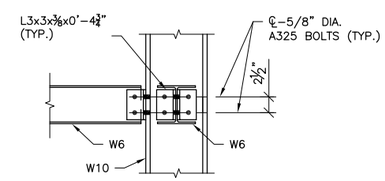
F / – MOUNTING ANGLES FOR PT
1 1/2" = 1'-0"



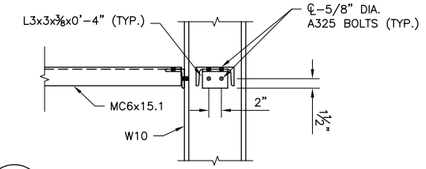
G / – MOUNTING HOLES FOR POST INSULATOR
1 1/2" = 1'-0"



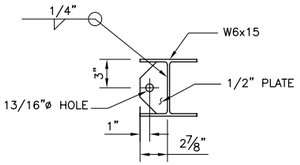
H / – BEAM PLAN
1" = 1'-0"



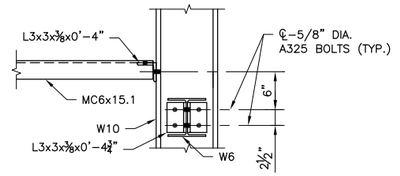
A / – TYPICAL W6 TO COLUMN CONNECTION
1" = 1'-0"



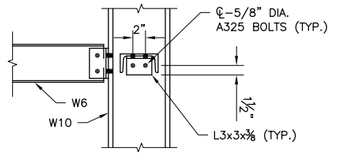
B / – TYPICAL MC6 TO COLUMN CONNECTION
1" = 1'-0"



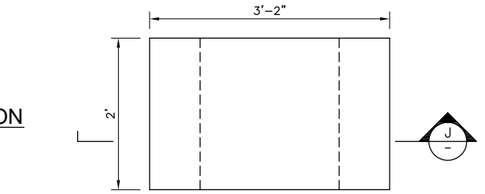
C / – DEADEND PLATE
1 1/2" = 1'-0"



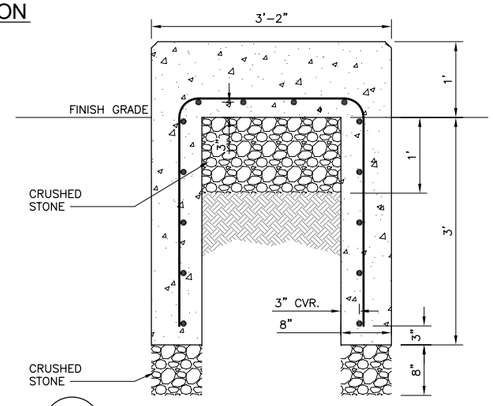
D / – TYPICAL MC6, W6 TO COLUMN CONNECTION
1" = 1'-0"



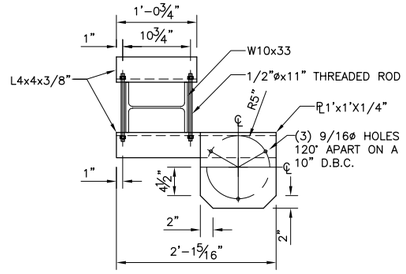
E / – TYPICAL W6, MC6 TO COLUMN CONNECTION
1" = 1'-0"



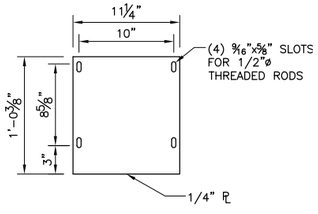
I / – TRANSFORMER FOUNDATION
1" = 1'-0"



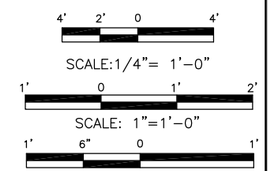
J / – TRANSFORMER FOUNDATION SECTION
1" = 1'-0"



K / – LIGHTNING ARRESTER MOUNT
1" = 1'-0"
NOTE: (2) AS SHOWN
AND (2) OPPOSITE HAND



L / – BACKER PLATE FOR CT
1 1/2" = 1'-0"



NOTE:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING S-5000.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – PAOLI SUBSTATION
SIGNAL POWER STRUCTURE ELEVATIONS AND DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

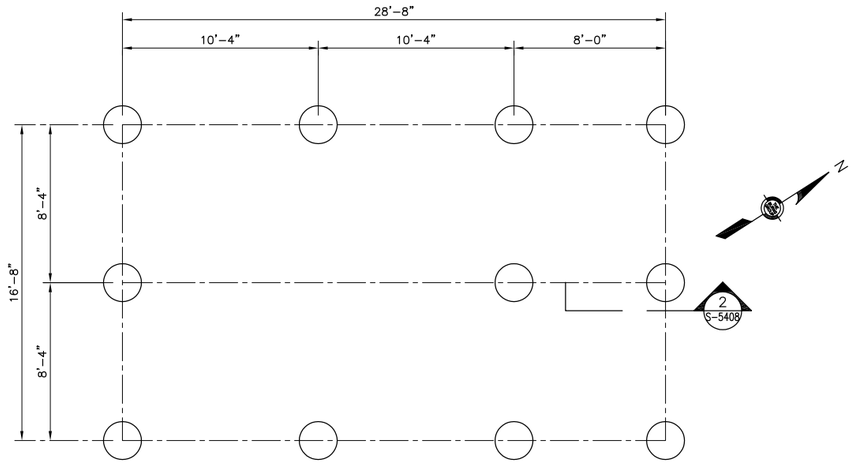
File No.:	2011-059-S-5407.DWG
Ref. No.:	2011-059
Sheet No:	540 OF 565

S-5407

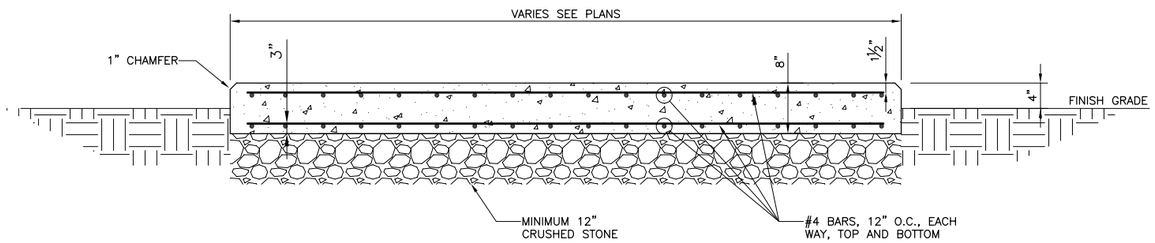
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3/14/2016
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NOTES:

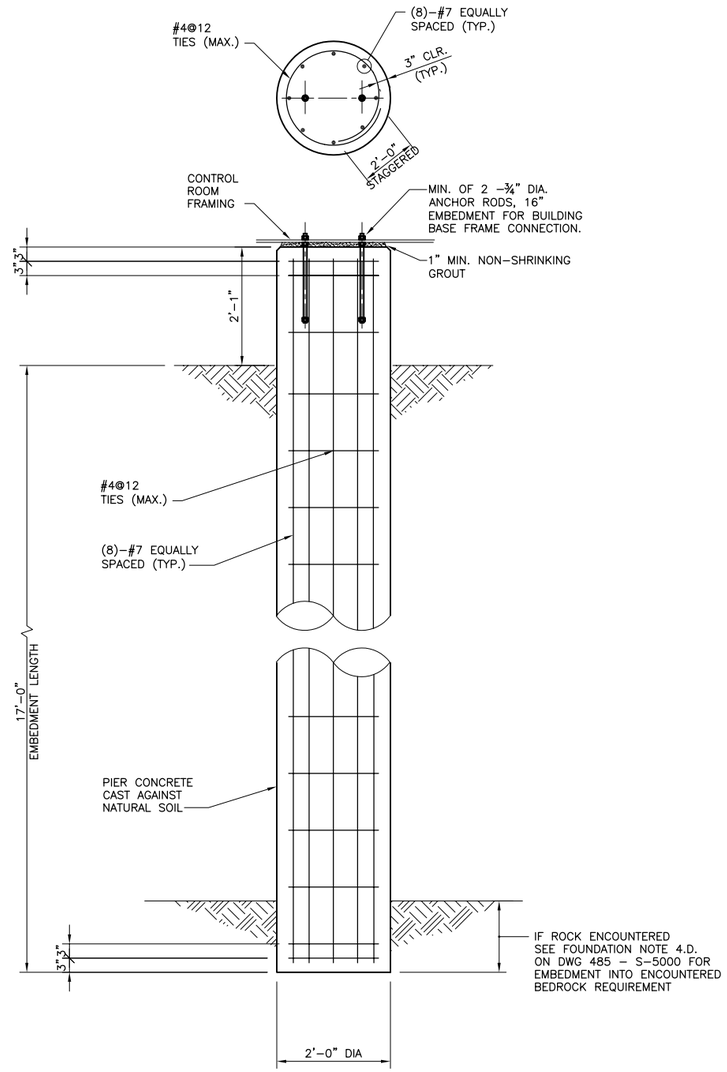
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. BUILDING MANUFACTURER SHALL DESIGN THE BUILDING FLOOR TO SUPPORT MINIMUM OF 250 PSF FLOOR LIVE LOAD UNLESS HIGHER LIVE LOADING IS REQUIRED FOR SUPPORT OF EQUIPMENT.
3. THE BUILDING'S BASE FRAME SHALL BE DESIGNED TO BEAR ON THE FOUNDATIONS AS SHOWN.



1 S-5408 SIGNAL POWER HOUSE FOUNDATION PLAN
1/4" = 1'-0"



3 S-5408 STAIR LANDING PAD DETAIL
1" = 1'-0"



2 S-5408 FOUNDATION DETAIL
3/4" = 1'-0"

1' 6" 0 1'
SCALE:3/4"=1'-0"

4' 2' 0 4'
SCALE:1/4"= 1'-0"

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Approved	Date

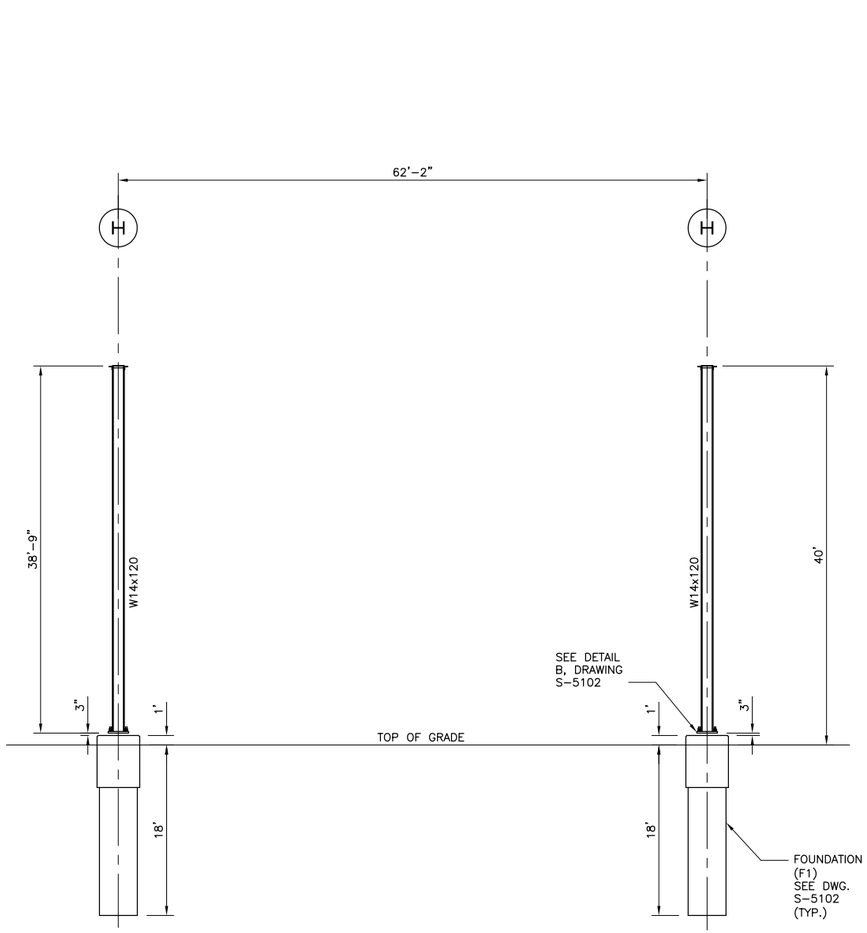
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL - PAOLI SUBSTATION
SIGNAL POWER HOUSE FOUNDATION PLANS AND SECTIONS

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5408.DWG
Ref. No.:	2011-059
Sheet No:	541 OF 565

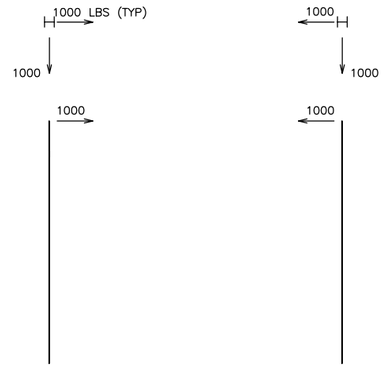
S-5408



1 S-5409 138kV TIE-WRAP AROUND STRUCTURE

8' 4' 0 8'

SCALE:1/8"=1'-0"



2 S-5409 LOADING DIAGRAM

NOT TO SACLE

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IN ASSOCIATION WITH

Baker
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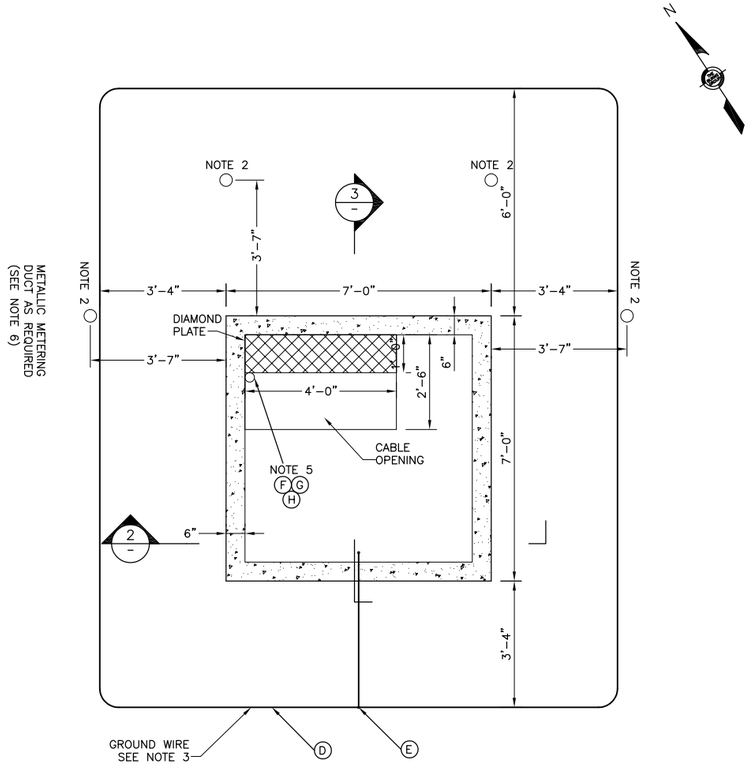
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – PAOLI SUBSTATION
138KV TIE-WRAP AROUND STRUCTURE

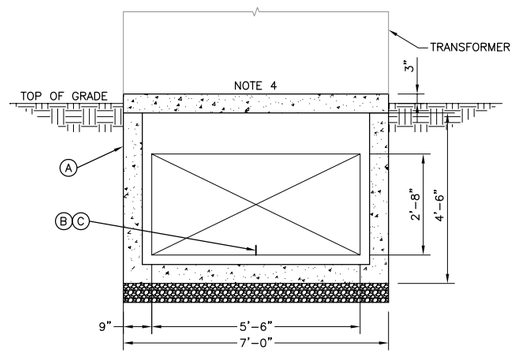
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5409.DWG
Ref. No.:	2011-059
Sheet No:	542 OF 565

S-5409

3/14/2016 2:35:43 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5409.dwg

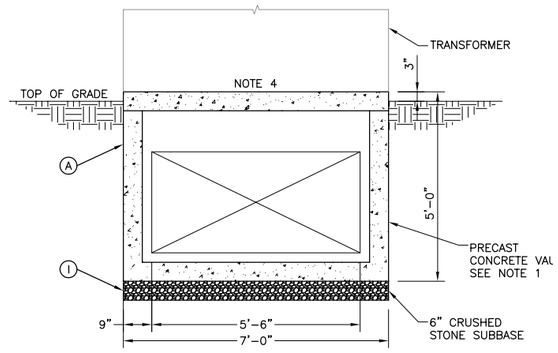




2 — TRANSFORMER FOUNDATION SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"



3 — TRANSFORMER FOUNDATION SECTION

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

1 — PECO TRANSFORMER FOUNDATION DETAIL

2' 1' 0 2'

SCALE: 1/2"= 1'-0"

NOTE:

1. SET PRECAST TRANSFORMERS FOUNDATION ON CRUSHED STONE. MINIMUM EXCAVATION IS 8' x 8' x 5'-6" DEEP. FOUNDATION AND CRUSHED STONE SHALL BE SET ON UNDISTURBED SOIL.
2. INSTALL GUARD POSTS WHEN TRANSFORMER IS SUBJECT TO DAMAGE BY VEHICLES. USE 4" GALVANIZED STEEL PIPE FILLED WITH CONCRETE, SET IN 15" DIAMETER CONCRETE 3' DEEP. GUARD POST PIPE TO EXTEND 4' ABOVE FINAL GRADE.
3. INSTALL #4 BARE COPPER FOR GROUNDING, PROVIDE 12" TO 18" COVER. EXTEND TO GROUND (ITEM B) AND 2/0 COPPER WIRE EXTENDING THROUGH WALL OF PRECAST TRANSFORMER FOUNDATION.
4. INSTALL WITH TOP APPROXIMATELY 3" ABOVE GRADE.
5. EXTEND METERING CONDUIT 6" ABOVE VAULT LID IN FRONT RIGHT CORNER OF CABLE OPENING.
6. TO BE COORDINATED WITH PECO.

MATERIAL INDEX	
ITEM	DESCRIPTION
A	PRECAST TRANSFORMER FNDN. W/7' X 7' TOP
B	ROD, GROUND, 1/2" x 8'
C	CLAMP, GROUND ROD
D	WIRE, #4 SOLID COPPER, BARE
E	CONNECTOR, TAP, VISE TYPE, #4 SOLID COPPER
F	METERING DUCT, METALLIC, 1 1/2" MIN I.D.
G	BUSHING, INSULATED
H	GROUNDING BUSHING FOR METERING CONDUIT
I	AASHTO #57 CRUSHED STONE

J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5410.dwg
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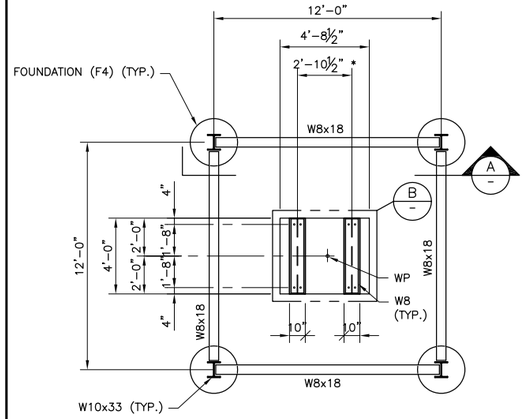
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL – PAOLI SUBSTATION
PECO TRANSFORMER FOUNDATION DETAILS

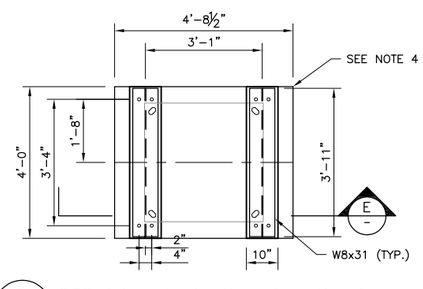
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5410.DWG
Ref. No.:	2011–059
Sheet No:	543 OF 565

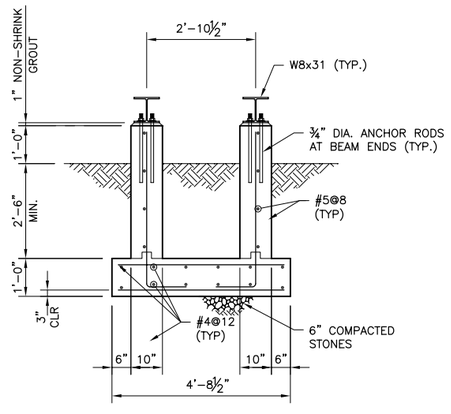
S–5410



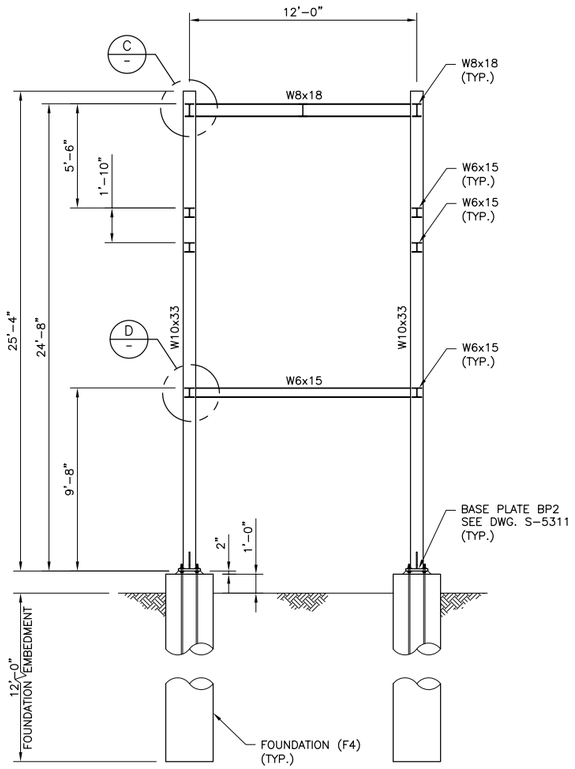
1 — 352 BREAKER FRAMING PLAN
1/4" = 1'-0"



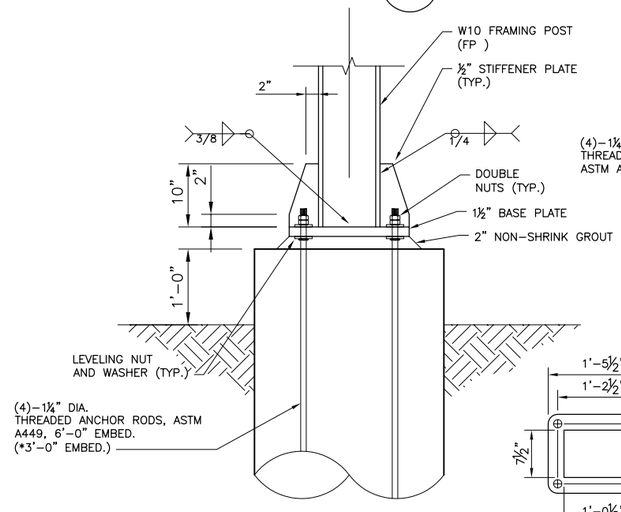
B — 352 BREAKER FOUNDATION PLAN
1/2" = 1'-0"



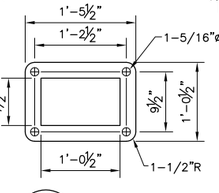
E — SECTION
1/2" = 1'-0"



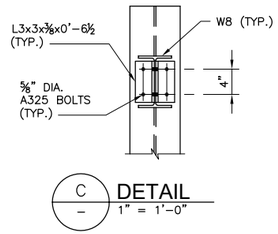
A — SECTION
1/4" = 1'-0"



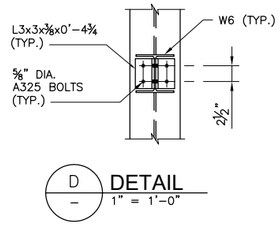
F — DETAIL
1" = 1'-0"



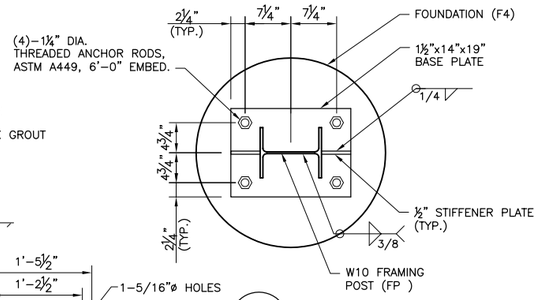
H — DETAIL
1" = 1'-0"



C — DETAIL
1" = 1'-0"



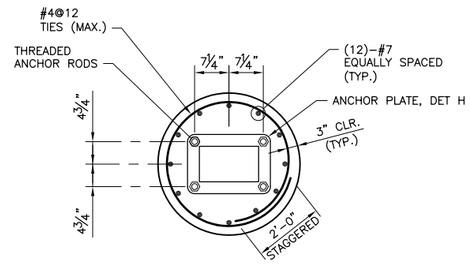
D — DETAIL
1" = 1'-0"



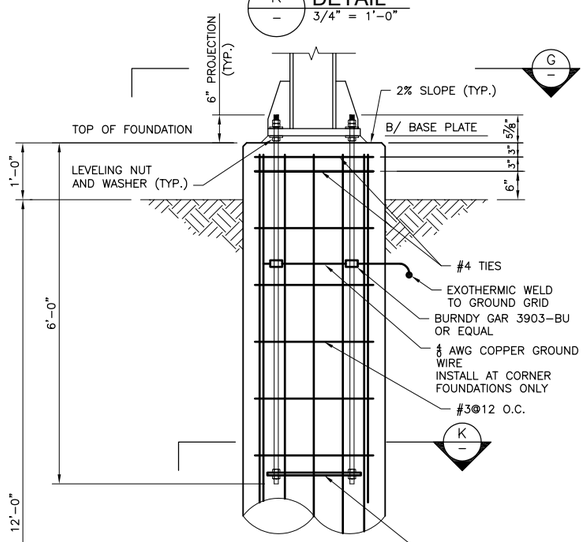
G — DETAIL
1" = 1'-0"

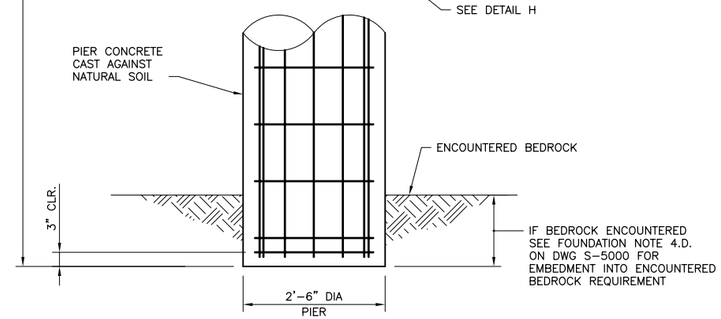
NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.
3. 252 BREAKER AND 352 BREAKER FOUNDATIONS ARE IDENTICAL.



K — DETAIL
3/4" = 1'-0"





2 — FOUNDATION DETAIL (F4)
3/4" = 1'-0"

1' 6" 0 1' — SCALE:3/4"=1'-0"
4' 2' 0 4' — SCALE:1/4"= 1'-0"
1' 0 1' 2' — SCALE: 1"=1'-0"

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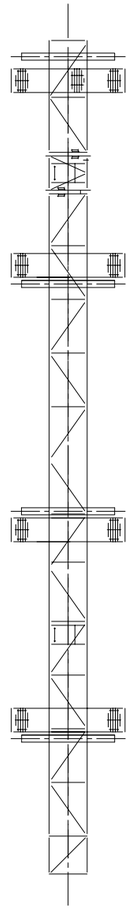
ZOO TO PAOLI TRANSMISSION ELECTRIFICATION
STRUCTURAL STEEL – 352 BREAKER INSTALLATION PLANS, SECTIONS AND DETAILS

Recommended: AJT | Drawn: TAB | Checked: MJM | Date: 12/19/14

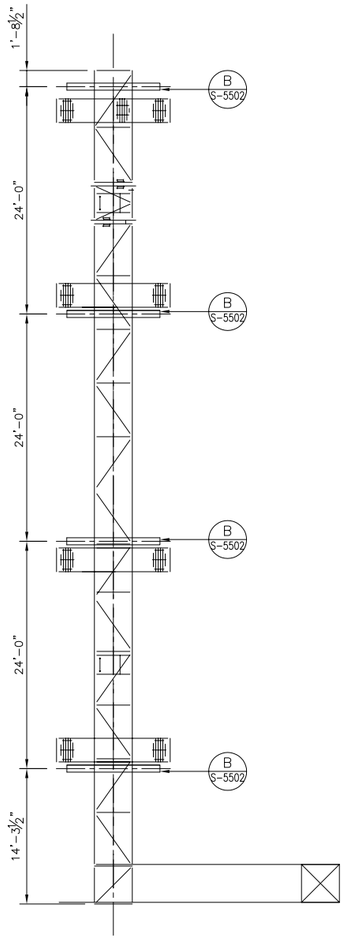
File No.:	2011-059-S-5501.DWG
Ref. No.:	2011-059
Sheet No:	544 OF 936

S-5501

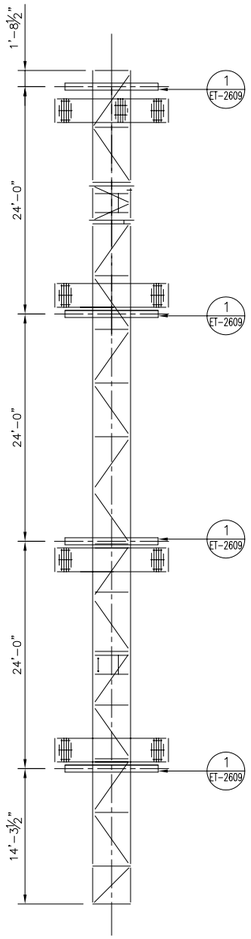
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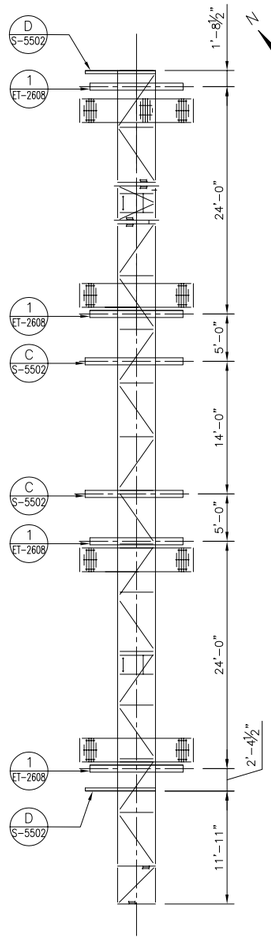
WEST GANTRY (85')
(NO WORK)
EXIST



MID GANTRY (85')
EXIST



EAST GANTRY (85')
NEW



EAST GANTRY (46')
NEW

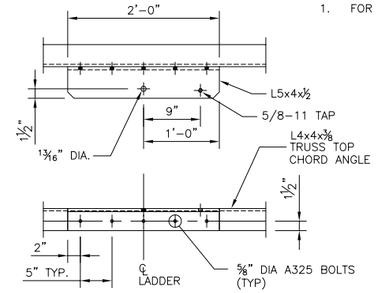
1 S-5502 **GANTRY PLAN VIEW**
1/8"=1'-0"

8' 4' 0 8'
SCALE:1/8"=1'-0"

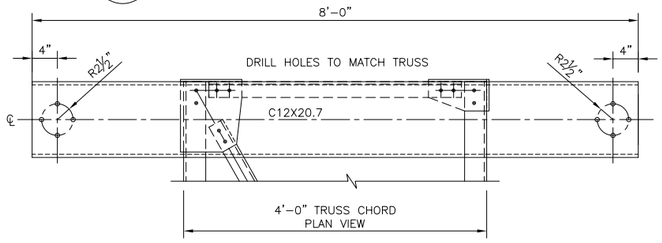
1' 0 1' 2'
SCALE: 1"=1'-0"

NOTES:

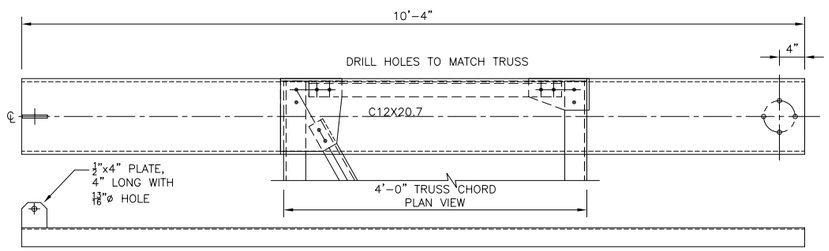
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.



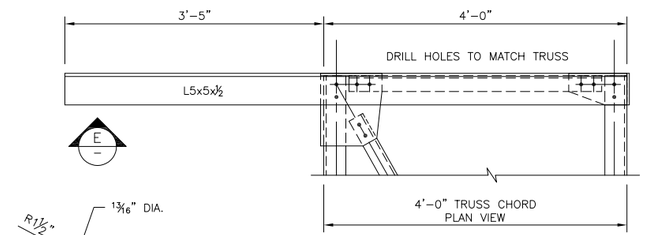
A S-5502 **DETAIL**
SCALE: 1" = 1'-0"

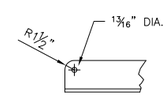


B S-5502 **DETAIL**
SCALE: 1" = 1'-0"



C S-5502 **DETAIL**
SCALE: 1" = 1'-0"





E S-5502 **DETAIL**
SCALE: 1" = 1'-0"

D S-5502 **DETAIL**
SCALE: 1" = 1'-0"

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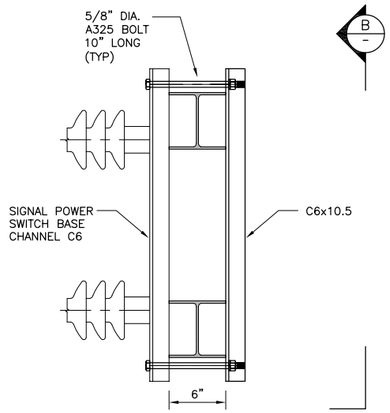
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL – 352 BREAKER INSTALLATION
PLANS, SECTIONS AND DETAILS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

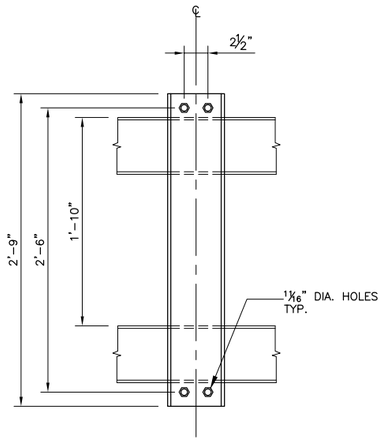
File No.:	2011-059-S-5502.DWG
Ref. No.:	2011-059
Sheet No:	545 OF 565

S-5502

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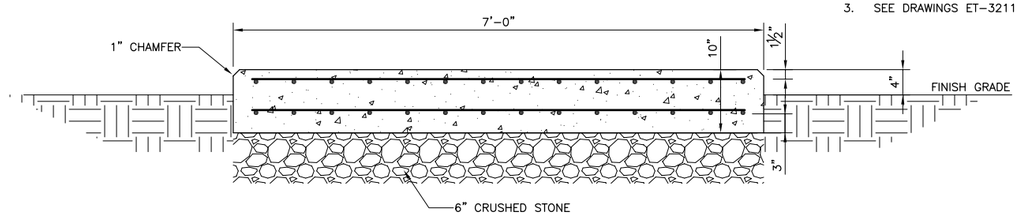
A — SWITCH MOUNTING PLATE
1 1/2" = 1'-0"



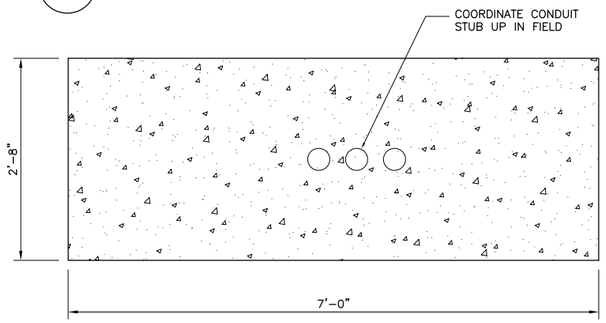
B — SECTION
1 1/2" = 1'-0"

NOTES:

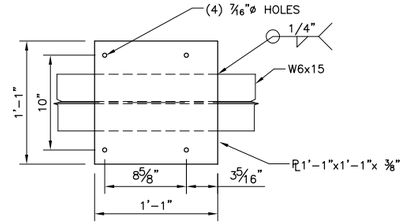
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.
3. SEE DRAWINGS ET-3211 AND ET-3212 FOR EQUIPMENT LOCATIONS.



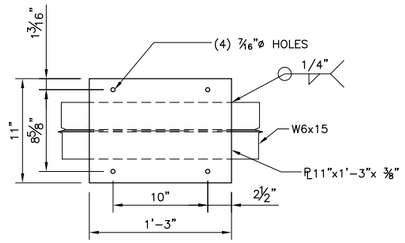
G — SIGNAL POWER CABINET FOUNDATION - SECTION
1" = 1'-0"



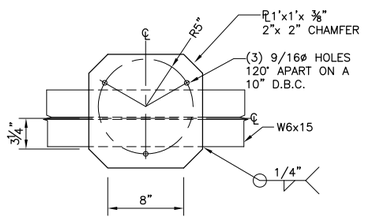
H — SIGNAL POWER CABINET FOUNDATION - PLAN
1" = 1'-0"



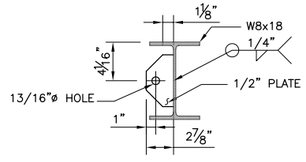
C — CURRENT TRANSFORMER MOUNTING PLATE
1 1/2" = 1'-0"



D — POTENTIAL TRANSFORMER MOUNTING PLATE
1 1/2" = 1'-0"



E — LIGHTNING ARRESTER MOUNTING PLATE
1 1/2" = 1'-0"



F — DEADEND PLATE
1 1/2" = 1'-0"

1' 6" 0 1'
SCALE:1-1/2"= 1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

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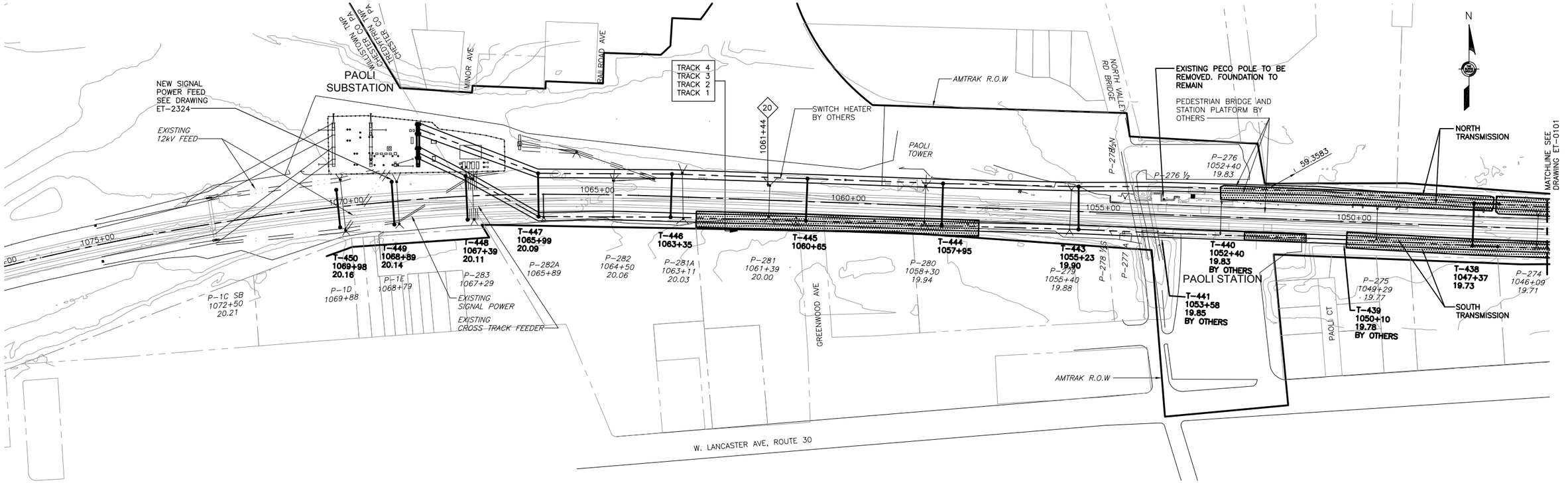
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL STEEL - 352 BREAKER INSTALLATION EQUIPMENT MOUNTING DETAILS

Recommended: AJT	Drawn: TAB	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5503.DWG
Ref. No.:	2011-059
Sheet No:	546 OF 565

S-5503

3/16/2016 10:53:02 AM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\Heavy-Structural\2011-059-S-5503.dwg



TREE PRUNING SITE PLAN

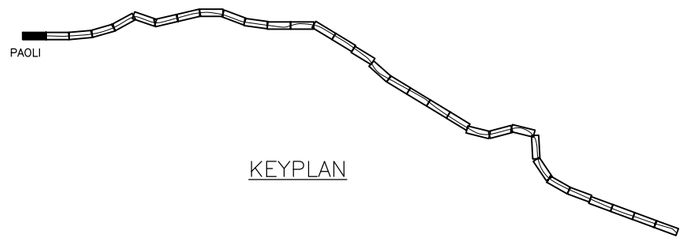
100' 50' 0 100'

SCALE:1"=100'-0"

NOTES:

1. THE PURPOSE OF THESE PLANS IS TO SHOW THE LOCATION AND LIMITS OF TREE PRUNING AND TREE FELLING TO PROVIDE SAFE ELECTRICAL CLEARANCES TO NEW AERIAL TRANSMISSION LINES.
2. TWO WEEKS PRIOR TO ANY TREE PRUNING OR TREE FELLING WORK, CONTACT OWNERS OF PROPERTY ADJACENT TO AMTRAK RIGHT-OF-WAY WHERE WORK WILL BE PERFORMED.
3. PERFORM TREE PRUNING AND TREE FELLING IN ACCORDANCE WITH ANSI-A300, STANDARDS FOR TREE MAINTENANCE. PRUNE TREES FOR ELECTRICAL LINE CLEARANCE BY DIRECTIONAL PRUNING; DO NOT "TOP" OR "ROUND" TREES. PERFORM TREE PRUNING AND TREE FELLING BY MECHANICAL MEANS ONLY, IE. SAWING OR CLIPPING. DO NOT USE DEFOLIANTS OR HERBICIDES.
4. ALL WORK IS TO BE PERFORMED UNDER THE DIRECT SUPERVISION OF A FULL-TIME, INTERNATIONAL SOCIETY OF ARBORCULTURE (ISA) CERTIFIED ARBORIST.
5. ALL DEBRIS GENERATED BY TREE PRUNING AND TREE FELLING OPERATIONS IS TO REMOVED FROM AMTRAK'S RIGHT-OF-WAY AND DISPOSED OF LEGALLY OFF AMTRAK PROPERTY.
6. ALL WORK IS TO BE PERFORMED FROM AMTRAK RIGHT-OF-WAY.
7. LIMITS SHOWN ON PLAN ARE FOR CLEARANCE TO 138kV TRANSMISSION LINE. TREE PRUNING OR TREE FELLING FOR INSTALLATION OF NEW CATENARY STRUCTURES IS NOT SHOWN.

PROPOSED LIMITS OF TREE TRIMMING. SEE DETAIL ON SHEET C-0232 FOR MORE INFORMATION.



KEYPLAN

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National Railroad Passenger Corporation
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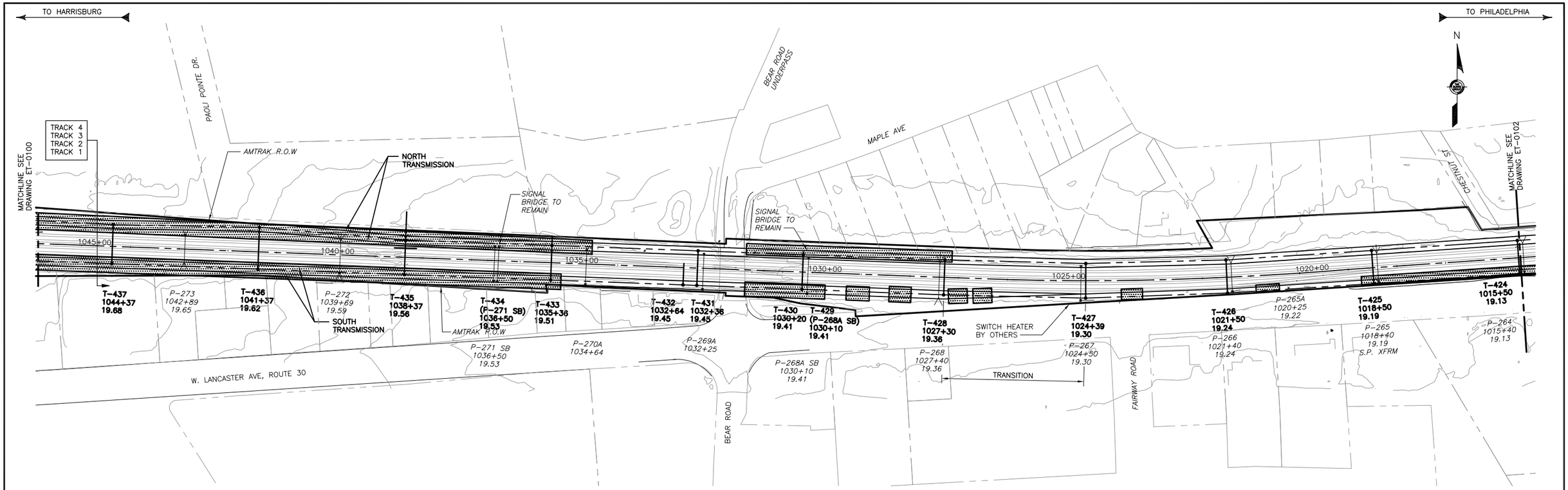
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 1075+00 TO 1046+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	C-0200.DWG
Ref. No.:	2011-059
Sheet No:	547 OF 565

C-0200

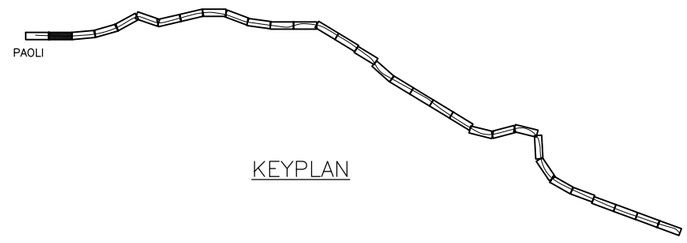
3/14/2016 2:41:51 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0200.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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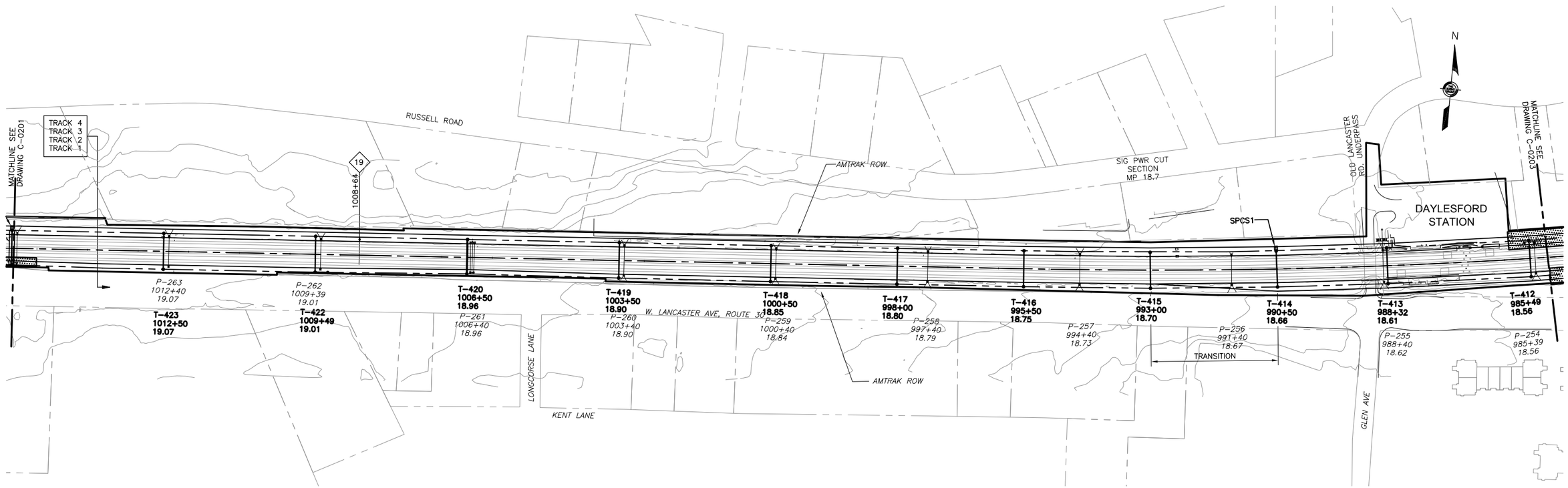
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 1046+00 TO 1015+45

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	C-0201.DWG
Ref. No.:	2011-059
Sheet No:	548 OF 565

C-0201

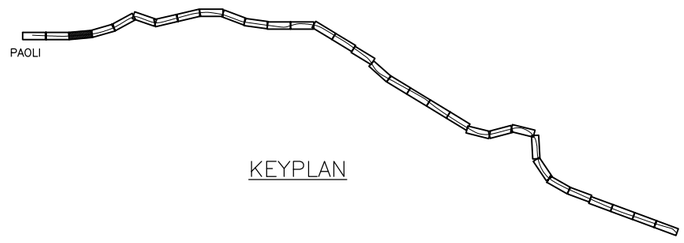
2:42:03 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0201.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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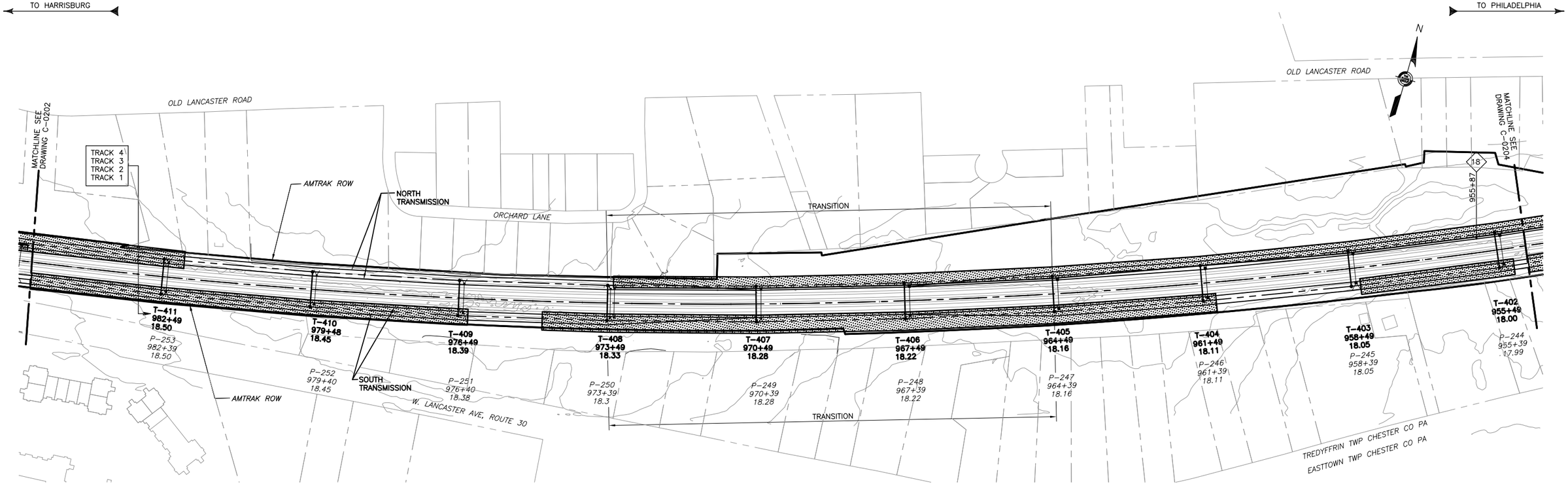
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 1015+45 TO 985+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	C-0202.DWG
Ref. No.:	2011-059
Sheet No:	549 OF 565

C-0202

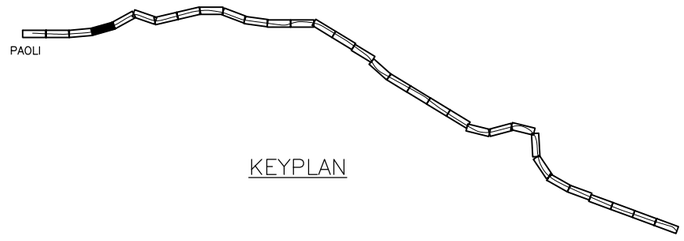
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3/14/2016 2:42:15 PM



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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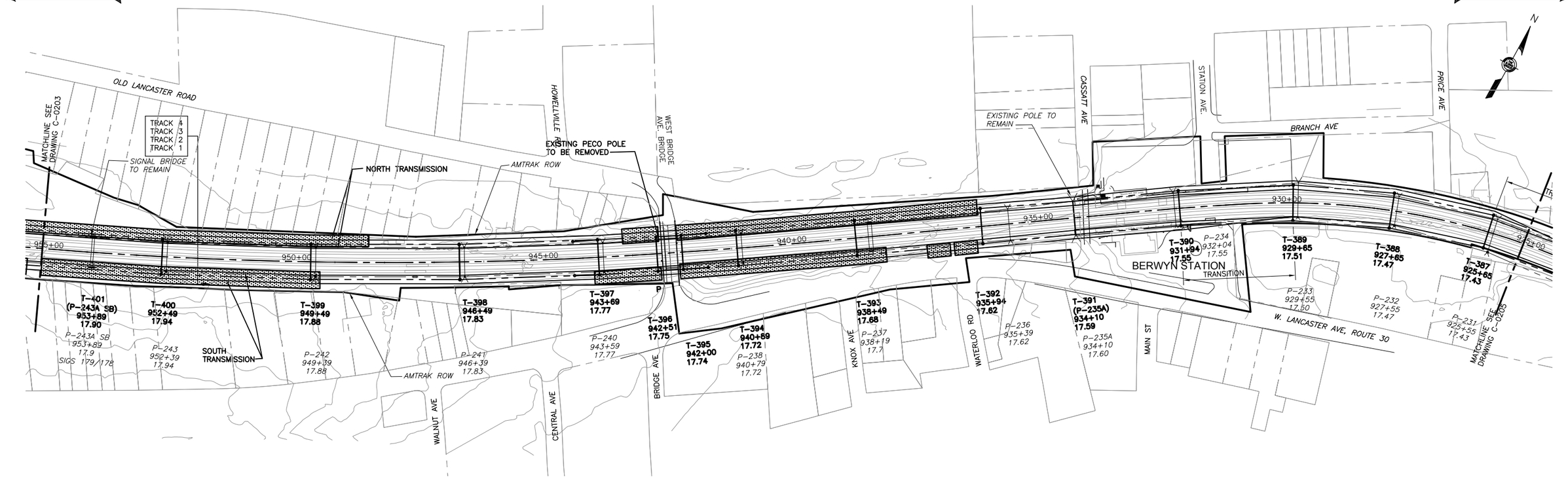
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 985+00 TO 955+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	C-0203.DWG
Ref. No.:	2011-059
Sheet No:	550 OF 565

C-0203

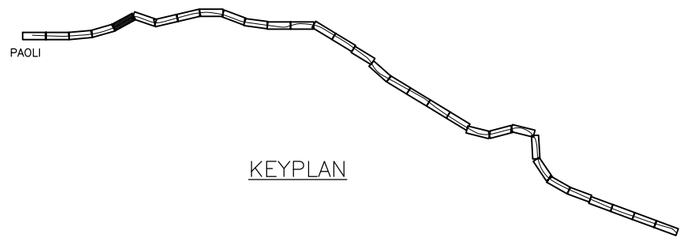
3/14/2016 2:42:26 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0203.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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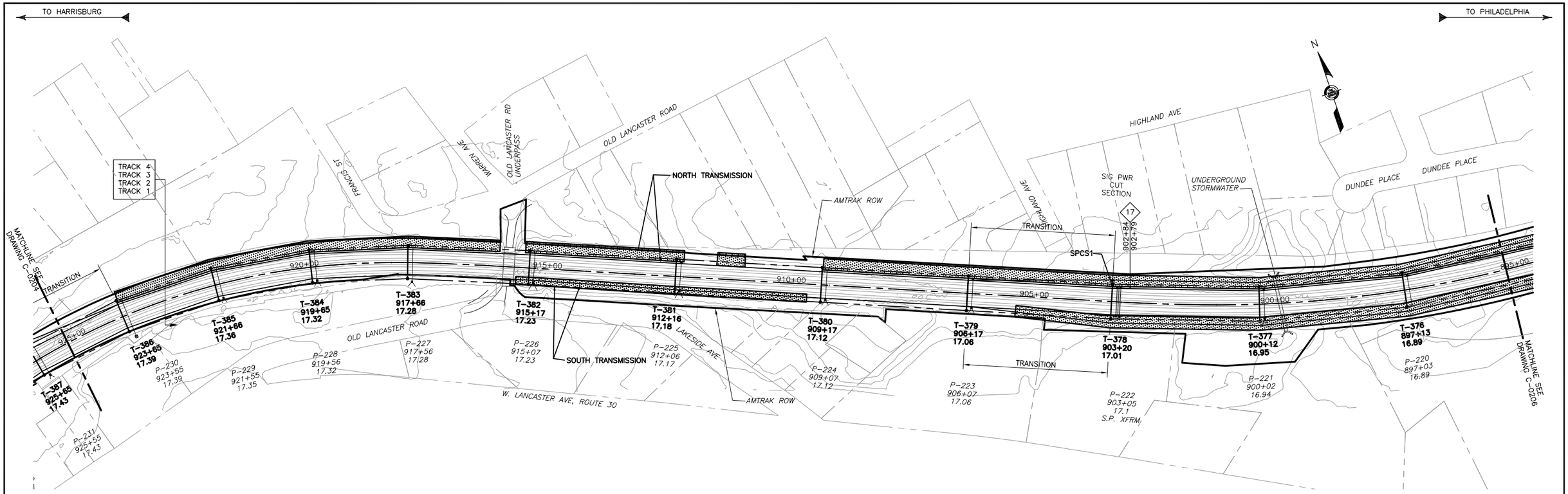
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 955+00 TO 925+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	C-0204.DWG
Ref. No.:	2011-059
Sheet No:	551 OF 565

C-0204

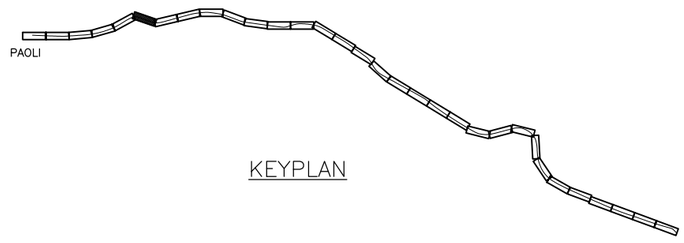
2:42:36 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0204.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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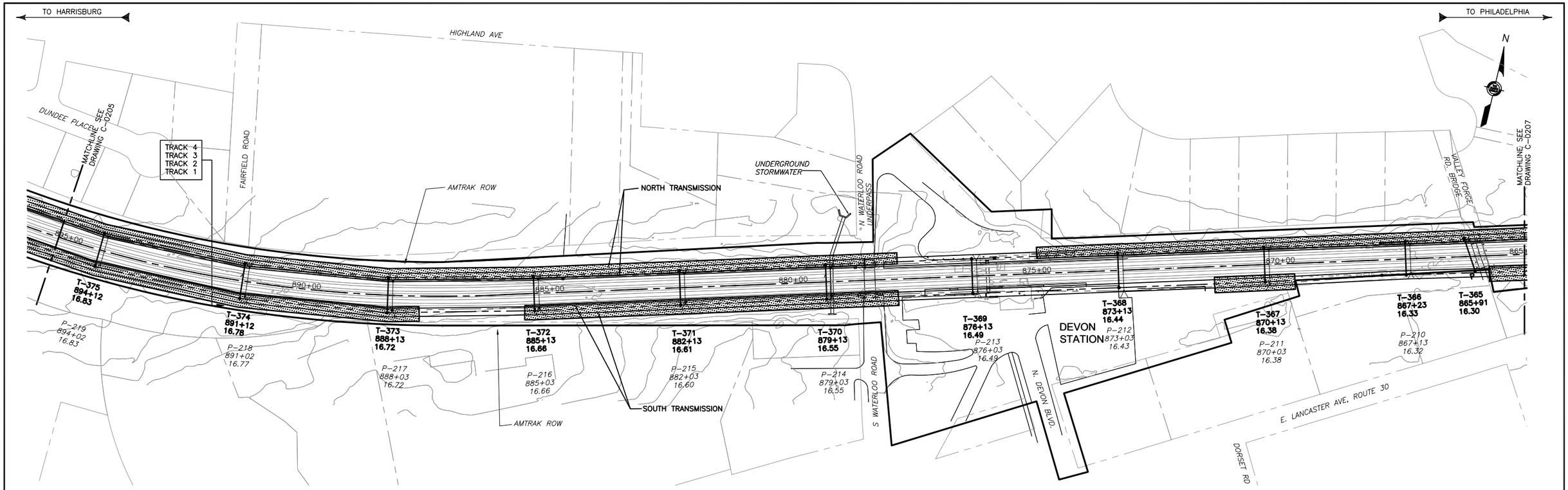
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 925+00 TO 895+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	C-0205.DWG
Ref. No.:	2011-059
Sheet No:	552 OF 565

C-0205

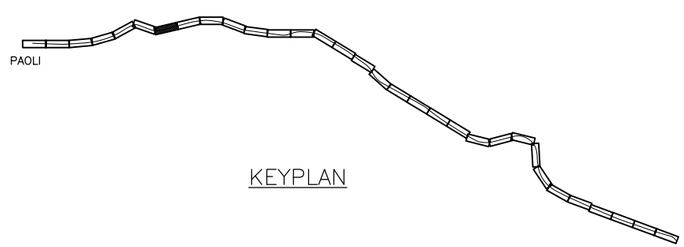
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE: 1"=100'-0"



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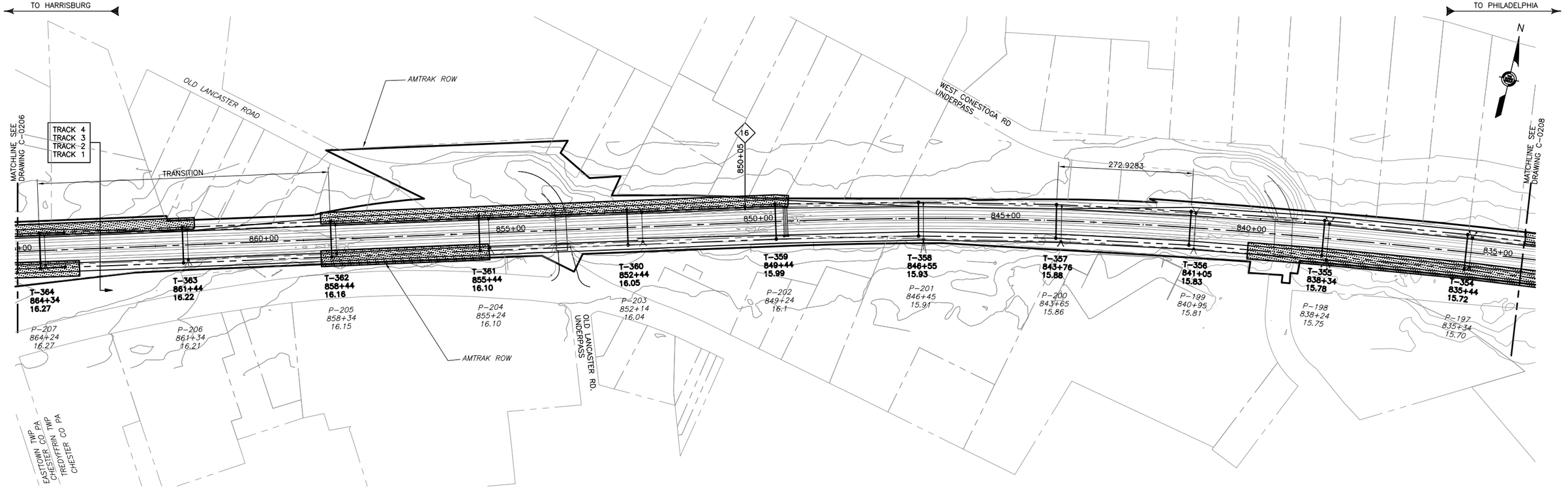
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 895+00 TO 865+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	C-0206.DWG
Ref. No.:	2011-059
Sheet No:	553 OF 565

C-0206

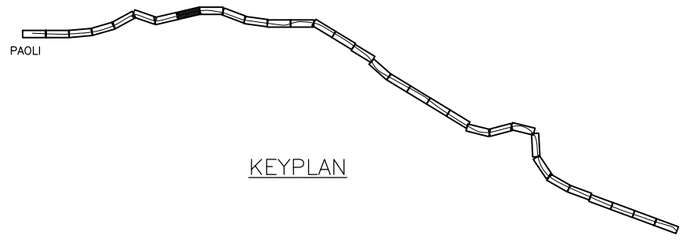
2-42:59 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0206.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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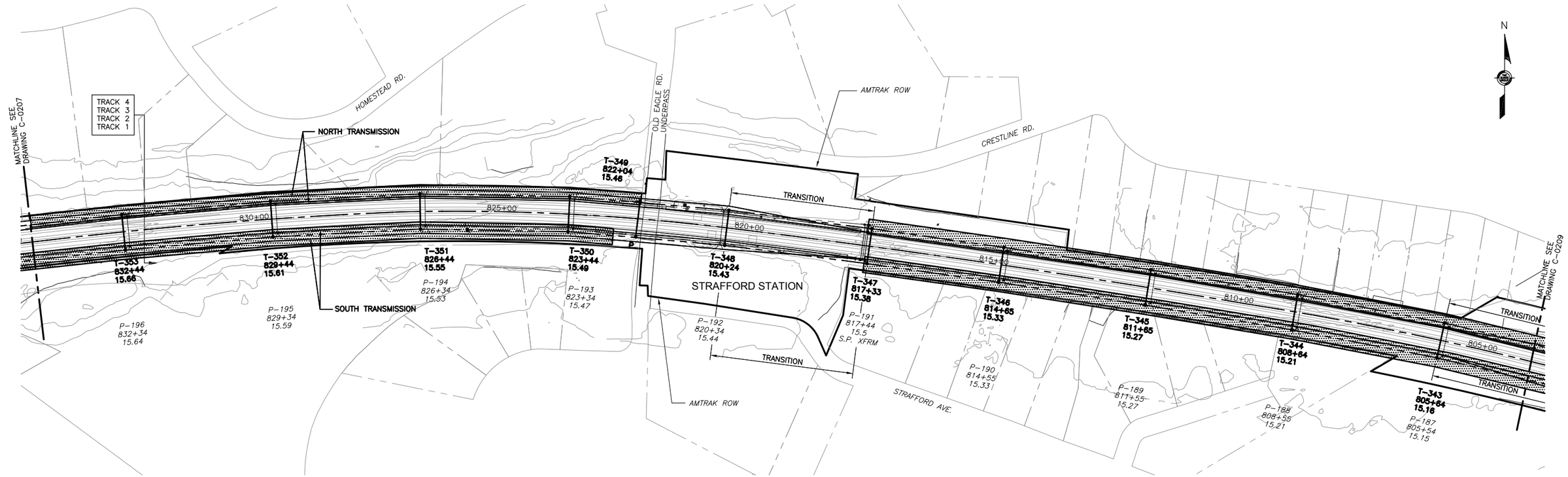
ZOO TO PAOLI TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 865+00 TO 835+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	12/19/14

File No.:	C-0207.DWG
Ref. No.:	2011-059
Sheet No:	554 OF 936

C-0207

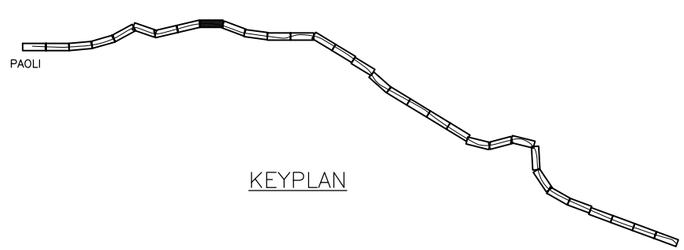
3/14/2016 2:43:09 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0207.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE: 1"=100'-0"



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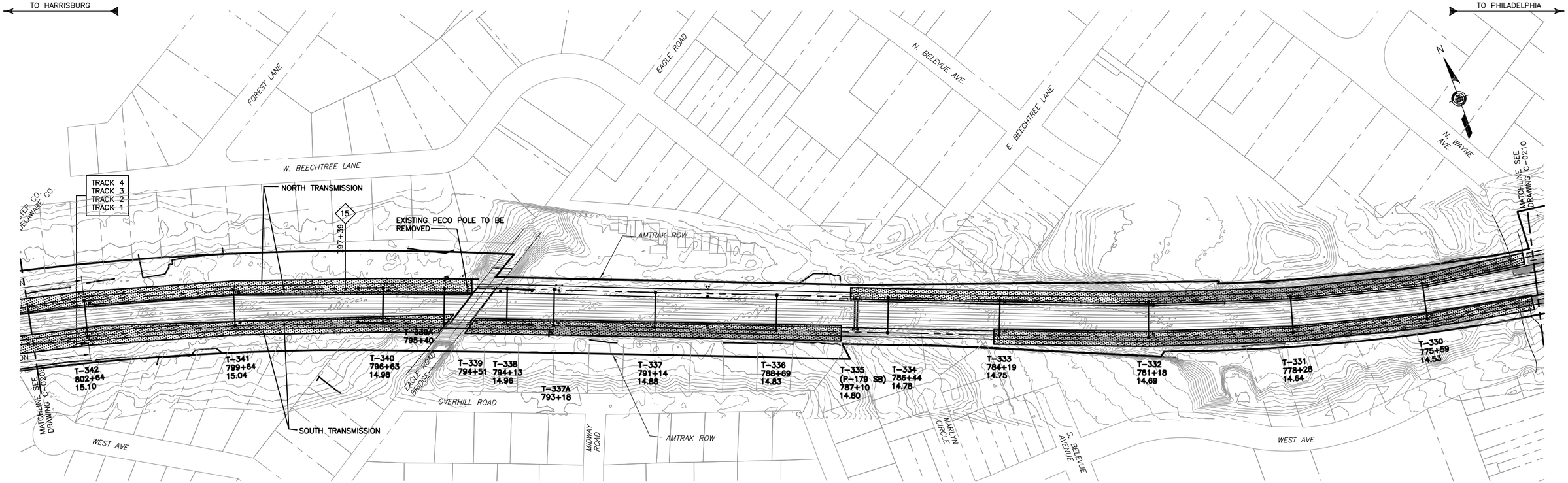
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 835+00 TO 804+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 12/19/14

File No.:	C-0208.DWG
Ref. No.:	2011-059
Sheet No:	555 OF 936

C-0208

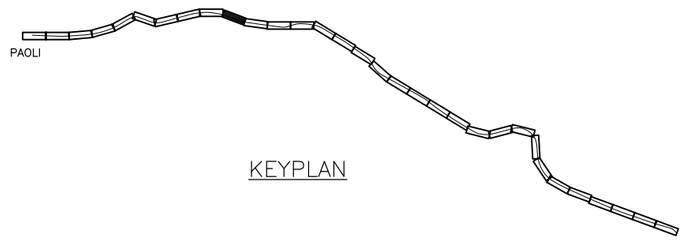
3/14/2016 2:43:20 PM J:\2011\2011-059\Drawings\working drawings.paoli to bryn mawr\civil\c-0208.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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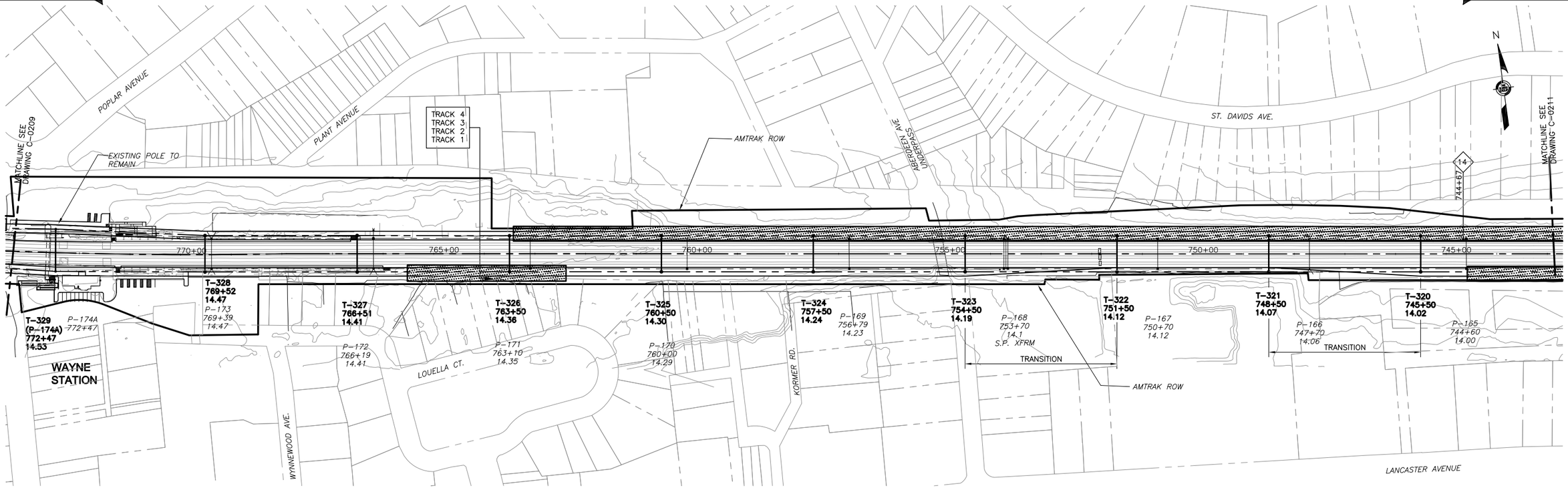
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 804+00 TO 774+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 12/19/14

File No.:	C-0209.DWG
Ref. No.:	2011-059
Sheet No:	556 OF 936

C-0209

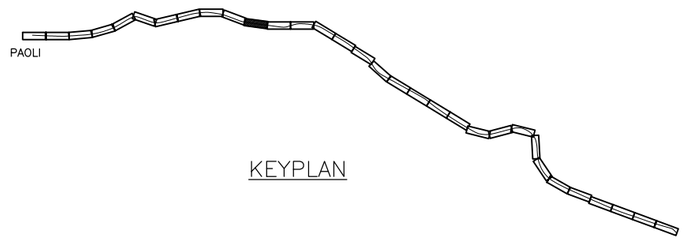
3/14/2016 2:43:31 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0209.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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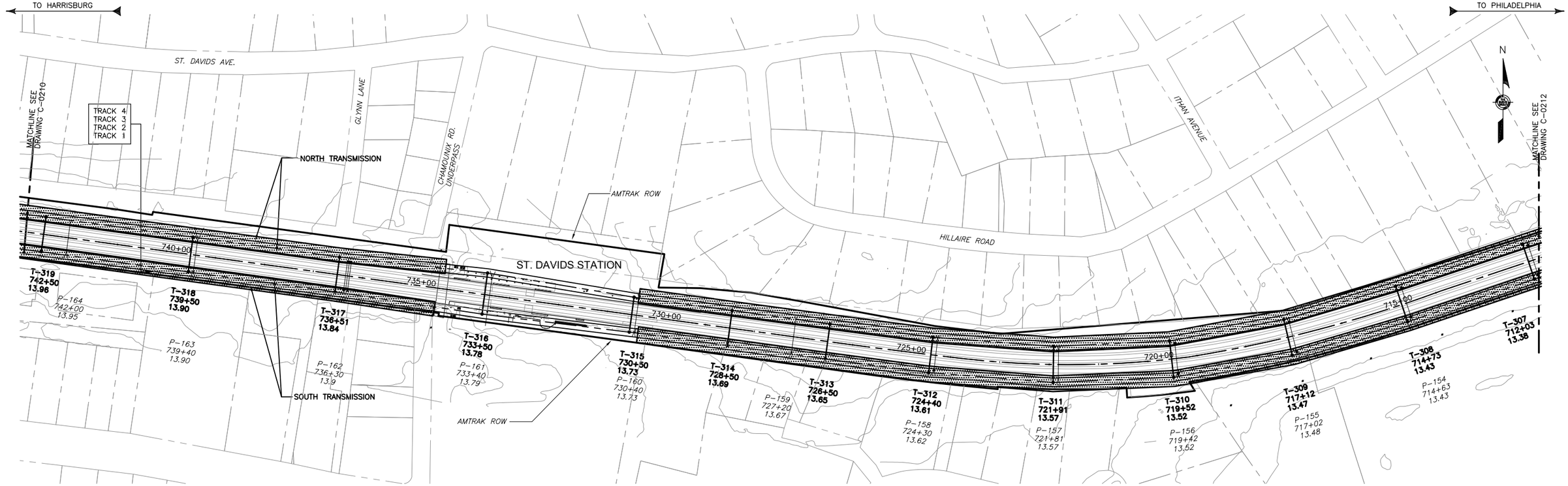
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 774+00 TO 744+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	12/19/14

File No.:	C-0210.DWG
Ref. No.:	2011-059
Sheet No:	557 OF 936

C-0210

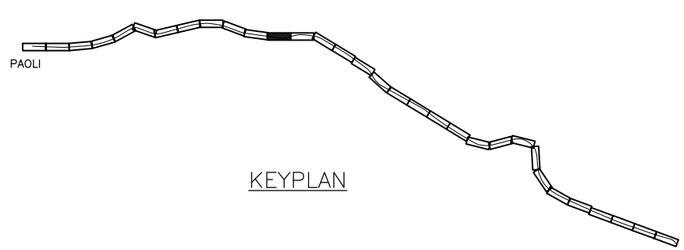
3/14/2016 2:43:42 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0210.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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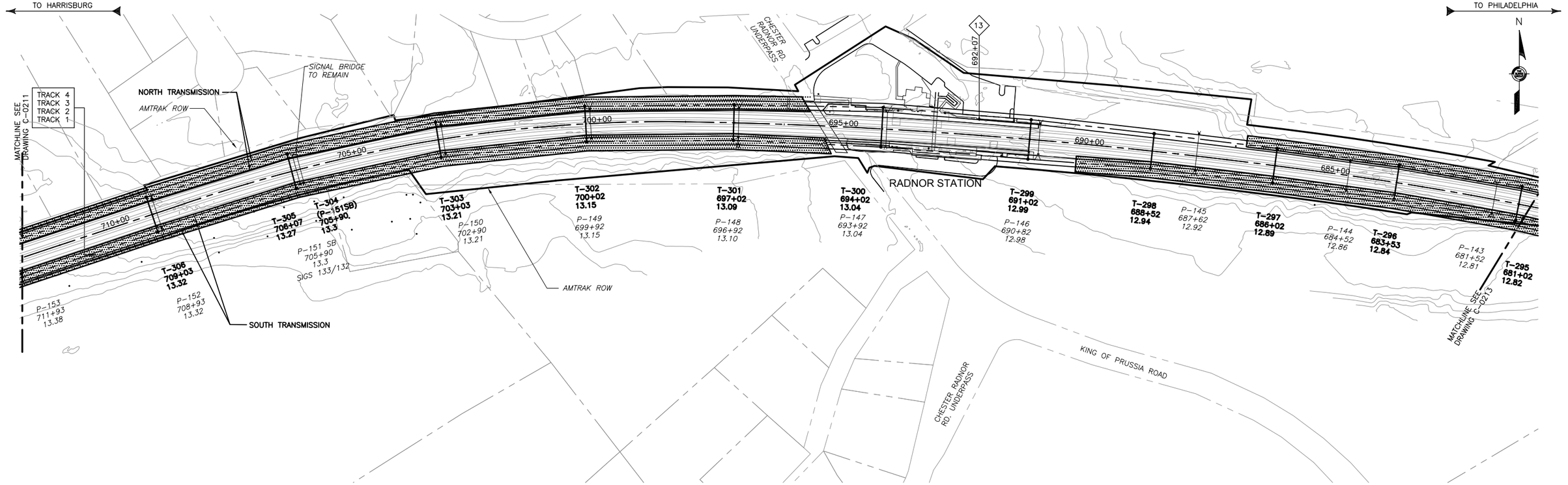
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 744+00 TO 712+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 12/19/14

File No.:	C-0211.DWG
Ref. No.:	2011-059
Sheet No:	558 OF 936

C-0211

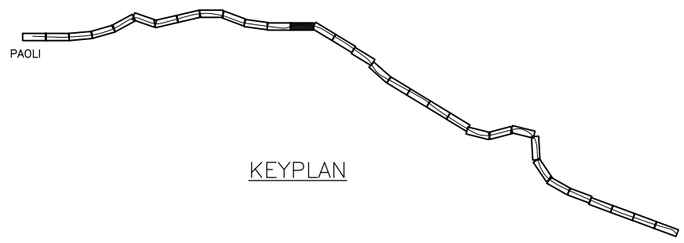
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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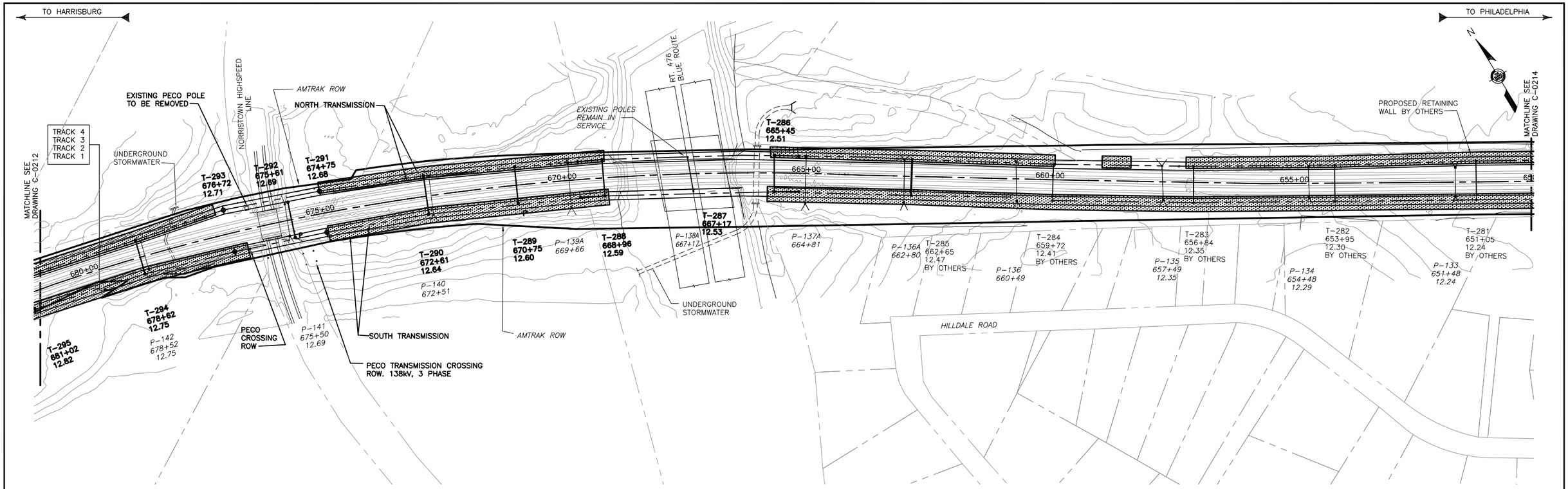
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ELECTRIFICATION
TREE PRUNING
STA. 712+00 TO 681+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 12/19/14

File No.:	C-0212.DWG
Ref. No.:	2011-059
Sheet No:	559 OF 936

C-0212

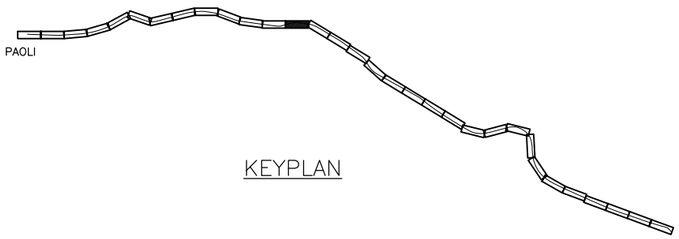
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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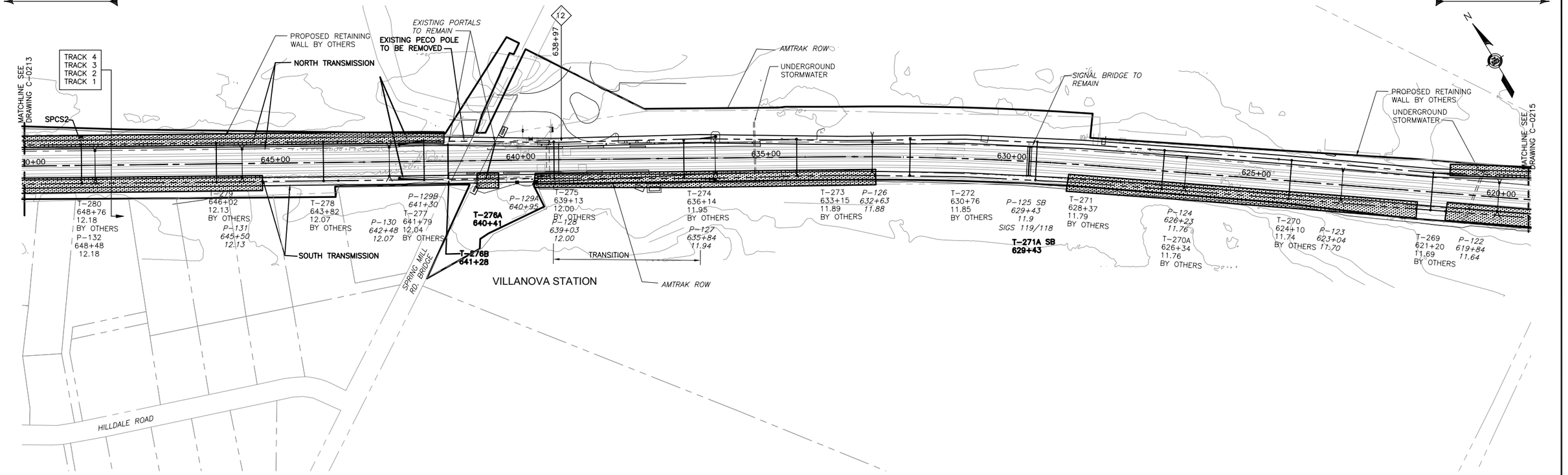
ZOO TO PAOLI TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 681+00 TO 650+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	12/19/14

File No.:	C-0213.DWG
Ref. No.:	2011-059
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C-0213

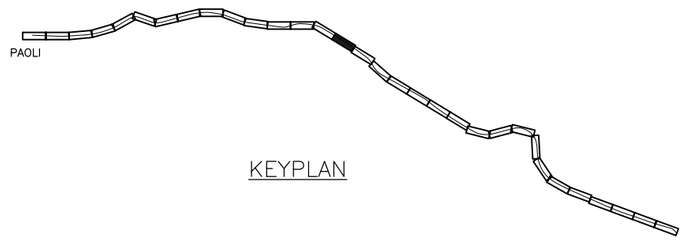
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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PHILADELPHIA

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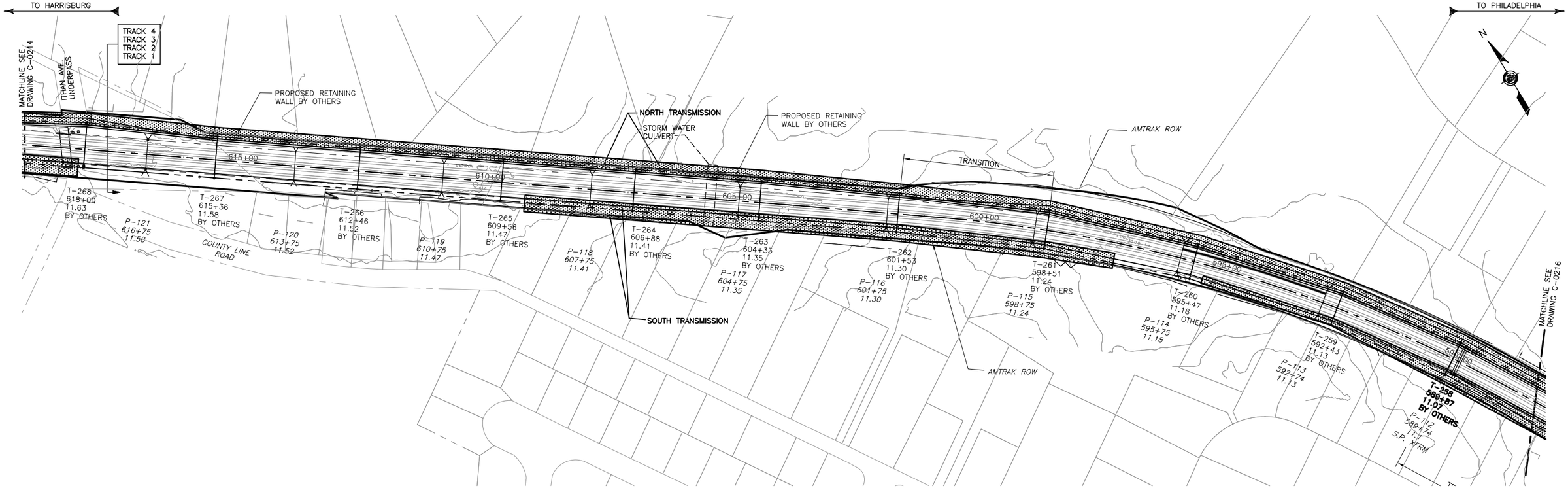
ZOO TO PAOLI TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 650+00 TO 619+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	12/19/14

File No.:	C-0214.DWG
Ref. No.:	2011-059
Sheet No:	561 OF 936

C-0214

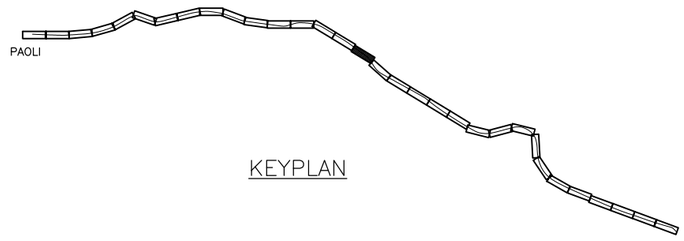
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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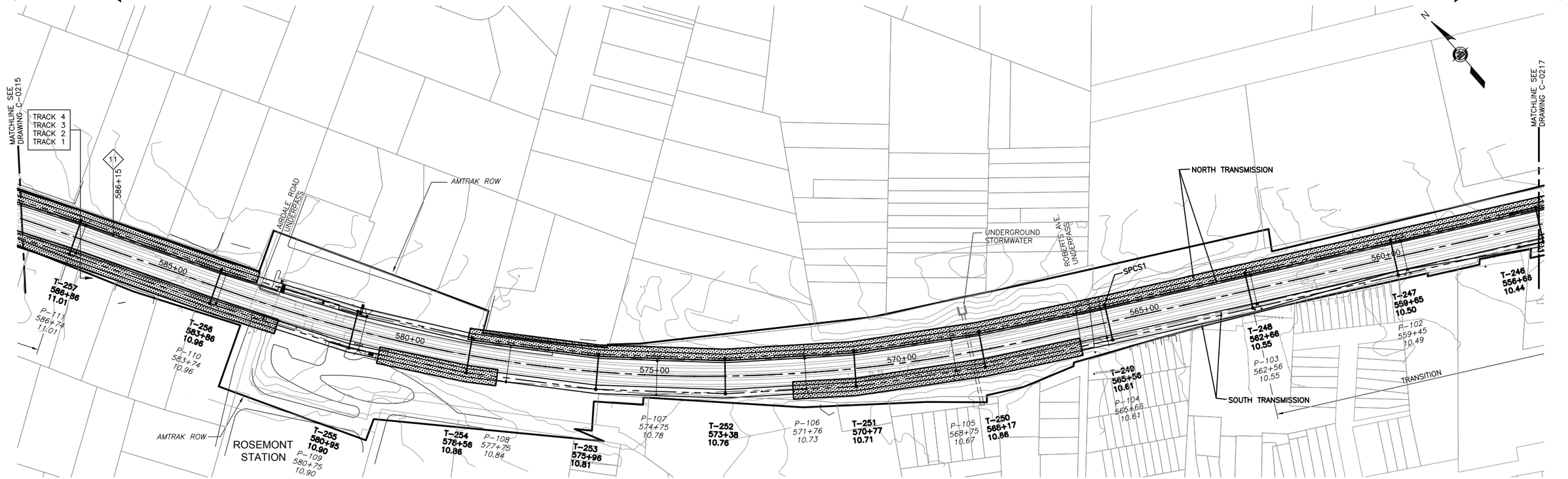
ZOO TO PAOLI TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 619+00 TO 588+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	12/19/14

File No.:	C-0215.DWG
Ref. No.:	2011-059
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C-0215

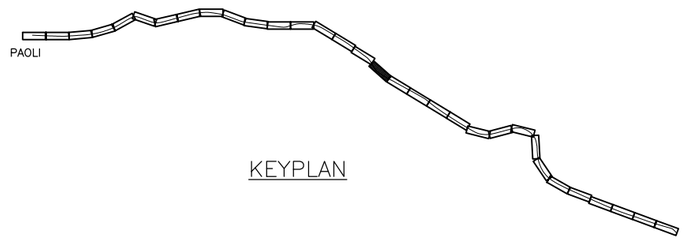
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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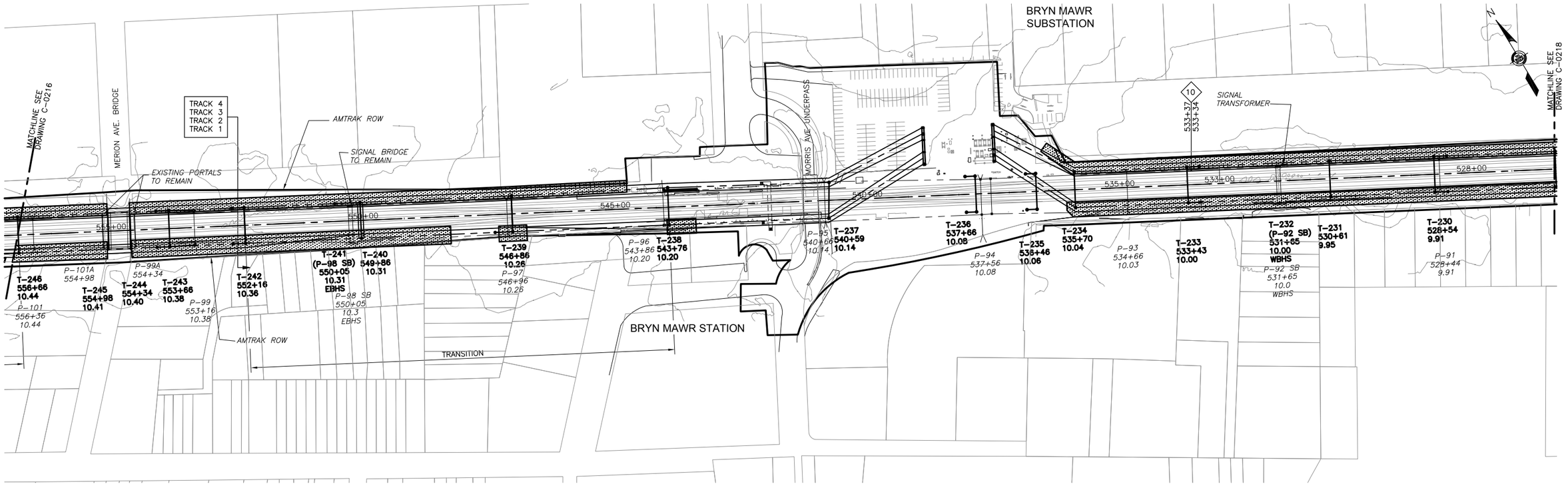
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 588+00 TO 556+65

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 12/19/14

File No.:	C-0216.DWG
Ref. No.:	2011-059
Sheet No:	563 OF 936

C-0216

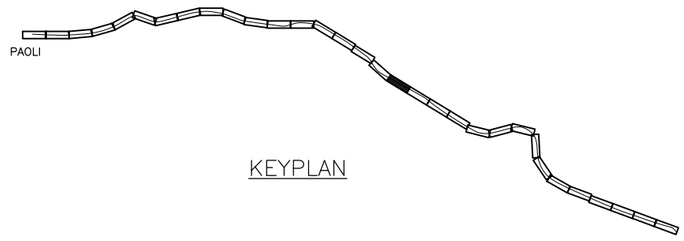
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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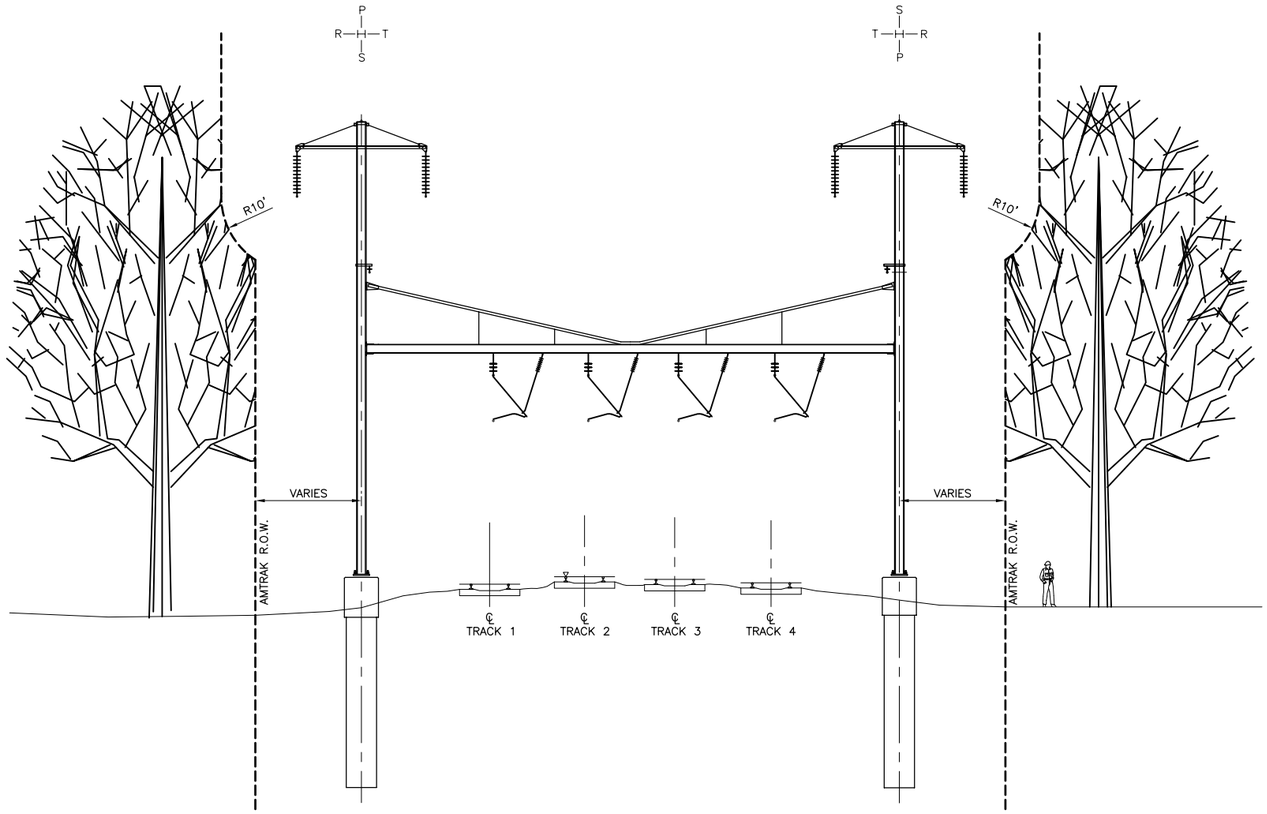
ZOO TO PAOLI TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 556+65 TO 526+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 12/19/14

File No.:	C-0217.DWG
Ref. No.:	2011-059
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3/14/2016 2:45:01 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\civil\c-0217.dwg



TYPICAL TREE PRUNING DETAIL

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
TREE PRUNING
TYPICAL TREE PRUNING DETAIL

Recommended: DP	Drawn: SZM	Checked: MJM	Date: 03/17/16

File No.:	C-0232.DWG
Ref. No.:	2011-059
Sheet No:	565 OF 565

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