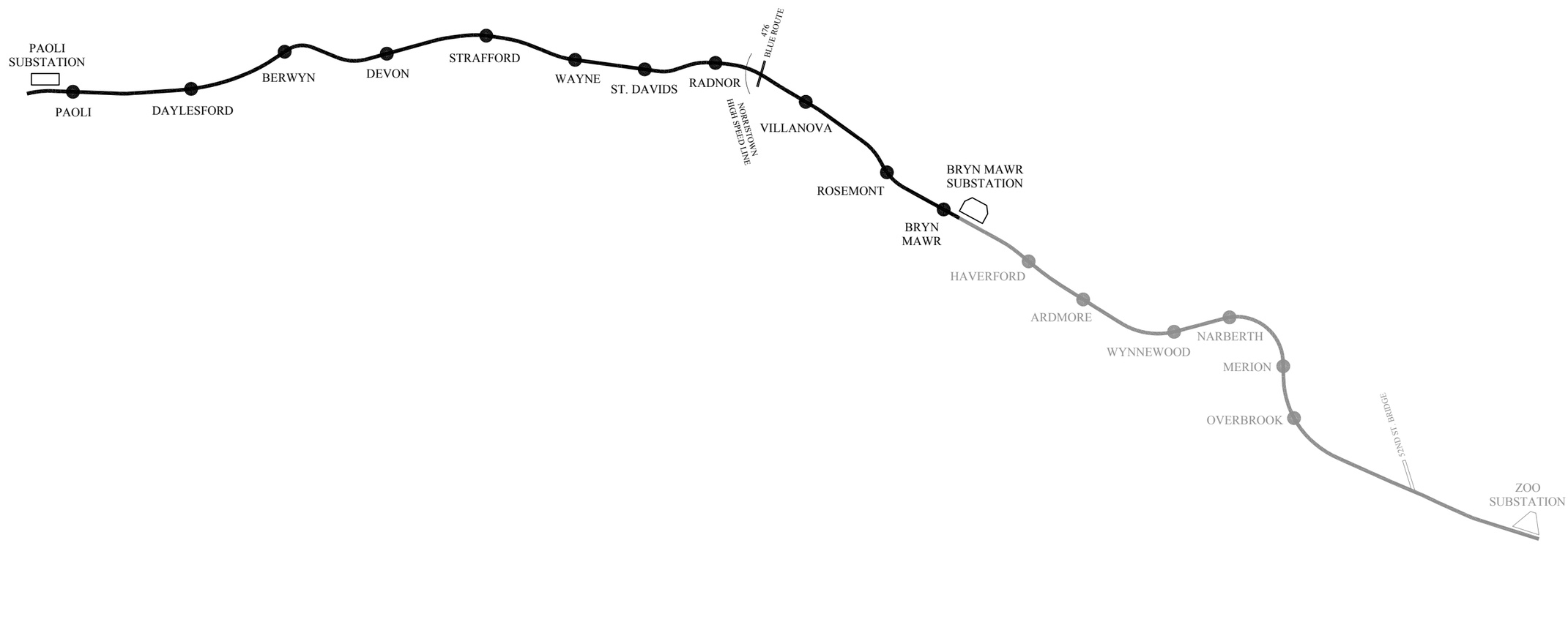
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION



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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
GENERAL DRAWINGS
COVER SHEET

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

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GENERAL DRAWINGS

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499 OF 565	S-5123	STRUCTURAL - TYPICAL FRAME & FOUNDATIONS - DOWNGUY STUB POLE DETAIL (DGP)
500 OF 565	S-5124	STRUCTURAL - TYPICAL FRAME & FOUNDATIONS - POLE STEP DETAILS (PSD1)
501 OF 565	S-5200	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA1)
502 OF 565	S-5201	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA2, BA2A & BA2B)
503 OF 565	S-5202	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA3)
504 OF 565	S-5203	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA4 & BA4L)
505 OF 565	S-5204	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA5&6)
506 OF 565	S-5205	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA7 & BA7A)
507 OF 565	S-5206	STRUCTURAL - TYPICAL TRANSMISSION BRACKETS (BA8)
508 OF 565	S-5211	STRUCTURAL - TYPICAL DETAILS - MISCELLANEOUS SIGNAL POWER BRACKETS
509 OF 565	S-5212	STRUCTURAL - TYPICAL DETAILS - CROSS TRACK FEEDER ARM (CA-1)
510 OF 565	S-5213	STRUCTURAL - TYPICAL DETAILS - SPIDER ARM BRACKET (SPA-1)
511 OF 565	S-5214	STRUCTURAL - TYPICAL DETAILS - SLIDING BRACKET DETAILS
512 OF 565	S-5215	STRUCTURAL - TYPICAL DETAILS - SLIDING BRACKET DETAILS
513 OF 565	S-5216	STRUCTURAL - TYPICAL DETAILS - MANUAL OPERATED DISCONNECT SWITCH DETAILS
514 OF 565	S-5217	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER TRANSFORMER PLATFORM
515 OF 565	S-5218	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER - TRANSFORMER PLATFORM (SHEET 1 OF 2)
516 OF 565	S-5219	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER - TRANSFORMER PLATFORM (SHEET 2 OF 2)
517 OF 565	S-5220	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER - DISCONNECT SWITCH PLATFORM
518 OF 565	S-5221	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER - DISCONNECT SWITCH PLATFORM (SHEET 1 OF 2)
519 OF 565	S-5222	STRUCTURAL - TYPICAL DETAILS - 6.9kV SIGNAL POWER - DISCONNECT SWITCH PLATFORM (SHEET 2 OF 2)
520 OF 565	S-5224	STRUCTURAL - TYPICAL DETAILS - LADDER DETAILS
521 OF 565	S-5225	STRUCTURAL - TYPICAL DETAILS - OPERATING ROD AND CONDUIT SUPPORT
522 OF 565	S-5228	STRUCTURAL - TYPICAL DETAILS - UNDER BRIDGE BRACKET ASSEMBLY (UBA-1)
523 OF 565	S-5229	STRUCTURAL - TYPICAL DETAILS - MISC STEEL DETAILS
524 OF 565	S-5230	STRUCTURAL - TYPICAL DETAILS - DOWNGUY SCHEDULE AND DETAILS
525 OF 565	S-5231	STRUCTURAL - TYPICAL DETAILS - DUAL SWITCH - SIGNAL POWER DISCONNECT ARRANGEMENT
526 OF 565	S-5232	STRUCTURAL - TYPICAL DETAILS - SIGNAL POWER - TRANSFORMERS PLATFORM
527 OF 565	S-5233	STRUCTURAL - TYPICAL DETAILS - TRANSFORMER PLATFORM - ASSEMBLY DETAILS (SHEET 1 OF 2)
528 OF 565	S-5234	STRUCTURAL - TYPICAL DETAILS - TRANSFORMER PLATFORM - ASSEMBLY DETAILS (SHEET 2 OF 2)
529 OF 565	S-5235	STRUCTURAL - TYPICAL DETAILS - SIGNAL POWER DISCONNECT SWITCH PLATFORM
530 OF 565	S-5236	STRUCTURAL - TYPICAL DETAILS - DISCONNECT SWITCH - PLATFORM ASSEMBLY DETAILS (SHEET 1 OF 2)
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532 OF 565	S-5239	TYPICAL DETAILS - SIGNAL POWER BRACKETS
533 OF 565	S-5240	TYPICAL DETAILS - UNDER BRIDGE SIGNAL POWER (UBSP)
534 OF 565	S-5401	STRUCTURAL - PAOLI SUBSTATION - STRUCTURAL PROPOSED PLAN
535 OF 565	S-5402	STRUCTURAL - PAOLI SUBSTATION - 138 kV GANTRY FRAMING ELEVATIONS
536 OF 565	S-5403	STRUCTURAL - PAOLI SUBSTATION - 138 kV GANTRY FOUNDATIONS (F6)
537 OF 565	S-5404	STRUCTURAL - PAOLI SUBSTATION - 138 kV GANTRY FRAMING SECTIONS & DETAILS (1 OF 3)
538 OF 565	S-5405	STRUCTURAL - PAOLI SUBSTATION - 138kV GANTRY FRAMING SECTIONS & DETAILS (2 OF 3)
539 OF 565	S-5406	STRUCTURAL - PAOLI SUBSTATION - 138kV GANTRY FRAMING SECTIONS & DETAILS (3 OF 3)
540 OF 565	S-5407	STRUCTURAL - PAOLI SUBSTATION - SIGNAL POWER STRUCTURE ELEVATIONS AND DETAILS
541 OF 565	S-5408	STRUCTURAL - PAOLI SUBSTATION - SIGNAL POWER HOUSE FOUNDATION PLANS AND SECTIONS
542 OF 565	S-5409	STRUCTURAL - PAOLI SUBSTATION - 138kV TIE-WRAP AROUND STRUCTURE
543 OF 565	S-5410	STRUCTURAL - PAOLI SUBSTATION - PECO TRANSFORMER FOUNDATION DETAILS
544 OF 565	S-5501	STRUCTURAL - 352 BREAKER INSTALLATION - PLANS, SECTIONS AND DETAILS
545 OF 565	S-5502	STRUCTURAL - 352 BREAKER INSTALLATION - PLANS, SECTIONS AND DETAILS
546 OF 565	S-5503	- EQUIPMENT MOUNTING DETAILS
547 OF 565	C-0200	TREE PRUNING - STA. 1075+00 TO 1046+00
548 OF 565	C-0201	TREE PRUNING - STA. 1046+00 TO 1015+45
549 OF 565	C-0202	TREE PRUNING - STA. 1015+45 TO 985+00
550 OF 565	C-0203	TREE PRUNING - STA. 985+00 TO 955+00
551 OF 565	C-0204	TREE PRUNING - STA. 955+00 TO 925+00
552 OF 565	C-0205	TREE PRUNING - STA. 925+00 TO 895+00
553 OF 565	C-0206	TREE PRUNING - STA. 895+00 TO 865+00
554 OF 565	C-0207	TREE PRUNING - STA. 865+00 TO 835+00
555 OF 565	C-0208	TREE PRUNING - STA. 835+00 TO 804+00
556 OF 565	C-0209	TREE PRUNING - STA. 804+00 TO 774+00
557 OF 565	C-0210	TREE PRUNING - STA. 774+00 TO 744+00
558 OF 565	C-0211	TREE PRUNING - STA. 744+00 TO 712+00
559 OF 565	C-0212	TREE PRUNING - STA. 712+00 TO 681+00
560 OF 565	C-0213	TREE PRUNING - STA. 681+00 to 650+00
561 OF 565	C-0214	TREE PRUNING - STA. 650+00 TO 619+00
562 OF 565	C-0215	TREE PRUNING - STA. 619+00 TO 588+00
563 OF 565	C-0216	TREE PRUNING - STA. 588+00 TO 556+65
564 OF 565	C-0217	TREE PRUNING - STA. 556+65 TO 526+00
565 OF 565	C-0232	TREE PRUNING - TYPICAL TREE PRUNING DETAIL

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OFFICE OF
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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
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

GENERAL DRAWINGS

INDEX OF DRAWINGS (SHEET 5 OF 5)

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ET-0005

DIVISION OF WORK AND MATERIALS

ITEM	DESCRIPTION	MATERIALS	FABRICATION	INSTALLATION
1.	INSTALL FOUNDATIONS FOR POLES AND DOWN GUY ANCHORS	C	C	C
2.	INSTALL TRANSMISSION/CATENARY POLES AND CROSS BEAMS	C	C	C
3.	STRING 138 kV CONDUCTORS AND STATIC (TEMP. DEADEND AT SP–16A, 52nd ST)	C	C	C
4.	REMOVE PECO FROM STRUCTURES	C/U	C	C/U
5.	INSTALL SIGNAL POWER CABLES	C	C	C
6.	INSTALL NEW FIBER OPTIC FROM PAOLI TO MALVERN	C	C	C
7.	INSTALL SIGNAL POWER CUT SECTIONS (6900/120V XFMR's)	C	C	C
8.	INSTALL SIGNAL POWER CUT SECTION CONTROLS AT INTERLOCKINGS	A	A	A
9.	INSTALL 352 BREAKERS AT STRAFFORD AND MALVERN	C	C	C
10.	TRANSFER OPGW (FOG) WIRE TO NEW STRUCTURES	C	C	C
11.	TRANSFER CATENARY SUPPORTS TO NEW STRUCTURES	A	A	A
12.	ADJUST CATENARY PROFILES AND RE–HANG CATENARY	A	A	A
13.	INSTALL PAOLI SUBSTATION FOUNDATIONS	C	C	C
14.	INSTALL PAOLI SUBSTATION STEEL	C	C	C
15.	INSTALL PAOLI 138 kV SWITCHES	C	C	C
16.	INSTALL PAOLI 138 kV CONDUCTORS	C	C	C
17.	INSTALL PAOLI NEW 60 HZ SERVICE	C/U	C	C/U
18.	INSTALL PAOLI SIGNAL POWER MG SET	C	C	C
19.	CUT OVER SIGNAL POWER (SEE SIGNAL POWER STAGING)	A	A	A
20.	CUT OVER 138 kV AT PAOLI, AND BRYN MAWR	A	A	A
21.	DEMOLISH AND REMOVE EXISTING CATENARY STRUCTURES	C	C	C

A – AMTRAK
C – CONTRACTOR
U – UTILITY

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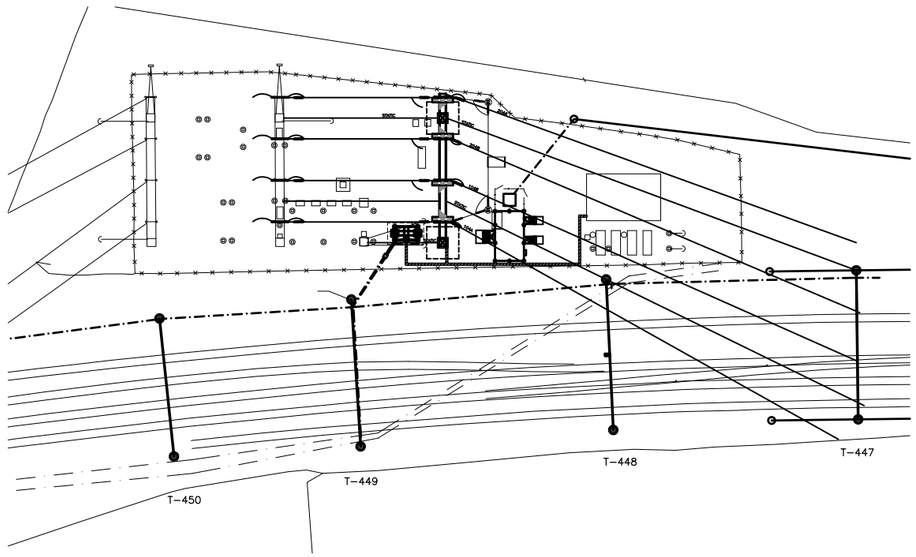
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
GENERAL DRAWINGS – DIVISION OF WORK
TRANSMISSION AND CATENARY

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PAOLI SUBSTATION

PAOLI SUBSTATION: DIVISION OF WORK AND MATERIALS

ITEM	DESCRIPTION	MATERIALS	FABRICATION	INSTALLATION
1.	INSTALL 138KV GANTRY FOUNDATIONS AND STEEL STRUCTURE.	C	C	C
2.	INSTALL 138KV SWITCHES.	C	C	C
3.	INSTALL CONTROL WIRING.	C	C	C
4.	INSTALL SIGNAL POWER, MOTOR–GENERATOR, ETC.	C	C	C
5.	CUT OVER 138KV CONDUCTORS.	A	A	A
6.	INSTALL NEW 60 HZ SERVICE.	C/U	C	C/U
7.				
8.				
9.				
10.				
11.				
12.				

A – AMTRAK
C – CONTRACTOR
U – UTILITY

1 / ET–0011 DIVISION OF WORK: PAOLI SUBSTATION
SCALE: NONE

NOTES:

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

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
GENERAL DRAWINGS – DIVISION OF WORK
PAOLI SUBSTATION

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ET–0011

ABBREVIATIONS

A	AMPERE, AMMETER
AB	AIR BREAK
AC	ALTERNATING CURRENT
AL	ALUMINUM
ANN	ANNUNCIATOR
AS	AMMETER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
B	BUS
BKR	BREAKER
℄	CENTERLINE
CANTIL.	CANTILEVER
CND, C	CONDUIT
CKT	CIRCUIT
CTB	CURRENT TEST BLOCK
CS	CONTROL SWITCH
CU.	COPPER
CUB	CUBIC
CW	CONTACT WIRE
C&S	COMMUNICATION & SIGNAL
DC	DIRECT CURRENT
DE	DEAD END
DEFL.	DEFLECTOR ASSEMBLIES
DISC	DISCONNECT
DPDT	DOUBLE POLE DOUBLE THROW
DWG.	DRAWING
E	EAST
EBHS	EAST BOUND HOME SIGNAL
EL., ELEV	ELEVATION
ET	ELECTRIC TRACTION
EXIST.	EXISTING
F	FAHRENHEIT, FEEDER
FD	FIRE/SMOKE DETECTOR
FRE	FIBERGLASS REINFORCED EPOXY
FS	FAR SIDE
FT	FEET
FTAB	FULL TENSION AIR BREAK
FU	FUSE
FUT	FUTURE
GALV.	GALVANIZED
GEN, G	GENERATOR
GND, GRD	GROUND
GRS	GALVANIZED RIGID STEEL
HTAB	HALF TENSION AIR BREAK
HD	HARD DRAWN
HDG	HOT DIP GALVANIZED
HP	HORSEPOWER
HSSI	HIGH SPEED SECTION INSULATOR
HS	HIGH STRENGTH
HT.	HEIGHT
HTR	HEATER
HZ	HERTZ
IC	INTERRUPTING CAPACITY
IL	INTERLOCKING LIGHTING
ISC	INTERRUPTING & SHORT CURRENT RATING
JB	JUNCTION BOX
KV	KILOVOLT
KW	KILOWATT
KVA	KILOVOLT–AMPERE
LA	SURGE/LIGHTNING ARRESTER
LBS	POUND
LG	LONG
LO	LOCKOUT
LOC	LOCATION
LS	LIMIT SWITCH
LV	LOW VOLTAGE
MAX.	MAXIMUM
MCM, KCMIL	THOUSAND CIRCULAR MILLS
MH	MANHOLE
MIN.	MINIMUM
ML	MAINLINE
MP	MILE POST

ABBREVIATIONS (CONTINUED)

M.G.	MOTOR GENERATOR
MS	MOTOR STARTER
MOD	MOTOR OPERATED DISCONNECT
MV	MEDIUM VOLTAGE
NTS	NOT TO SCALE
NIC	NOT IN CONTRACT
N.C.	NORMALLY–CLOSED
NEG, N	NEGATIVE
NEUT	NEUTRAL
NG	NATURAL GAS
N.O.	NORMALLY–OPEN
NS	NEAR SIDE
OCS	OVERHEAD CONTACT SYSTEM
O.H.	OVERHEAD
OOR	OUT OF RUNNING
OOS	OUT OF SERVICE
P	POLE
PB	PULL BOX, PUSH BOTTON
PDS	POWER DISTRIBUTION SYSTEM
PL.	PLATE
PNL	PANEL
PO	PULL OFF
POP	PULL OFF POLE
PORC.	PORCELAIN
POS, P	POSITIVE
PR	POINT OF RISE
PS	POINT OF SWITCH
PSI	POUND PER SQUARE INCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
QTY.	QUANTITY
REF.	REFERENCE
REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
ROW	RIGHT OF WAY
SED	STRUCTURE ERECTION DIAGRAM
SHP	SWITCH HEATER PANEL
SHUS	SWITCH HEATER UNIT SUBSTATION
SIG	SIGNAL
SPCS	SIGNAL POWER CUT SECTION
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
STA.	STATION
STD.	STANDARD
STR.	STRUCTURE
SW	SWITCH
SWGR	SWITCHGEAR
T	TROLLEY
TB	TERMINAL CABLE
TBR	TO BE REMOVED
TC	TEL CABLE
THR'D	THREADED
T/F	TOP OF FOUNDATION
T.O.	TURNOUT
TP	TRACTION POWER
T/R	TOP OF RAIL
TRK.	TRACK
TS	TEST SWITCH
TYP.	TYPICAL
UG	UNDERGROUND
V	VOLT, VOLTMETER
VA	VOLT–AMPERE
VT	VOLT TRANSFORMER
W	WEST, WIRE
WBHS	WEST BOUND HOME SIGNAL
W/	WITH
W/O	WITHOUT
W/R	WIRE RUN
X, XFMR	TRANSFORMER
X/O	CROSS OVER
X/O TRK	CROSS OVER TRACK
#	POUND

GENERAL LEGEND

- EXISTING
- NEW
- PROPERTY OR R.O.W. LINE
- UNDERGROUND CONDUITS OR DUCTBANK
- OVERHEAD WIRES
- UNDERGROUND ELECTRICAL
- PROPOSED FENCELINE
- REFERENCE (A/B) — A– DETAIL/REFERENCE, b– SHEET #
- SECTION CUT (A/B) — A– DETAIL/REFERENCE, b– SHEET #

CATENARY LEGEND

- SECTION BREAK
- IN–LINE INSULATOR
- DEAD END ASSEMBLY
- TRACK ℄
- DE–ENERGIZED WIRE
- ENERGIZED WIRE–TRACK O/S
- WIRE DEAD END
- GROUND
- IN–LINE INSULATORS
- IN–LINE INSULATORS WITH AIR GAP
- CROSS TRACK FEEDER
- CROSS CATENARY STRUCTURE
- K–FRAME PORTAL STRUCTURE
- HSSI — HIGH SPEED SECTION INSULATOR
- FULL TENSION AIR BREAK
- HALF TENSION AIR BREAK
- OUT OF RIDING WIRE
- STRUCTURES TO BE MODIFIED OR DEMOLISHED.
- PLAIN SIDE / RIGHT OF WAY SIDE (R) / TRACK SIDE (T) / STEP SIDE (P, S)
- ANCHOR

ELECTRICAL LEGEND

SINGLE–LINE DIAGRAMS

- MEDIUM–VOLTAGE MOTOR–OPERATED SWITCH NORMALLY CLOSED
- MEDIUM–VOLTAGE MOTOR–OPERATED SWITCH NORMALLY OPEN
- MEDIUM–VOLTAGE HAND–OPERATED SWITCH NORMALLY CLOSED
- MEDIUM–VOLTAGE HAND–OPERATED SWITCH NORMALLY OPEN
- 52 OR — MEDIUM–VOLTAGE CIRCUIT BREAKER
- MEDIUM–VOLTAGE DRAWOUT CIRCUIT BREAKER
- LOW–VOLTAGE DRAWOUT CIRCUIT BREAKER
- LOW–VOLTAGE CIRCUIT BREAKER
- LOW–VOLTAGE ENCLOSED CIRCUIT BREAKER
- AUTOMATIC TRANSFER SWITCH (ATS)
- OR — DISCONNECT SWITCH / KNIFE BLADE DISCONNECT SWITCH
- 112.5KVA, 480V, 208/120V — TRANSFORMER, DELTA PRIMARY, WYE SECONDARY
- CONV. — CONVERTER
- MS — SYNCHRONOUS MOTOR STARTER
- FUSED SWITCH
- OR — FUSE
- SPARK GAP SURGE ARRESTOR
- METAL OXIDE VARISTOR (MOV) SURGE ARRESTOR
- GROUND
- Z — IMPEDANCE BOND
- M — MOTOR
- G — GENERATOR
- MOTOR STARTER
- OR — CABLE TERMINATION
- SEPARABLE CONNECTOR
- BATTERY
- DC SHUNT
- ELECTRIC UTILITY CONNECTION
- SPCS — SIGNAL POWER CUT SECTION

ELECTRICAL LEGEND

TWO–LINE DIAGRAMS

- MEDIUM–VOLTAGE TWO–POLE MOTOR–OPERATED HORN–GAP LINE AND GROUND SWITCH
- MEDIUM–VOLTAGE TWO–POLE HAND–OPERATED SWITCH
- OR — MEDIUM–VOLTAGE TWO–POLE CIRCUIT BREAKER
- TRANSFORMER / POTENTIAL TRANSFORMER
- LOW–VOLTAGE TWO–POLE CIRCUIT BREAKER

RELAYING, CONTROL AND INSTRUMENTATION DIAGRAMS

- 50 — RELAY OPERATING COIL NUMBER DESIGNATES RELAY TYPE
- SUPERVISORY RELAY
- FUNCTIONAL INTERCONNECTION AMONG CONTROL, PROTECTIVE, AND POWER DEVICES (ARROW DENOTES DIRECTION OF CONTROL)
- TD — TEST DEVICE
- TRIP — CONTROL LINE INTERCONECTION
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- V VM — VOLTMETER
- VS — VOLTMETER SWITCH
- A AM — AMMETER
- –K– — KEY INTERLOCK
- –E– — ELECTRICAL INTERLOCK
- R — INDICATING LIGHT: R–RED, G–GREEN, A–AMBER, W–WHITE, C–CLEAR, B–BLUE
- CONTACTOR (N.O.)
- CONTACTOR (N.C.)
- MOMENTARY PUSHBUTTON
- DIODE
- PILOT LIGHT
- RES OR — RESISTOR
- RESISTIVE HEATER
- GROUND DETECTOR
- LIMIT SWITCH (N.O.)
- NOTC — NORMALLY OPEN TIMEDELAY CLOSE CONTACTOR
- NCTO — NORMALLY CLOSE TIMEDELAY OPEN CONTACTOR

ELECTRICAL LEGEND

PLAN SYMBOLS

- LIGHTING FIXTURE
- LOW–VOLTAGE PANELBOARD
- LIGHTNING MAST

ANNOTATION

- XX — CABLE #
- 2–750kCMIL — QUANTITY AND SIZE OF CABLES
- SINGLE CONDUCTOR WIRING IN PANELS
- MULTI–CONDUCTOR CABLES TO OTHER DEVICES

GENERAL NOTES

1. PERFORM WORK IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL CODES AND REGULATIONS PERTAINING TO THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970. PERFORM WORK IN ACCORDANCE WITH THE NATIONAL RAILROAD PASSENGER CORPORATION'S (AMTRAK'S) SPECIFICATIONS REGARDING SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY (LATEST VERSION).
2. EXAMINE THE SITE AND VERIFY CONTROLLING PHYSICAL CONDITIONS, CONSTRUCTION DATA AND UTILITIES.
3. BRING TO THE ATTENTION OF THE ENGINEER ANY DISCREPANCIES WITHIN THE DRAWINGS, SPECIFICATIONS, CODES OR STANDARDS FOR CORRECTIVE ACTION PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. FIELD CHANGES TO THE STRUCTURES REQUIRE PRIOR ENGINEERING REVIEW AND WRITTEN CONFIRMATION.
5. ALL CONSTRUCTION WORK SHALL BE PERFORMED BY QUALIFIED, EXPERIENCED PERSONNEL.
6. VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION. IF FIELD CONDITIONS PROHIBIT USE OF THE CONTRACT DRAWING DESIGN DETAILS, SUBMIT ALTERNATE DESIGN DETAILS FOR APPROVAL BY THE ENGINEER.
7. BEFORE COMMENCEMENT OF WORK, CONTRACTOR SHALL CONFIRM AND ESTABLISH WITH AMTRAK THE EXACT SEQUENCES AND PROCEDURES TO BE UTILIZED BASED ON MANPOWER, EQUIPMENT, MATERIAL AND TRACK AVAILABILITY.
8. CONTRACTOR SHALL PROTECT ALL EXISTING AMTRAK FACILITIES WHETHER EXPLICITLY SHOWN OR NOT.

DEVICE TABLE

21	DISTANCE RELAY
27	UNDERVOLTAGE RELAY
27C	UNDERVOLTAGE RELAY – LOW CONTROL POWER VOLTAGE
27B	UNDERVOLTAGE RELAY – DC CONTROL POWER OUTPUT FAILURE
27A	UNDERVOLTAGE RELAY – BATTERY CHARGER AC INPUT FAILURE
47	PHASE BALANCE VOLTAGE RELAY
50	INSTANTANEOUS OVERCURRENT RELAY
51	TIME OVERCURRENT RELAY
52	AC CIRCUIT BREAKER
62	TIMING RELAY, JD BREAKER FAILURE
67	DIRECTIONAL OVERCURRENT RELAY
74	SUMMARY ALARM
86	LOCKOUT RELAY
87	DIFFERENTIAL RELAY
94	ANTIPUMPING RELAY
89	DISCONNECT SWITCH
AM	AMMETER
VM	VOLT METER
FM	FREQUENCY METER
LB	BUS SIDE DISCONNECT
LC	LINESIDE CABLE DISCONNECT
T	TROLLEY/TRANSFORMER
F	FEEDER
B	BUS
R	RAIL/RETURN

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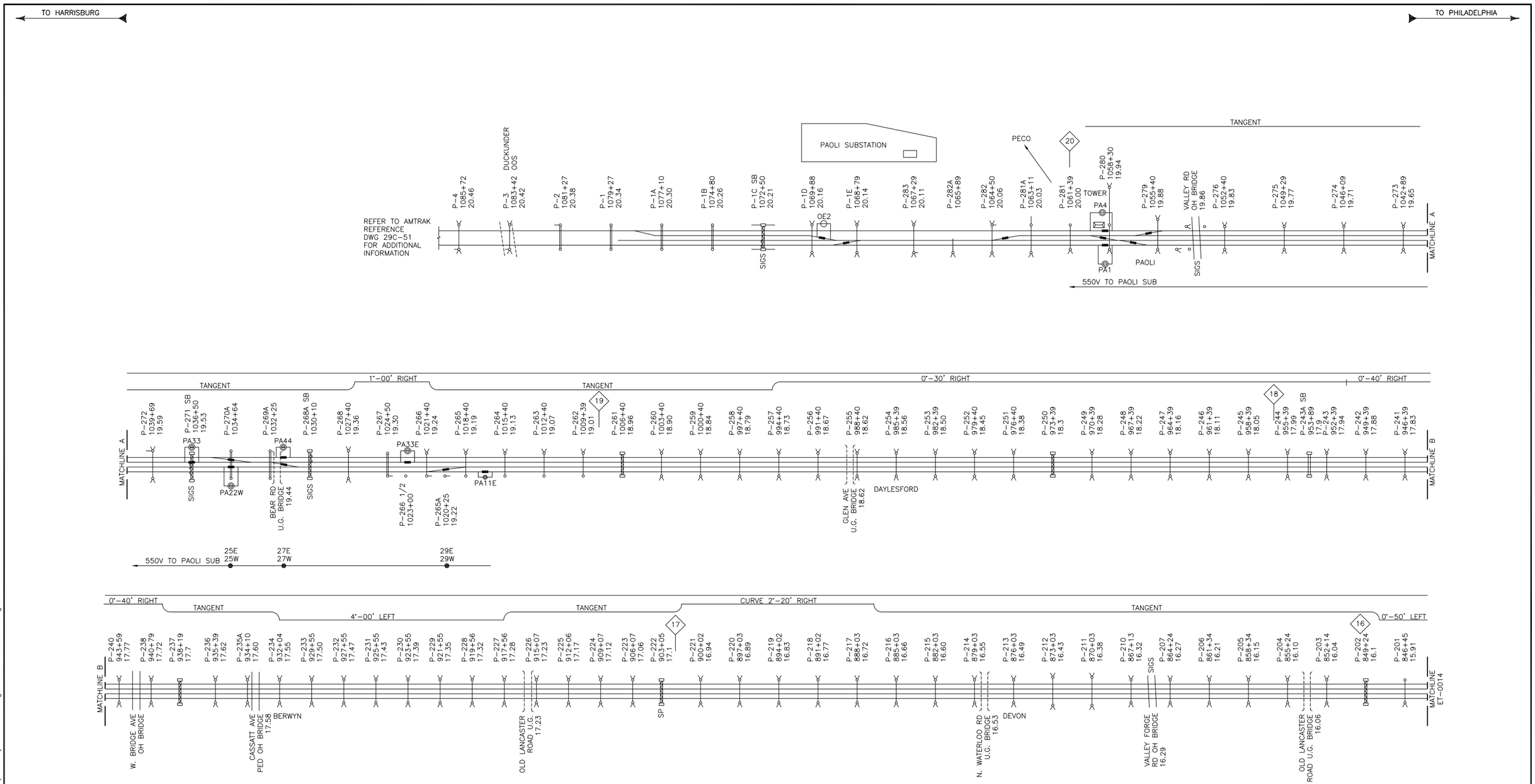
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
GENERAL DRAWINGS
GENERAL NOTES, LEGEND AND ABBREVIATIONS

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

File No.:	2011–059–ET–0012.DWG
Ref. No.:	2011–059
Sheet No:	009 OF 565

ET–0012

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EXISTING PLAN OF CONSTRUCTION

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

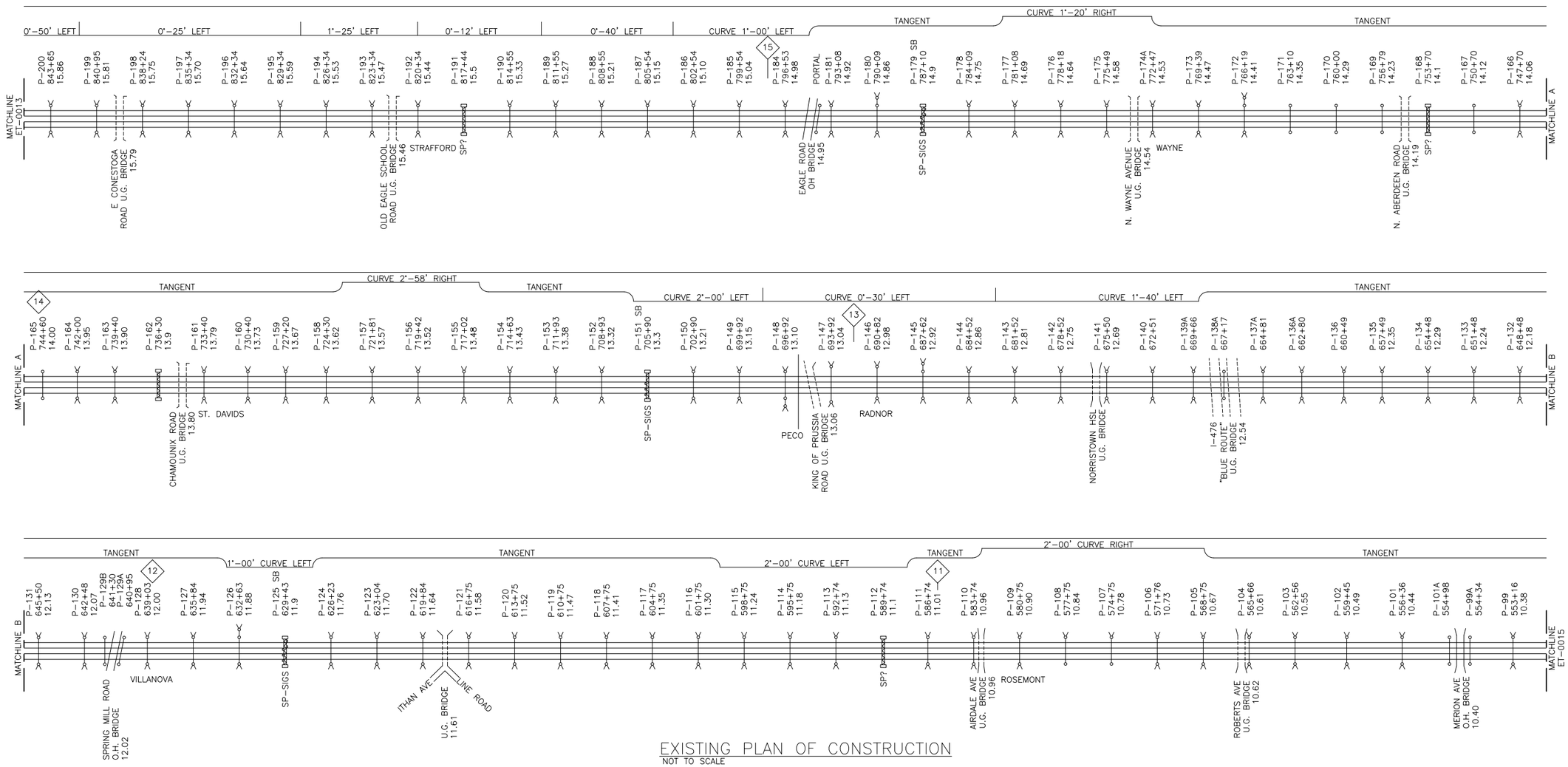
EXISTING PLAN OF CONSTRUCTION
SHEET 1 OF 4

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

File No.:	2011-059-ET-0013.DWG
Ref. No.:	2011-059
Sheet No:	010 OF 565

ET-0013

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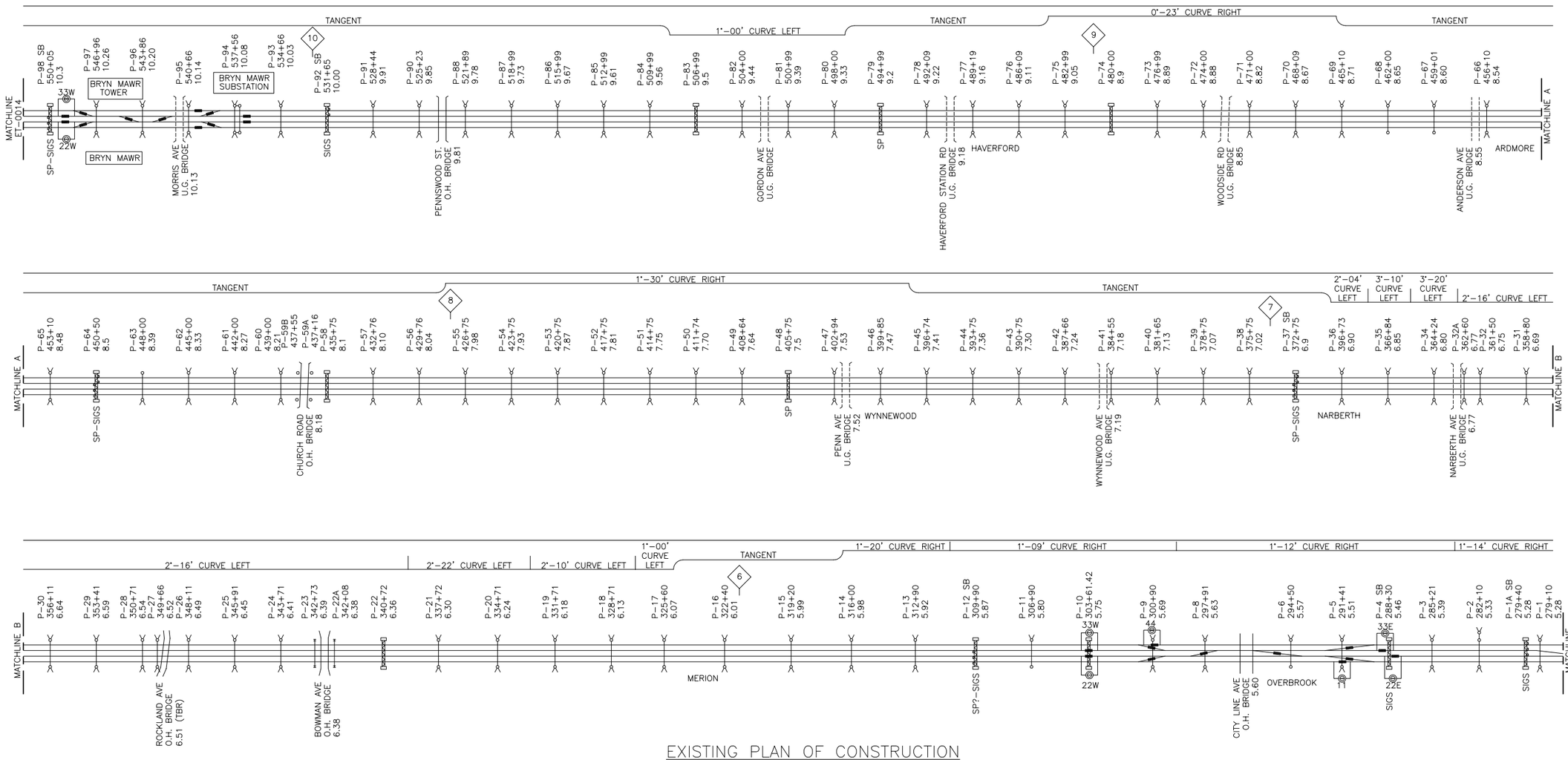
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
EXISTING PLAN OF CONSTRUCTION
SHEET 2 OF 4

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

File No.:	2011-059-ET-0014.DWG
Ref. No.:	2011–059
Sheet No:	011 OF 565

ET–0014

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
EXISTING PLAN OF CONSTRUCTION
SHEET 3 OF 4

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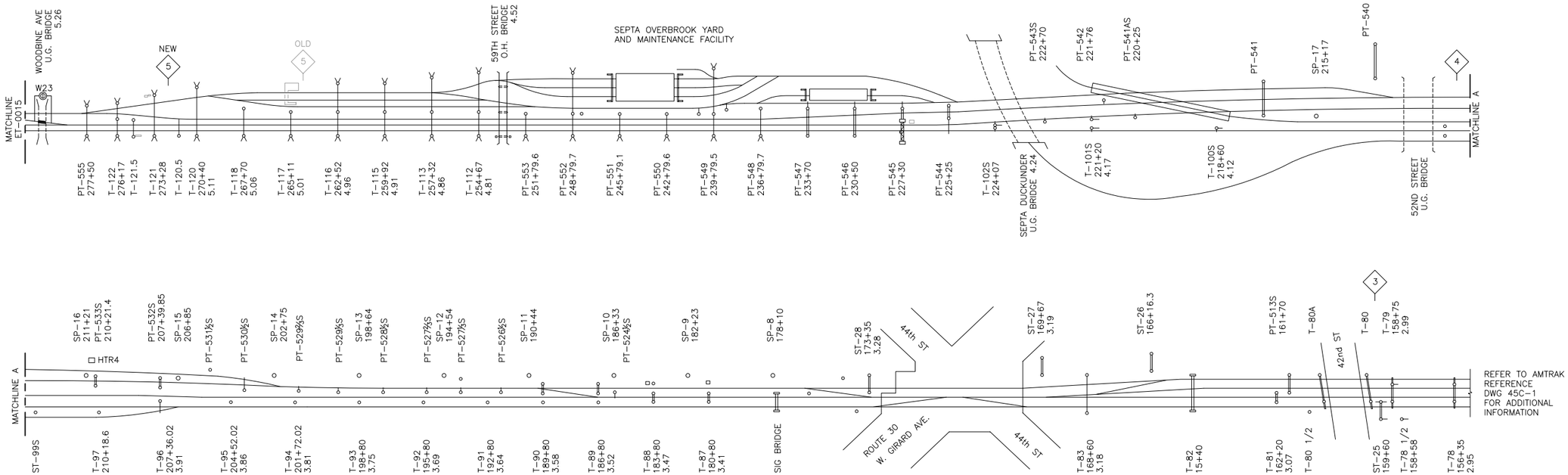
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Ref. No.:	2011–059
Sheet No:	012 OF 565

ET–0015

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TO HARRISBURG

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
EXISTING PLAN OF CONSTRUCTION
SHEET 4 OF 4

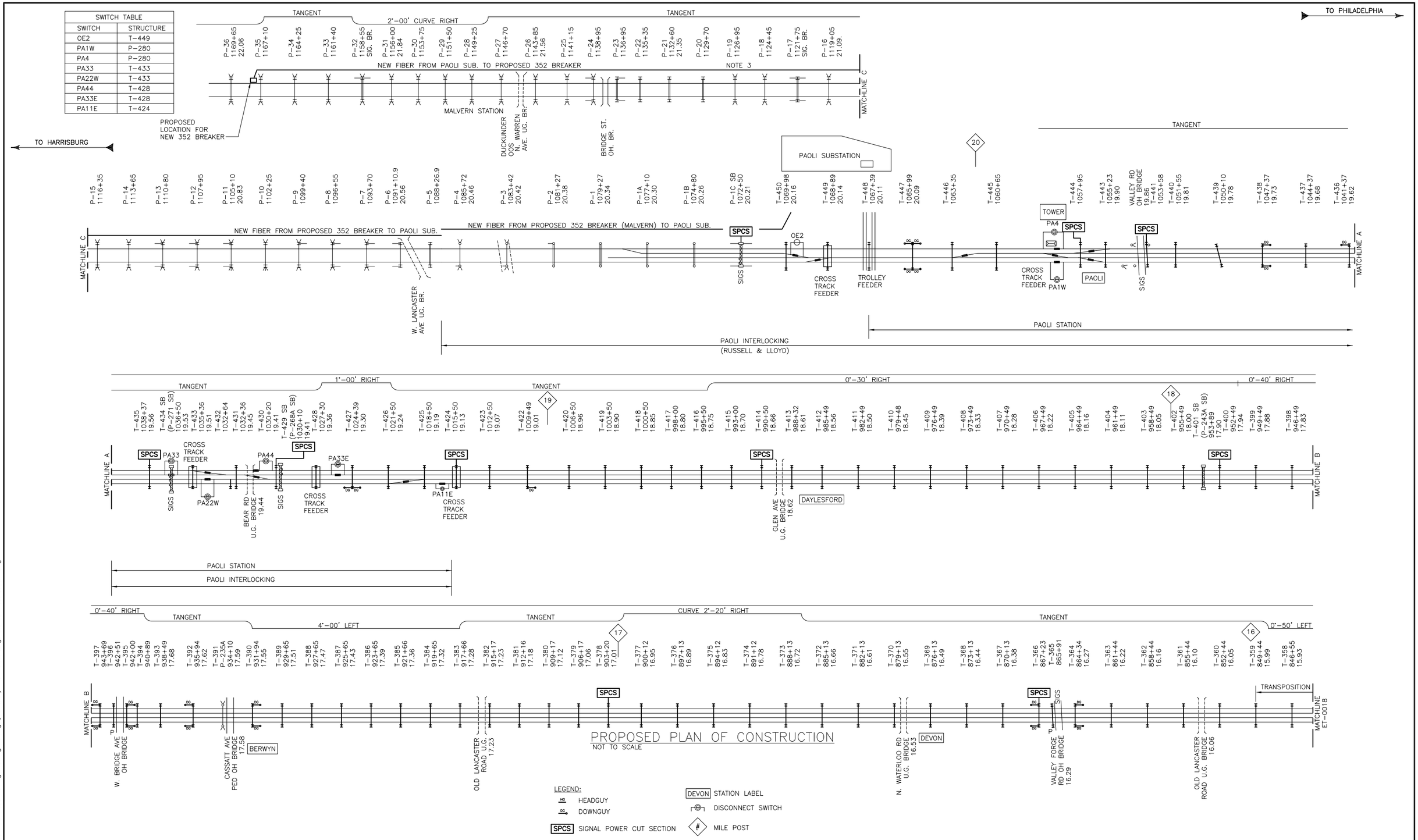
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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Ref. No.:	2011-059
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ET-0016

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SWITCH TABLE	
SWITCH	STRUCTURE
OE2	T-449
PA1W	P-280
PA4	P-280
PA33	T-433
PA22W	T-433
PA44	T-428
PA33E	T-428
PA11E	T-424



PROPOSED PLAN OF CONSTRUCTION
NOT TO SCALE

LEGEND:
- HG HEADGUY
- DG DOWNGUY
- SPCS SIGNAL POWER CUT SECTION
- DEVON STATION LABEL
- DISCONNECT SWITCH
- # MILE POST

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PROPOSED PLAN OF CONSTRUCTION
SHEET 1 OF 4

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

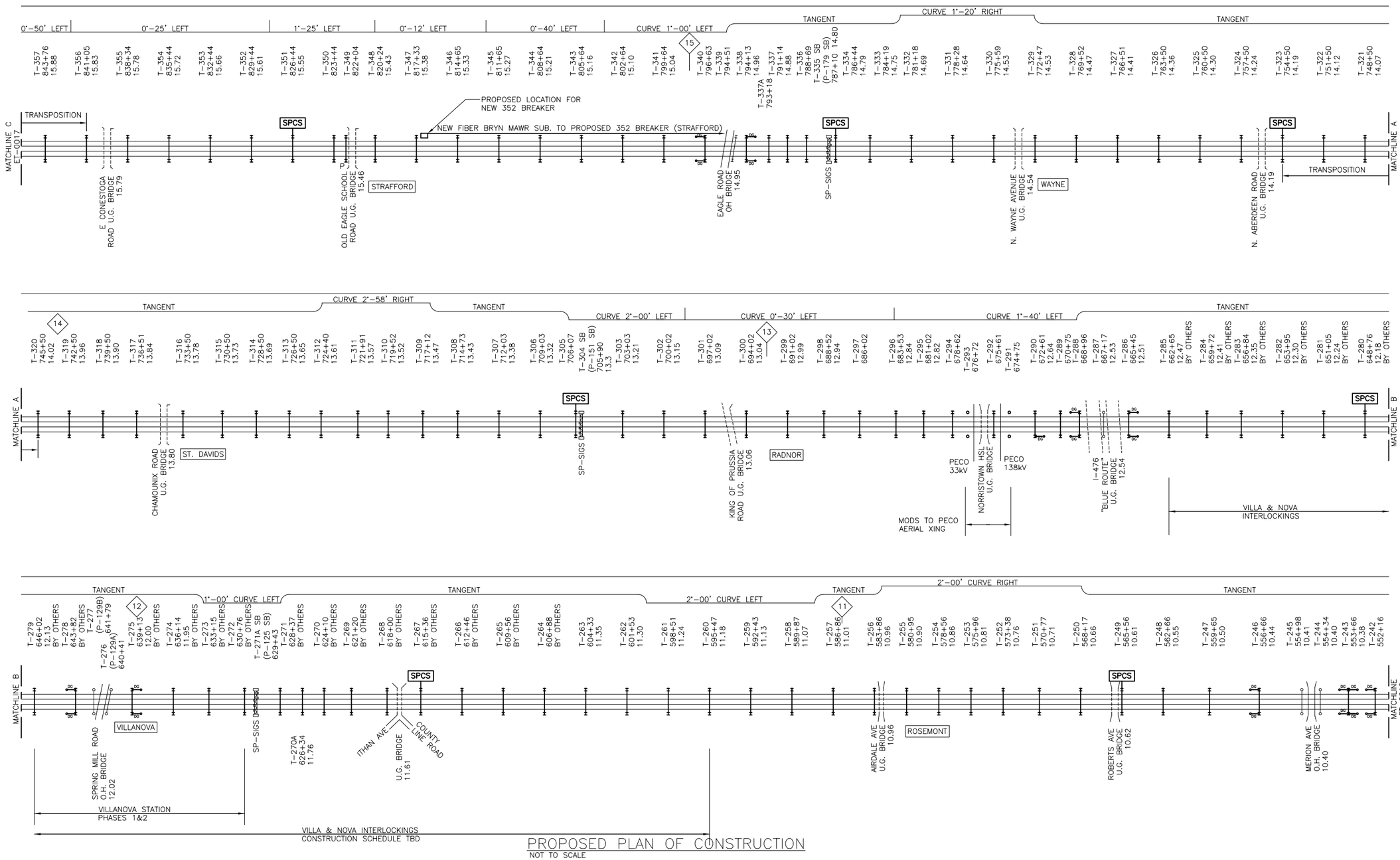
File No.:	2011-059-ET-0017.DWG
Ref. No.:	2011-059
Sheet No:	014 OF 565

ET-0017

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PROPOSED PLAN OF CONSTRUCTION

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ELECTRIFICATION
PROPOSED PLAN OF CONSTRUCTION
SHEET 2 OF 4

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

File No.:	2011-059-ET-0018.DWG
Ref. No.:	2011–059
Sheet No:	015 OF 565

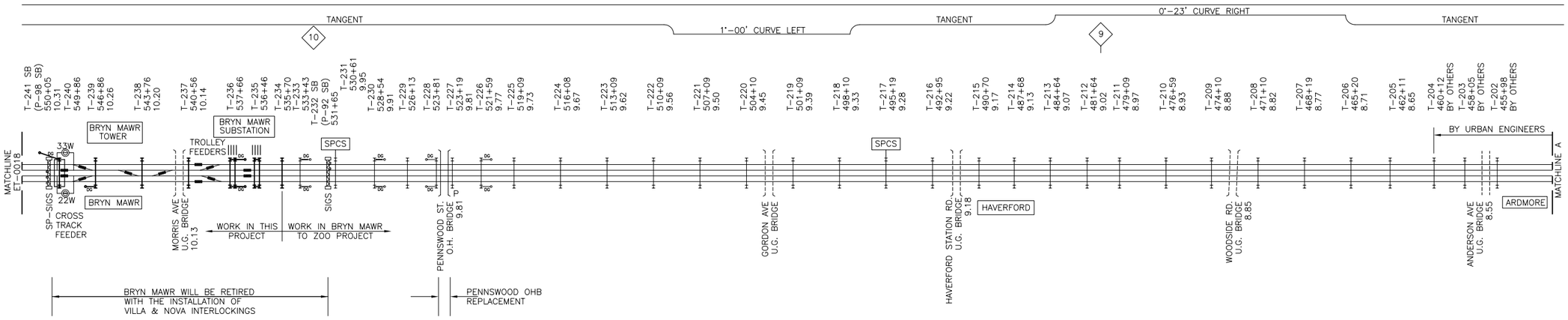
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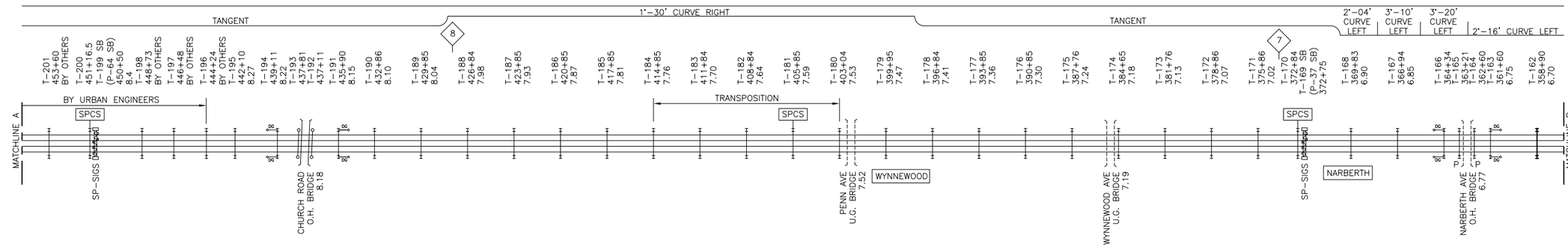
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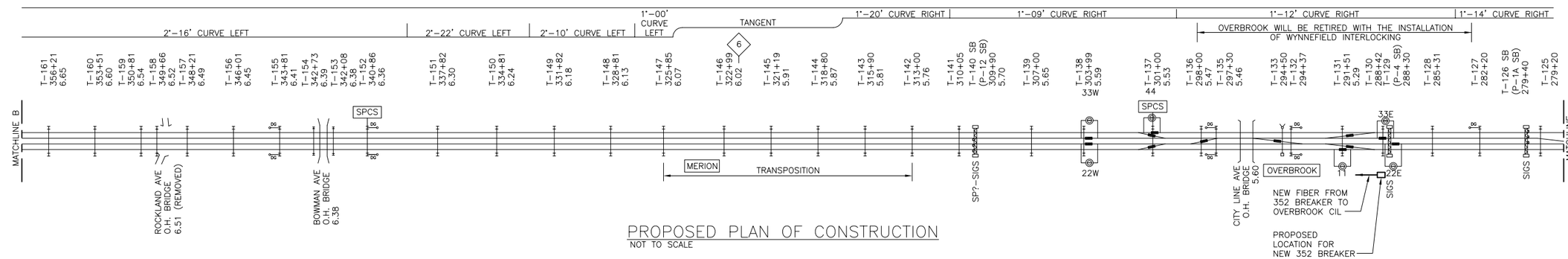
TO HARRISBURG

TO PHILADELPHIA

SWITCH TABLE	
SWITCH	STRUCTURE
33W	T–240
22W	T–240
33W	T–138
22W	T–138
44	T–137
11	T–131
33E	T–130
22E	T–130







PROPOSED PLAN OF CONSTRUCTION

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PROPOSED PLAN OF CONSTRUCTION SHEET 3 OF 4

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

File No.:	2011–059–ET–0019.DWG
Ref. No.:	2011–059
Sheet No:	016 OF 565

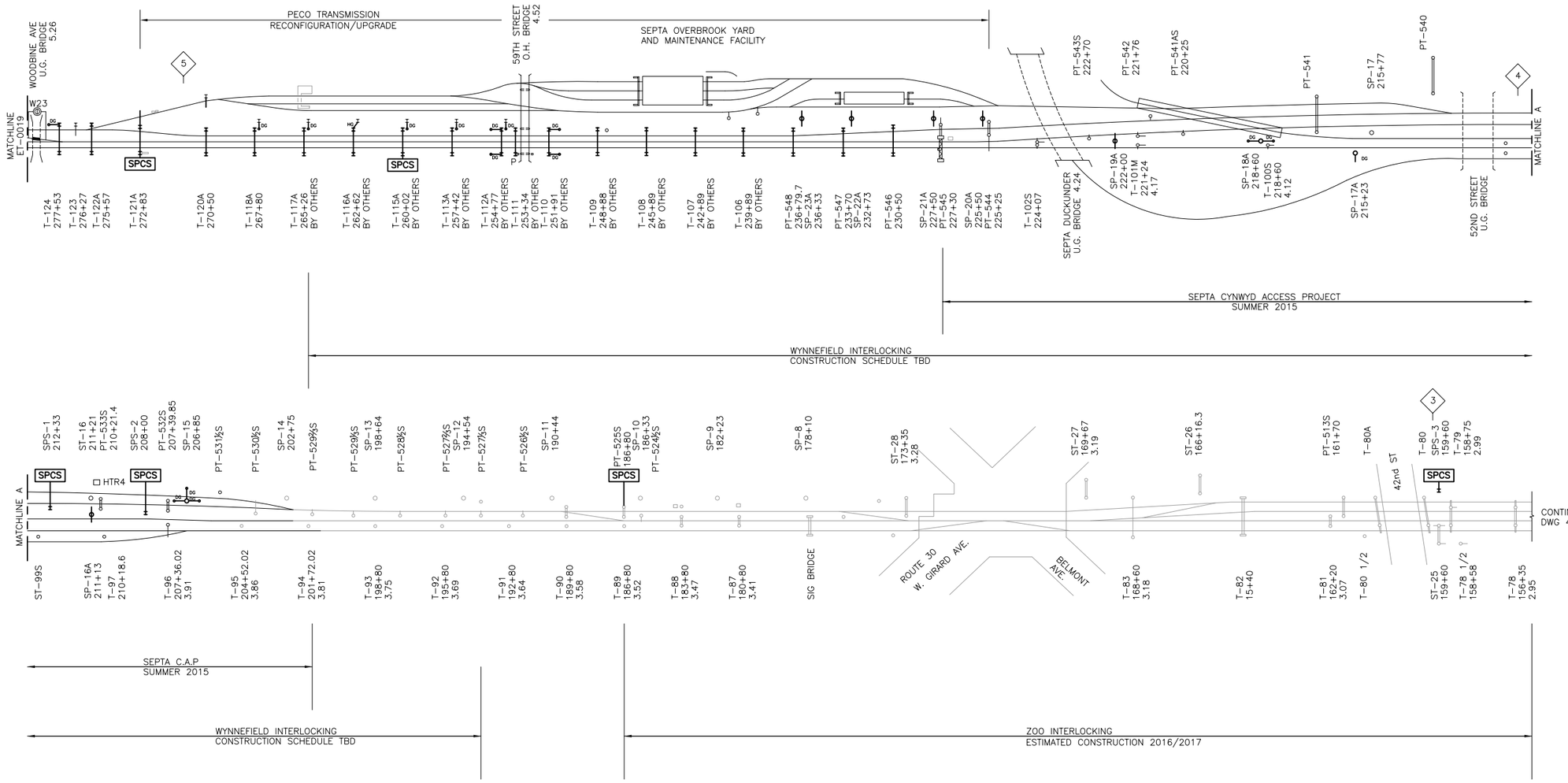
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TO HARRISBURG

TO PHILADELPHIA

SWITCH TABLE	
SWITCH	STRUCTURE
W23	T–124



PROPOSED PLAN OF CONSTRUCTION

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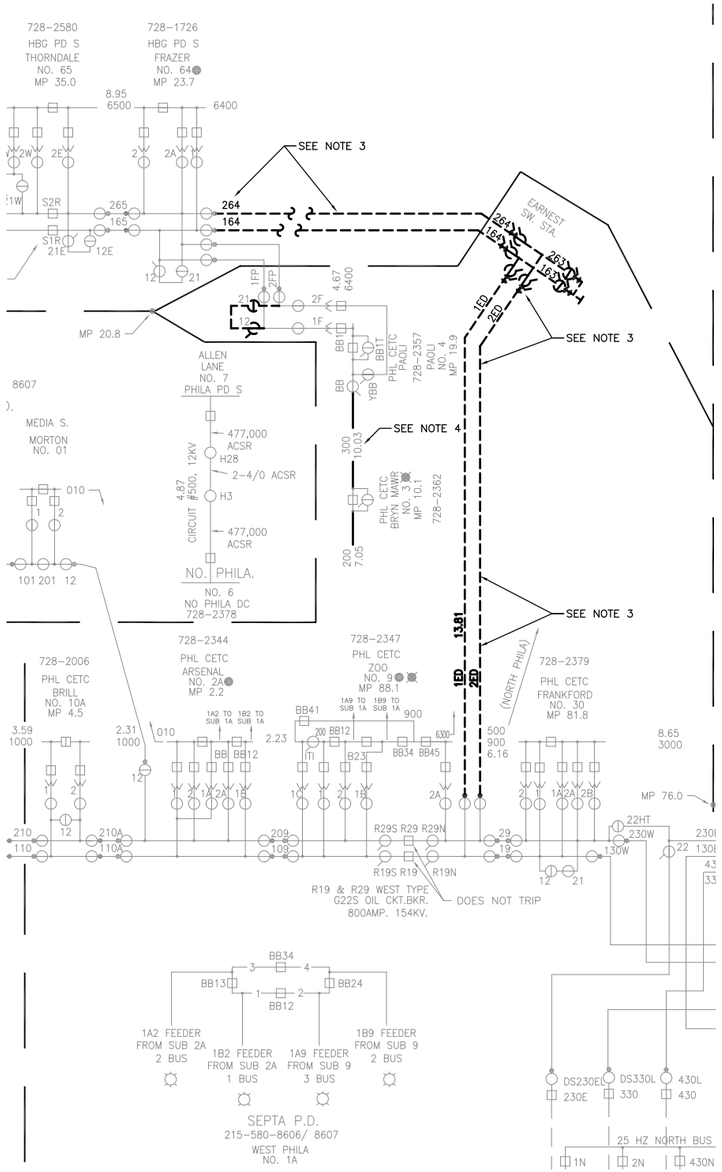
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
PROPOSED PLAN OF CONSTRUCTION
SHEET 4 OF 4

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

File No.:	2011–059–ET–0020.DWG
Ref. No.:	2011–059
Sheet No:	017 OF 565

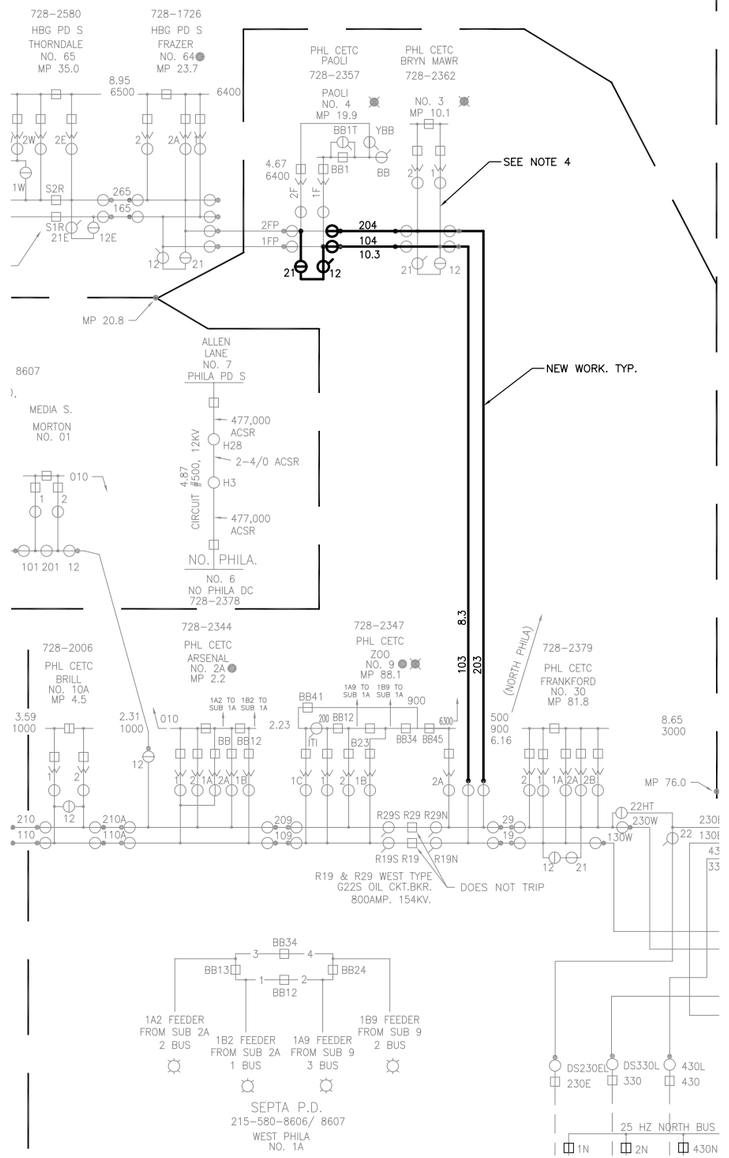
ET–0020

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1 ET-0021 138kV OPERATING SYSTEM -DEMOLITION

SCALE: NONE



2 ET-0021 138kV OPERATING SYSTEM - PROPOSED

SCALE: NONE

LEGEND:

PSE&G D.C.	= PUBLIC SERVICE ELECTRIC & GAS DIRECT CONTROL
SCADA	= SUPERVISORY CONTROL AND DATA ACQUISITION
CETC	= CENTRALIZED ELECTRIFICATION AND TRAFFIC CONTROL
PHL LD SCADA	= PHILADELPHIA LOAD DISPATCHER SCADA CONTROL
HBG PD S	= HARRISBURG POWER DIRECTOR OFFICE SUPERVISORY CONTROL
SAFE HARBOR DC	= SAFE HARBOR POWER COMPANY DIRECT CONTROL
PECO DC	= PECO ENERGY COMPANY DIRECT CONTROL

ALL OTHERS BY TOWERS AS INDICATED BY NAMES AND "S" ON DC

- SWITCH–NORMALLY CLOSED
- SWITCH–NORMALLY OPEN
- HAND OPERATED SWITCH
- LINE AND GROUND SWITCH
- CIRCUIT BREAKER–NORMALLY OPEN
- CIRCUIT BREAKER–NORMALLY CLOSED
- TRANSFORMER
- TRANSFORMER – NEUTRAL GROUND RESISTOR ON 138KV WINDING
- GENERATOR
- UNDERGROUND CABLES
- POTHEAD
- 100HZ SIG MG – 25HZ MOTOR
- 100HZ SIG MG – 60HZ MOTOR
- 91⅔ HZ SIG MG – 25HZ MOTOR
- 91⅔ HZ SIG MG – 60HZ MOTOR
- 100 HZ SOLID STATE SIGNAL CONVERTER –25HZ INPUT
- HAND OPERATED GROUND SWITCH
- BUS TIE

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. AMTRAK DRAWING 390–EE–96 SHALL BE REVISED FOLLOWING THE AS–BUILT PROCESS.
3. EXISTING CIRCUITS 264, 164, 1ED AND 2ED TO BE ABANDONED IN PLACE, EXCEPT AS SHOWN ON CONTRACT DOCUMENTS.
4. BRYN MAWR SUBSTATION 138kV ELECTRIFICATION IS PART OF ANOTHER CONTRACT AND SHALL BE READY FOR CONNECTION WITH THE PROPOSED ZOO TO PAOLI WORK.

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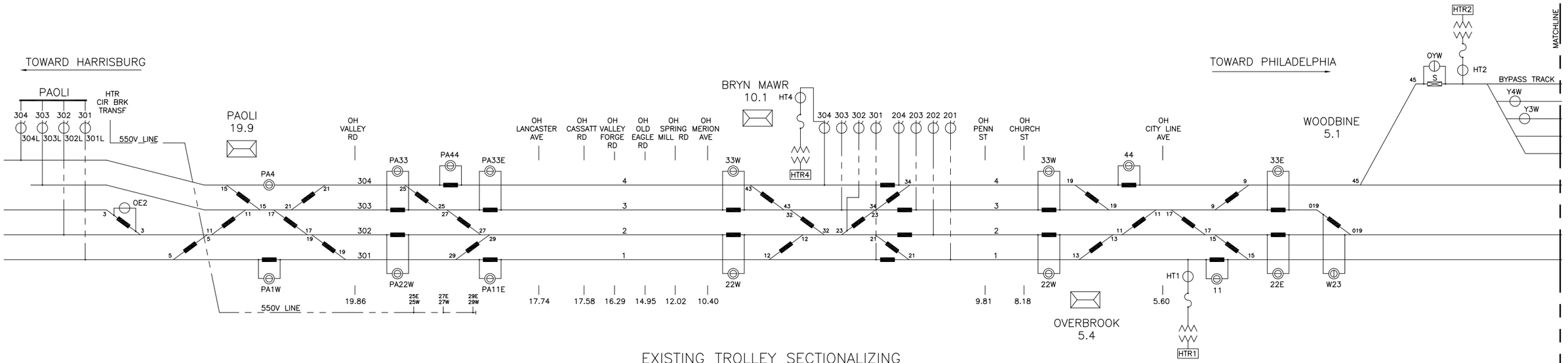
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERALL SYSTEM OPERATING DIAGRAM 138KV SYSTEM – EXISTING & PROPOSED

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

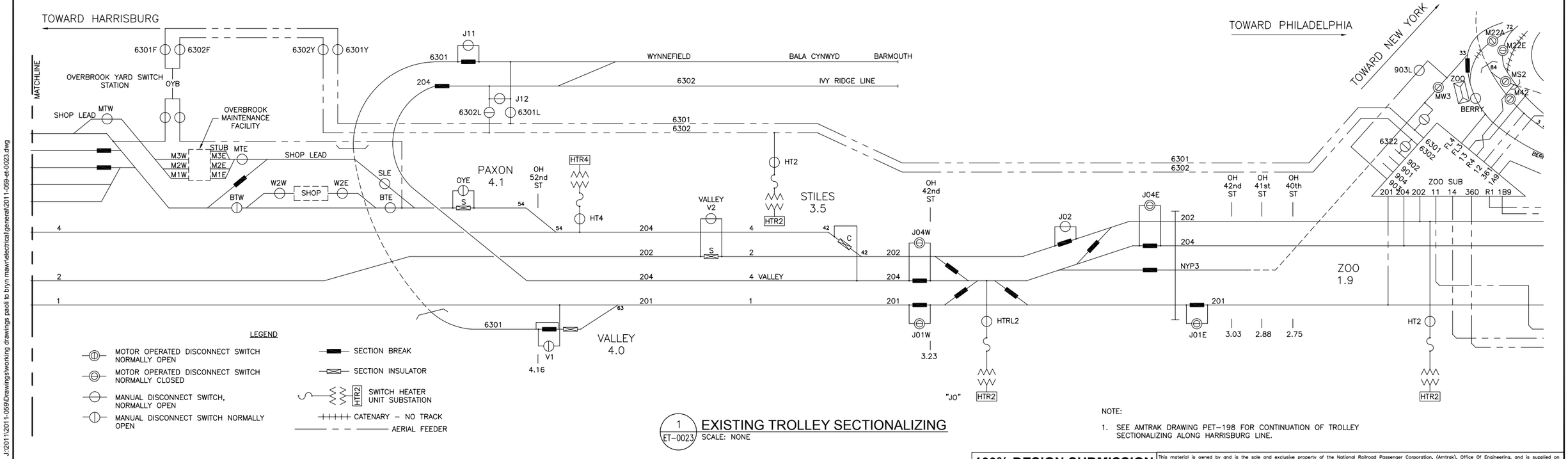
File No.:	2011–059–ET–0021.DWG
Ref. No.:	2011–059
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ET–0021

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EXISTING TROLLEY SECTIONALIZING



1 ET-0023 EXISTING TROLLEY SECTIONALIZING
SCALE: NONE

NOTE:

1. SEE AMTRAK DRAWING PET–198 FOR CONTINUATION OF TROLLEY SECTIONALIZING ALONG HARRISBURG LINE.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

OVERALL SYSTEM OPERATING DIAGRAM
TROLLEY SECTIONALIZING DIAGRAM – ZOO TO PAOLI

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

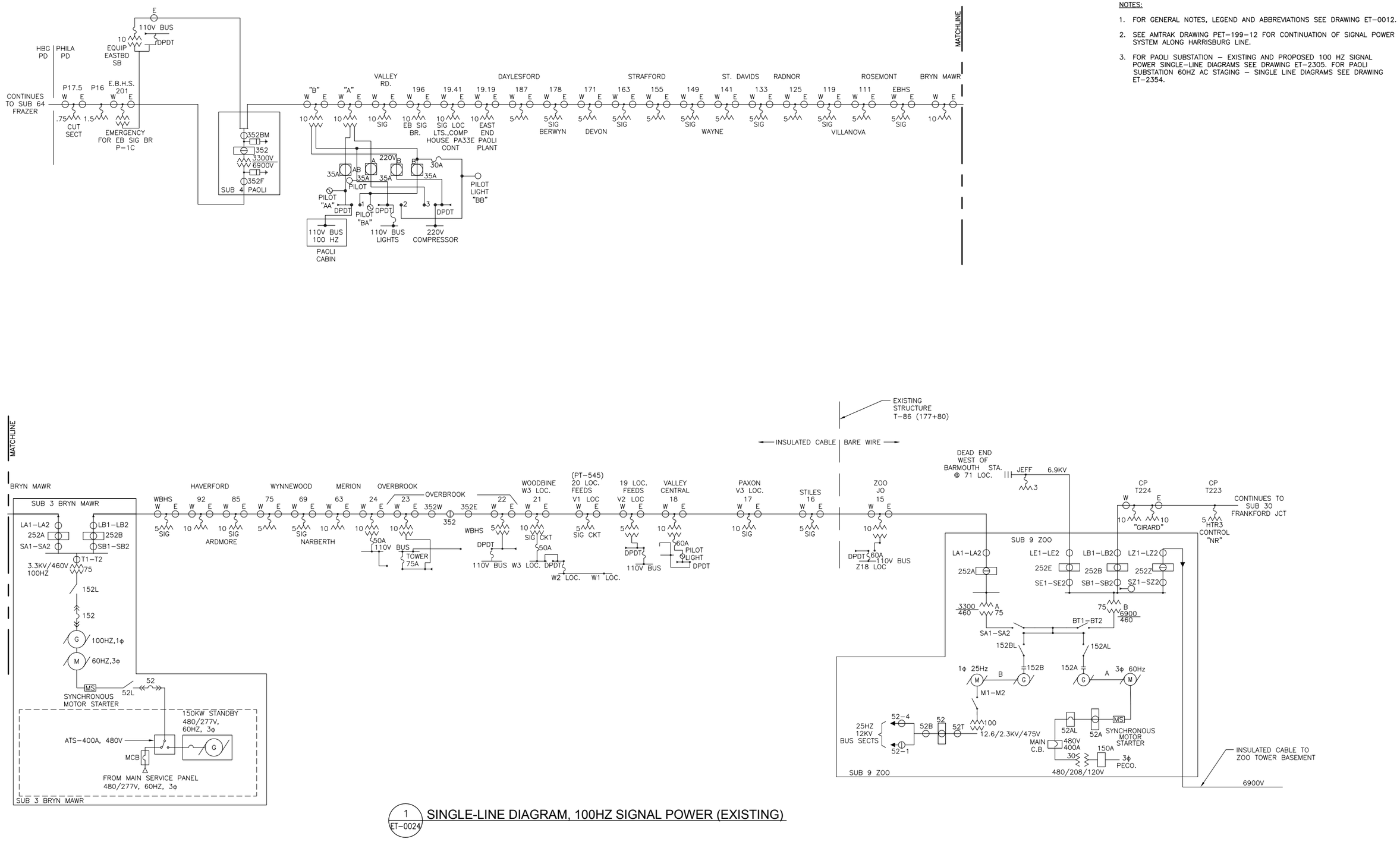
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ET–0023

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR PAOLI SUBSTATION – EXISTING AND PROPOSED 100 HZ SIGNAL POWER SINGLE–LINE DIAGRAMS SEE DRAWING ET–2305. FOR PAOLI SUBSTATION 60HZ AC STAGING – SINGLE LINE DIAGRAMS SEE DRAWING ET–2354.



1 ET–0024 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (EXISTING)

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERALL SYSTEM OPERATING DIAGRAM 100HZ SIGNAL POWER (EXISTING)

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

File No.:	2011–059–ET–0024.DWG
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ET–0024

3/14/2016 2:14:40 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\general\2011-059-ET-0024.dwg

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR 352 BREAKER INSTALLATION AT:
   3.1. OVERBROOK SEE SEE DRAWING ET–3201.
   3.2. STRAFFORD SEE DRAWING ET–3202.
   3.3. MALVERN SEE DRAWING ET–3203.
4. EXISTING OVERBROOK 352 BREAKER INSTALLATION SHALL BE REPLACED.
5. FOR PAOLI SUBSTATION – EXISTING AND PROPOSED 100 HZ SIGNAL POWER SINGLE–LINE DIAGRAMS SEE DRAWING ET–2305. FOR PAOLI SUBSTATION 60HZ AC STAGING – SINGLE LINE DIAGRAMS SEE DRAWING ET–2354.

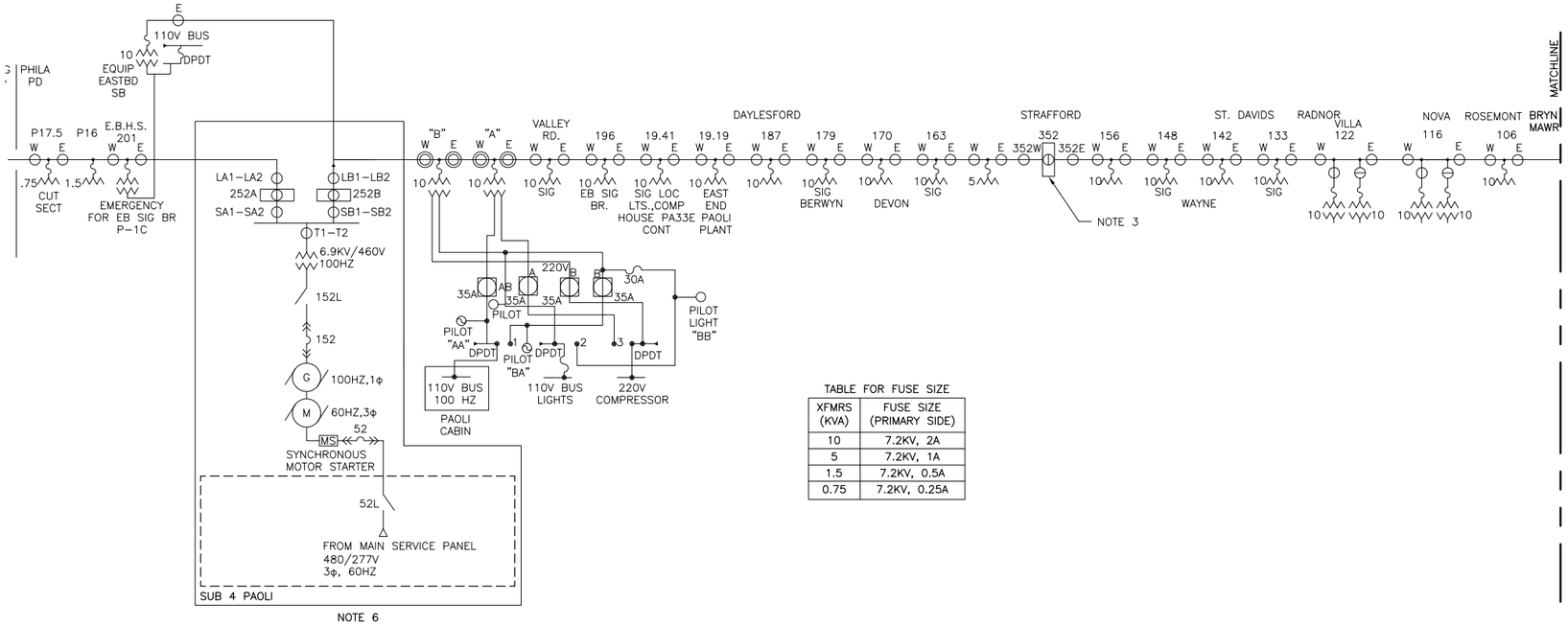
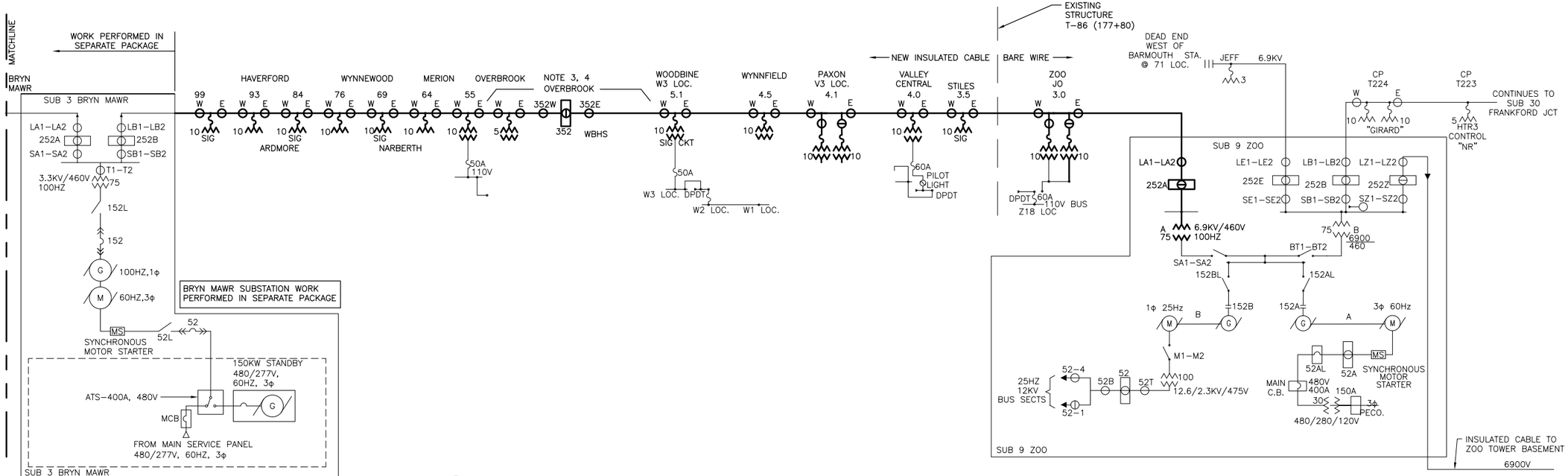


TABLE FOR FUSE SIZE

XFMRS (KVA)	FUSE SIZE (PRIMARY SIDE)
10	7.2KV, 2A
5	7.2KV, 1A
1.5	7.2KV, 0.5A
0.75	7.2KV, 0.25A



1 ET–0025 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (PROPOSED)

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERALL SYSTEM OPERATING DIAGRAM 100HZ SIGNAL POWER (PROPOSED)

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

File No.:	2011–059–ET–0025.DWG
Ref. No.:	2011–059
Sheet No:	021 OF 565

ET–0025

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NOTES:

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

138kV CLEARANCE CHART

No.	CLEARANCE CHART	AMTRAK		NESC MINIMUM	PROJECT MINIMUM	NOTE
		STANDARD	MINIMUM			
1	LINE SWITCH, POLE TO NEAREST POLE OF ANOTHER LINE SWITCH.	24'–0"	20'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
2	LINE SWITCH, POLE TO POLE OF SAME SWITCH.	24'–0"	20'–0"	–	24'–0"	–
3	LINE TIE SWITCH, POLE TO POLE OF SAME SWITCH.	24'–0"	20'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
4	TRANSFORMER SWITCH, POLE TO POLE OF SAME SWITCH.	18'–0"	18'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
5	CIRCUIT BREAKER ISOLATING SWITCH, POLE TO POLE OF SAME OR ANOTHER SWITCH.	18'–0"	18'–0"	5'–7"	N/A	NESC TABLE 235–1, 144KV
6	CONDUCTORS, SAME POLARITIES OF DIFFERENT CIRCUITS.	16'–0"	15'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
7	CONDUCTORS, OPPOSITE POLARITIES OF SAME CIRCUIT.	18'–0"	16'–0"	5'–0"	18'–0"	NESC TABLE 235–6, 144KV
8	CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED.	5'–0"	5'–0"	2'–6"	5'–0"	NESC TABLE 235–6
9	CONDUCTOR TO STEEL STRUCTURE, CROSSING.	8'–0"	6'–0"	4'–8"	10'–0"	NESC TABLE 234–1, 144KV
10	CONDUCTOR TO STEEL STRUCTURE, PARALLEL.	10'–0"	8'–0"	4'–8"	N/A	NESC TABLE 234–1, 144KV
11	CONDUCTORS CROSSING, OPPOSITE POLARITIES.	16'–0"	14'–0"	5'–0"	25'–0"	NESC TABLE 235–6, 144KV
12	CONDUCTOR TO FACE OF CLIFF.	30'–0"	20'–0"	–	N/A	–

12kV CLEARANCE CHART

No.	CLEARANCE CHART	AMTRAK		NESC MINIMUM	PROJECT MINIMUM	NOTE
		STANDARD	MINIMUM			
1	TROLLEY CIRCUIT BREAKERS, CENTER TO CENTER.	9'	–	3'–6"	9'–0"	HORIZONTAL CLEARANCE BETWEEN LIVE PARTS, NESC TABLE 124–1
2	SWITCH POLES BETWEEN TROLLEY CIRCUIT BREAKERS AND BUS TO PARALLEL CONDUCTOR OF SAME CIRCUIT.	3'	–	1'–2"	3'–0"	NESC TABLE 235–1, 12KV
3	SWITCH POLES BETWEEN TROLLEY CIRCUIT BREAKERS AND BUS TO PARALLEL CONDUCTOR OF ANOTHER CIRCUIT.	6'	–	1'–2"	6'–0"	NESC TABLE 235–1, 12KV
4	SWITCH POLES, FOR TROLLEY FEEDERS, POLE TO POLE.	9'	6'	2'–2"	6'–0"	NESC TABLE 441–1
5	SWITCH ISOLATING TRANSFORMER CIRCUIT BREAKERS, POLE TO POLE.	5'	–	2'–2"	5'–0"	NESC TABLE 441–1
6	SWITCH ISOLATING BUS TIE BREAKERS, POLE TO POLE.	5'	–	2'–2"	5'–0"	–
7	TROLLEY BUS AND RAIL BUS PARALLEL.	6'	5'	1'–2"	4'–0"	NESC TABLE 235–3 @ 12.47KV
8	CONDUCTOR CROSSING STEEL.	2'	1'–6"	6"	1'–6"	NESC TABLE 235–6, 4.a
9	CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED.	1'–6"	1'–6"	6"	1'–6"*	NESC TABLE 235–6, 4.a
10	FENCE TO NEAREST ENERGIZED PART	–	–	SEE NOTE	PER NESC	10'–4" MEASURED 5' ABOVE GRADE (NESC TABLE 110–1)
11	HORIZONTAL CLEARANCE TO UNGUARDED PART	–	–	3'–7"	3'–7"	NESC TABLE 124–1 @ 23KV
12	VERTICAL CLEARANCE OVER ROADWAY	–	–	18'–6"	35'–0"	NESC TABLE 232–1

* PROJECT MINIMUM *"CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED"* DOES NOT INCLUDE THE RAIL RETURN BUS, WHICH IS SUSPENDED BY A SINGLE B1 INSULATOR AND IS LESS THAN 1'–6" FROM STEEL, IN ACCORDANCE WITH NESC TABLE 235–6 NOTE 6.

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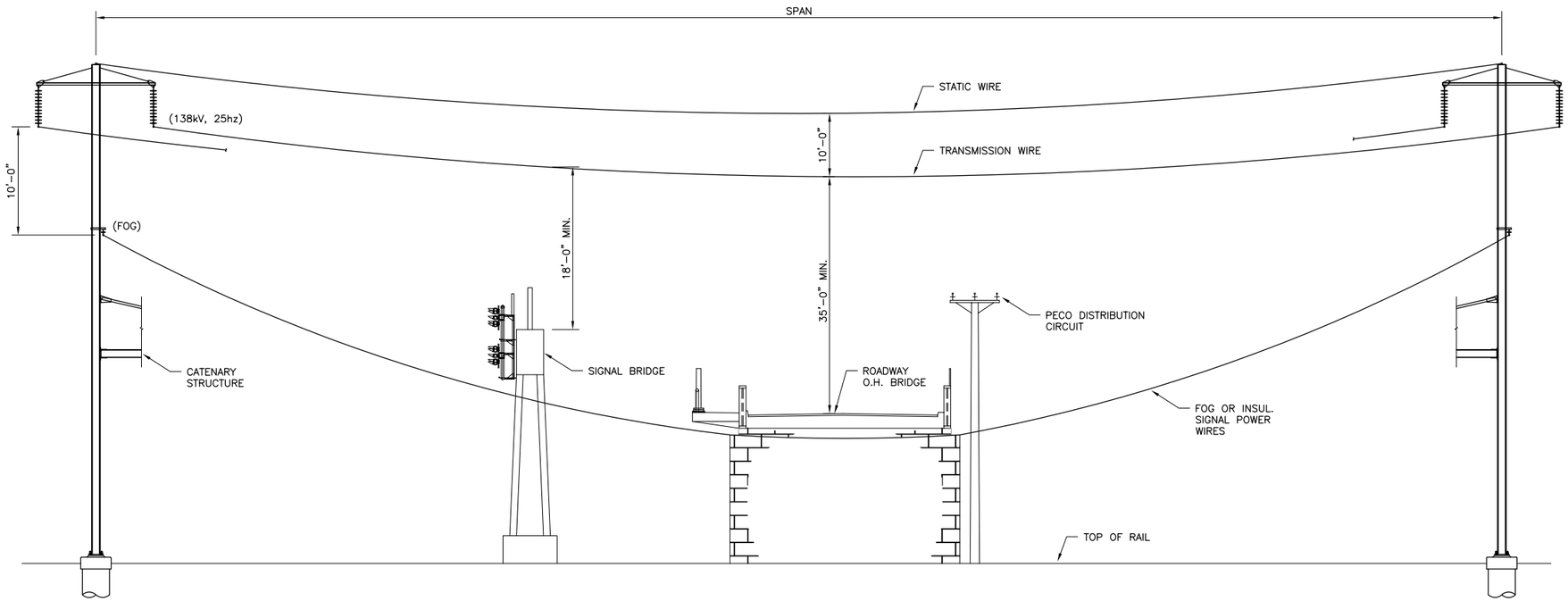
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRACTION POWER
138KV & 12KV SUBSTATION CLEARANCE CHART

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

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ET–0029

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GENERAL NOTES:

1. DRAWING IS NOT TO SCALE AND IS USED TO ILLUSTRATE MINIMUM CLEARANCES.
2. ALL DIMENSIONS ARE IN FEET AND INCHES, UNLESS OTHERWISE NOTED.
3. ALL CLEARANCES SHALL BE THE GREATEST VALUE OF AMTRAK, NESC CODE OR AREMA STANDARDS.
4. 138kV TRANSMISSION LINE CLEARANCE IS BASED ON 145kV INCLUDING 1.05 SURGE FACTOR [(145kV–22kV) * 0.4 IN/kV = 49.2 INCHES = 4.1 FT].
5. 750V TO 22kV CLEARANCE TO GROUND IS 18'–6" OVER ROADWAY AND AMTRAK ACCESS ROADS BASED ON NESC TABLE 232–1, WORST CASE SAG.
6. 750V TO 22kV CLEARANCE TO GROUND IS 14'–0" FOR PEDESTRIAN ACCESS ONLY BASED ON NESC TABLE 232–1, WORST CASE SAG.
7. 750V TO 22kV CLEARANCE TO GROUND FOR ELECTRICAL EQUIPMENT LIKE SIGNAL POWER TRANSFORMERS IS 18'–0" AT ACCESS ROADS AND 14'–0" FOR PEDESTRIAN ACCESS BASED ON NESC TABLE 232–2.
8. 138kV TRANSMISSION LINE CLEARANCE OVER PECO IS 10 FT WORST CASE SAG PER AED–1. NESC RULE 233 CLEARANCE FROM TABLE 233–1 IS 2 FT PLUS 4.1 ADDER.

138kV CLEARANCE TABLE

CONDITIONS	138kV REQ. CLEARANCE	CONTROLLING DOCUMENT
ABOVE GROUND	22'–6"	NESC TABLE 232–1 PLUS ADDER IN RULE 232C1.
ABOVE O.H. BRIDGES, TOP OF ROADWAY	35'–0"	AMTRAK AED–1
ABOVE SIGNAL BRIDGES, TOP OF STEEL	18'–0"	AMTRAK REQUIREMENT
ABOVE OTHER WIRES IN 300 FT SPANS	10'–0"	AMTRAK AED–1

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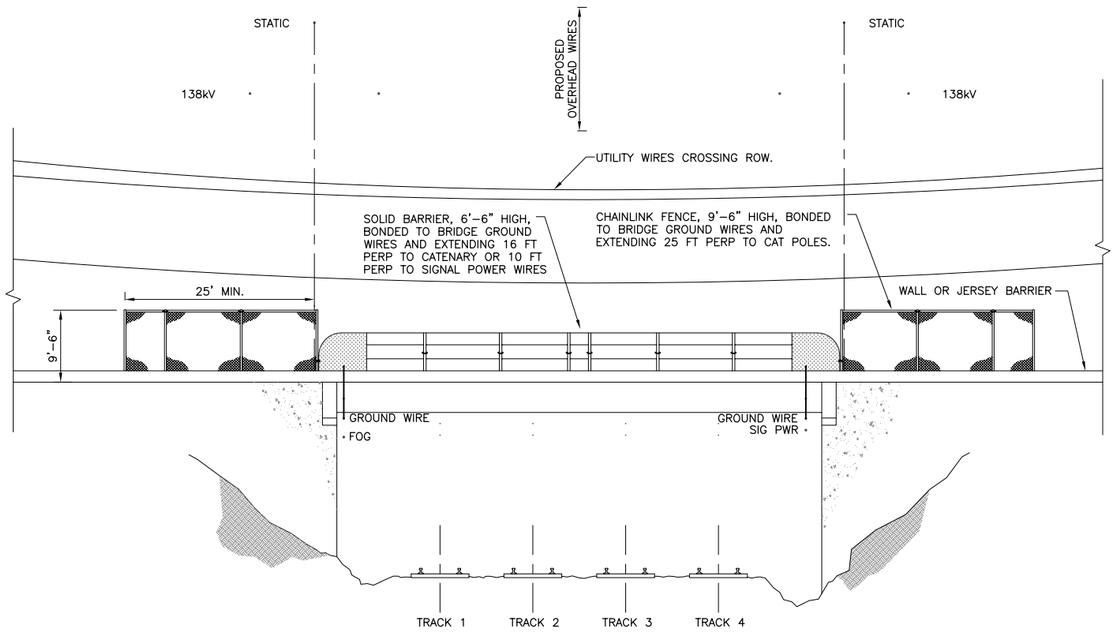
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OCS
TRANSMISSION LINE CLEARANCES

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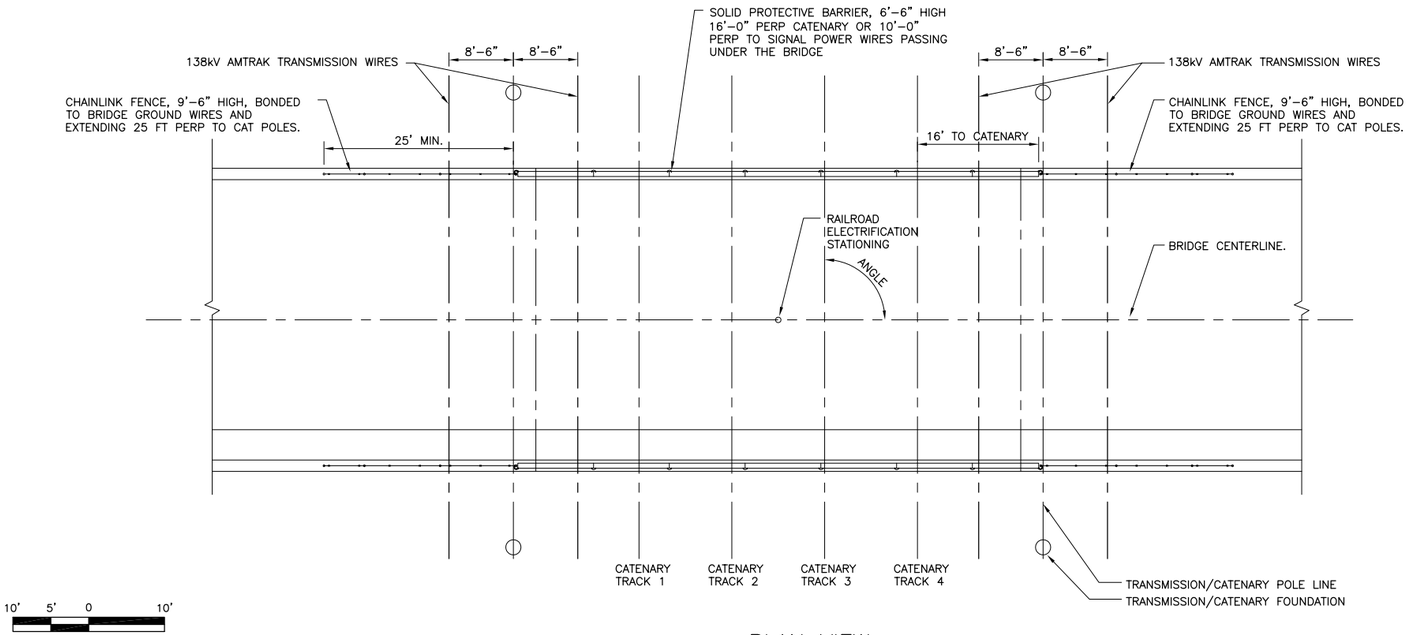
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ELEVATION VIEW



PLAN VIEW

GENERAL NOTES (FROM AMTRAK DRAWING ET–1446–D):

1. ANY MODIFICATIONS TO THE REQUIREMENTS FOR O.H. BRIDGE BARRIERS SHALL BE SUBMITTIED TO THE ELECTRIC TRACTION DEPARTMENT FOR APPROVAL
2. OVERHEAD BRIDGES SHALL BE PROVIDED WITH 6'–6" HIGH SOLID PROTECTIVE BARRIERS ABOVE THE SURFACE OF THE SIDEWALK OR CURB TO PROTECT PEDESTRIANS AGAINST CONTACT WITH RAILROAD WIRES PASSING UNDER THE BRIDGE AND TO PREVENT DAMAGE TO THE WIRES. WHERE A WALKWAY EXISTS ON THE BRIDGE A CURVED FENCE SHALL BE INSTALLED ON TOP OF THE SOLID BARRIER OVER IT'S ENTIRE LENGTH. WHERE NO WALKWAY EXISTS THE FENCE SHALL BE STRAIGHT.
3. NORMALLY THE SIGNAL POWER TRANSMISSION WIRES AND THE TRACTION POWER FEEDER WIRES ARE LOCATED ABOVE THE BRIDGE. FOR THE ALTERNATIVE POSITION OF THESE WIRES UNDER THE BRIDGE, THE PROTECTIVE BARRIER SHALL EXTEND AS SPECIFIED IN NOTE #4.
4. THE PROTECTION BARRIER SHALL EXTEND AT LEAST 16 FEET BEYOND THE POINT AT WHICH ANY CATENARY WIRE PASSES UNDER THE BRIDGE, HOWEVER THE MINIMUM DISTANCE FROM THE END OF THE PROTECTION BARRIER MEASURED TO A POINT OUTSIDE THE BRIDGE AND NORMAL TO THE WIRE SHALL BE 16 FEET. THE PROTECTION BARRIER SHALL EXTEND AT LEAST 10 FEET BEYOND THE POINT AT WHICH A SIGNAL POWER OR TRACTION FEEDER WIRE PASSES UNDER THE BRIDGE, THE MINIMUM DISTANCE FROM THE END OF THE PROTECTION BARRIER MEASURED TO A POINT OUTSIDE THE BRIDGE AND NORMAL TO THE WIRE SHALL BE 10 FEET.
5. WHERE HIGH VOLTAGE WIRES PASS OVER THE BRIDGE, A CHAIN LINK FENCE OR SUITABLE ALTERNATIVE, CAPABLE OF BEING ELECTRICALLY BONDED TO THE BARRIER AND RAIL RETURN SYSTEM, SHALL EXTEND FROM THE END OF THE SOLID BARRIER TO A POINT 25 FEET BEYOND AND NORMAL TO THE CENTERLINE OF THE STRUCTURES SUPPORTING THE WIRES ON EITHER SIDE OF THE BRIDGE.
6. NONMETALLIC BARRIERS SHALL BE PROVIDED WITH GROUND STRIPS, EITHER 3" X ¼" COPPER OR 5" X ½"" ALUMINUM. OTHER MATERIALS MAY BE USED SUBJECT TO THE APPROVAL OF THE ELECTRIC TRACTION DEPARTMENT. METALLIC BARRIERS SHALL BE BONDED AND GROUNDED BY A METHOD AND WITH MATERIALS APPROVED BY THE ELECTRIC TRACTION DEPARTMENT.
7. PROTECTION BARRIERS SHALL BE GROUNDED IN ACCORDANCE WITH AMTRAK DRAWING ET–1120–C, TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES.
8. OVERHEAD BRIDGES WITH OPEN–FLOOR CONSTRUCTION REQUIRE SPECIAL PROTECTION. THE DESIGN OF THE PROPOSED PROTECTION SHALL BE SUBMITTED TO THE ELECTRIC TRACTION DEPTMENT FOR APPROVAL.
9. WHERE LOCAL CONDITIONS WARRANT, THE DIMENSION SHOWN ON THIS DRAWING MAY BE MODIFIED WITH THE APPROVAL OF THE ELECTRIC TRACTION DEPARTMENT.
10. DESIGN DRAWINGS OF THE OVERHEAD BRIDGE SHALL SHOW MINIMUM CLEARANCE, ANGLE AND RAILROAD ELECTRIFICATION STATIONING MEASURED TO THE CENTERLINE OF THE BRIDGE.
11. EXISTING PROTECTION BARRIERS ON BRIDGES OVER ELECTRIFIED TRACKS IN CLASS EIGHT (8) TERRITORY (GREATER THAN 125 MPH) WHERE THERE'S A DEMONSTRATED NEED SHALL BE RETROFITTED WITH THE CURVED OR STRAIGHT FENCE OVER THEIR ENTIRE LENGTH. A 9'–6" HIGH CHAIN LINK FENCE SHALL EXTEND FROM THE END OF THE SOLID PROTECTION BARRIER TO A POINT 16 FEET BEYOND THE CENTERLINE OF THE OUTERMOST ELECTRIFIED TRACK AS SPECIFIED IN NOTE #4 ABOVE. THE FENCE SHALL BE CURVED OR STRAIGHT PER NOTE #2 ABOVE.

PAOLI TO BRYN MAWR BARRIER AND FENCING SUMMARY

BRIDGE	STANDARD ALUMINUM BARRIER	TOP FENCE ABOVE ALUMINUM BARRIER	6FT CHAIN LINK FENCE BEYOND BARRIER	PROTECTIVE BARRIER AND FENCE DESRCIPTION	ACTION
N. VALLEY RD	YES	NO	YES	ALUMINUM BARRIER WITH A FENCE ON WEST SIDE, CORRUGATED BARRIER ON EAST SIDE, SHORT FENCE ON EAST SIDE NEEDS UPGRADING.	INSTALL A FENCE ALONG EAST CANTILEVER SIDEWALK. BOND FENCING, ADD AN ALUMINUM BAR ACROSS THE TOP OF EAST PROTECTIVE BARRIER.
WEST BRIDGE AVE	NO	NO	NO	CORRUGATED BARRIER ATTACHED TO BRIDGE, CONCRETE WALLS PAST BARRIER, NO FENCES.	ADD AN ALUMINUM BAR ACROSS THE TOP OF THE CORRUGATED BARRIERS. INSTALL FENCES ON CONCRETE WALLS AND BOND FENCING.
CASSATT AVE	NO	NO	NO	PEDESTRIAN BRIDGE HAS FENCING ABOVE SOLID BARRIER.	NO MODIFICATIONS REQUIRED.
N. VALLEY FORGE RD	NO	NO	NO	FENCING ENCLOSES THE ABANDONED BRIDGE AND PREVENTS ACCESS.	VERIFY BONDING OF THE FENCE AND BRIDGE SUPERSTRUCTURE TO RAIL RETURN SYSTEM.
EAGLE RD	YES	NO	NO	ALUMINUM BARRIER ON BOTH SIDES. NO FENCING PAST BARRIER.	INSTALL 6FT FENCES ALONG CONCRETE BARRIERS, BOND FENCING.
SPRING MILL RD	YES	NO	YES	ALUMINUM BARRIER ON BOTH SIDES. FENCE EXTENDS PAST BARRIER.	NO MODIFICATIONS REQUIRED.
MERION AVE	YES	YES	YES	ALUMINUM BARRIER ON BOTH SIDES. CURVED FENCE ABOVE ALUMINUM BARRIER. FENCE EXTENDS PAST BARRIER.	NO MODIFICATIONS REQUIRED.

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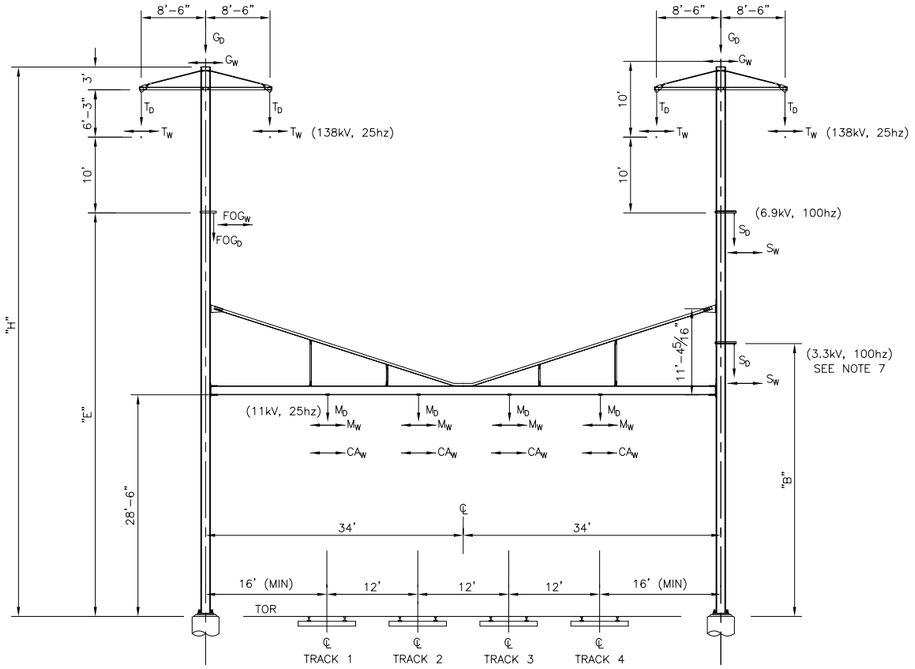
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRIDGE BARRIERS
TYPICAL O.H. BRIDGE BARRIERS

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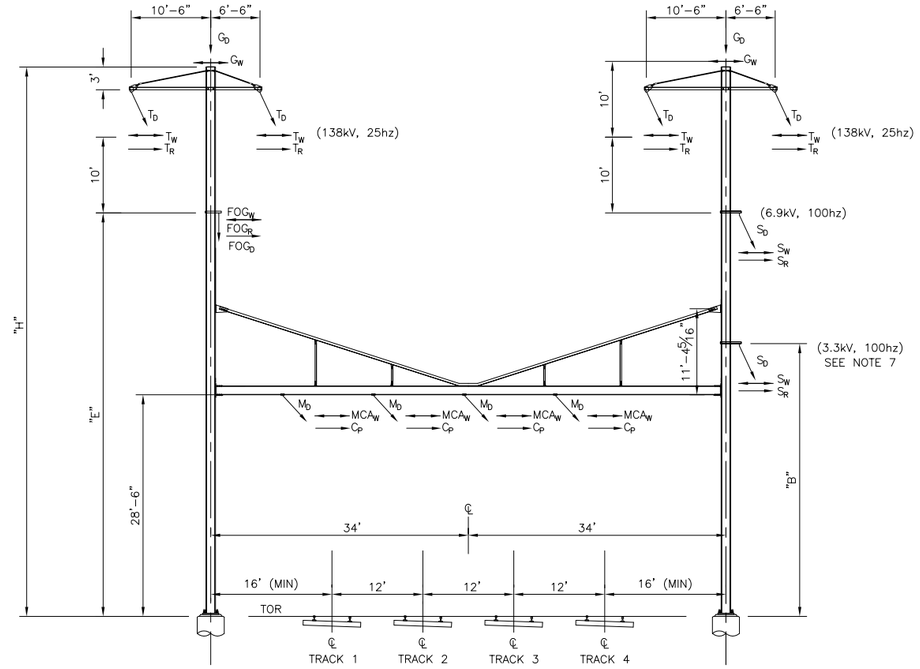
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TANGENT TRACK
(LOOKING WEST)



CURVED TRACK
(LOOKING WEST)

STRUCTURE LOAD TABLE

LOAD	½" ICE, 40 MPH WIND (LBS/FT)	BARE, 90 MPH WIND (LBS/FT)
G_D	1.35	0.700
G_W	0.537	0.991
T_D	1.50	0.656
T_W	0.634	1.483
FOG_D	1.26	0.486
FOG_W	0.589	1.253
F_D	1.985	1.235
F_W	0.59	1.258
S_D	3.552	1.738
S_W	1.223	4.465
M_D	4.217	2.27
M_W	0.555	1.08
MCA_W	1.567	2.746
CA_W	1.012	1.666

STRUCTURE RADIAL LOAD TABLE

LOAD	TENSION @ −10° WITH ½" ICE AND WIND	CALCULATED RADIAL LOAD FOR ø=½°
G_R	3587	65
T_R	4144	75
FOG_R	4508	80
F_R	5459	100
S_R	6437	115
M_R	7594	135

*CALCULATED LOAD ROUNDED UP TO NEXT "5".

STRUCTURE HEIGHT TABLE

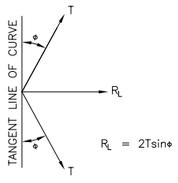
HEIGHT (FT)	OPEN ROUTE	OH BRIDGE
H	60'−0"	82'−0"
B	36'−0"	36'−0"
E	40'−0"	20'−0"

SEE NOTE 9

STRUCTURE LOAD KEY

SYM	DESCRIPTION	WIRE TYPE AND SIZE
G_D	STATIC WIRE DEAD LOAD	9/16" COPPERWELD
G_W	STATIC WIRE WIND LOAD	
G_R	STATIC WIRE RADIAL LOAD	
T_D	138kV WIRE DEAD LOAD	477 kcmil ACSR HAWK
T_W	138kV WIRE WIND LOAD	
T_R	138kV WIRE RADIAL LOAD	
FOG_D	AERIAL FIBER WIRE DEAD LOAD	ALCOA S1−129/44/725
FOG_W	AERIAL FIBER WIRE WIND LOAD	
FOG_R	AERIAL FIBER WIRE RADIAL LOAD	
F_D	FEEDER WIRE DEAD LOAD	400 kcmil BARE COPPER
F_W	FEEDER WIRE WIND LOAD	
F_R	FEEDER WIRE RADIAL LOAD	
S_D	SIGNAL POWER WIRE DEAD LOAD	2C−#2 CONDUCTOR BUNDLE WITH 3/8" EHS STEEL MESSENGER WIRE
S_W	SIGNAL POWER WIRE WIND LOAD	
S_R	SIGNAL POWER WIRE RADIAL LOAD	
M_D	MESSENGER WIRE DEAD LOAD	5/8" BRONZE WIRE
M_W	MESSENGER WIRE WIND LOAD	
M_R	MESSENGER WIRE RADIAL LOAD	
MCA_W	MESSENGER, AUX AND CONTACT WIND LOAD	5/8" MW AND TWIN 4/0 GROOVED TROLLEYS
CA_W	CONTACT AND AUXILLARY WIRE WIND LOAD	TWIN 4/0 GROOVED TROLLEYS
C_P	CATENARY CURVE PULL (RADIAL LOAD)	5/8" MW AND TWIN 4/0 GROOVED TROLLEYS

NOTES:
1. WIRE LOADS SUPPORTED BY INSULATOR STRINGS ARE APPLIED TO THE SUPPORTING BRACKETS AT THE BRACKET HEIGHT.
2. SEE WIRE PARTICULAR DRAWINGS ON ET−0092, ET−0093 AND ET−0094 FOR ADDITIONAL WIRE DATA.
3. CURVE PULL IS CALCULATED AS TENSION/CURVE RADIUS IN FT.
4. RADIAL LOADS ARE CALCULATED AS 2 x TENSION x SIN (WIRE ANGLE).
5. WIRE ANGLE IS MEASURED OFF TANGENT LINE OF CURVE.
6. WIRE TENSIONS ARE BASED ON THE AMBIENT TEMPERATURES FOR THE SPECIFIC LOAD CASES.
7. EXISTING 3.3kV SIGNAL POWER WIRES WILL BE REMOVED AFTER 6.9kV SIGNAL POWER WIRES ARE COMMISSIONED.
8. LONGITUDINAL STORM GUYS WILL BE INSTALLED AT INTERMEDIATE STRUCTURES AND SHOULD BE INCLUDED IN BUCKLING ANALYSIS.
9. STRUCTURE HEIGHTS ARE CONSIDERED PRELIMINARY AND WILL BE SUPERCEDED BY INDIVIDUAL STRUCTURAL ERECTION DIAGRAMS.



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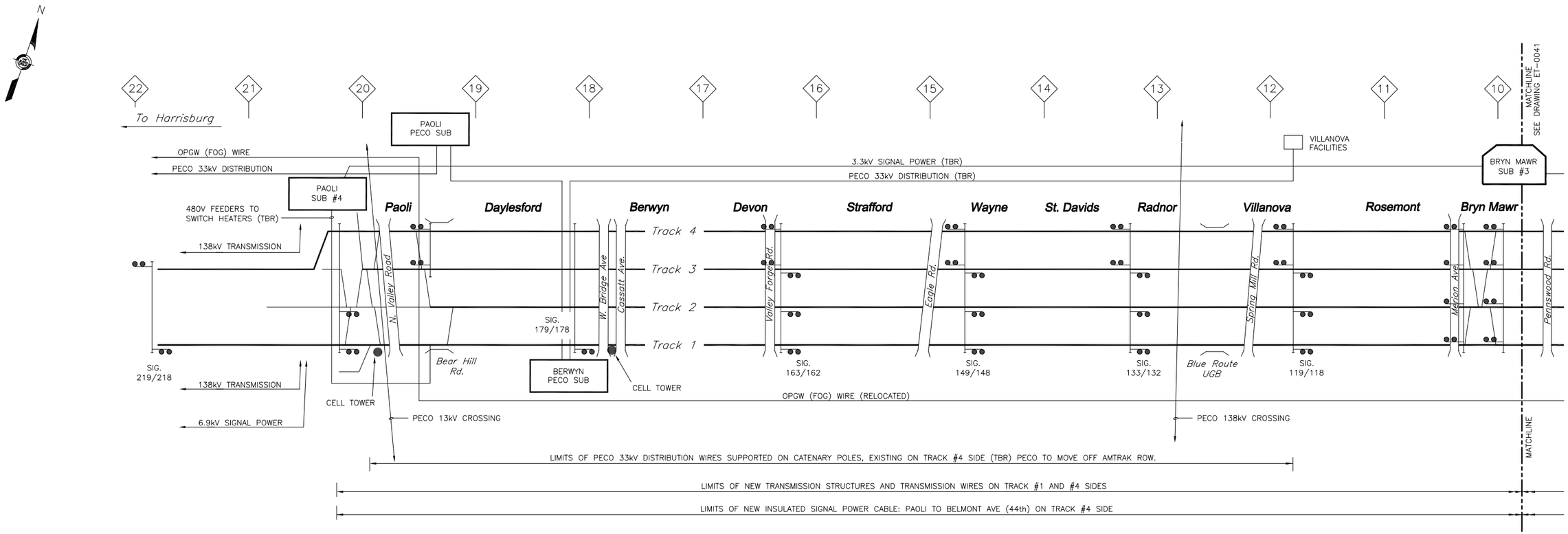
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
LOAD STRUCTURE DIAGRAM
LOAD TABLE & LOAD KEY

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

File No.:	2011-059-ET-0032.DWG
Ref. No.:	2011−059
Sheet No:	025 OF 565

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TRANSMISSION STAGING PLANS: PAOLI TO BRYN MAWR

NOT TO SCALE

SUGGESTED CONSTRUCTION SEQUENCE:

1. REMOVE PECO DISTRIBUTION WIRES FROM NORTH SIDE.
2. REPLACE PECO WIRE CROSSINGS IN VERTICAL STACK ARRANGEMENTS WITH HORIZONAL STACK ARRANGEMENTS.
3. RELOCATE 480V HEATER CABLES BETWEEN PAOLI SUB AND INTERLOCKING EAST OF PAOLI.
4. INSTALL FOUNDATIONS ON TRACK #1 AND #4 SIDES OF THE RAILROAD.
5. INSTALL POLES ALONG TRACK #1 AND #4.
6. INSTALL K-FRAMES.
7. TRANSFER OPGW (FOG) WIRES TO NEW TRACK #1 POLES AND LOWER THE OPGW WIRES BELOW TRANSMISSION ENVELOPE.
8. INSTALL TRANSMISSION AND STATIC WIRES ALONG TRACK #1 AND #4 POLES. PULL WIRES, TENSION AND CLIP IN.

SUGGESTED CONSTRUCTION SEQUENCE (CONTINUED):

9. INSTALL SIGNAL POWER CABLE (INSULATED 6.9Kv) ALONG TRACK #4 POLES.
10. CUT OVER SIGNAL POWER TO 6.9kV SERVICE.
    NOTE: SIGNAL POWER GENERATION WORK MUST BE COMPLETE AT BRYN MAWR AND PAOLI PRIOR TO THIS STEP.
11. TRANSFER CATENARY AND DEMOLISH EXISTING STRUCTURES INCLUDING EXISTING 3.3kV SIGNAL POWER.

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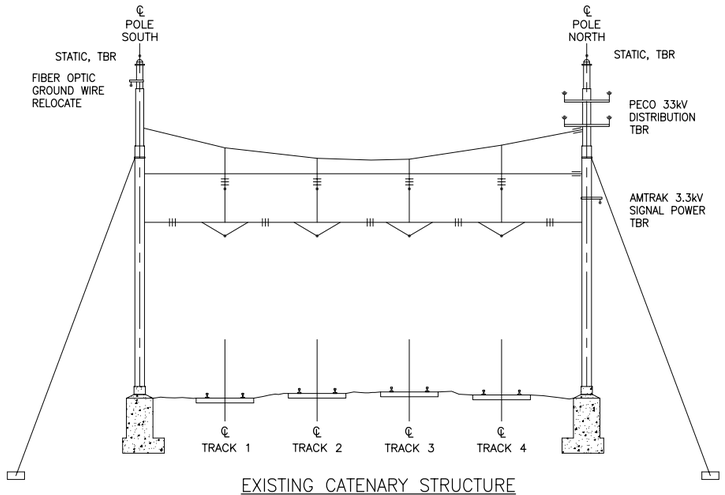
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS - TRANSMISSION
STAGING PLANS (SHEET 1 OF 4)

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

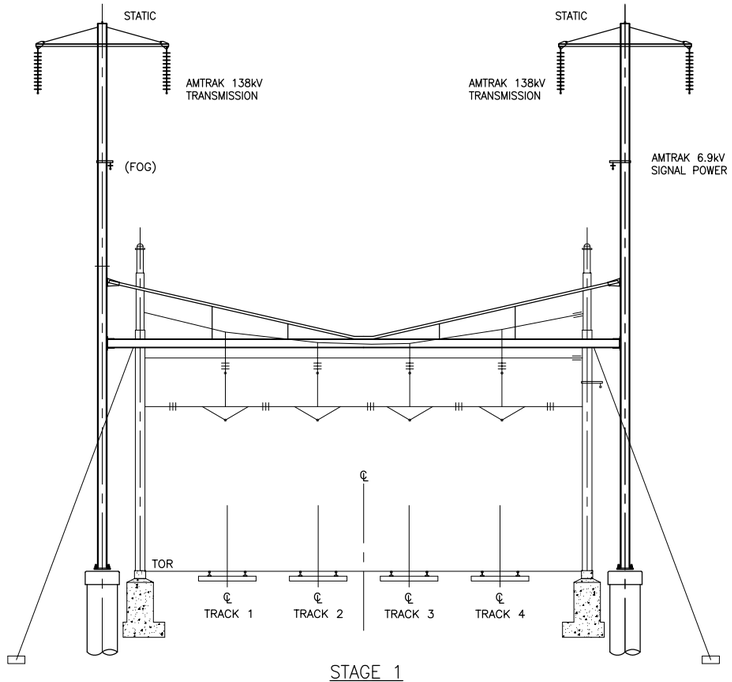
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Ref. No.:	2011-059
Sheet No:	026 OF 565

ET-0040

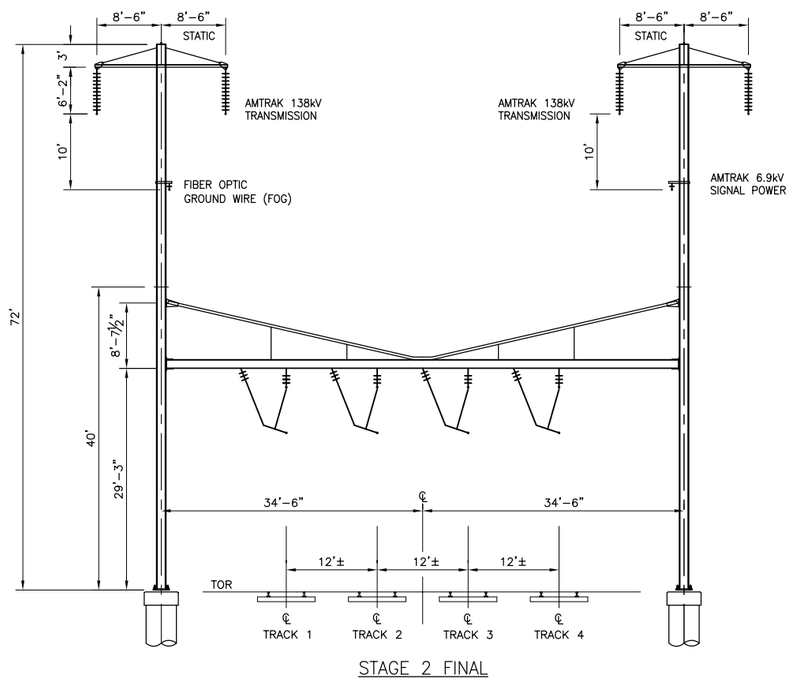
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EXISTING CATENARY STRUCTURE
(LOOKING WEST)



STAGE 1
(LOOKING WEST)



STAGE 1 FINAL
(LOOKING WEST)

PAOLI TO BRYN MAWR

STAGE 1

1. DEMOLISH EXISTING PECO CONDUCTORS ON EXISTING NORTH POLES
2. INSTALL FOUNDATIONS, POLES AND K–FRAME ON BOTH NORTH AND SOUTH SIDE
3. TRANSFER FIBER OPTIC GROUND CONDUCTOR TO NEW SOUTH POLE
4. INSTALL NEW TRANMISSION AND STATIC CONDUCTORS ON NEW NORTH AND SOUTH POLES
5. INSTALL NEW 6.9 kV SIGNAL POWER ON NEW NORTH POLES

STAGE 2

1. TRANSFER AND RE–PROFILE CATENARY
2. DEMOLISH EXISTING 3.3kV SIGNAL POWER LINE
3. DEMOLISH EXISTING CATENARY STRUCTURES, GUYS AND FOUNDATIONS

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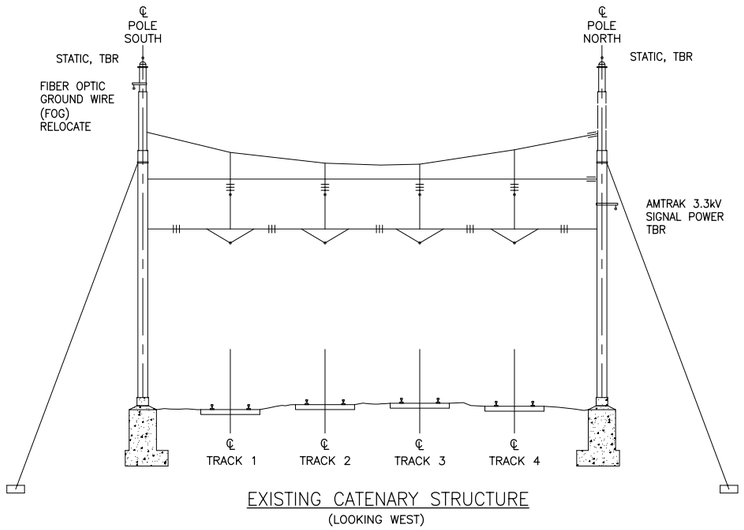
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS – TRANSMISSION
STAGING PLANS (SHEET 2 OF 4)

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

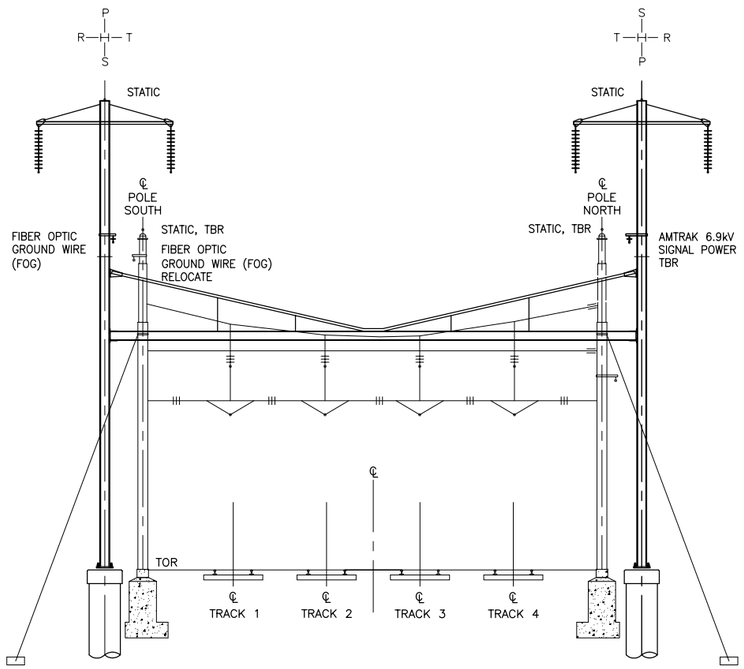
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Ref. No.:	2011–059
Sheet No:	027 OF 565

ET–0042

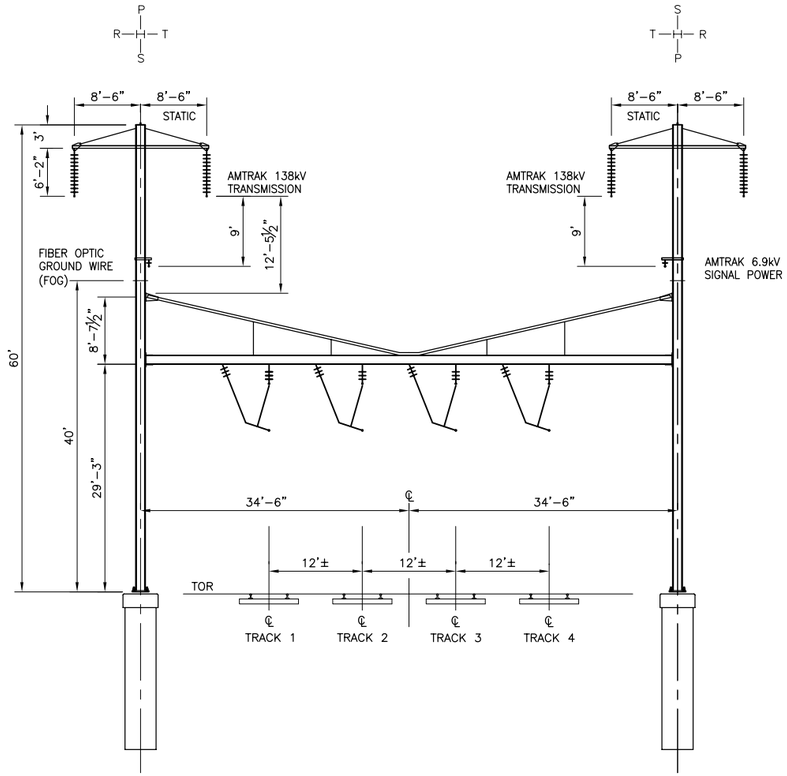
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EXISTING CATENARY STRUCTURE
(LOOKING WEST)



STAGE 1
(LOOKING WEST)



STAGE 2
(LOOKING WEST)

BRYN MAWR TO ZOO

STAGE 1

1. INSTALL FOUNDATIONS, POLES AND K–FRAMES ON BOTH NORTH AND SOUTH SIDE
2. TRANSFER FIBER OPTIC GROUND CONDUCTOR TO NEW SOUTH POLE
3. INSTALL NEW TRANSMISSION AND STATIC WIRE ON NEW NORTH AND SOUTH POLES
4. INSTALL 6.9 kV SIGNAL POWER ON NEW NORTH POLE

STAGE 2

1. TRANSFER AND RE–PROFILE CATENARY
2. DEMOLISH EXISTING 3.3kV SIGNAL POWER LINE
3. DEMOLISH EXISTING CATENARY STRUCTURES, GUYS AND FOUNDATIONS

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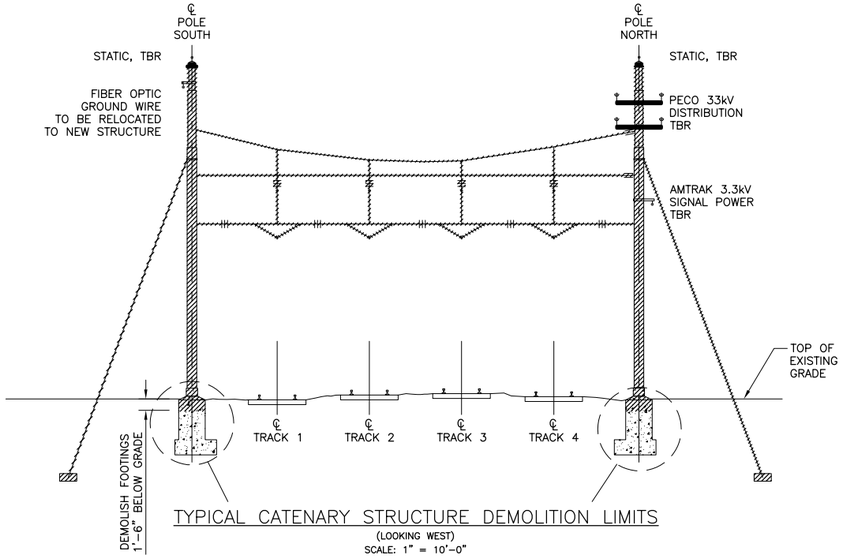
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS – TRANSMISSION
STAGING PLANS (SHEET 3 OF 4)

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

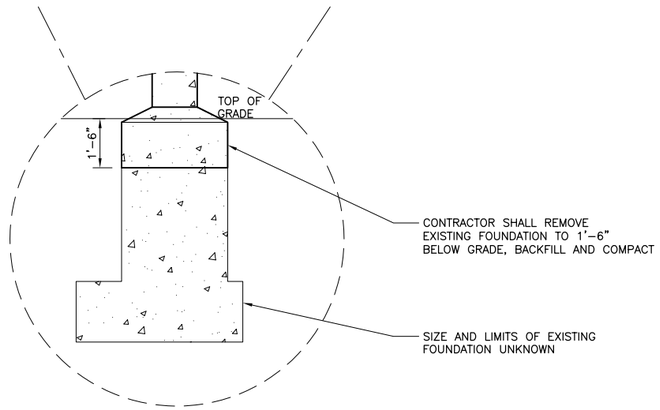
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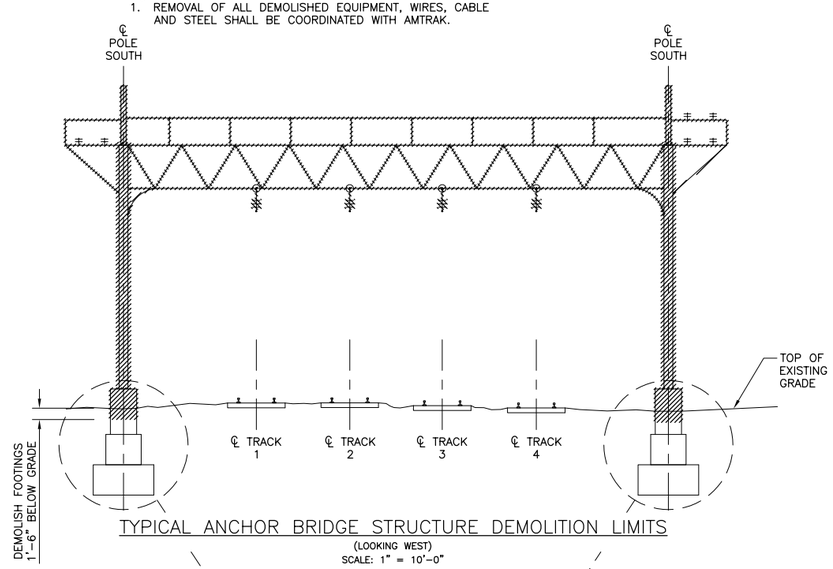


TYPICAL CATENARY STRUCTURE DEMOLITION LIMITS

(LOOKING WEST)
SCALE: 1" = 10'-0"

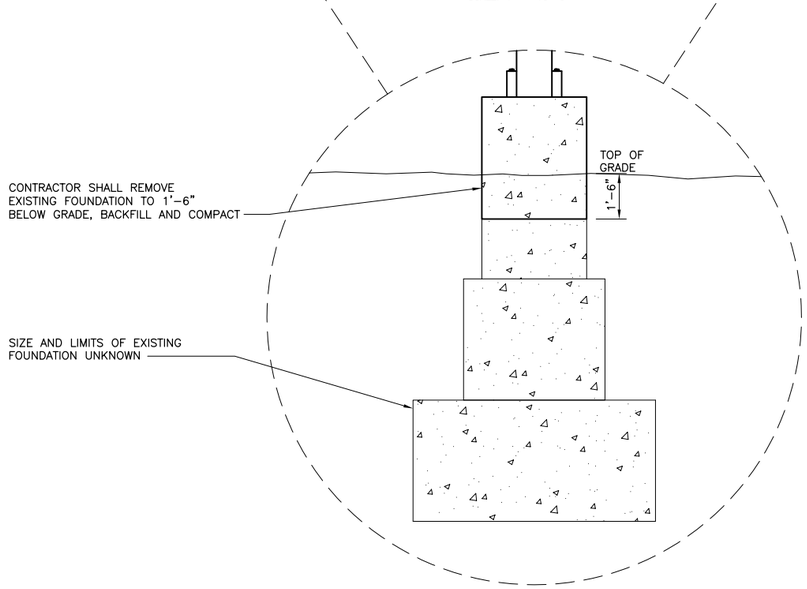


NOTES
1. REMOVAL OF ALL DEMOLISHED EQUIPMENT, WIRES, CABLE AND STEEL SHALL BE COORDINATED WITH AMTRAK.



TYPICAL ANCHOR BRIDGE STRUCTURE DEMOLITION LIMITS

(LOOKING WEST)
SCALE: 1" = 10'-0"



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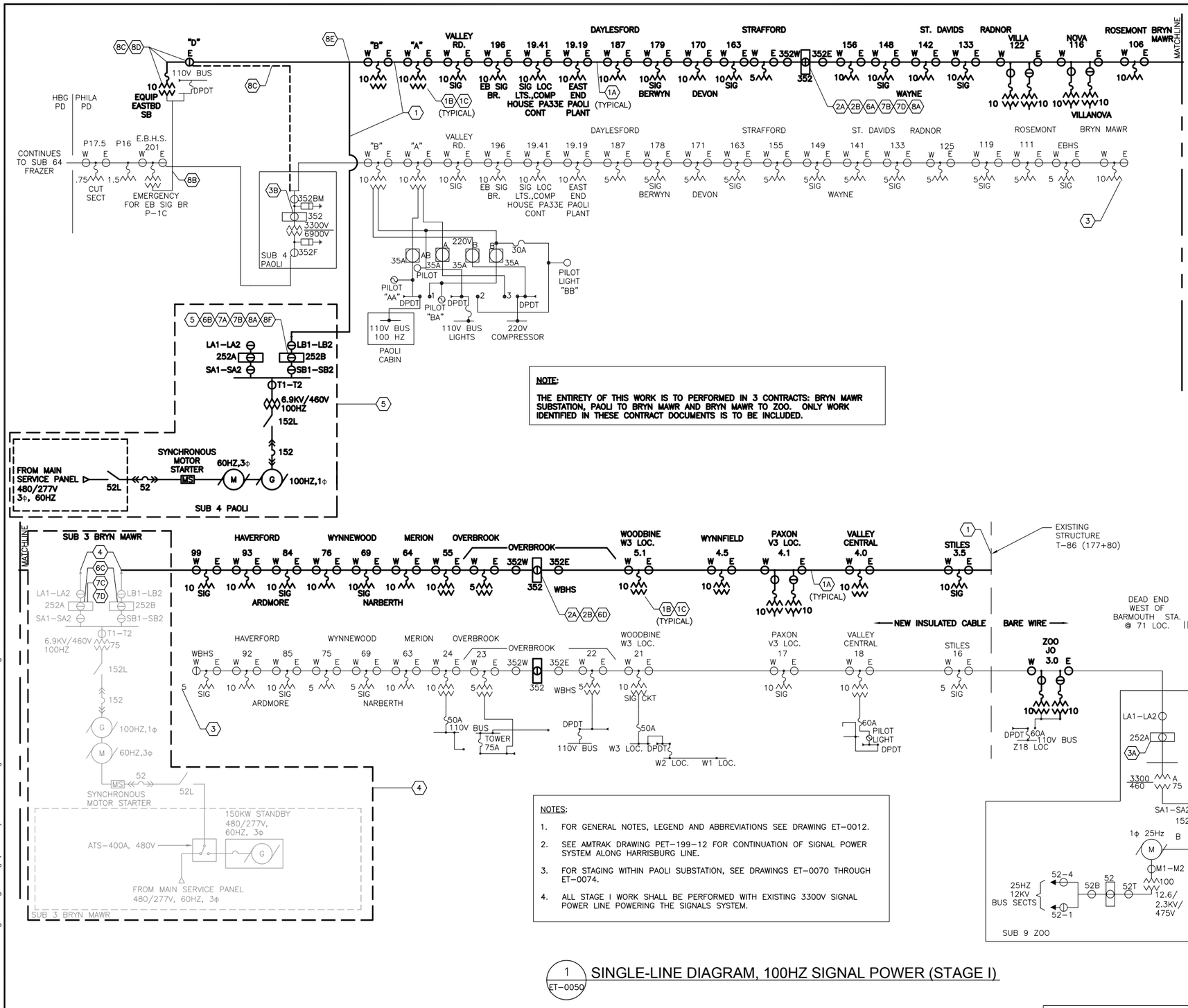
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS – TRANSMISSION
STAGING PLANS (SHEET 4 OF 4)

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

File No.:	2011-059-ET-0044.DWG
Ref. No.:	2011-059
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ET-0044

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET–0070 THROUGH ET–0074.
4. ALL STAGE I WORK SHALL BE PERFORMED WITH EXISTING 3300V SIGNAL POWER LINE POWERING THE SIGNALS SYSTEM.

STAGE I:

1. BETWEEN EXISTING STRUCTURE T–86 (STA. 177+80) AND PAOLI SUBSTATION:
   - 1.A. INSTALL NEW 6900V SIGNAL POWER CABLES.
   - 1.B. INSTALL NEW 6900/120V TRANSFORMERS AT EACH SIGNAL HUT.
   - 1.C. INSTALL TAPS TO NEW 6900V SIGNAL POWER TRANSFORMERS.
2. AT OVERBROOK AND STRAFFORD:
   - 2.A. INSTALL NEW SIGNAL POWER 352 CIRCUIT BREAKER.
   - 2.B. MODIFY NEW SIGNAL POWER CABLES TO CONNECT THE NEW 352 BREAKER.
3. EXISTING BRYN MAWR SUBSTATION SHALL BE TAKEN OUT OF SERVICE. (OTHER CONTRACT)
   - 3.A. EXISTING 252A (3300V) AT ZOO SUB SHALL FEED THE SIGNAL POWER LINE FROM ZOO TO BRYN MAWR.
   - 3.B. EXISTING 352 (3300V) AT PAOLI SUB SHALL FEED THE SIGNAL POWER LINE FROM PAOLI TO BRYN MAWR.
4. TEST AND COMMISSION NEW SIGNAL POWER EQUIPMENT AT BRYN MAWR SUBSTATION AND TERMINATE NEW 6900V SIGNAL POWER CONDUCTORS TO 252 BREAKERS. (BRYN MAWR PROJECT).
5. INSTALL, TEST AND COMMISSION NEW SIGNAL POWER EQUIPMENT AT PAOLI SUBSTATION AND TERMINATE NEW 6900V SIGNAL POWER CONDUCTORS TO 252B BREAKER.

   NOTE: AT PAOLI SUBSTATION BOTH NEW 252 BREAKERS ARE OPEN AND EXISTING 352 REMAINS IN SERVICE, ALLOWING FRAZER SUBSTATION TO FEED SIGNAL HUTS EAST TO BRYN MAWR SUBSTATION.
6. ENERGIZE THE ENTIRE LENGTH OF THE NEW 6900V SIGNAL POWER CONDUCTORS
   - 6.A. OPEN STRAFFORD CIRCUIT BREAKER 352.
   - 6.B. CLOSE PAOLI SUBSTATION CIRCUIT BREAKER 252B.
   - 6.C. CLOSE BRYN MAWR SUBSTATION CIRCUIT BREAKERS 252A AND 252B.
   - 6.D. CLOSE OVERBROOK CIRCUIT BREAKER 352.
7. TEST STRAFFORD 352 BREAKER
   - 7.A. OPEN PAOLI 252B AND VERIFY THAT STRAFFORD 352 CLOSES AUTOMATICALLY.
   - 7.B. OPEN STRAFFORD 352 AND CLOSE PAOLI 252B TO RESTORE NORMAL OPERATING CONDITIONS.
   - 7.C. OPEN BRYN MAWR 252A AND VERIFY THAT STRAFFORD 352 CLOSES AUTOMATICALLY.
   - 7.D. OPEN STRAFFORD 352 AND CLOSE BRYN MARW 252A TO RESTORE NORMAL OPERATING CONDITIONS.
8. MIGRATE SIGNAL BRIDGE P–1C EMERGENCY XFRM FEED TO FINAL CONFIGURATION
   - 8.A. OPEN PAOLI 252B AND STRAFFORD 352.
   - 8.B. FEED 110V BUS FROM EMERGENCY TRANSFORMER AT SIGNAL BRIDGE P–1C (1072+50).
   - 8.C. REMOVE 3300V TRANSFORMER, WIRING AND ASSOCIATED EQUIPMENT.
   - 8.D. INSTALL NEW 6900/120V TRANSFORMER AND NEW ASSOCIATED EQUIPMENT.
   - 8.E. TAP TO NEW (DE–ENERGIZED) 6900V SIGNAL POWER CONDUCTORS.
   - 8.F. CLOSE PAOLI 252B.
   - 8.G. TEST AND RESTORE SIGNAL BRIDGE TO NORMAL OPERATING CONFIGURATION.

STAGE I SUMMARY:

AT THE END OF STAGE I:

A. NEW 6900V SIGNAL POWER CONDUCTORS, TRANSFORMERS AND ASSOCIATED EQUIPMENT HAVE BEEN ENERGIZED FOR TESTING PURPOSES.

B. SIGNAL POWER AT BRYN MAWR SUBSTATION HAS BEEN TESTED AND COMMISSIONED.

C. NEW SIGNAL POWER EQUIPMENT AT PAOLI SUBSTATION HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

D. STRAFFORD 352 HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

E. OVERBROOK 352 HAS BEEN INSTALLED.

F. SIGNAL BRIDGE P–1C EMERGENCY FEED HAS BEEN MIGRATED TO FINAL CONFIGURATION.

G. ALL SIGNAL HUTS CONTINUE TO RECEIVE POWER FROM 3300V SOURCE.

1 ET–0050 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE I)

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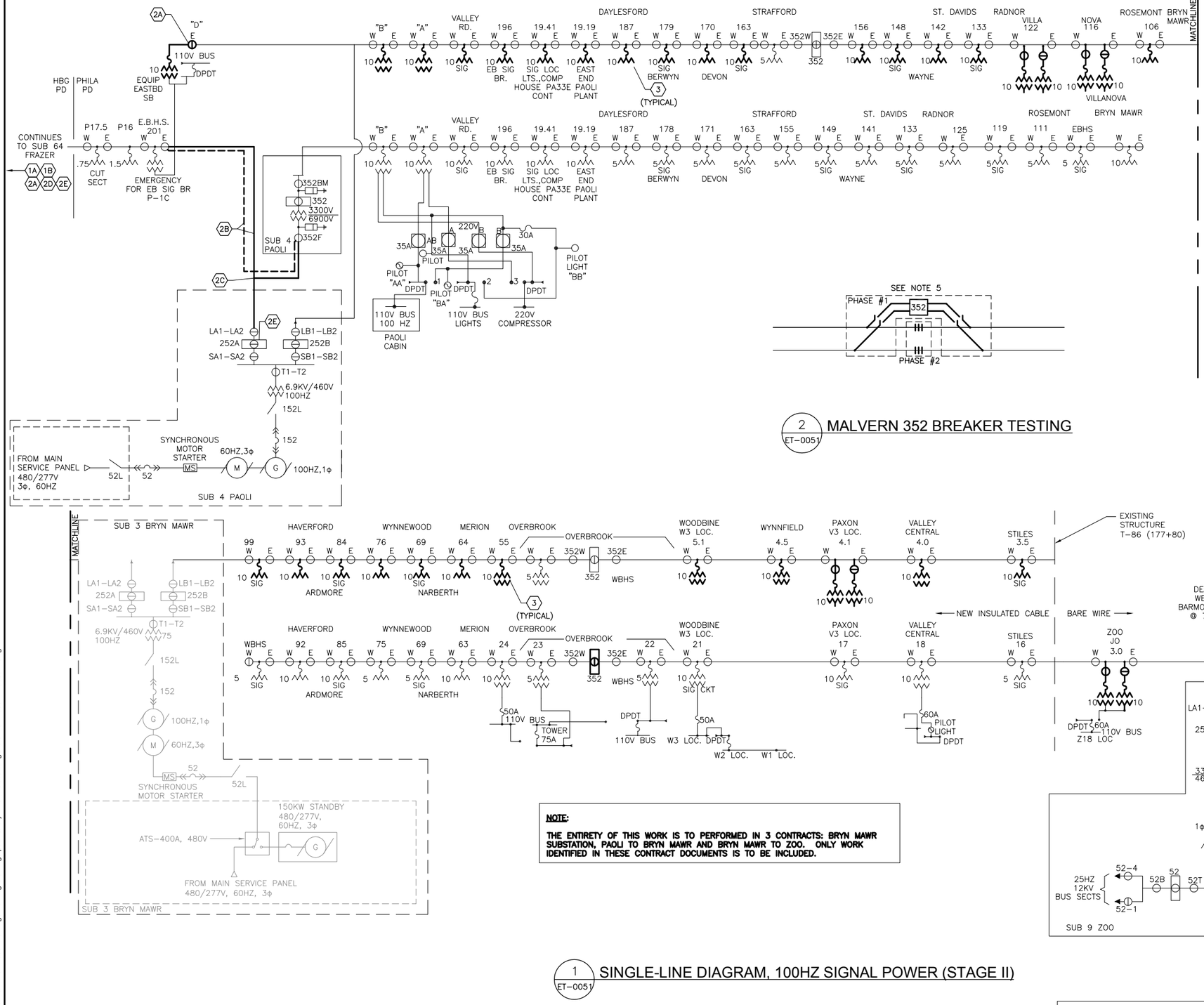
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS – SIGNAL POWER
100HZ SIGNAL POWER (SHEET 1 OF 3)

File No.:	2011–059–ET–0050–2.DWG
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NOTE:

THE ENTIRETY OF THIS WORK IS TO PERFORMED IN 3 CONTRACTS: BRYN MAWR SUBSTATION, PAOLI TO BRYN MAWR AND BRYN MAWR TO ZOO. ONLY WORK IDENTIFIED IN THESE CONTRACT DOCUMENTS IS TO BE INCLUDED.

1 ET-0051 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE II)

STAGE II:

1. BETWEEN FRAZER AND PAOLI SUBSTATION, NEAR MALVERN STATION.
 1.A. INSTALL NEW SIGNAL POWER 352 CIRCUIT BREAKER IN PARALLEL WITH EXISTING 6900V LINE.
 1.B. TEST MALVERN 352 BREAKER – PRIOR TO MAKING THE CUT-INS (SEE DETAIL 2/ET-0051).

2. ISOLATE EXISTING 6900V SIGNAL POWER BETWEEN FRAZER AND PAOLI STATION.
 2.A. OPEN FRAZER 252B AND TEMPORARILY LIFT P-1C WIRES.

NOTE: THIS WILL DE-ENERGIZE EXISTING SIGNAL POWER LINE BETWEEN FRAZER SUBSTATION AND PAOLI STATION. COORDINATION WITH SIGNALS DEPARTMENT IS REQUIRED.

 2.A. REMOVE WESTBOUND SIGNAL POWER CONDUCTORS FROM EXISTING PAOLI 352 AND RE-CIRCUIT TO NEW PAOLI 252A.
 2.B. INSTALL TEMPORARY TAP FROM NEW PAOLI 252A TO EXISTING PAOLI 352 TRANSFORMER.
 2.C. MODIFY MAIN LINE SIGNAL POWER CONDUCTOR TO CONNECT THE NEW MALVERN 352 BREAKER.
 2.D. OPEN MALVER 352, CLOSE FRAZER 252B AND CLOSE PAOLI 252A.

NOTE: THIS WILL RESTORE SIGNAL POWER BETWEEN FRAZER AND PAOLI STATION.

3. CUTOVER EACH SIGNAL HUT FROM 3300V SOURCE TO 6900V SOURCE:
 3.A. WITH AMTRAK'S PERMISSION, DE-ENERGIZE A SIGNAL HUT AND REMOVE THE CUTOUTS UPSTREAM OF THE 3300V HUT TRANSFORMER.
 3.B. CIRCUIT THE SECONDARY OF THE NEW 6900V TRANSFORMER TO THE HUT MAIN CIRCUIT BREAKER.
 3.C. RESTORE POWER TO THE SIGNAL HUT BY REPLACING ONLY THE CUTOUT TO THE NEW 6900V TRANSFORMER.

NOTE: THE SIGNAL HUT IS NOW FED FROM THE 6900V SOURCE, BUT CAN EASILY BE RESTORED TO THE 3300V SOURCE. REPEAT FOR EACH SIGNAL HUT, AS NIGHTLY OUTAGES ALLOW.

STAGE II SUMMARY:

AT THE END OF STAGE II:

A. THE MALVERN 352 BREAKER HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

B. THE 6900V SIGNAL POWER LINE BETWEEN FRAZER SUBSTATION AND PAOLI SUBSTATION IS IN FINAL CONFIGURATION.

C. TEMPORARY TAP HAS BEEN INSTALLED WITHIN PAOLI SUBSTATION FEEDS EASTBOUND 3300V SIGNAL POWER VIA BRYN MAWR STATION TO ZOO SUBSTATION.

D. EACH SIGNAL HUT BETWEEN PAOLI SUBSTATION AND STILES INTERLOCKING HAS BEEN MIGRATED TO THE NEW 6900V SIGNAL POWER SOURCE, WITH A BACKUP CONNECTION TO THE EXISTING 3300V AVAILABLE IF NEEDED.

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. SEE AMTRAK DRAWING PET-199-12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET-0070 THROUGH ET-0074.
4. ALL STAGE II WORK SHALL BE PERFORMED WITH EXISTING 3300V SIGNAL POWER LINE AVAILABLE TO POWER THE SIGNALS SYSTEM.
5. TO AVOID LONG TIME SIGNAL POWER OUTAGE, DURING PHASE #1 CONNECT MALVERN 352 BREAKER IN PARALLEL FOR TESTING. ONCE TESTING IS COMPLETE INSTALL DEAD-END CUT SECTIONS DURING PHASE #2.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

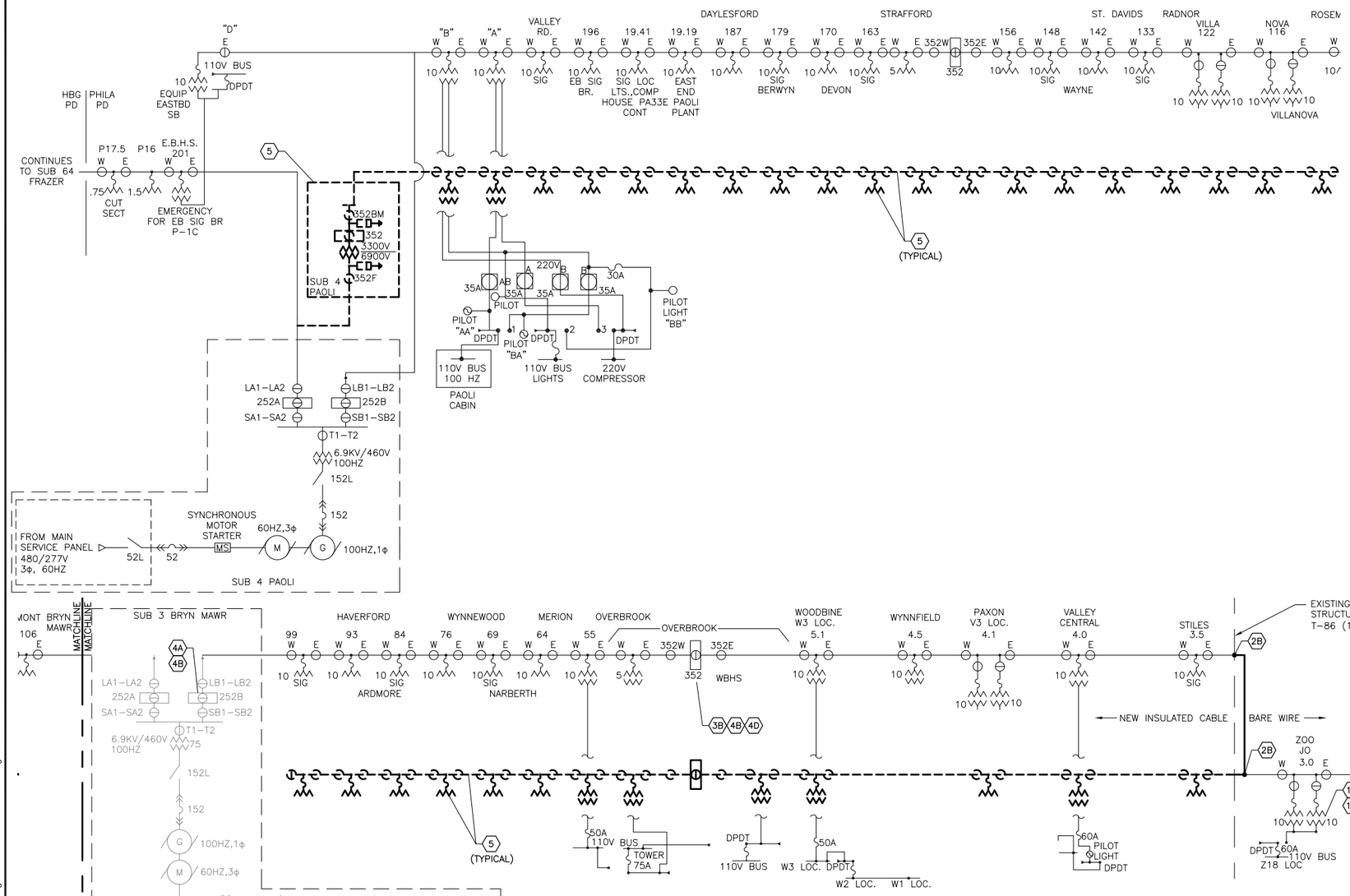
STAGING PLANS – SIGNAL POWER
100HZ SIGNAL POWER (SHEET 2 OF 3)

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

File No.:	2011-059-ET-0050-2.DWG
Ref. No.:	2011-059
Sheet No:	031 OF 565

ET-0051

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NOTE:

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STAGE III:

1. AT ZOO/JO INTERLOCKING SIGNAL HUT (INSTALL NEW 6900/3300/120V DUAL-TAP TRANSFORMER).
   - 1.A. WITH AMTRAK'S PERMISSION, DE-ENERGIZE SIGNAL HUT AND REMOVE THE CUTOUT UPSTREAM OF THE EXISTING 3300/120V HUT TRANSFORMER.
   - 1.B. REPLACE THE 3300/120V TRANSFORMER WITH A NEW 6900/3300/120V DUAL-TAP TRANSFORMER.
   - 1.C. CIRCUIT THE XFRM SECONDARY TO THE HUT MAIN CIRCUIT BREAKER.
   - 1.D. CONNECT EXISTING 3300V CUTOUT TO 3300V TAP OF THE NEW TRANSFORMER.

   NOTE: THE SIGNAL HUT IS STILL FED FROM THE 3300V SOURCE, BUT WILL BE PREPARED TO ACCOMMODATE 6900V PRIMARY ONCE THE EXISTING SIGNAL POWER CONDUCTORS ARE MIGRATED FROM 3300V TO 6900V.

2. MIGRATE THE BARE 3300V SIGNAL POWER CONDUCTORS TO 6900V CABLE.
   - 2.A. WITH AMTRAK'S PERMISSION, OPEN EXISTING ZOO 252A TO DE-ENERGIZE THE 3300V SIGNAL POWER LINE BETWEEN ZOO SUBSTATION AND STRUCTURE T-86.
   - 2.B. CONNECT EXISTING SIGNAL POWER LINE BETWEEN STRUCTURE T-86 AND ZOO SUBSTATION TO NEW 6900V SIGNAL POWER CABLES AT STRUCTURE T-86.

3. AT ZOO SUBSTATION
   - 3.A. INSTALL, TEST AND COMMISSION NEW 6900/460V SIGNAL POWER TRANSFORMER AND ALL ASSOCIATED EQUIPMENT.
   - 3.B. OPEN OVERBROOK 352 BREAKER AND CLOSE NEW ZOO 252A BREAKER TO ENERGIZE THE 6900V SIGNAL POWER LINE FROM ZOO SUBSTATION TO OVERBROOK.

   NOTE: SIGNAL POWER SYSTEM IS IN FINAL CONFIGURATION.

4. TEST OVERBROOK 352 BREAKER:
   - 4.A. OPEN BRYN MAWR 252B AND VERIFY THAT OVERBROOK 352 CLOSES AUTOMATICALLY.
   - 4.B. OPEN 352 AND CLOSE BRYN MAWR 252B TO RESTORE NORMAL OPERATING CONDITIONS.
   - 4.C. OPEN ZOO 252A AND VERIFY THAT OVERBROOK 352 CLOSES AUTOMATICALLY.
   - 4.D. OPEN 352 AND CLOSE ZOO 252A TO RESTORE NORMAL OPERATING CONDITIONS.

5. REMOVE ALL 3300V EQUIPMENT BETWEEN ZOO SUBSTATION AND PAOLI SUBSTATION.

STAGE III SUMMARY:

AT THE END OF STAGE III:

A. THE OVERBROOK 352 BREAKER HAS BEEN TESTED AND COMMISSIONED.

B. NEW TRANSFORMER AT ZOO SUBSTATION HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

C. THE SIGNAL POWER SYSTEM BETWEEN ZOO SUBSTATION AND FRAZER SUBSTATION IS IN THE FINAL CONFIGURATION.

D. EXISTING 3300V EQUIPMENT HAS BEEN REMOVED.

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. SEE AMTRAK DRAWING PET-199-12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET-0070 THROUGH ET-0074.

1 / ET-0052 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE III)

100% DESIGN SUBMISSION

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OFFICE OF
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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
STAGING PLANS - SIGNAL POWER
100HZ SIGNAL POWER (SHEET 3 OF 3)

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

File No.:	2011-059-ET-0050-2.DWG
Ref. No.:	2011-059
Sheet No:	032 OF 565

ET-0052

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PHASE 1:

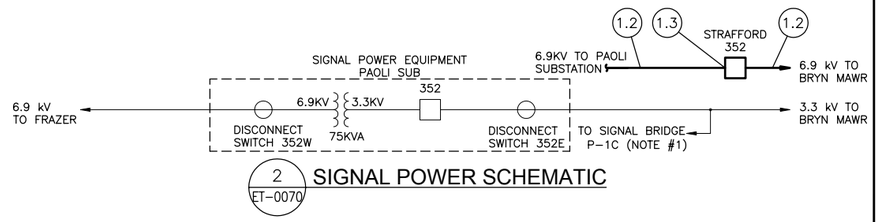
1.1 REMOVE EXISTING FOUNDATIONS AS INDICATED IN HATCHED AREA.

1.2 INSTALL NEW SIGNAL POWER CONDUCTORS BETWEEN PAOLI SUBSTATION (T-449) AND STRUCTURE T-86, AND TEST. SEE DRAWING ET-0025 FOR SINGLE LINE DIAGRAM.

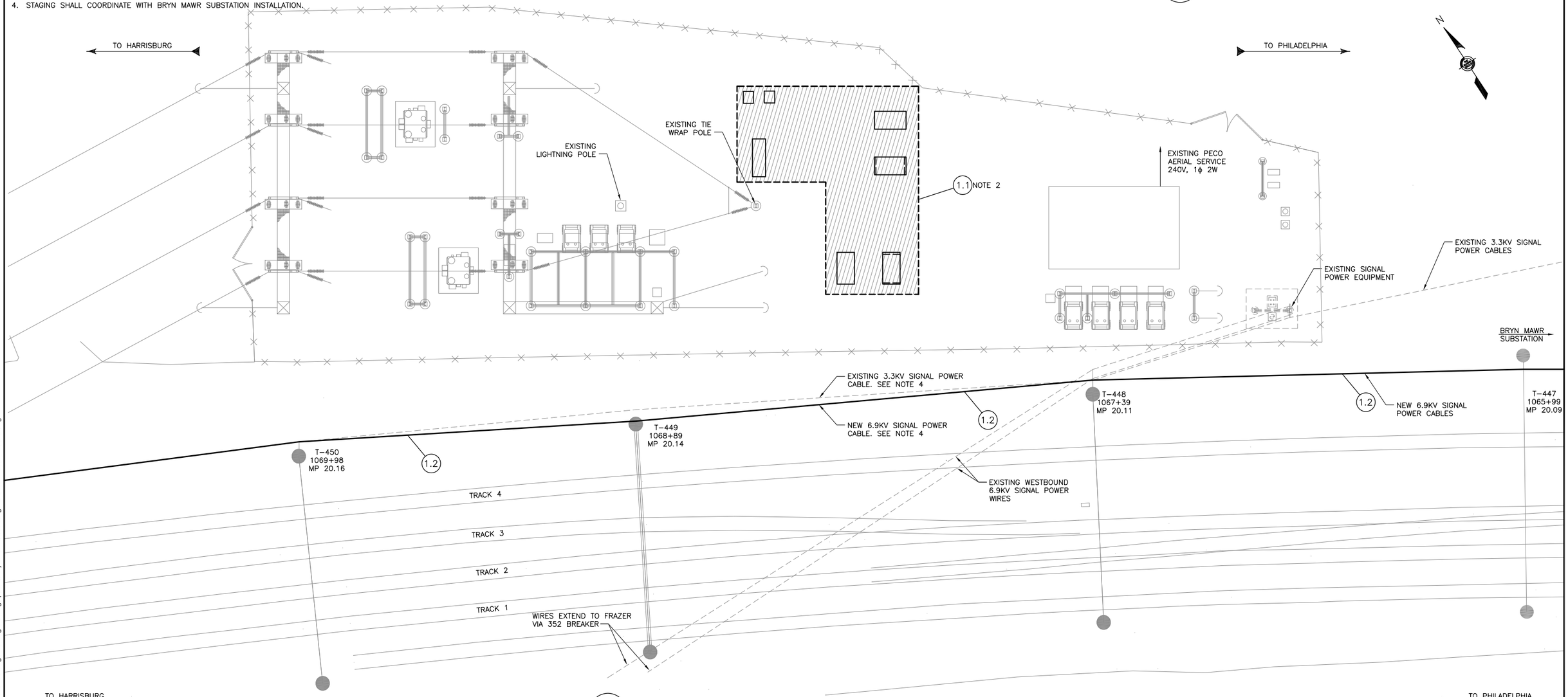
1.3 INSTALL NEW 352 BREAKER AT STRAFFORD AND OVERBROOK LOCATIONS, BETWEEN PAOLI SUBSTATION AND BRYN MAWR SUBSTATION. SEE DRAWING ET-0025 FOR SINGLE LINE DIAGRAM. SEE ET-3200 FOR BREAKER 352 INSTALLATION DETAILS.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P-1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET-0050 THROUGH ET-0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING SHALL COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.



2 ET-0070 SIGNAL POWER SCHEMATIC



1 ET-0070 PAOLI SUBSTATION STAGING PLAN - PHASE 1

16' 8' 0 16'

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

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STAGING PLANS
PAOLI SUB - STAGING DETAILS (SHEET 1 OF 7)

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

File No.:	2011-059-ET-0070.DWG
Ref. No.:	2011-059
Sheet No:	033 OF 565

ET-0070

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PHASE 2:

2.1 INSTALL NEW SIGNAL POWER HOUSE, AND ASSOCIATED EQUIPMENT.

2.2 INSTALL PECO TRANSFORMER.

2.3 PECO TO COMPLETE INSTALLATION OF NEW AERIAL SERVICE.

2.4 CONNECT, TEST, AND ENERGIZE 60HZ EQUIPMENT.

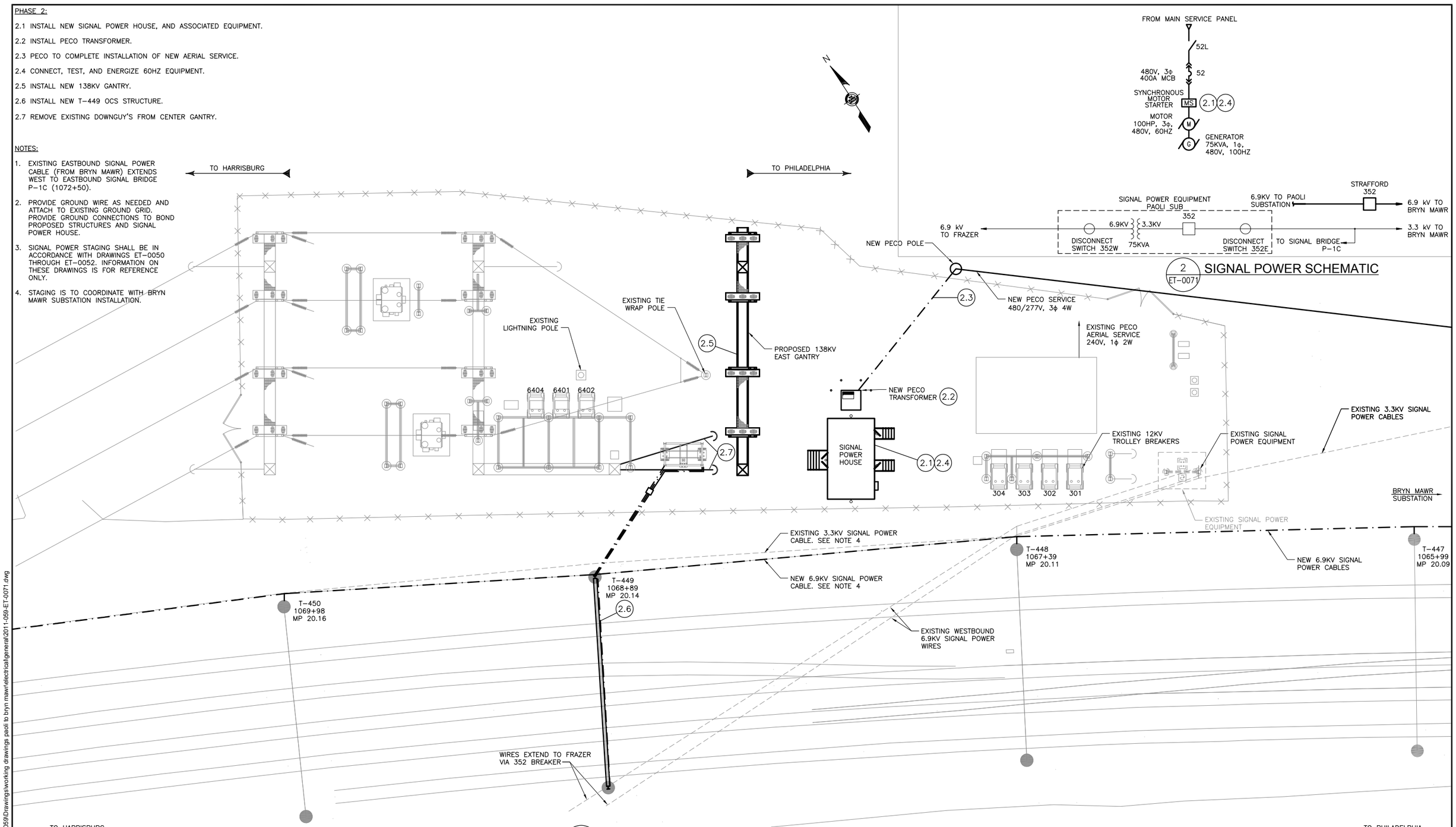
2.5 INSTALL NEW 138KV GANTRY.

2.6 INSTALL NEW T-449 OCS STRUCTURE.

2.7 REMOVE EXISTING DOWNGUY'S FROM CENTER GANTRY.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P-1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET-0050 THROUGH ET-0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.



1 ET-0071 PAOLI SUBSTATION STAGING PLAN - PHASE 2

16' 8' 0 16'

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

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB - STAGING DETAILS (SHEET 2 OF 7)

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

File No.:	2011-059-ET-0071.DWG
Ref. No.:	2011-059
Sheet No:	034 OF 565

ET-0071

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PHASE 3:

3.1 INSTALL LIGHTNING PROTECTION ON CONTROL HOUSE, WEST, CENTER AND EAST GANTRIES.

3.2 REMOVE EXISTING LIGHTNING POLE.

3.3 INSTALL NEW SIGNAL POWER STRUCTURE.

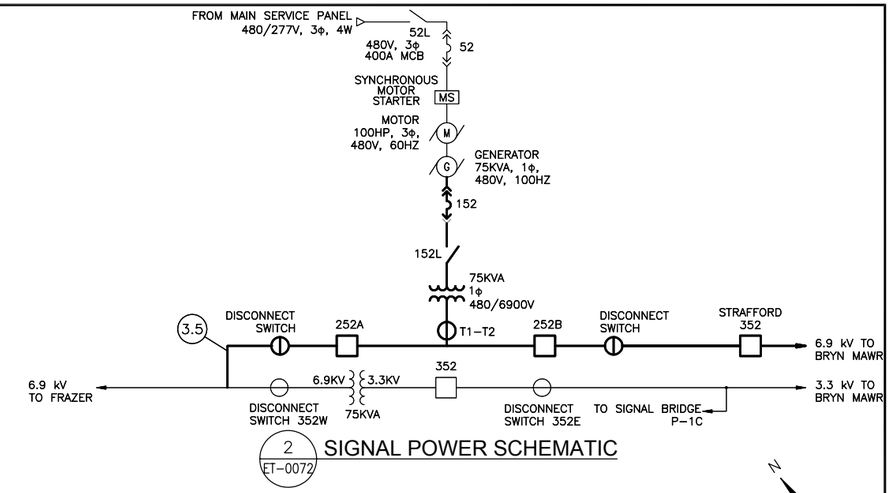
3.4 INSTALL NEW TRENCH AND CONTROL WIRING.

3.5 INSTALL SIGNAL POWER CABLES FROM NEW SIGNAL POWER STRUCTURE TO T–449. DO NOT CONNECT TERMINATIONS ON T–449 TO EXISTING WIRE. ONCE TESTING IS COMPLETE, CONNECT TERMINATIONS TO SIGNAL POWER CIRCUITS ALONG RIGHT OF WAY.

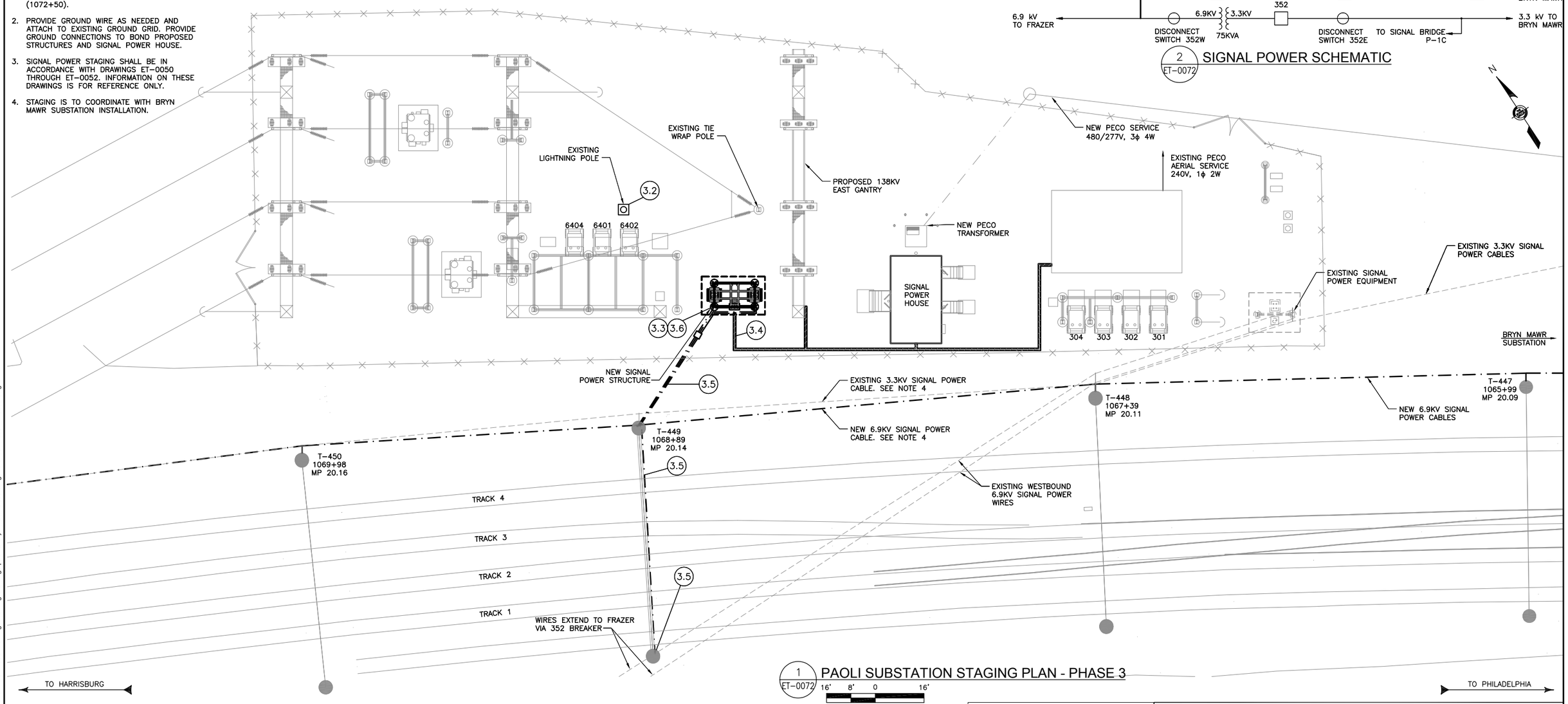
3.6 ENERGIZE, TEST AND COMMISSION NEW SIGNAL POWER EQUIPMENT.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P–1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET–0050 THROUGH ET–0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.



2 ET–0072 SIGNAL POWER SCHEMATIC



1 ET–0072 PAOLI SUBSTATION STAGING PLAN - PHASE 3

16' 8' 0 16'

SCALE:1/16"=1'–0"

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB – STAGING DETAILS (SHEET 3 OF 7)

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

File No.:	2011-059-ET-0072.DWG
Ref. No.:	2011–059
Sheet No:	035 OF 565

ET–0072

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PHASE 4:

4.1 OPEN 352 BREAKER AT STRAFFORD AND CLOSE 252B BREAKER AT PAOLI SUBSTATION.

4.2 INSTALL NEW 352 BREAKER AT MALVERN, BETWEEN PAOLI SUBSTATION AND FRAZER SUBSTATION.

4.3 REPLACE SIGNAL BRIDGE P1-C EMERGENCY 3.3 kV FEED WITH NEW 6.9 kV EMERGENCY FEED. SEE DRAWING ET-0025 FOR MORE INFORMATION.

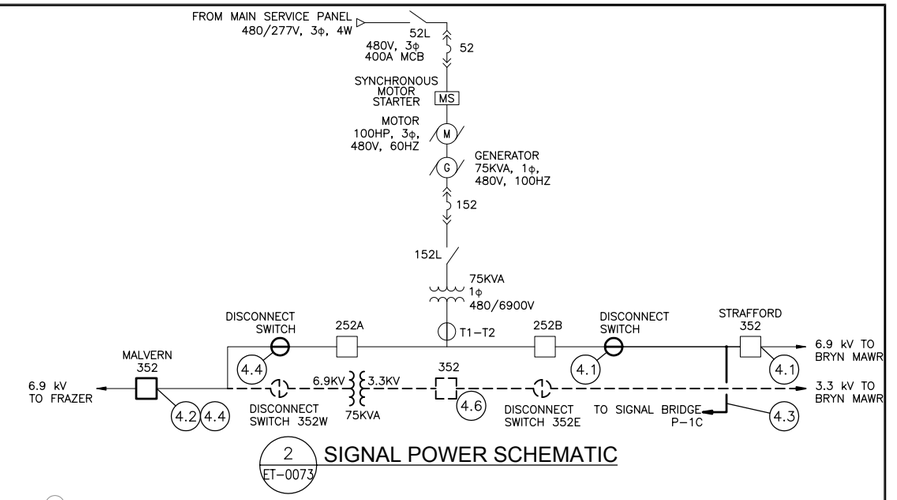
4.4 OPEN 352 BREAKER AT MALVERN AND CLOSE 252A BREAKER AT PAOLI SUBSTATION.

4.5 REMOVE EXISTING SIGNAL POWER WIRES FROM EXISTING STRUCTURE T-448.

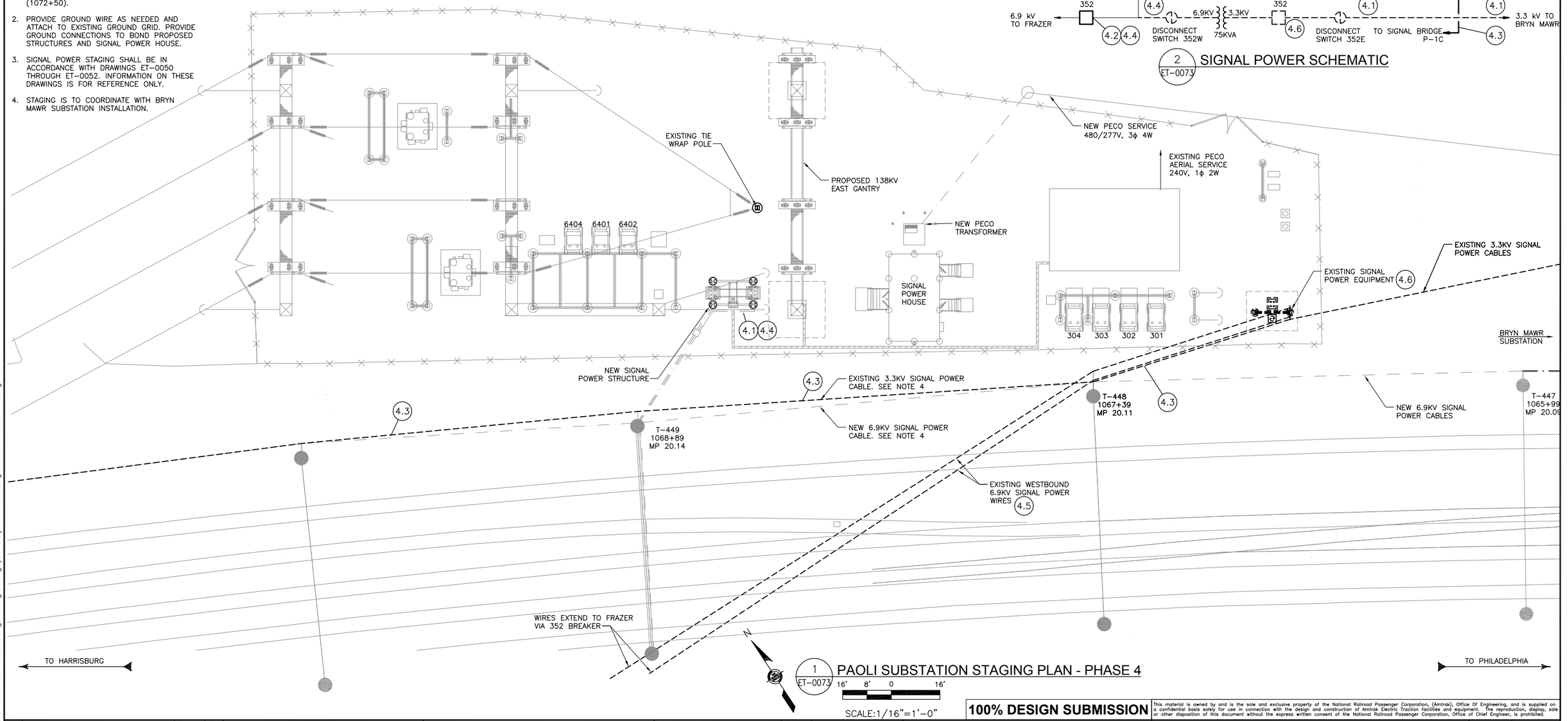
4.6 REMOVE EXISTING SIGNAL POWER STRUCTURE, EQUIPMENT AND FOUNDATIONS.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P-1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET-0050 THROUGH ET-0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.



2 / ET-0073 SIGNAL POWER SCHEMATIC



1 / ET-0073 PAOLI SUBSTATION STAGING PLAN - PHASE 4

16' 8' 0 16'

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

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB - STAGING DETAILS (SHEET 4 OF 7)

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

File No.:	2011-059-ET-0073.DWG
Ref. No.:	2011-059
Sheet No:	036 OF 565

ET-0073

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PHASE 5:

5.1 INSTALL NEW 138KV EQUIPMENT ON EAST GANTRY, TEST.

5.2 INSTALL NEW TIE WRAP COLUMNS.

5.3 REMOVE EXISTING TIE WRAP COLUMN.

5.4 REMOVE EXISTING SWITCHES ON CENTER GANTRY AND INSTALL NEW POST INSULATORS.

5.5 INSTALL NEW CONDUCTORS BETWEEN CENTER AND EAST GANTRIES.

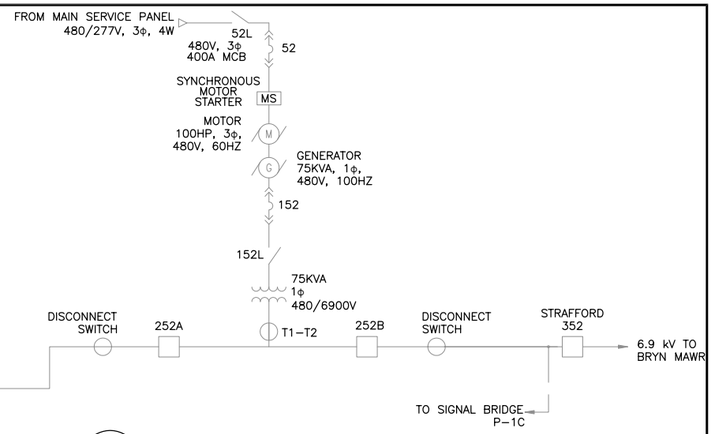
5.6 INSTALL NEW CONDUCTORS FROM STRUCTURE T–447 AND EAST GANTRY.

NOTES:

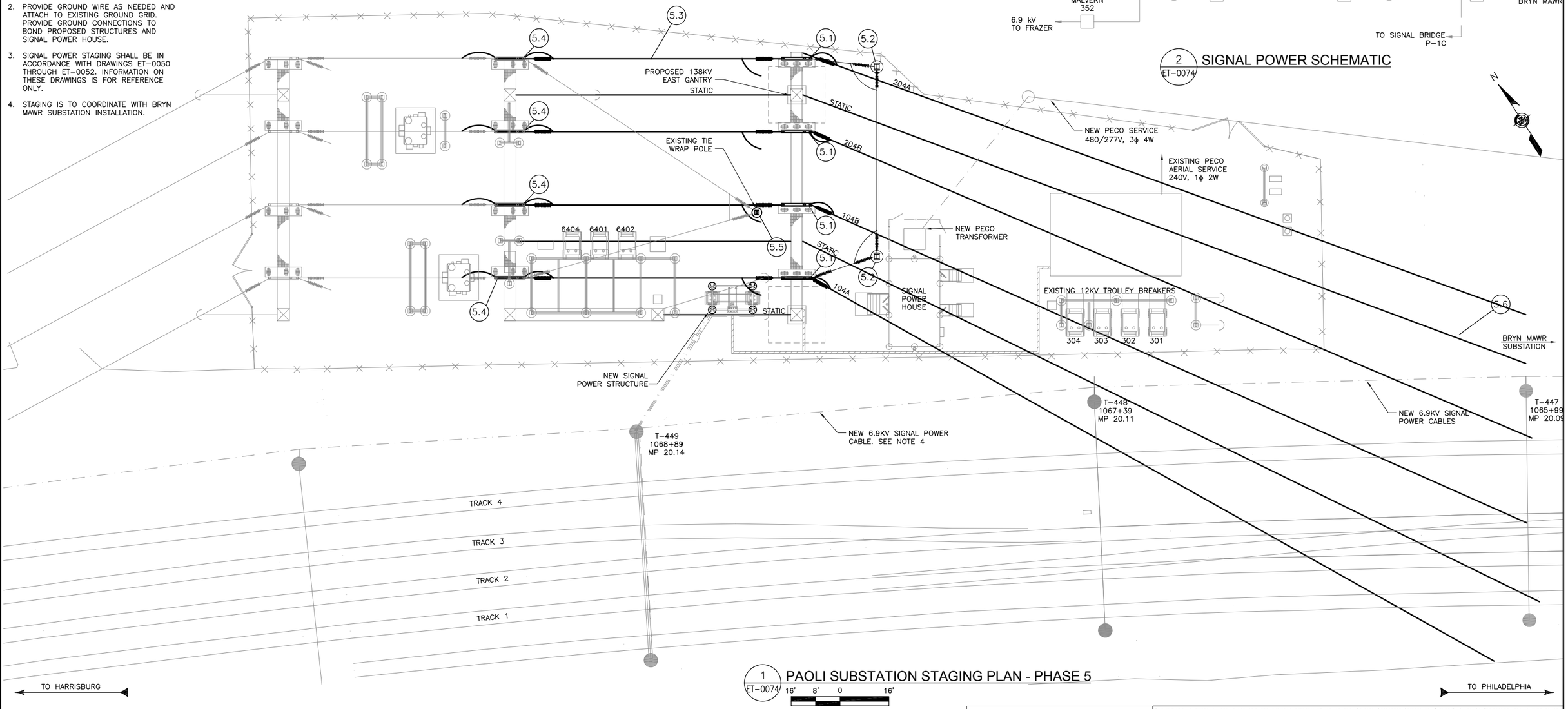
1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P–1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET–0050 THROUGH ET–0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.

CONSTRUCTION NOTES:

1. INSTALL STATIC WIRES OR USE TEMPORARY DOWN GUYS TO STABILIZE THE NEW EAST GANTRY BEFORE STRINGING THE NEW TRANSMISSION WIRES BETWEEN THE MIDDLE GANTRY AND THE EAST GANTRY OR STRINGING TRANSMISSION WIRES BETWEEN THE EAST GANTRY AND THE OCS POLES.
2. THE EAST GANTRY IS NOT DESIGNED TO SUPPORT SIX WIRES AT FULL TENSION WITHOUT INSTALLING THE BALANCING WIRES ON THE OPPOSITE SIDE OF THE TRUSS.
3. TRANSMISSION WIRES CAN BE STRUNG BETWEEN GANTRIES AT A REDUCED TENSION UNTIL REMAINING WIRES ARE INSTALLED.



2 ET–0074 SIGNAL POWER SCHEMATIC



1 ET–0074 PAOLI SUBSTATION STAGING PLAN - PHASE 5

16' 8' 0 16'

SCALE:1/16"=1'–0"

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB – STAGING DETAILS (SHEET 5 OF 7)

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

File No.:	2011–059–ET–0074.DWG
Ref. No.:	2011–059
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ET–0074

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PHASE 6:

6.1 REMOVE EXISTING SIGNAL POWER TRIPLEX FROM STRUCTURE #T-453 TO EXISTING SIGNAL POWER STRUCTURE.

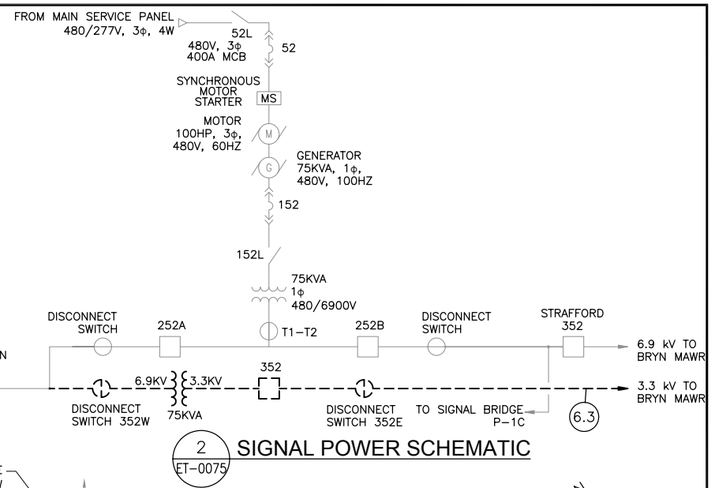
6.2 REMOVE EXISTING SIGNAL POWER WIRES, INCLUDING FROM STRUCTURE #T-453 TO EXISTING SIGNAL POWER STRUCTURE.

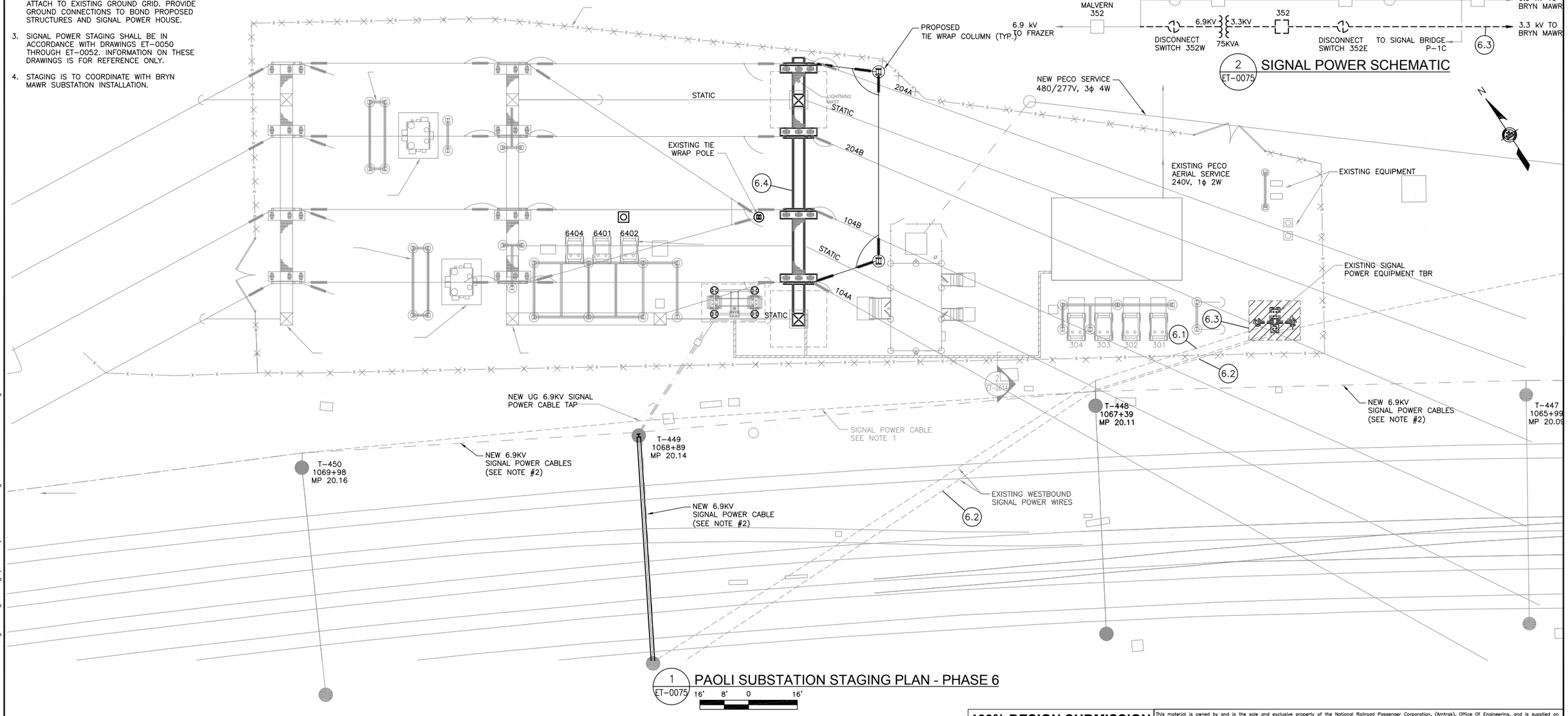
6.3 REMOVE EXISTING SIGNAL POWER STRUCTURE AND 3.3kV SIGNAL POWER EQUIPMENT.

6.4 INSTALL 138KV EQUIPMENT ON NEW GANTRY.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P-1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET-0050 THROUGH ET-0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.





1 ET-0075 PAOLI SUBSTATION STAGING PLAN - PHASE 6

16' 8' 0 16'

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

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IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB - STAGING DETAILS (SHEET 6 OF 7)

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

File No.:	2011-059-ET-0075.DWG
Ref. No.:	2011-059
Sheet No:	038 OF 565

ET-0075

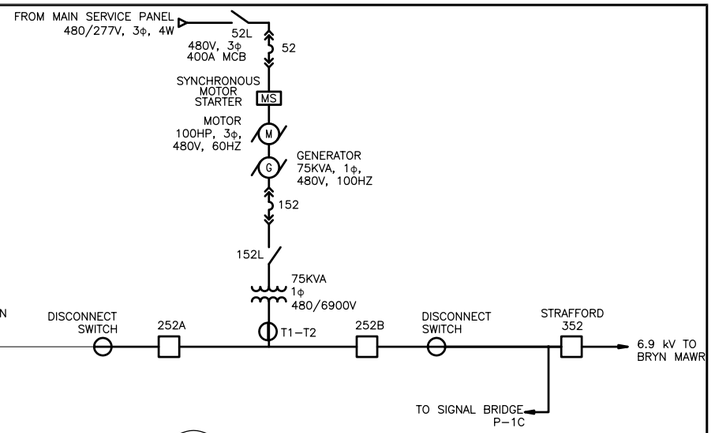
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PHASE 7:

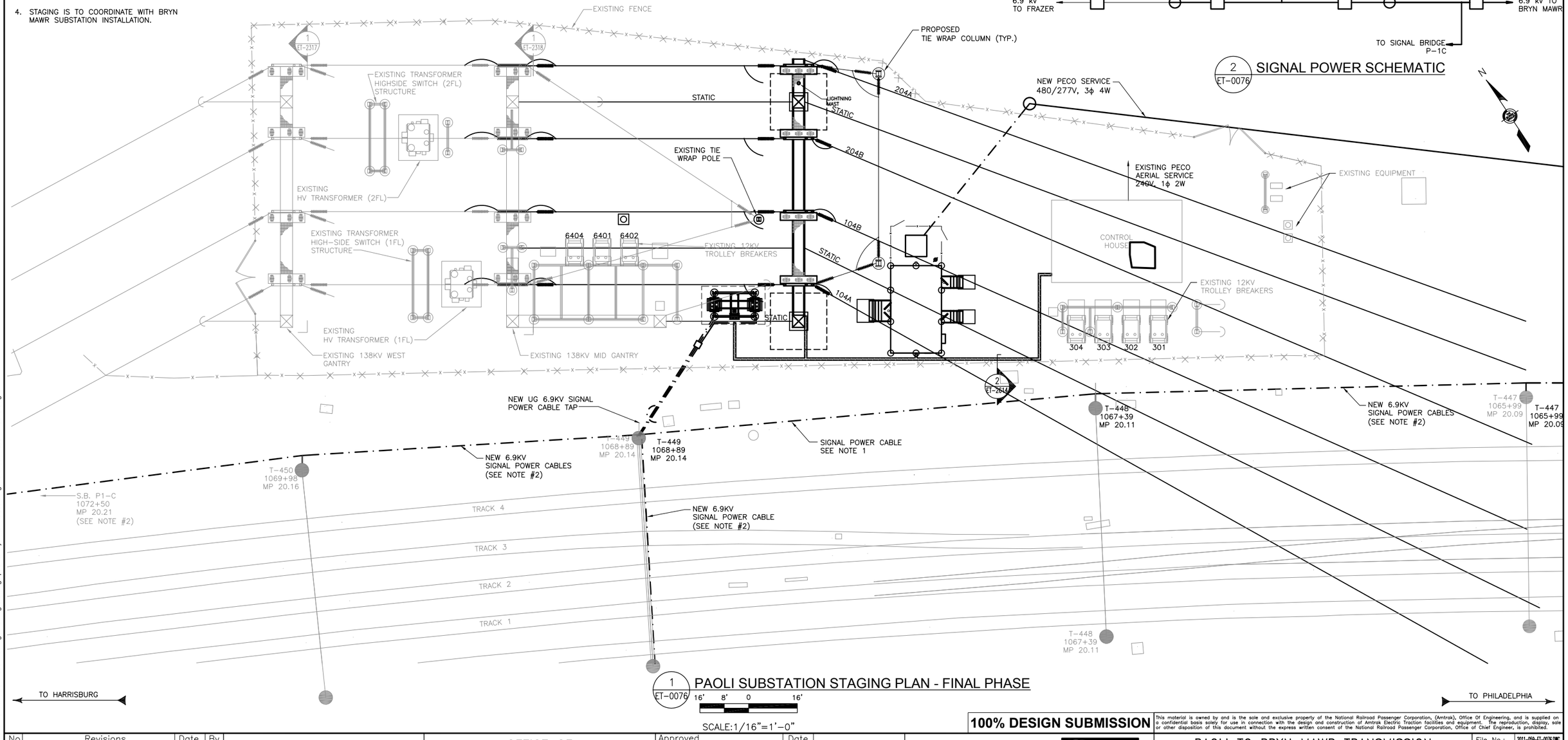
7.1 FINAL CONFIGURATION AS SHOWN ON THIS PHASE.

NOTES:

1. EXISTING EASTBOUND SIGNAL POWER CABLE (FROM BRYN MAWR) EXTENDS WEST TO EASTBOUND SIGNAL BRIDGE P–1C (1072+50).
2. PROVIDE GROUND WIRE AS NEEDED AND ATTACH TO EXISTING GROUND GRID. PROVIDE GROUND CONNECTIONS TO BOND PROPOSED STRUCTURES AND SIGNAL POWER HOUSE.
3. SIGNAL POWER STAGING SHALL BE IN ACCORDANCE WITH DRAWINGS ET–0050 THROUGH ET–0052. INFORMATION ON THESE DRAWINGS IS FOR REFERENCE ONLY.
4. STAGING IS TO COORDINATE WITH BRYN MAWR SUBSTATION INSTALLATION.



2 ET–0076 SIGNAL POWER SCHEMATIC



1 ET–0076 PAOLI SUBSTATION STAGING PLAN - FINAL PHASE

16' 8' 0 16'

SCALE:1/16"=1'–0"

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STAGING PLANS
PAOLI SUB – STAGING DETAILS (SHEET 7 OF 7)

File No.:	2011–059–ET–0076.DWG
Ref. No.:	2011–059
Sheet No:	039 OF 565

ET–0076

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

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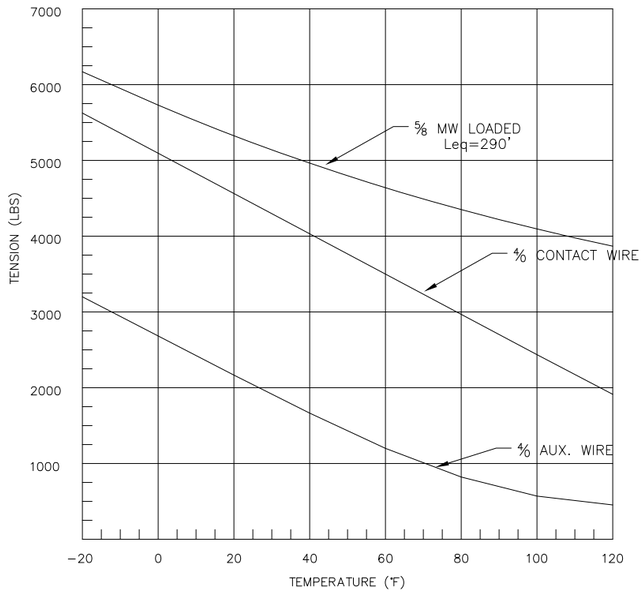
EXISTING CATENARY DATA (3 WIRE SYSTEM)

DESIGN ITEM	UNITS	MESSENGER	AUXILLARY WIRE	CONTACT WIRE
CONDUCTOR		5/8" DIA. BRONZE	4/0 GROOVED	4/0 GROOVED
SYMBOL				
MATERIAL		BRONZE	COPPER	BRONZE (ALLOY 55)
DIAMETER	IN	0.625	0.482	0.482
CROSS SECTIONAL AREA	SQ IN	0.233	0.1665	0.1665
WEIGHT OF CONDUCTOR	LB/FT	0.905	0.642	0.642
WEIGHT OF CATENARY (INCLUDING HANGERS)	LB/FT	2.27		
RADIAL THICKNESS OF ICE (PART ICE)	IN	0.500	.500	0.125
WEIGHT OF ICE (PART ICE)	LB/FT	0.699	.611	0.094
WEIGHT OF CATENARY WITH ICE (PART ICE)	LB/FT	3.674		
RADIAL THICKNESS OF ICE (FULL ICE)	IN	0.500	0.500	0.500
WEIGHT OF ICE (FULL ICE)	LB/FT	0.699	0.611	0.611
WEIGHT OF CATENARY WITH ICE (FULL ICE)	LB/FT	4.191		
BREAKING LOAD	LB	25,520	7700	11,490
EQUIVALENT SPAN	FT	290	30	15
TENSIONS AT : 60° F NO WIND	LB	4640	1200	3500
120° F NO WIND	LB	3867	454	1906
0°F NO WIND, FULL ICE	LB	7680	2750	5096
0°F 4 PSF WIND, FULL ICE	LB	7715	2762	5098
MESSENGER SAGS ON 300 FT SPAN AT:				
60° F NO WIND	FT	5.50	–	–
120° F NO WIND	FT	6.55	–	–
0° F NO WIND, FULL ICE	FT	5.75	–	–
MODULUS OF ELASTICITY	PSI	17.00E+06	17.00E+06	17.00E+06
COEFFICIENT OF EXPANSION	/ ° F	9.40E–06	9.40E–06	9.40E–06
MINIMUM FACTOR OF SAFETY		3.3	2.79	2.25

EXISTING CATENARY DATA (2 WIRE SYSTEM)

DESIGN ITEM	UNITS	MESSENGER	CONTACT WIRE
CONDUCTOR		5/8" DIA. BRONZE	4/0 GROOVED
SYMBOL			
MATERIAL		BRONZE	BRONZE (ALLOY 55)
DIAMETER	IN	0.625	0.482
CROSS SECTIONAL AREA	SQ IN	0.233	0.1665
WEIGHT OF CONDUCTOR	LB/FT	0.905	0.642
WEIGHT OF CATENARY (INCLUDING HANGERS)	LB/FT	1.67	
RADIAL THICKNESS OF ICE (PART ICE)	IN	0.500	0.125
WEIGHT OF ICE (PART ICE)	LB/FT	0.699	0.094
WEIGHT OF CATENARY WITH ICE (PART ICE)	LB/FT	2.275	
RADIAL THICKNESS OF ICE (FULL ICE)	IN	0.500	0.500
WEIGHT OF ICE (FULL ICE)	LB/FT	0.699	0.611
WEIGHT OF CATENARY WITH ICE (FULL ICE)	LB/FT	2.98	
BREAKING LOAD	LB	25,520	11,490
EQUIVALENT SPAN	FT	290	20
TENSIONS AT : 60° F NO WIND	LB	4640	3500
120° F NO WIND	LB	3598	1906
0°F NO WIND, FULL ICE	LB	7355	5096
0°F 4 PSF WIND, FULL ICE	LB	7534	5098
MESSENGER SAGS ON 300 FT SPAN AT:			
60° F NO WIND	FT	4.05	–
120° F NO WIND	FT	5.18	–
0° F NO WIND, FULL ICE	FT	4.55	–
MODULUS OF ELASTICITY	PSI	17.00E+06	17.00E+06
COEFFICIENT OF EXPANSION	/ ° F	9.40E–06	9.40E–06
MINIMUM FACTOR OF SAFETY		3.52	2.25

MAINLINE CATENARY (3 WIRE)
GRAPH OF WIRE TENSION VS TEMPERATURE



EXISTING CATENARY (3 WIRE) WIRE TENSIONS (LBS)

TEMP. (°F)	Leq=290 FT MESSENGER WIRE	Leq=30 FT AUXILLARY WIRE	Leq=15 FT CONTACT WIRE
–10	5943	2945	5362
0	5727	2684	5096
10	5521	2424	4830
20	5325	2167	4564
30	5139	1913	4298
40	4964	1665	4032
50	4797	1424	3766
60	4640	1200	3500
70	4492	994	3234
80	4352	822	2968
90	4220	679	2702
100	4096	571	2437
110	3978	500	2171
120	3868	454	1906

EXISTING CATENARY (2 WIRE) WIRE TENSIONS (LBS)

TEMP. (°F)	Leq=290 FT MESSENGER WIRE	Leq=20 FT CONTACT WIRE
–10	6354	5362
0	6076	5096
10	5810	4830
20	5553	4564
30	5307	4298
40	5075	4032
50	4850	3766
60	4640	3500
70	4442	3234
80	4256	2968
90	4082	2702
100	3919	2437
110	3767	2171
120	3626	1906

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OCS – GENERAL
TECHNICAL DATA AND WIRE PARTICULARS (SHEET 1 OF 3)

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

File No.:	2011-059-ET-0092.DWG
Ref. No.:	2011–059
Sheet No:	040 OF 565

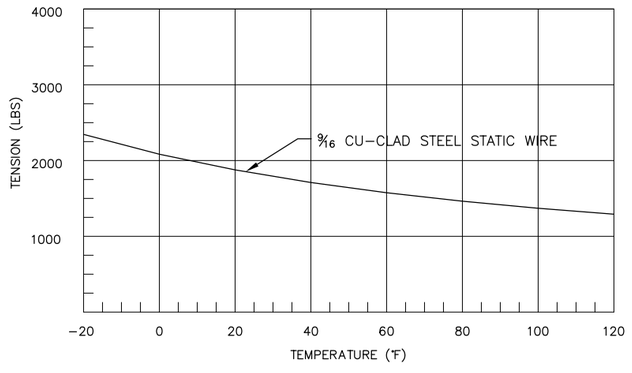
ET–0092

STATIC WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	9/16"ø CU–CLAD STEEL
MATERIAL:	–	COPPERCLAD H.S. STEEL
DIAMETER	IN	0.572
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.195
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.700
TENSION AT 60°F	LB	1575
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.676
WIND LOAD (NO ICE, 90 MPH)	LB/FT	0.991
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.537
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3435
TENSION AT 0°F WITH ICE, NO WIND	LB	3273
TENSION AT –10°F, NO WIND OR ICE	LB	2207
TENSION AT 120°F, NO WIND	LB	1292
BREAKING LOAD	LB	23,390
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.73
–10°F NO ICE, NO WIND	FT	3.57
120°F, NO WIND	FT	6.10
MODULUS OF ELASTICITY	PSI	2900E+6
COEFFICIENT OF EXPANSION	/°F	6.50E–6
MINIMUM FACTOR OF SAFETY	–	–

STATIC WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	4/0 AWG
MATERIAL:	–	HD COPPER
DIAMETER	IN	0.522
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.1662
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.653
TENSION AT 60°F	LB	1470
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.637
WIND LOAD (NO ICE, 90 MPH)	LB/FT	0.874
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.520
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3101
TENSION AT 0°F WITH ICE, NO WIND	LB	2973
TENSION AT –10°F, NO WIND OR ICE	LB	2227
TENSION AT 120°F, NO WIND	LB	1145
BREAKING LOAD	LB	9,154
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.88
–10°F NO ICE, NO WIND	FT	3.36
120°F, NO WIND	FT	6.34
MODULUS OF ELASTICITY	PSI	17.00E+6
COEFFICIENT OF EXPANSION	/°F	9.40E–6
MINIMUM FACTOR OF SAFETY	–	–

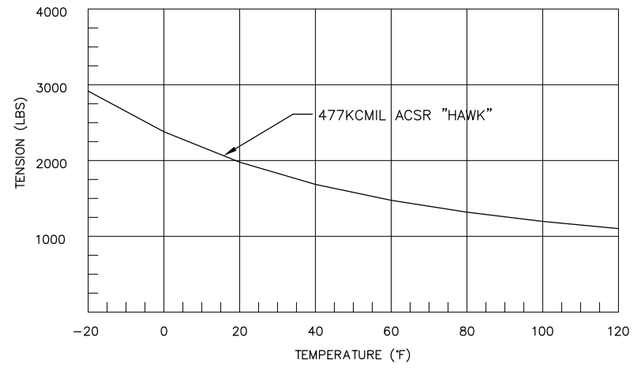
TRANSMISSION WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	477 KCMIL ACSR
MATERIAL: ALUM 26x0.1354, STEEL 7x0.1053	–	HAWK
DIAMETER	IN	0.858
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.4353
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.656
TENSION AT 60°F	LB	1475
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.844
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.487
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.635
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3899
TENSION AT 0°F WITH ICE, NO WIND	LB	3718
TENSION AT –10°F, NO WIND OR ICE	LB	2632
TENSION AT 120°F, NO WIND	LB	1102
BREAKING LOAD	LB	19,430
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.56
–10°F NO ICE, NO WIND	FT	3.10
120°F, NO WIND	FT	6.61
MODULUS OF ELASTICITY	PSI	10.10E+6
COEFFICIENT OF EXPANSION	/°F	10.55E–6
MINIMUM FACTOR OF SAFETY	–	–

9/16 CU–CLAD STEEL STATIC WIRE
GRAPH OF WIRE TENSION VS TEMPERATURE



9/16 STATIC WIRE WIRE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT STATIC WIRE
–20	2345
–10	2207
0	2084
10	1975
20	1877
30	1789
40	1710
50	1639
60	1575
70	1517
80	1464
90	1415
100	1371
110	1330
120	1292

477 KCMIL ACSR "HAWK" TRANSMISSION WIRE
GRAPH OF WIRE TENSION VS TEMPERATURE



477 KCMIL ACSR WIRE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT TRANSMISSION WIRE
–20	2917
–10	2632
0	2380
10	2163
20	1978
30	1820
40	1686
50	1573
60	1475
70	1391
80	1318
90	1254
100	1197
110	1147
120	1102

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

OCS – GENERAL

TECHNICAL DATA AND WIRE PARTICULARS (SHEET 2 OF 3)

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

File No.:	2011-059-ET-0093.DWG
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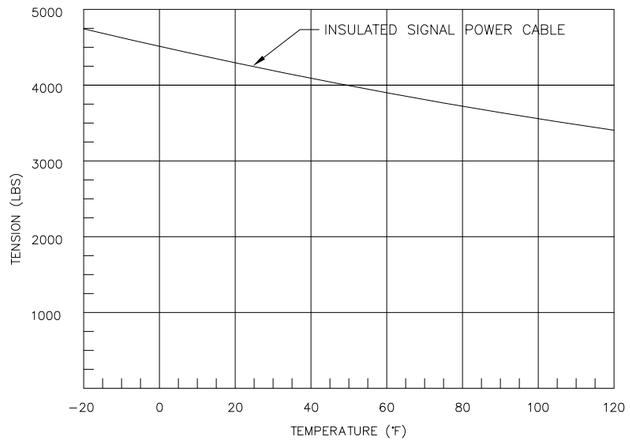
ET–0093

INSULATED SIGNAL POWER WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	2C #2 AWG
MATERIAL: 3/8 EHS & 2C #2 AWG CU	–	HD COPPER
VERTICAL DIMENSION	IN	2.584
CROSS SECTIONAL AREA	SQ. IN.	–
UNIT WEIGHT OF CONDUCTOR	LB/FT	1.738
TENSION AT 60°F	LB	3900
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	1.814
WIND LOAD (NO ICE, 90 MPH)	LB/FT	4.466
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	1.225
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	6439
TENSION AT 0°F WITH ICE, NO WIND	LB	6257
TENSION AT −10°F, NO WIND OR ICE	LB	4626
TENSION AT 120°F, NO WIND	LB	3405
BREAKING LOAD	LB	15,400
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.01
0F WITH 1/2" RADIAL ICE, NO WIND	FT	6.39
−10°F NO ICE, NO WIND	FT	4.25
120°F, NO WIND	FT	5.74
MODULUS OF ELASTICITY	PSI	29E+6
COEFFICIENT OF EXPANSION	/°F	6.5E−6
MINIMUM FACTOR OF SAFETY	–	2.39

OPTICAL GROUND WIRE (FOG)		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR – ALCOA	–	S1−129/44/725
MATERIAL:	–	ALUM/SS TUBE/STEEL
DIAMETER	IN	0.725
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.413
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.486
FINAL TENSION AT 60°F	LB	1630
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.772
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.214
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.589
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	4167
TENSION AT 0°F WITH ICE, NO WIND	LB	3994
TENSION AT −10°F, NO WIND OR ICE	LB	2959
TENSION AT 120°F, NO WIND	LB	1222
BREAKING LOAD	LB	20,288
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.25
−10°F NO ICE, NO WIND	FT	2.85
120°F, NO WIND	FT	6.59
MODULUS OF ELASTICITY	PSI	13.938E+6
COEFFICIENT OF EXPANSION	/°F	10.2E−6
MINIMUM FACTOR OF SAFETY	–	–

FEEDER WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	400 kcmil
MATERIAL	–	HD COPPER
DIAMETER	IN	0.728
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.3142
UNIT WEIGHT OF CONDUCTOR	LB/FT	1.235
TENSION AT 60°F	LB	2790
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.764
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.258
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.59
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	5155
TENSION AT 0°F WITH ICE, NO WIND	LB	5039
TENSION AT −10°F, NO WIND OR ICE	LB	4231
TENSION AT 120°F, NO WIND	LB	2170
BREAKING LOAD	LB	18,320
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	4.98
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.45
−10°F NO ICE, NO WIND	FT	3.35
120°F, NO WIND	FT	6.33
MODULUS OF ELASTICITY	PSI	17E+6
COEFFICIENT OF EXPANSION	/°F	9.40E−6
MINIMUM FACTOR OF SAFETY	–	–

INSULATED SIGNAL POWER CABLE
GRAPH OF WIRE TENSION VS TEMPERATURE



INSULATED SIGNAL POWER CABLE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT INSULATED SIGNAL POWER CABLE
−20	4743
−10	4626
0	4512
10	4402
20	4295
30	4191
40	4091
50	3994
60	3900
70	3810
80	3722
90	3638
100	3558
110	3480
120	3405

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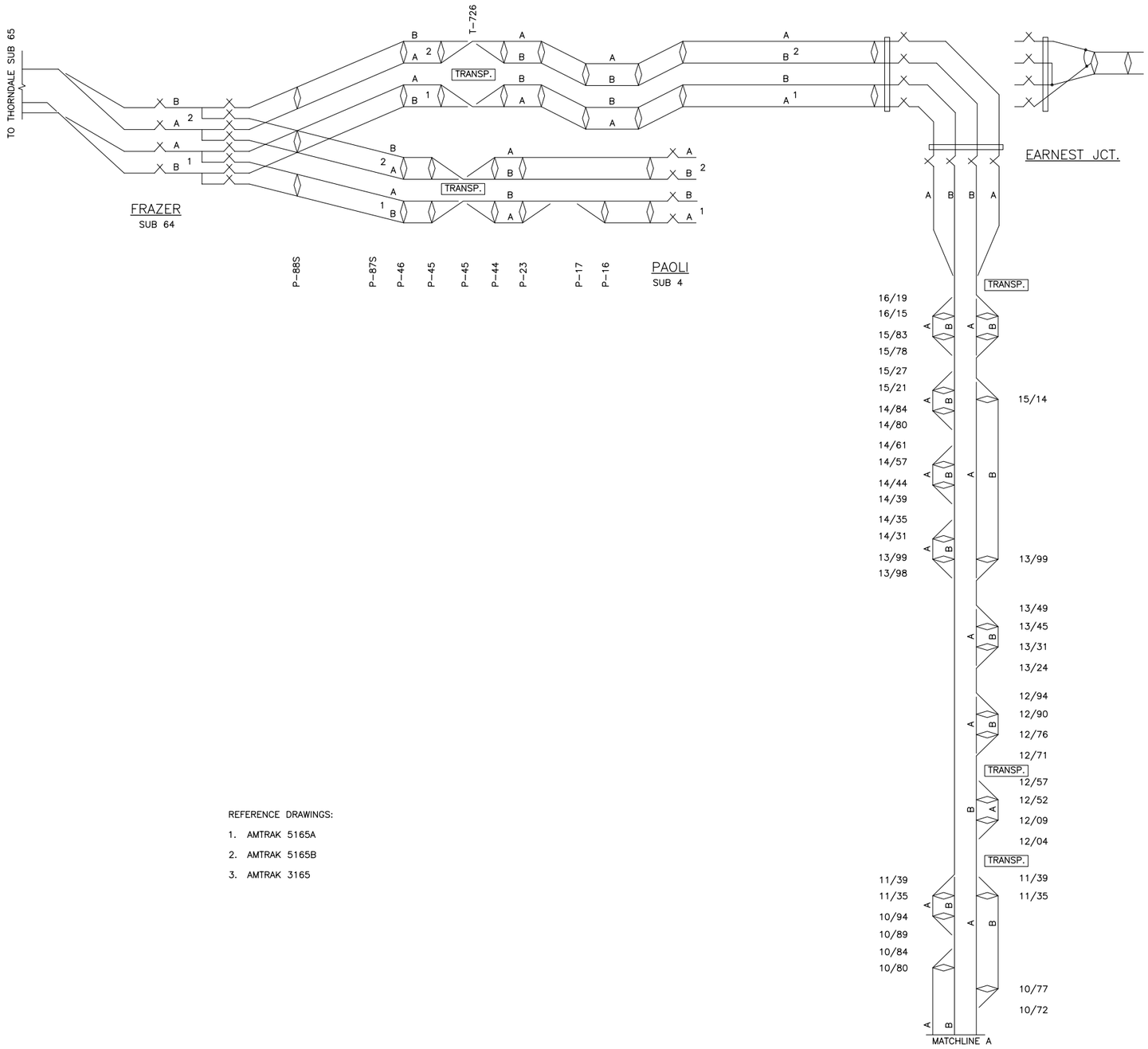
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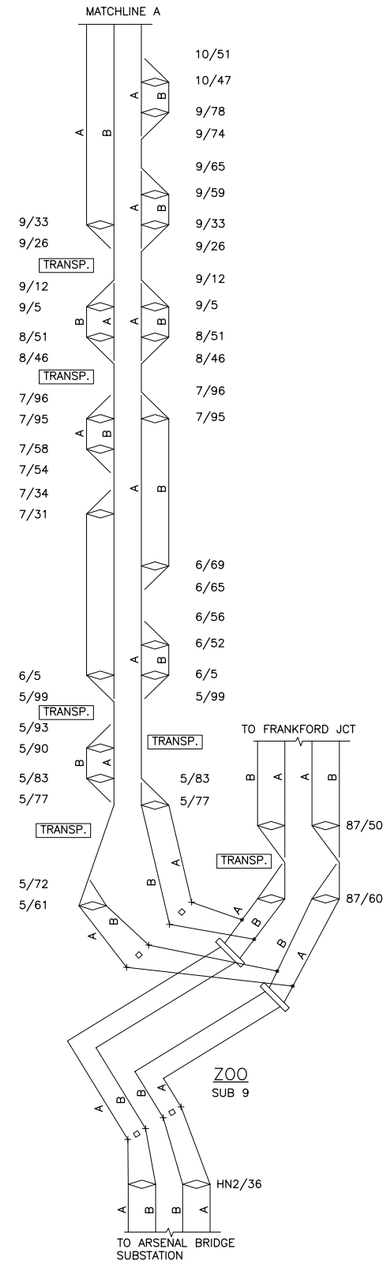
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OCS – GENERAL
TECHNICAL DATA AND WIRE PARTICULARS (SHEET 3 OF 3)

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File No.:	2011-059-ET-0094.DWG
Ref. No.:	2011-059
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REFERENCE DRAWINGS:

1. AMTRAK 5165A
2. AMTRAK 5165B
3. AMTRAK 3165

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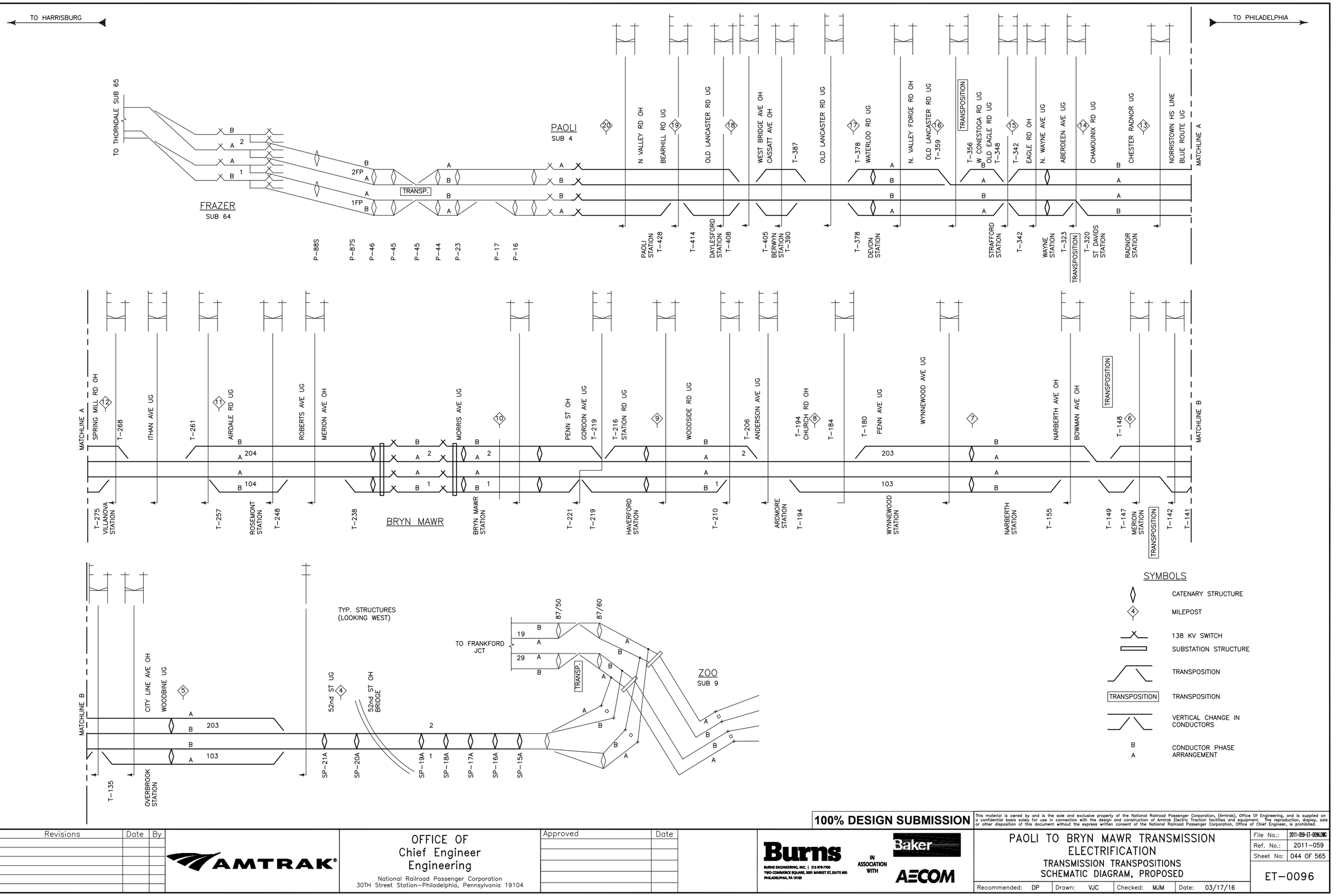
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION TRANSPOSITIONS SCHEMATIC DIAGRAM, EXISTING

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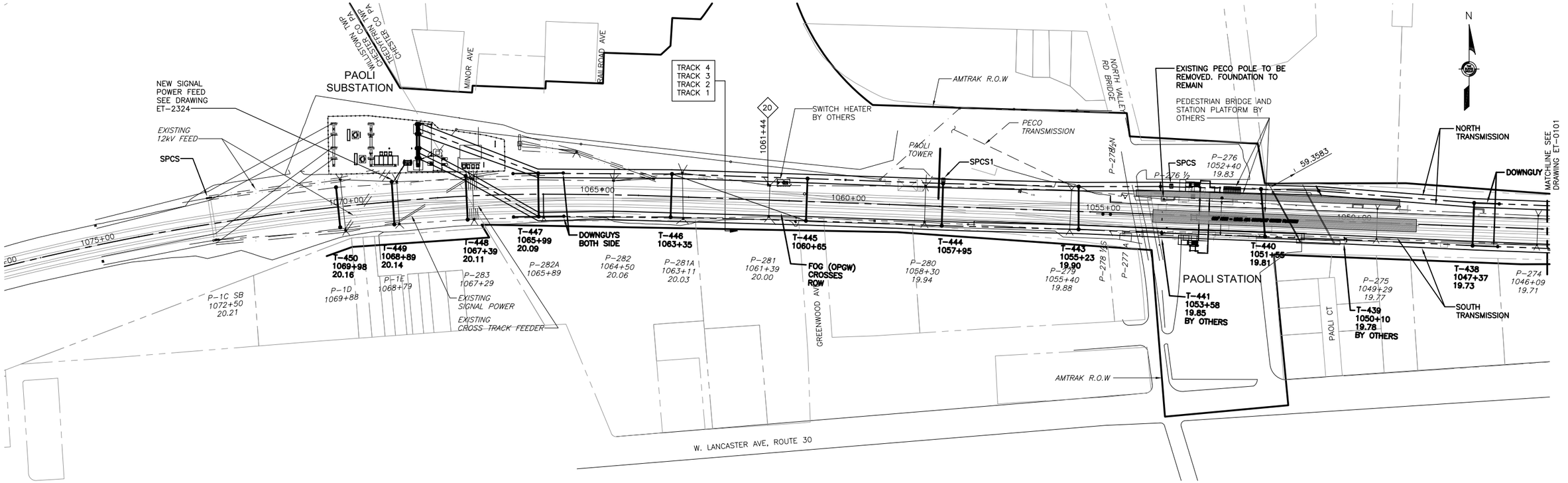
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION TRANSPOSITIONS SCHEMATIC DIAGRAM, PROPOSED

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

File No.:	2011-059-ET-0096.DWG
Ref. No.:	2011-059
Sheet No:	044 OF 565

ET-0096

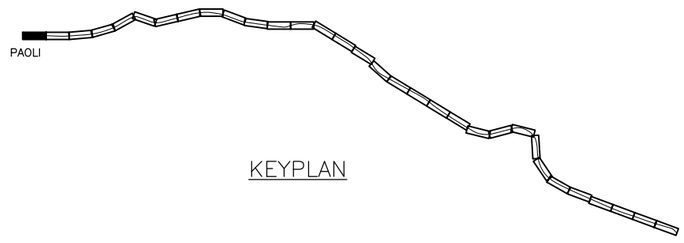
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3/14/2016
1:52:57 PM



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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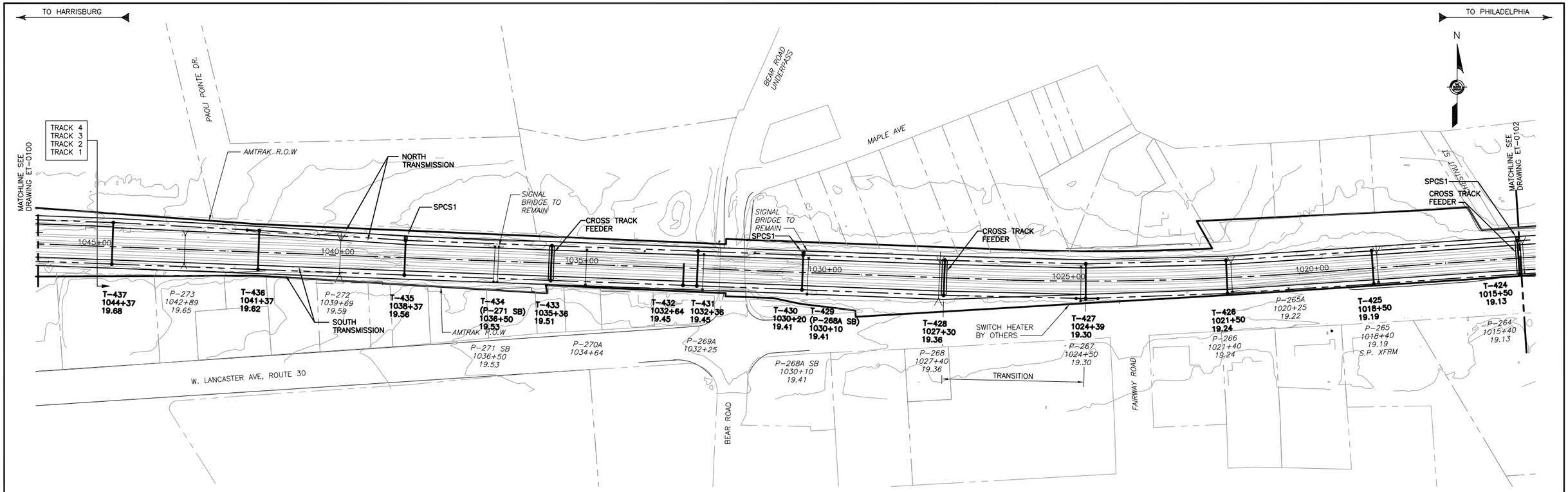
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 1075+00 TO 1046+00

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

File No.:	2011-059-ET-0100.DWG
Ref. No.:	2011-059
Sheet No:	045 OF 565

ET-0100

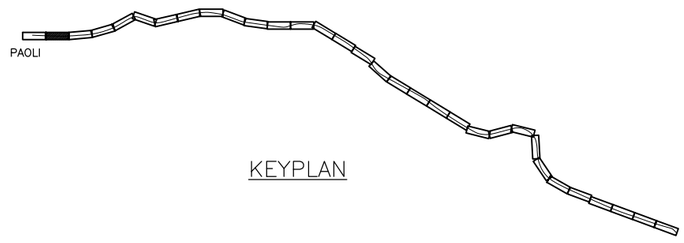
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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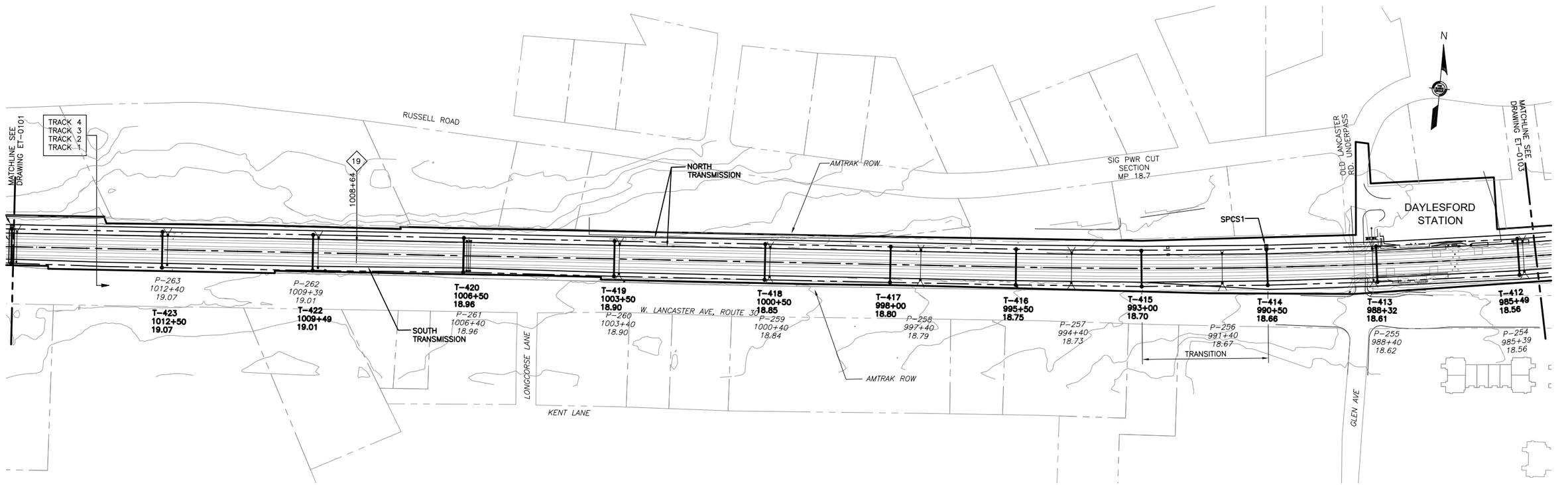
TRANSMISSION LINE SITE PLAN
STA. 1046+00 TO 1015+45

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

File No.:	2011-059-ET-0101.DWG
Ref. No.:	2011-059
Sheet No:	046 OF 565

ET-0101

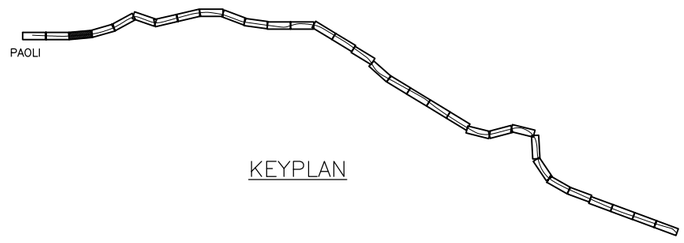
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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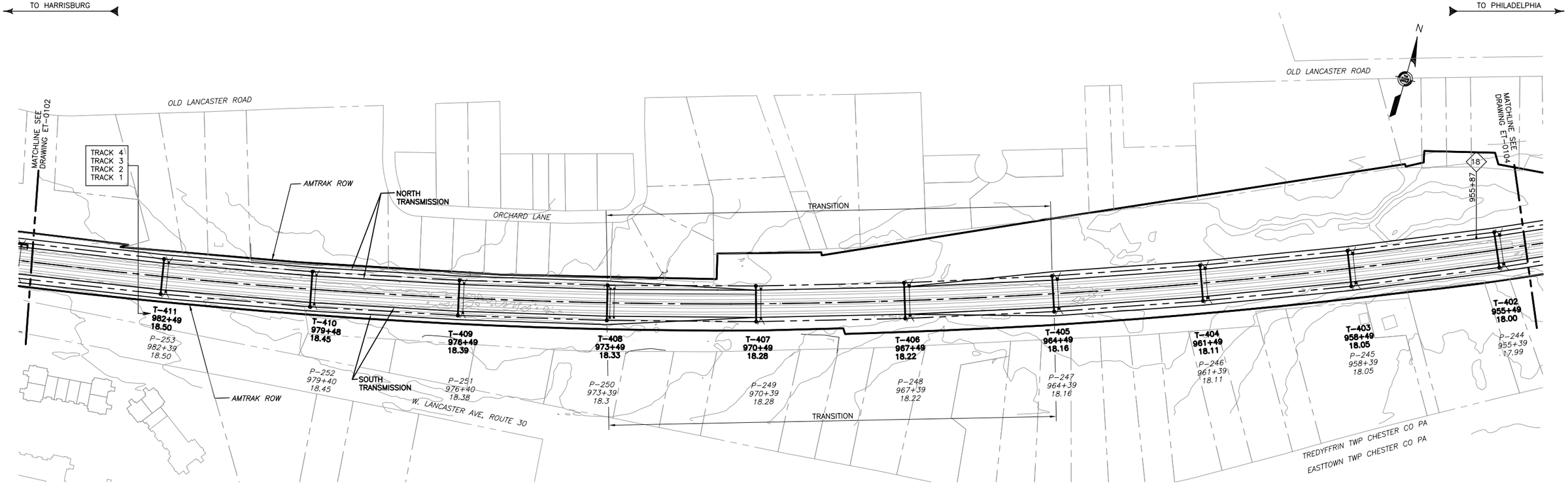
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 1015+45 TO 985+00

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

File No.:	2011-059-ET-0102.DWG
Ref. No.:	2011-059
Sheet No:	047 OF 565

ET-0102

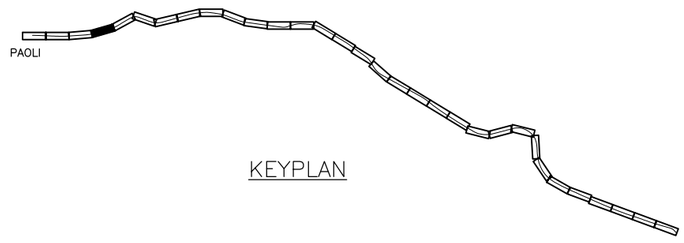
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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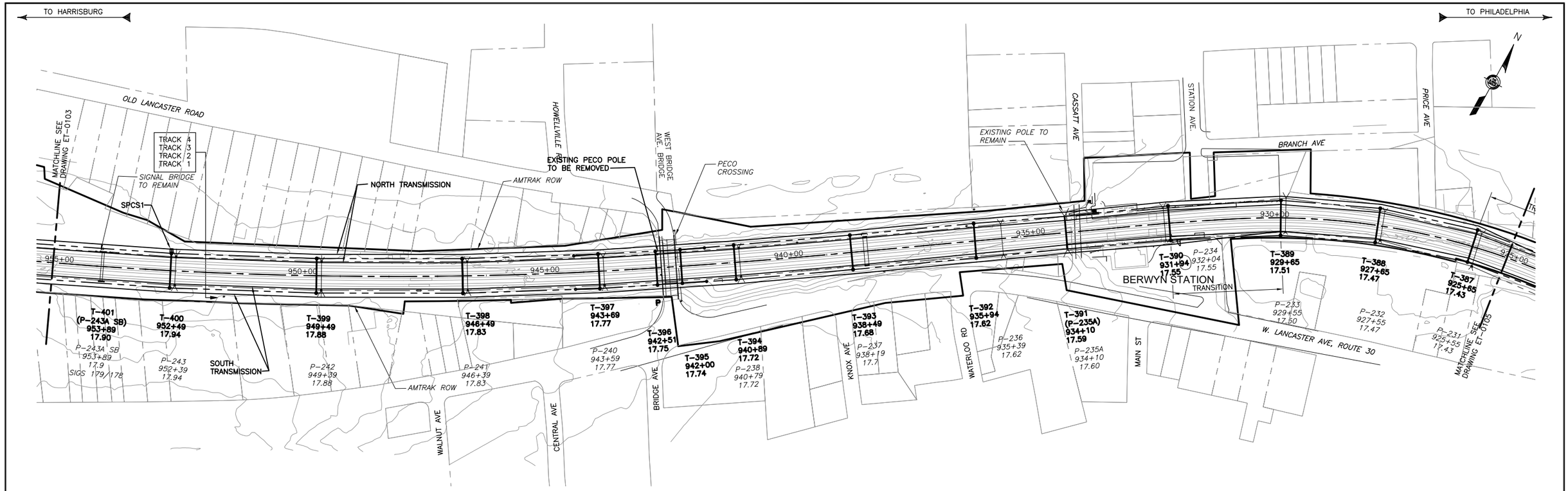
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 985+00 TO 955+00

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

File No.:	2011-059-ET-0103.DWG
Ref. No.:	2011-059
Sheet No:	048 OF 565

ET-0103

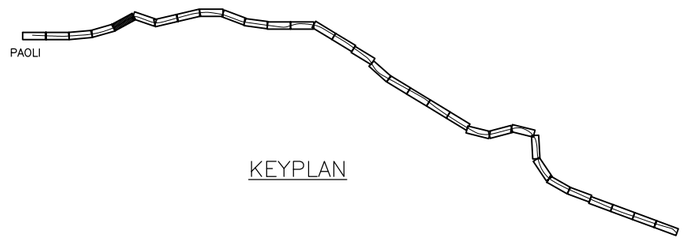
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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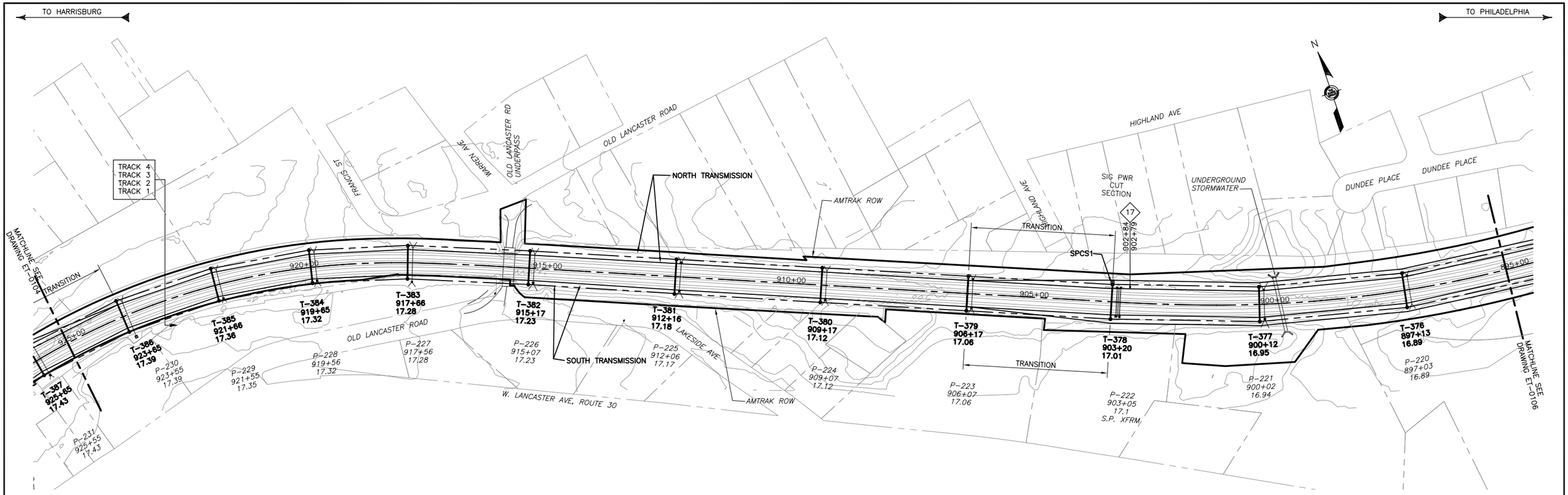
TRANSMISSION LINE SITE PLAN STA. 955+00 TO 925+00

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

File No.:	2011-059-ET-0104.DWG
Ref. No.:	2011-059
Sheet No:	049 OF 565

ET-0104

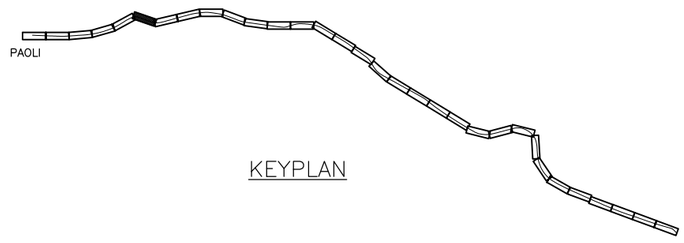
3/14/2016 1:53:58 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn maw\electrical\catenary\2011-059-et-0104.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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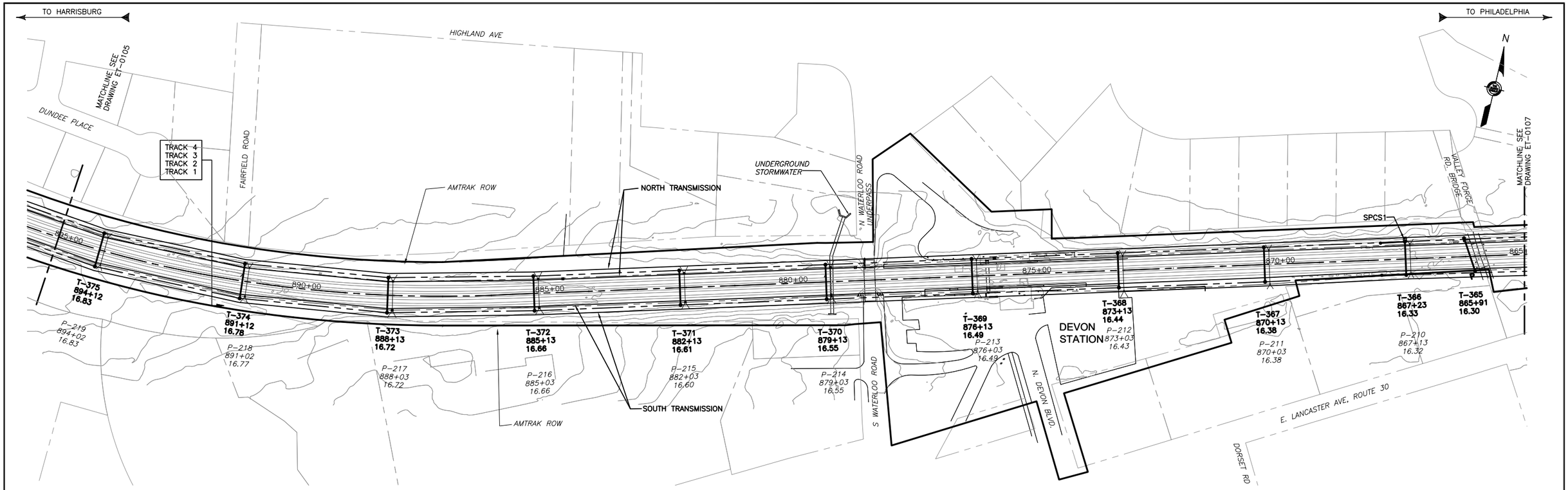
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA 925+00 TO 895+00

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

File No.:	2011-059-ET-0105.DWG
Ref. No.:	2011-059
Sheet No:	050 OF 565

ET-0105

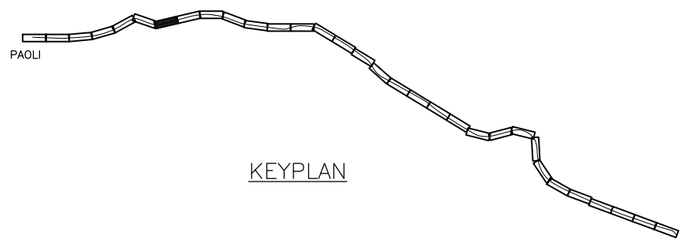
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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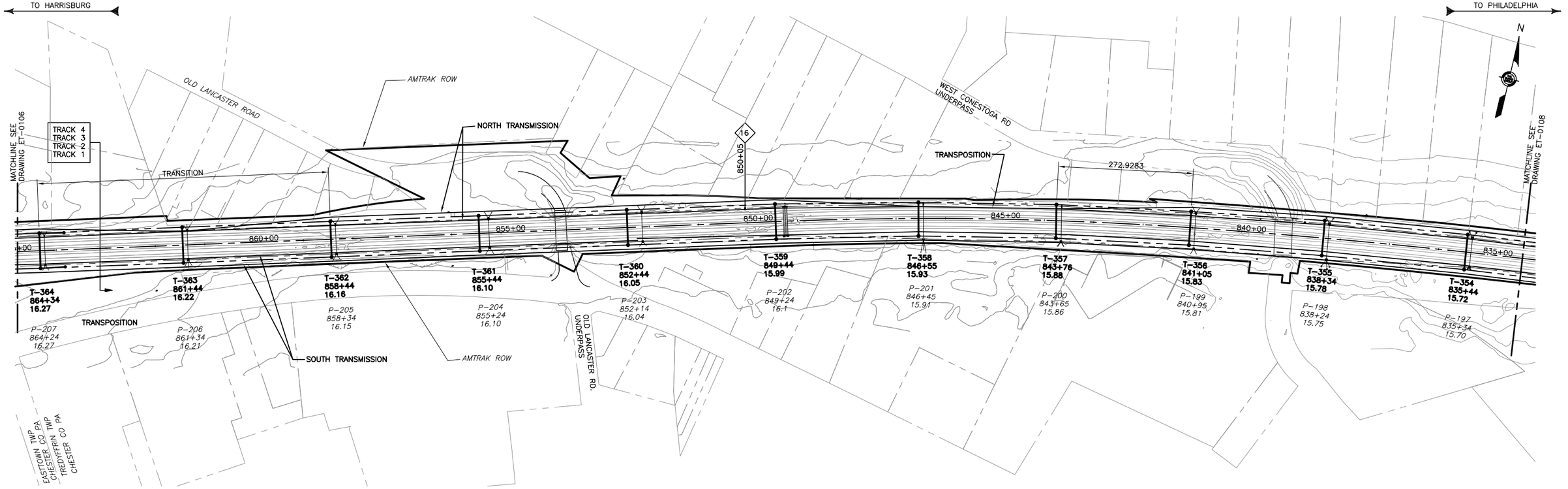
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 895+00 TO 865+00

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

File No.:	2011-059-ET-0106.DWG
Ref. No.:	2011-059
Sheet No:	051 OF 565

ET-0106

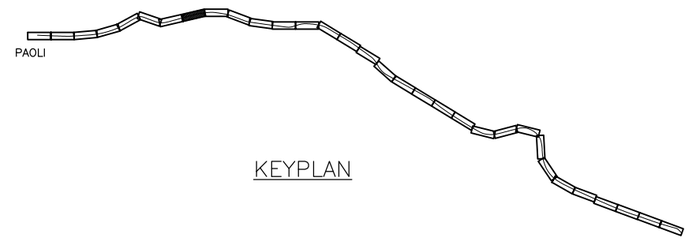
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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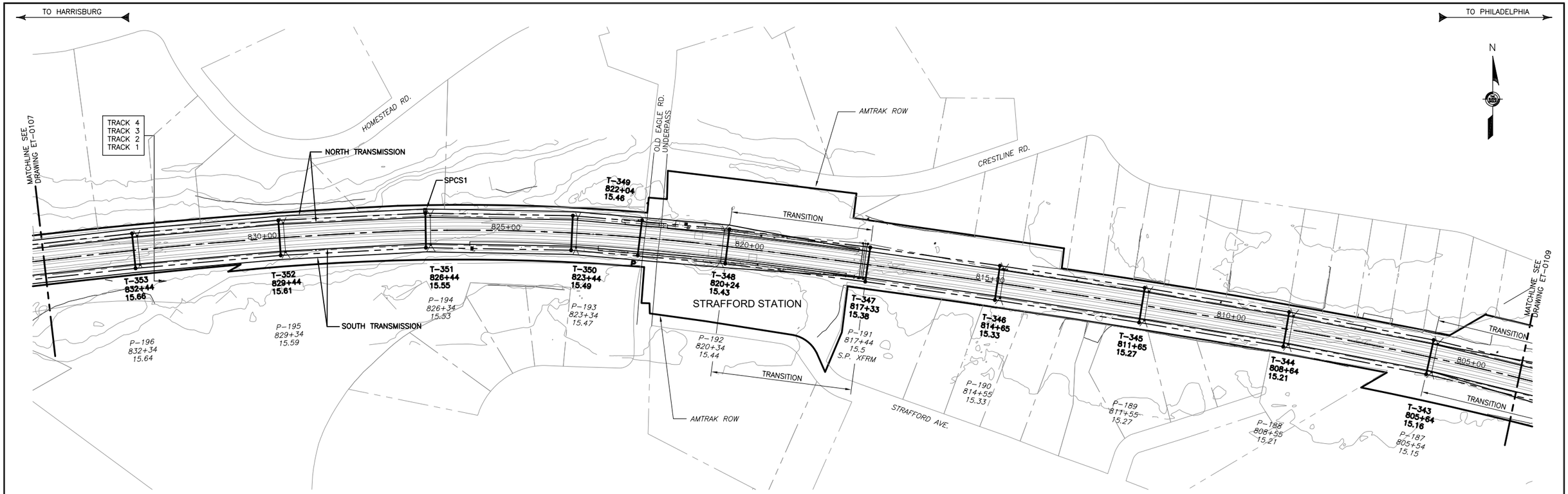
TRANSMISSION LINE SITE PLAN
STA. 865+00 TO 835+00

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

File No.:	2011-059-ET-0107.DWG
Ref. No.:	2011-059
Sheet No:	052 OF 565

ET-0107

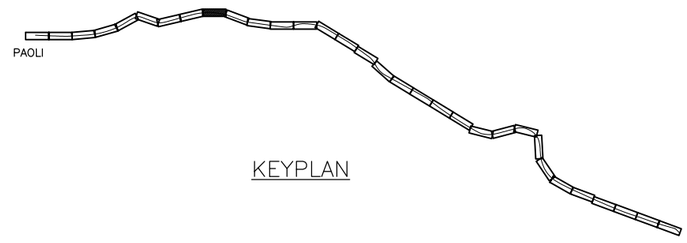
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100' 50' 0 100'

SCALE:1"=100'-0"



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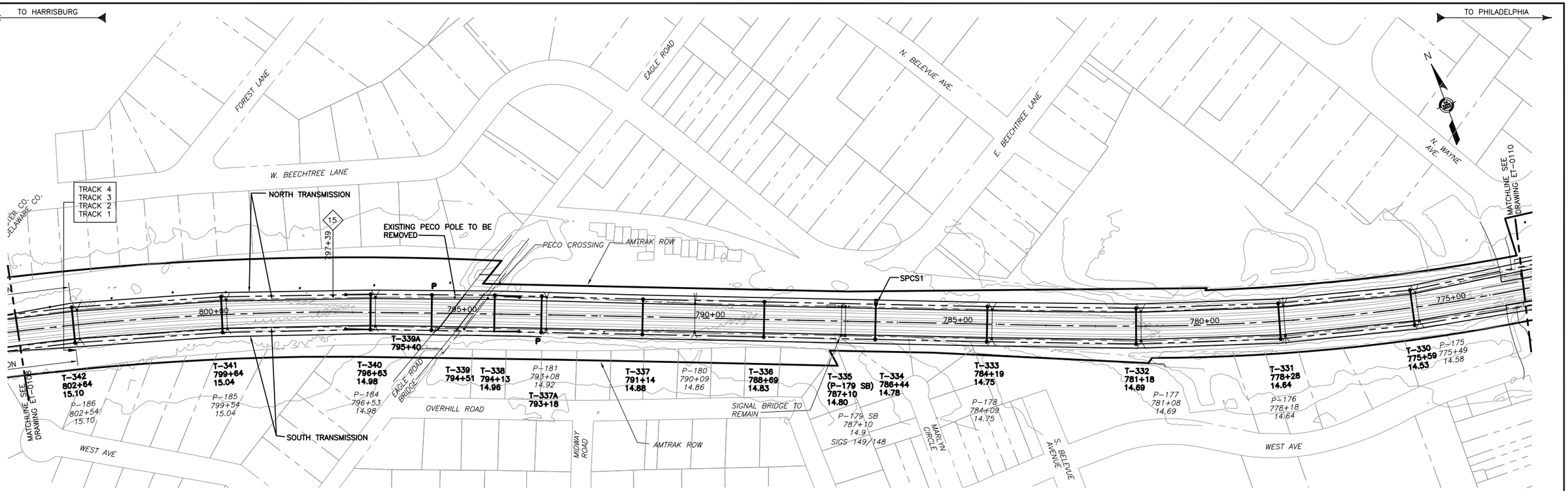
TRANSMISSION LINE SITE PLAN
STA. 835+00 TO 804+00

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

File No.:	2011-059-ET-0108.DWG
Ref. No.:	2011-059
Sheet No:	053 OF 565

ET-0108

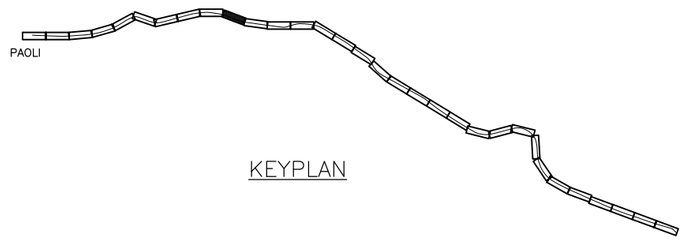
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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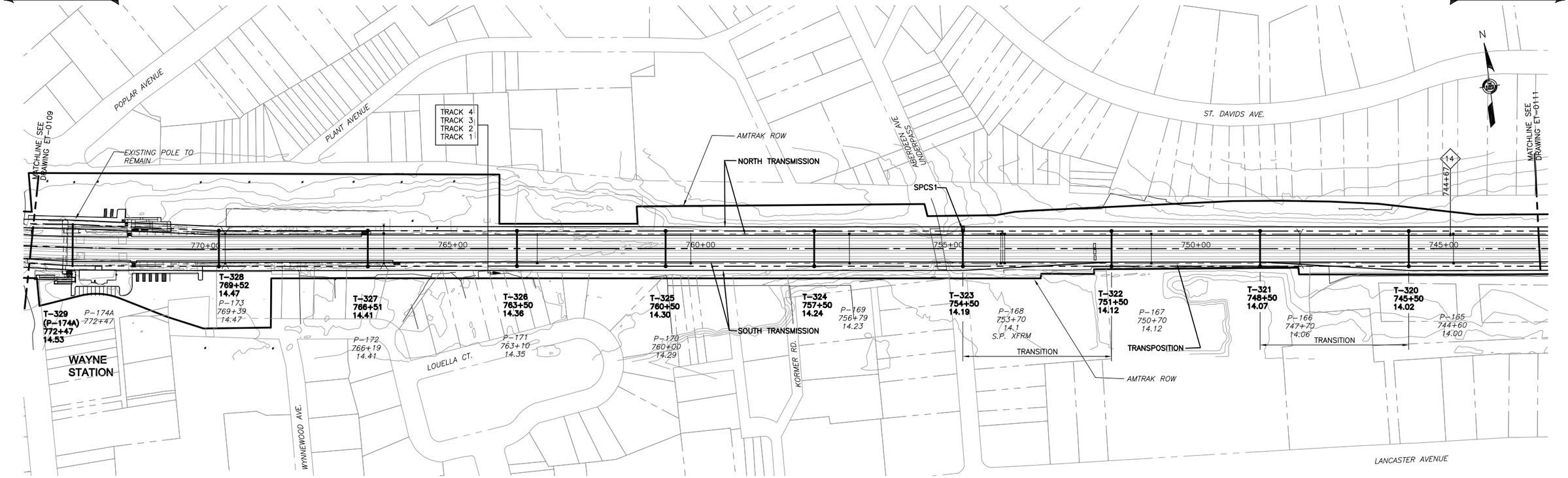
TRANSMISSION LINE SITE PLAN
STA. 804+00 TO 774+00

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

File No.:	2011-059-ET-0109.DWG
Ref. No.:	2011-059
Sheet No:	054 OF 565

ET-0109

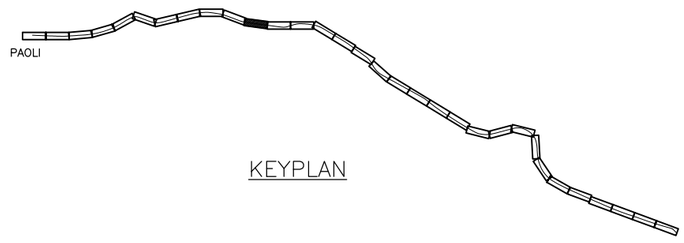
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100' 50' 0 100'

SCALE:1"=100'-0"



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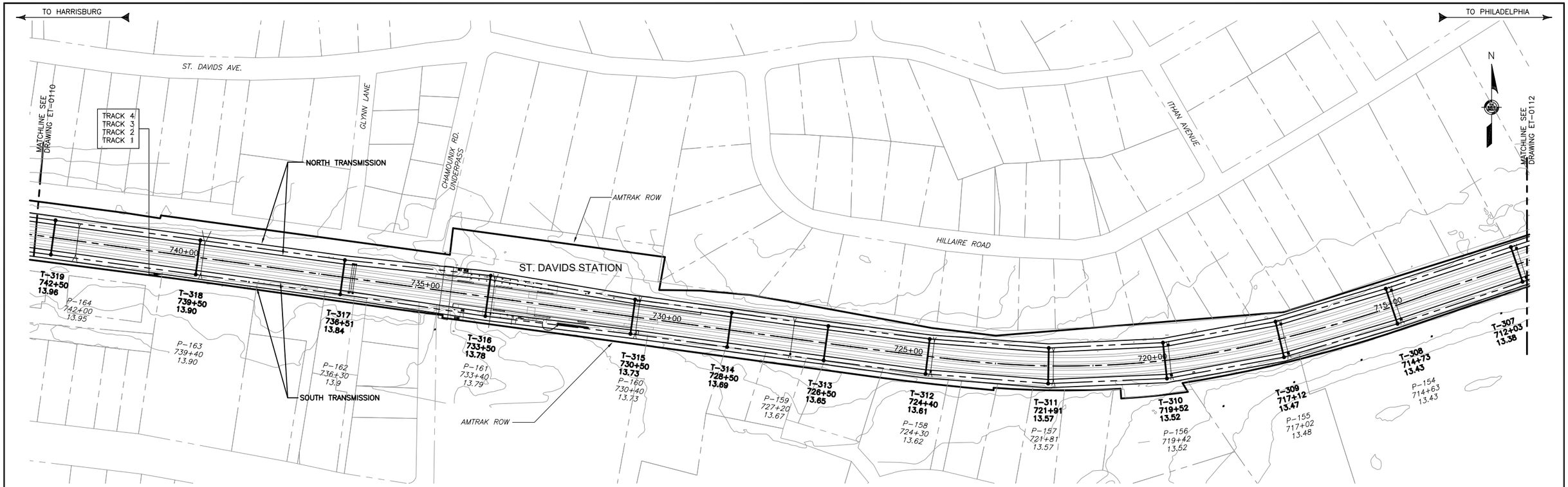
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 774+00 TO 744+00

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

File No.:	2011-059-ET-0110.DWG
Ref. No.:	2011-059
Sheet No:	055 OF 565

ET-0110

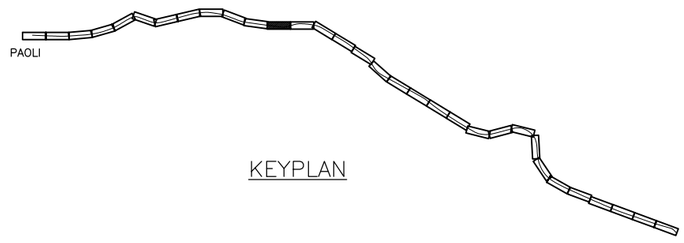
1:54:56 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn maw\electrical\catenary\2011-059-et-0110.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

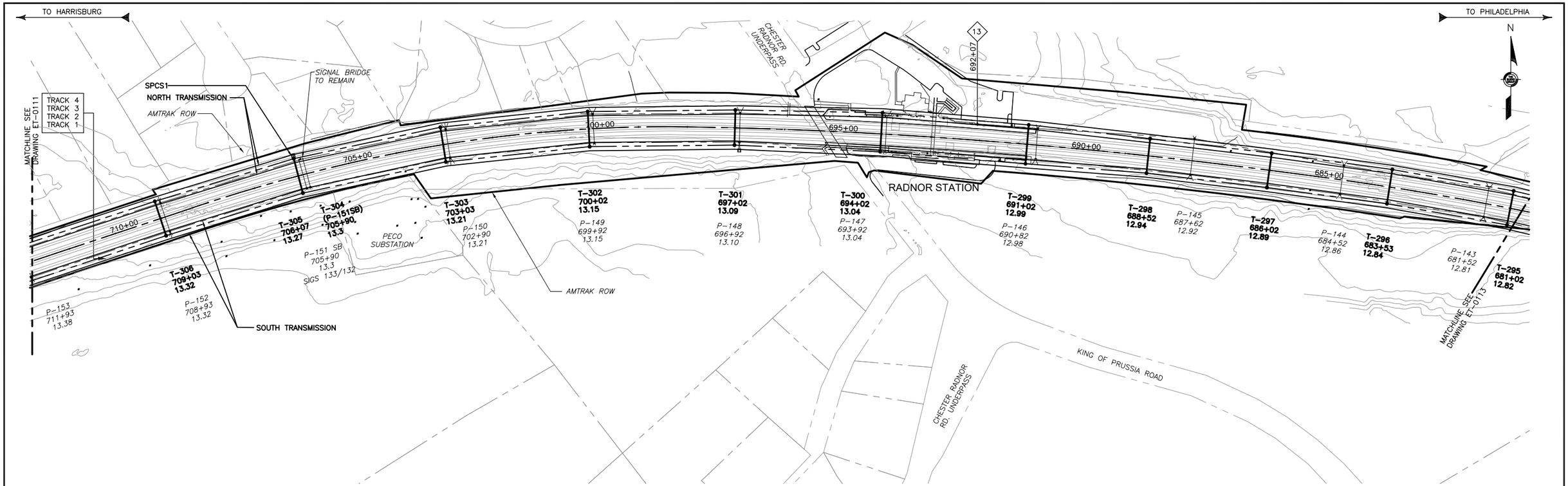
TRANSMISSION LINE SITE PLAN
STA. 744+00 TO 712+00

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

File No.:	2011-059-ET-0111.DWG
Ref. No.:	2011-059
Sheet No:	056 OF 565

ET-0111

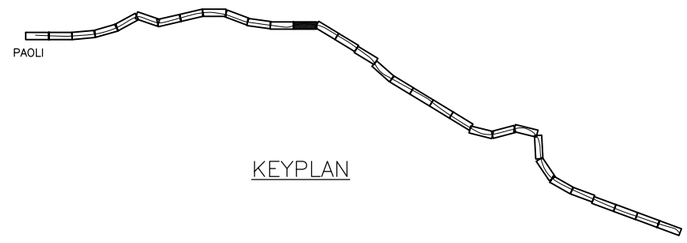
3/14/2016 1:55:08 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn maw\electrical\catenary\2011-059-et-0111.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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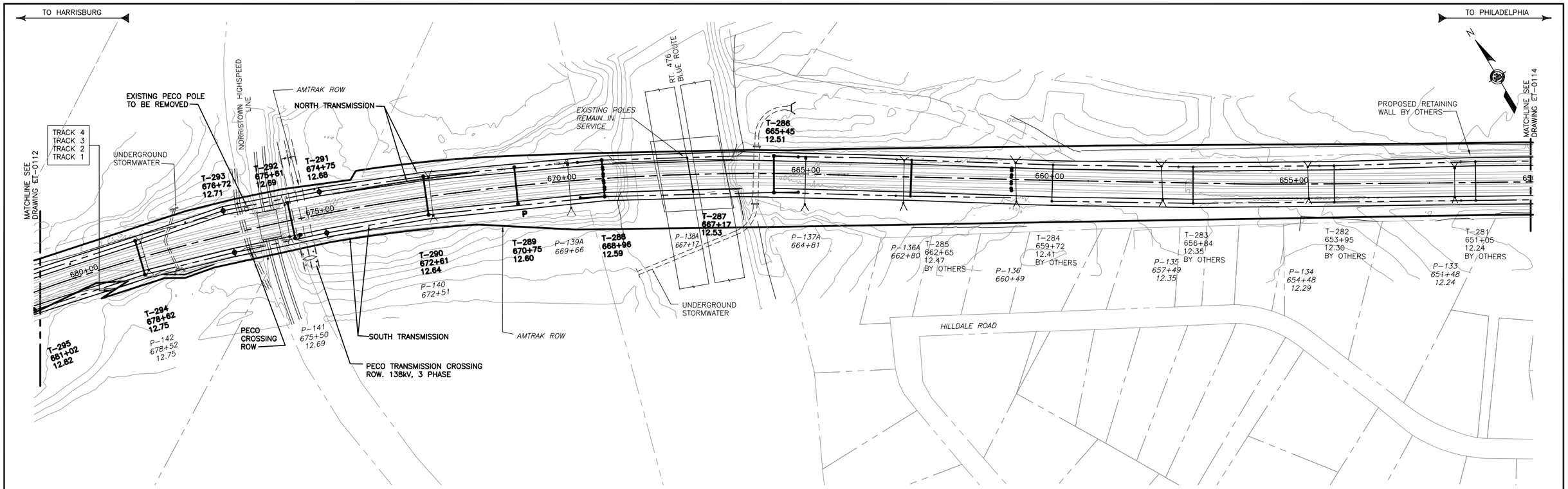
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 712+00 TO 681+00

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

File No.:	2011-059-ET-0112.DWG
Ref. No.:	2011-059
Sheet No:	057 OF 565

ET-0112

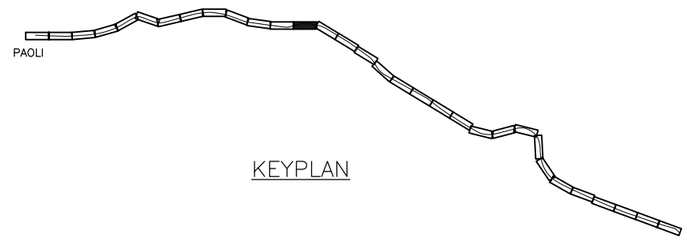
1:55:18 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn maw\electrical\catenary\2011-059-et-0112.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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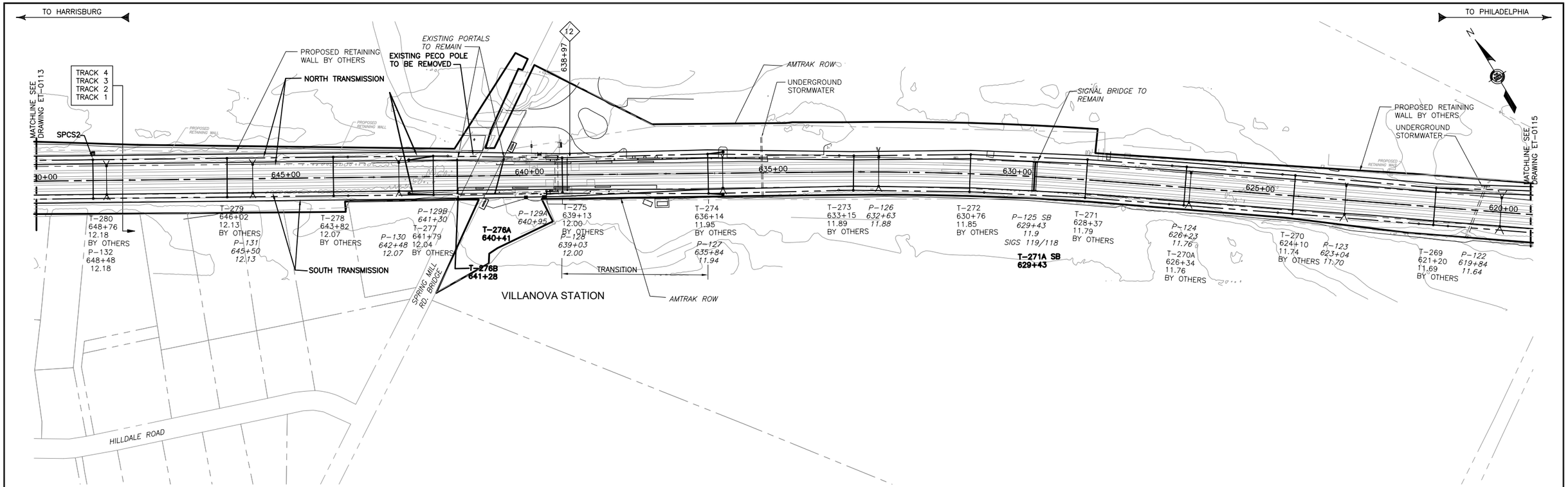
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 681+00 TO 650+00

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

File No.:	2011-059-ET-0113.DWG
Ref. No.:	2011-059
Sheet No:	058 OF 565

ET-0113

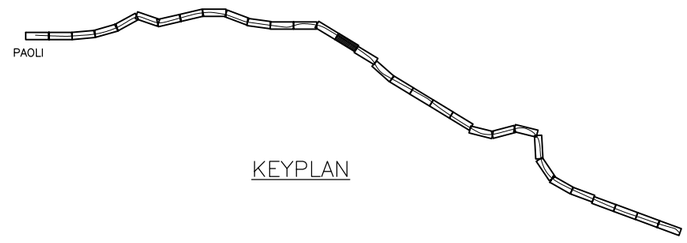
1:55:29 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0113.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

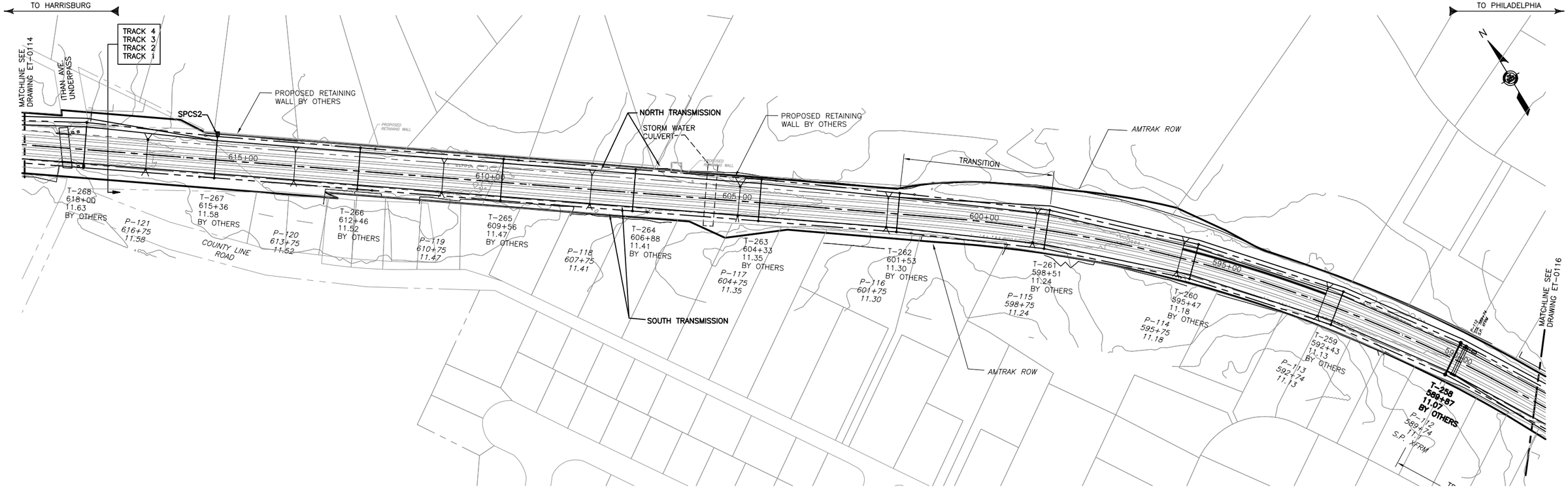
TRANSMISSION LINE SITE PLAN STA. 650+00 TO 619+00

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

File No.:	2011-059-ET-0114.DWG
Ref. No.:	2011-059
Sheet No:	059 OF 565

ET-0114

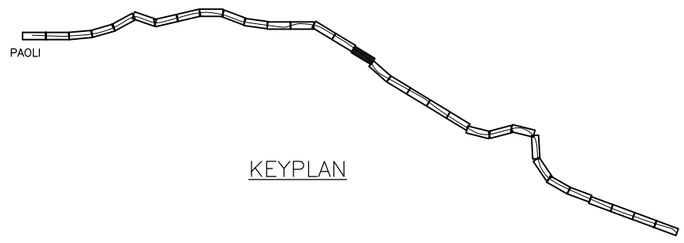
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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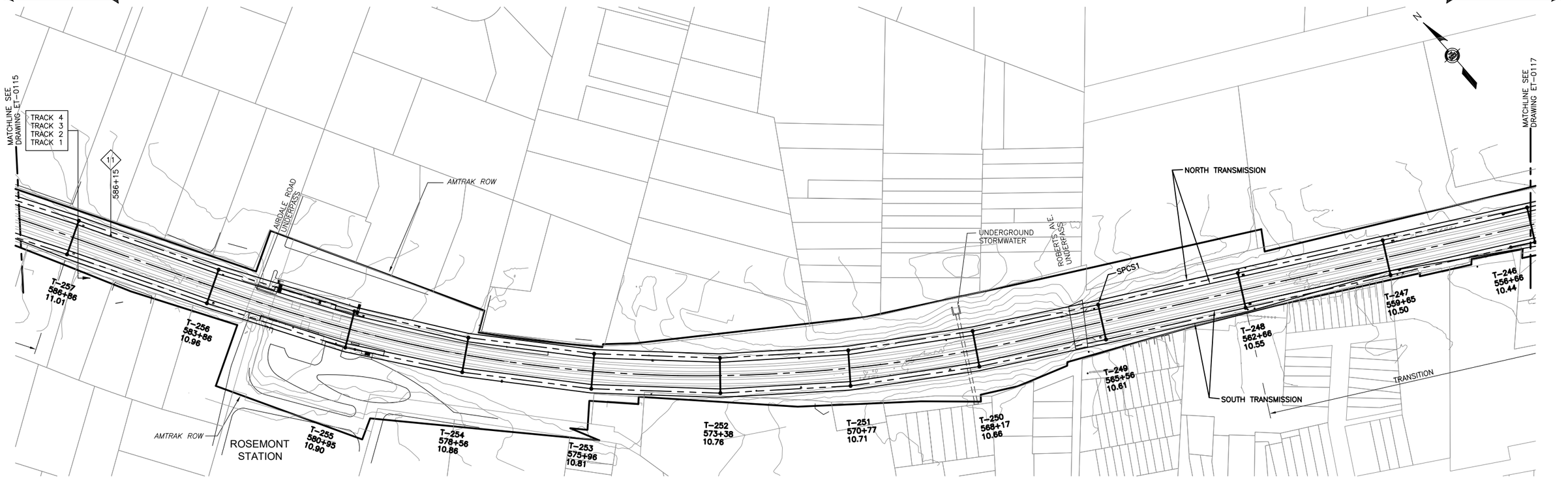
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 619+00 TO 588+00

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

File No.:	2011-059-ET-0115.DWG
Ref. No.:	2011-059
Sheet No:	060 OF 565

ET-0115

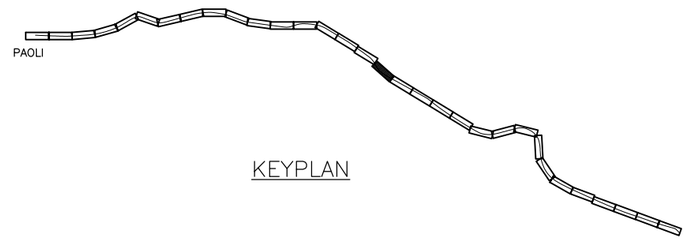
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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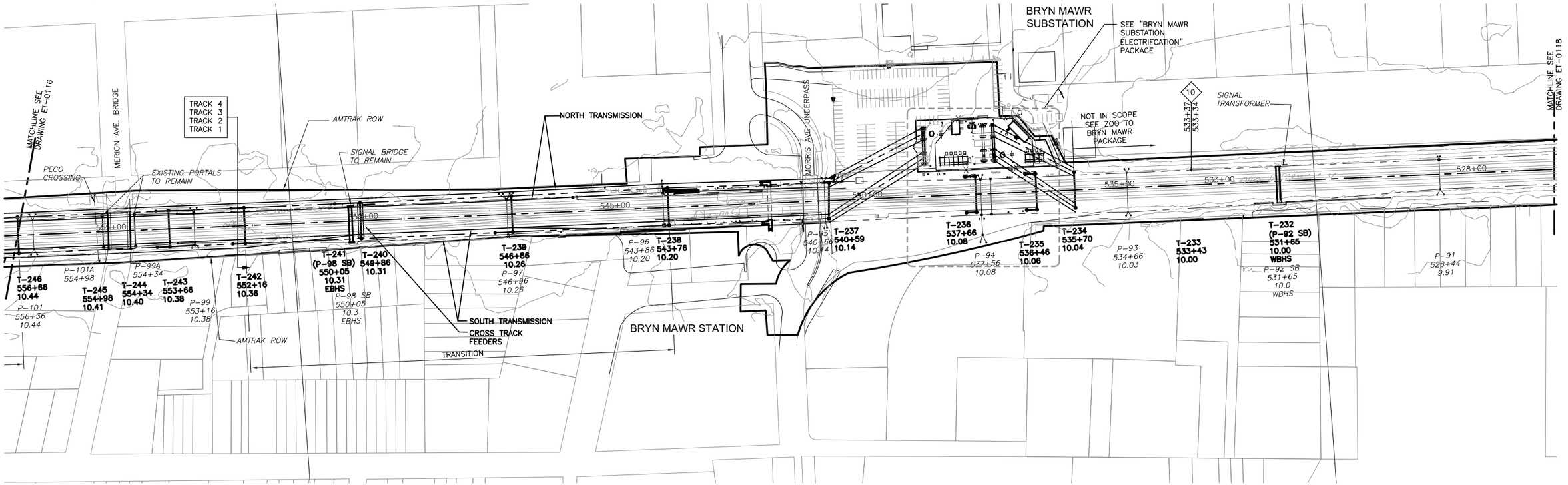
TRANSMISSION LINE SITE PLAN
STA. 588+00 TO 556+65

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

File No.:	2011-059-ET-0116.DWG
Ref. No.:	2011-059
Sheet No:	061 OF 565

ET-0116

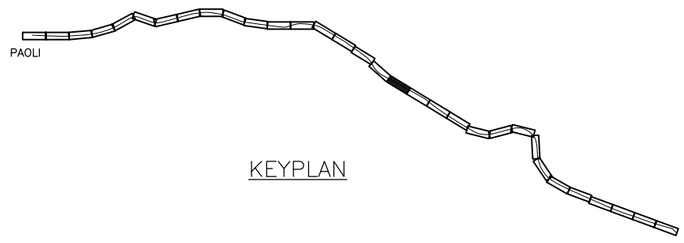
1:56:01 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0116.dwg



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

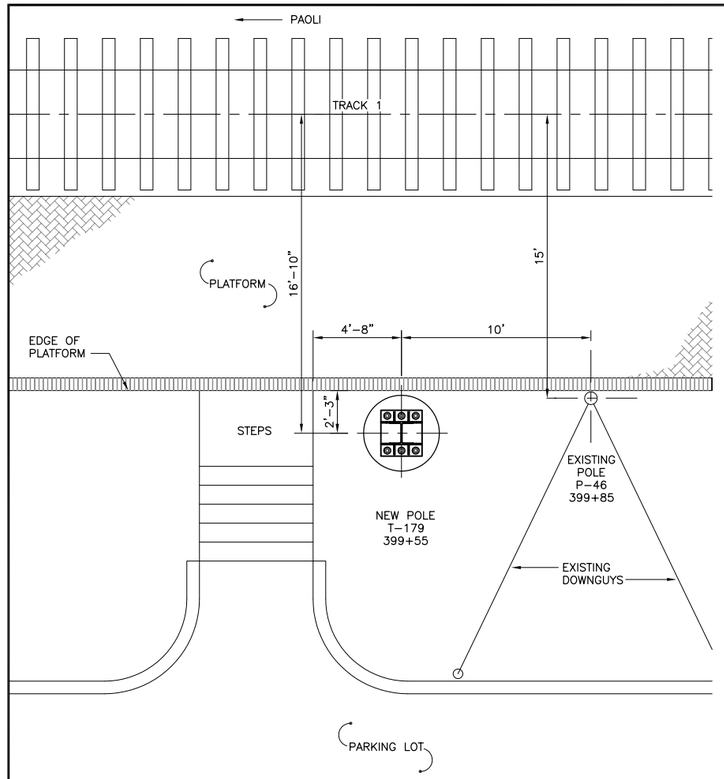
TRANSMISSION LINE SITE PLAN
STA 556+65 TO 526+00

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

File No.:	2011-059-ET-0117.DWG
Ref. No.:	2011-059
Sheet No:	062 OF 565

ET-0117

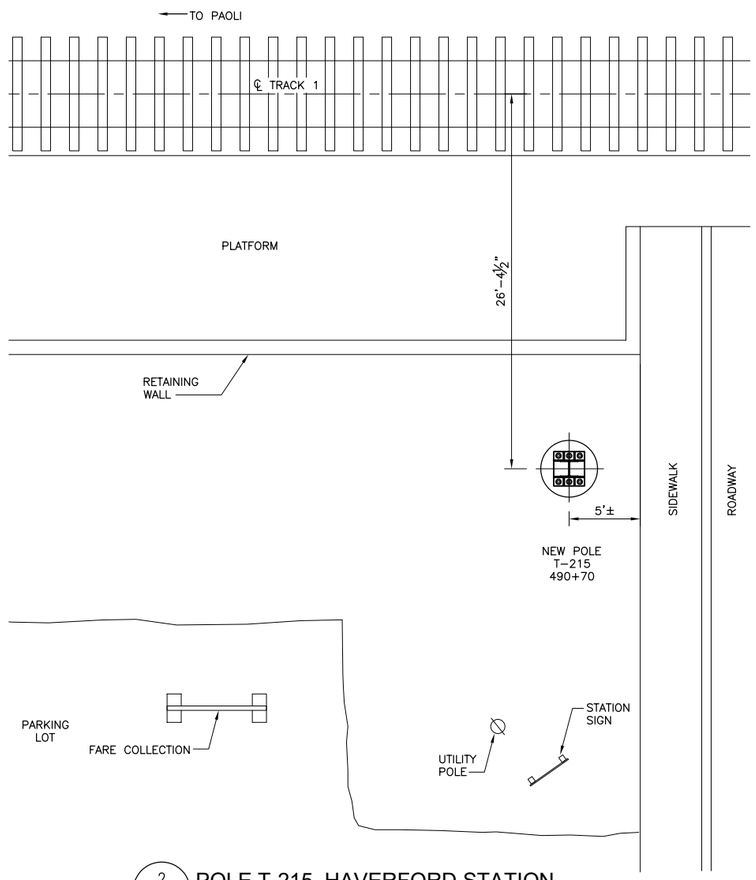
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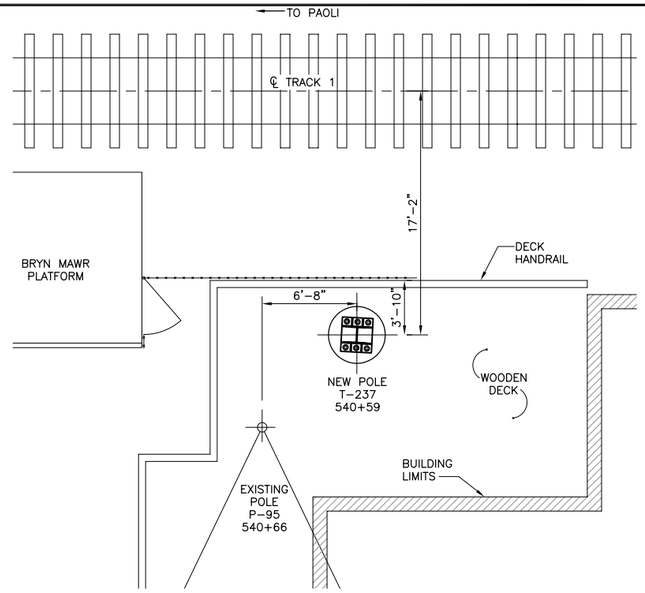
1 ET-0140 POLE T-179, WYNNEWOOD STATION

4' 2' 0 4'

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



2 ET-0140 POLE T-215, HAVERFORD STATION



3 ET-0140 POLE T-237, BRYN MAWR STATION

3:56:20 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0140.dwg

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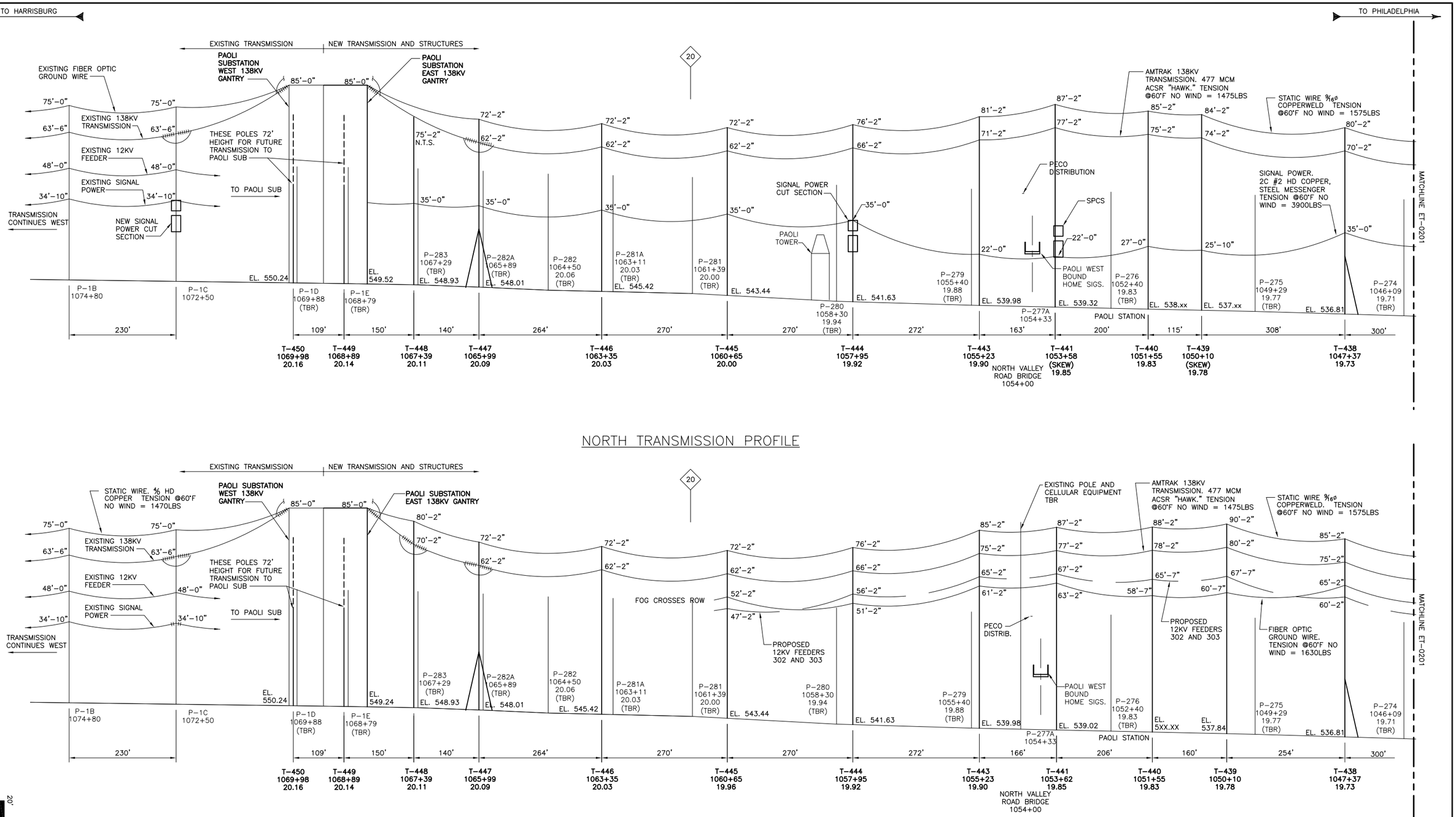
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

POLE PARTIAL PLANS

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

File No.:	2011-059-ET-0140.DWG
Ref. No.:	2011-059
Sheet No:	063 OF 565

ET-0140



NORTH TRANSMISSION PROFILE

SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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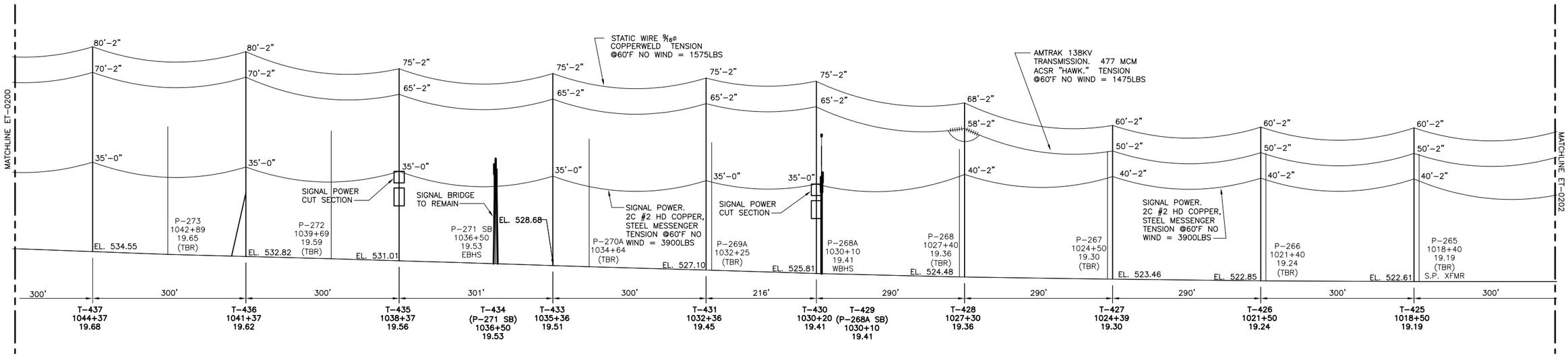
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 1064+60 TO 1044+37

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

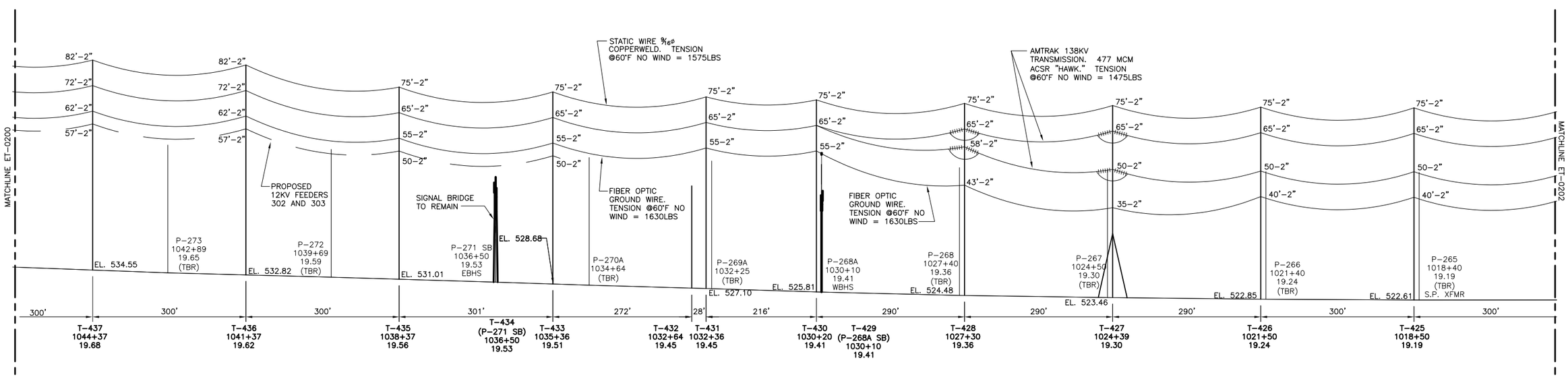
File No.:	2011-059-ET-0200.DWG
Ref. No.:	2011-059
Sheet No:	064 OF 565

ET-0200

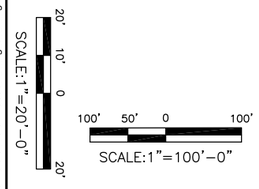
3/14/2016 1:56:31 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0200.dwg



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE



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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 1044+37 TO 1014+05

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

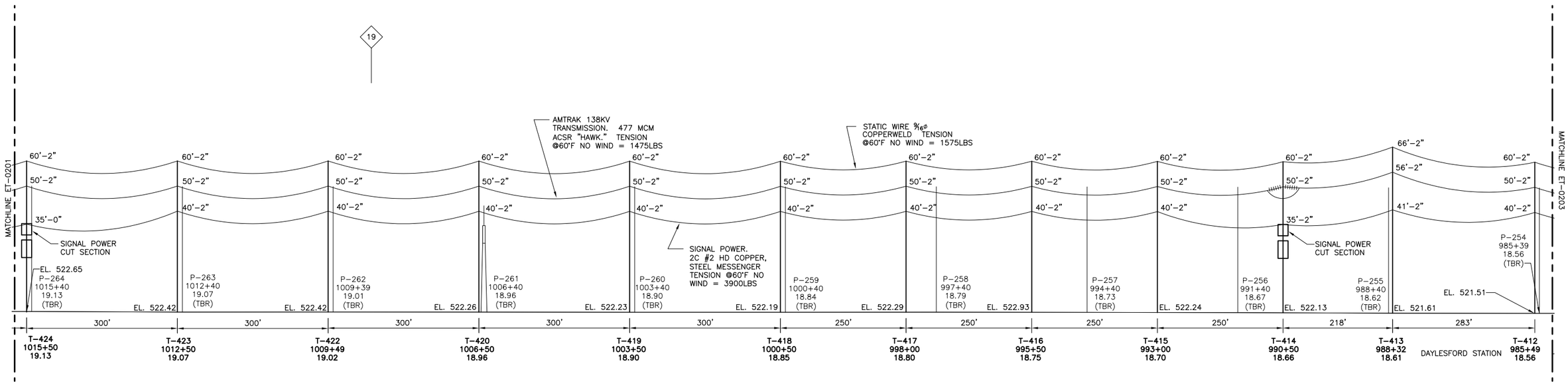
File No.:	2011-059-ET-0201.DWG
Ref. No.:	2011-059
Sheet No:	065 OF 565

ET-0201

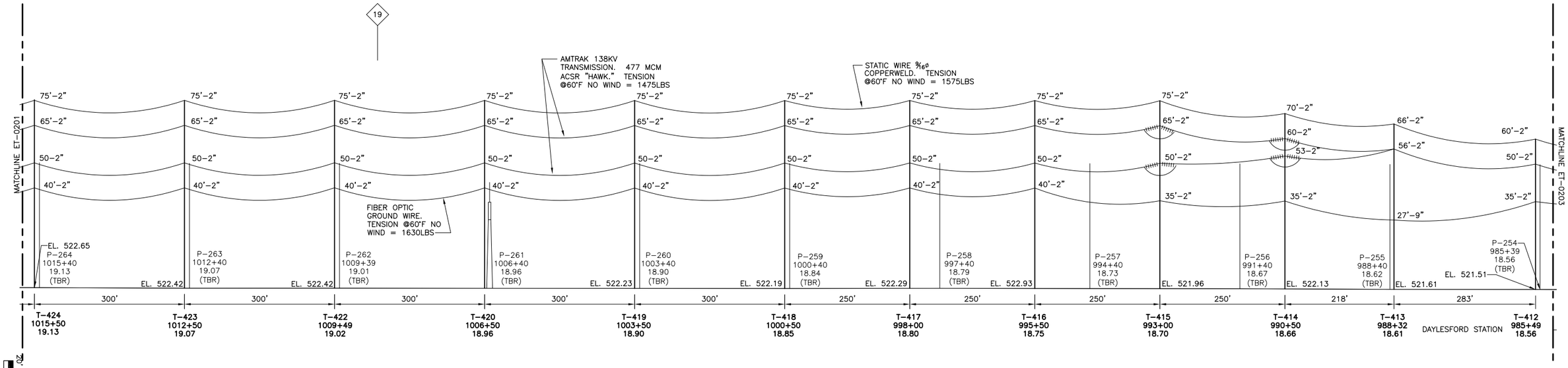
3/14/2016 1:56:46 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0201.dwg

TO HARRISBURG

TO PHILADELPHIA



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 1014+05 TO 982+49

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

File No.:	2011-059-ET-0202.DWG
Ref. No.:	2011-059
Sheet No:	066 OF 565

ET-0202

3/14/2016 1:56:59 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\electrical\catenary\2011-059-et-0202.dwg

TO HARRISBURG

TO PHILADELPHIA

MATCHLINE ET-0202

MATCHLINE ET-0204

18

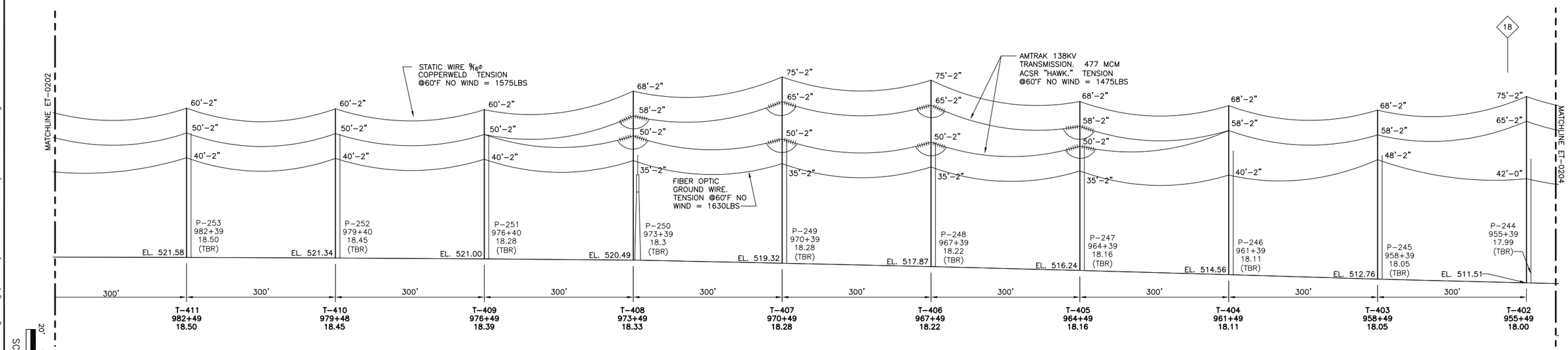
STATIC WIRE 9/16ϕ COPPERWELD TENSION @60°F NO WIND = 1575LBS

AMTRAK 138KV TRANSMISSION. 477 MCM ACSR "HAWK." TENSION @60°F NO WIND = 1475LBS

SIGNAL POWER. 2C #2 HD COPPER, STEEL MESSENGER TENSION @60°F NO WIND = 3900LBS

	T-411	T-410	T-409	T-408	T-407	T-406	T-405	T-404	T-403	T-402
	982+49 18.50	979+48 18.45	976+49 18.39	973+49 18.33	970+49 18.28	967+49 18.22	964+49 18.16	961+49 18.11	958+49 18.05	955+49 18.00
	60'-2"	60'-2"	60'-2"	68'-2"	75'-2"	75'-2"	68'-2"	68'-2"	68'-2"	75'-2"
	50'-2"	50'-2"	50'-2"	58'-2"	65'-2"	65'-2"	58'-2"	58'-2"	58'-2"	65'-2"
	40'-0"	40'-2"	40'-2"	50'-2"	50'-2"	50'-2"	50'-2"			
				35'-2"	35'-2"	35'-2"	35'-2"	40'-2"	40'-2"	40'-2"
	P-253 982+39 18.50 (TBR)	P-252 979+40 18.45 (TBR)	P-251 976+40 18.28 (TBR)	P-250 973+39 18.3 (TBR)	P-249 970+39 18.28 (TBR)	P-248 967+39 18.22 (TBR)	P-247 964+39 18.16 (TBR)	P-246 961+39 18.11 (TBR)	P-245 958+39 18.05 (TBR)	P-244 955+39 17.99 (TBR)
	EL. 521.58	EL. 521.34	EL. 521.00	EL. 520.49	EL. 519.32	EL. 517.87	EL. 516.24	EL. 514.56	EL. 512.76	EL. 511.51
	300'	300'	300'	300'	300'	300'	300'	300'	300'	300'

NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

20' 10' 0 20'

100' 50' 0 100'

SCALE:1"=100'-0"

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IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

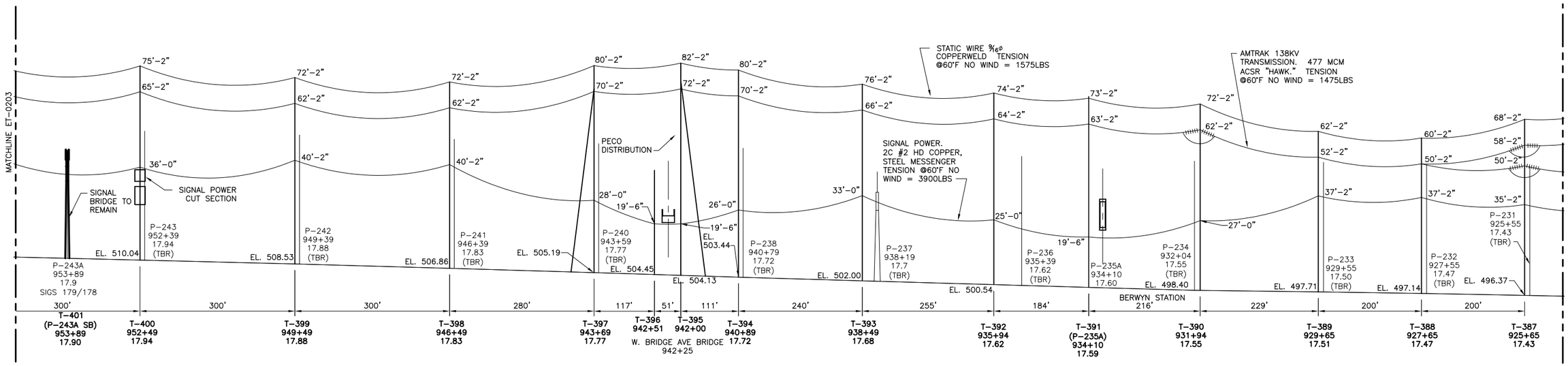
TRANSMISSION PROFILE
STA 982+49 TO 952+49

File No.:	2011-059-ET-0203.DWG
Ref. No.:	2011-059
Sheet No:	067 OF 565

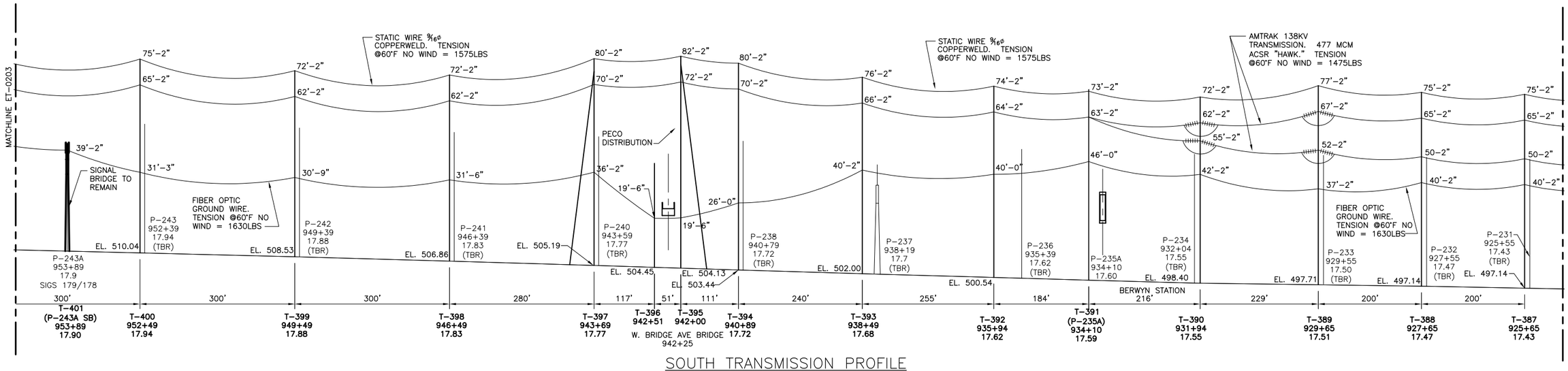
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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

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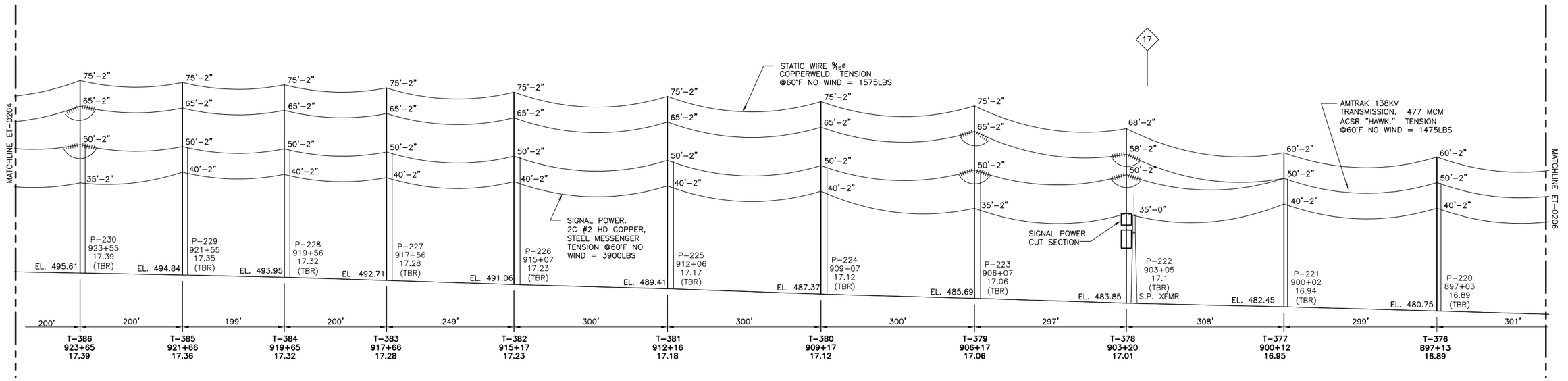
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 952+49 TO 923+65

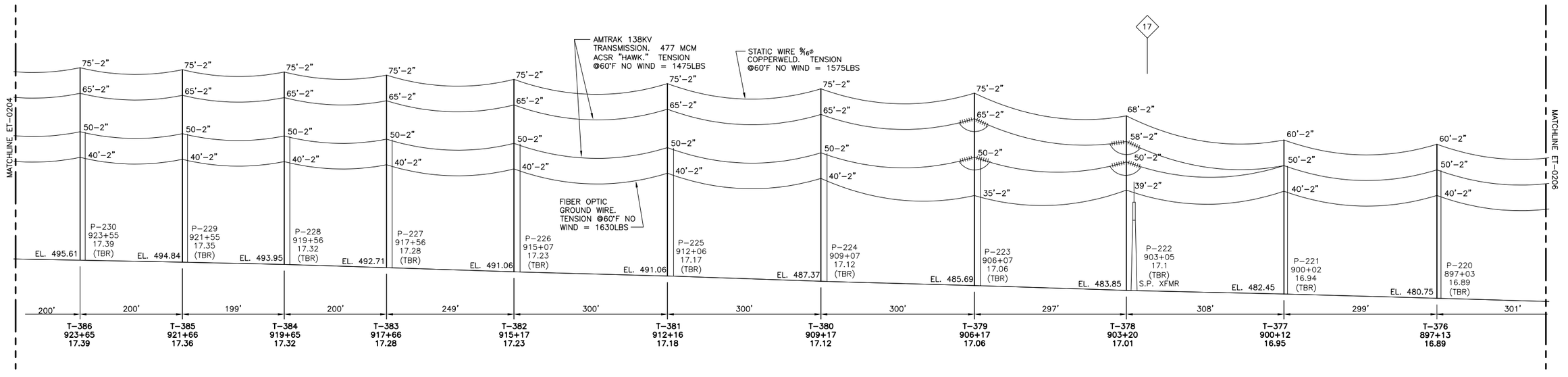
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Sheet No:	068 OF 565

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 923+65 TO 894+12

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

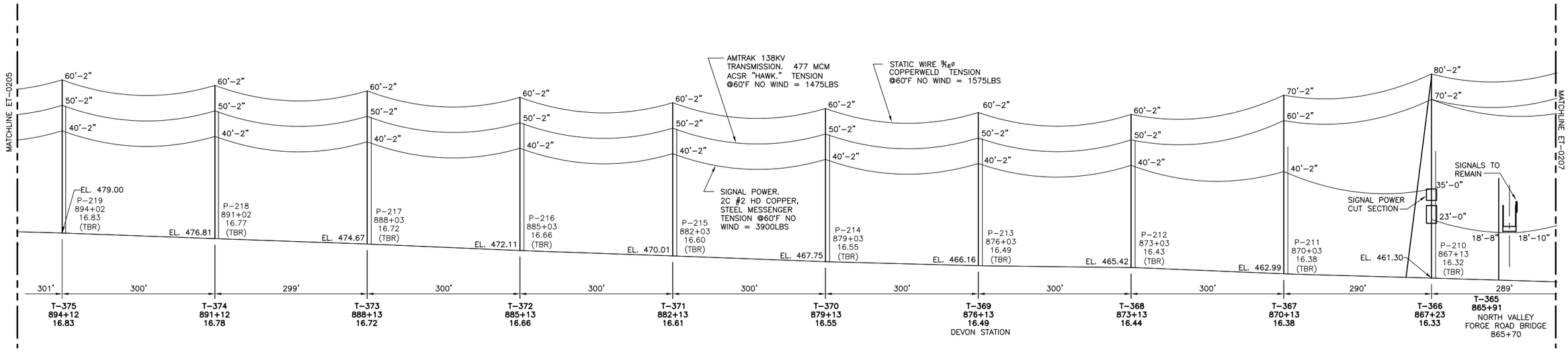
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Ref. No.:	2011-059
Sheet No:	069 OF 565

ET-0205

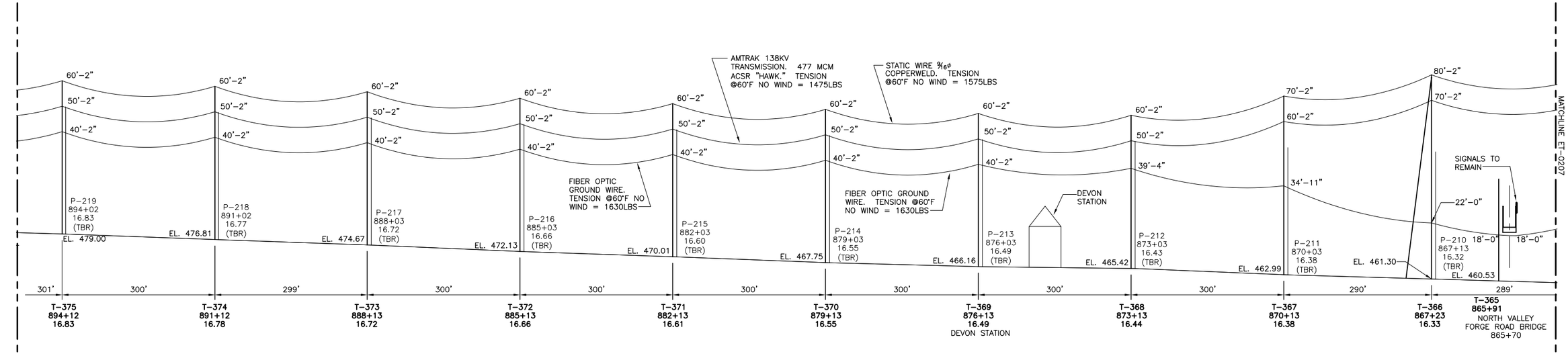
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TO HARRISBURG

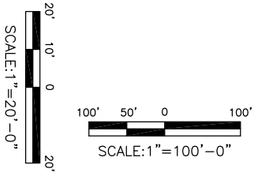
TO PHILADELPHIA



NORTH TRANSMISSION PROFILE



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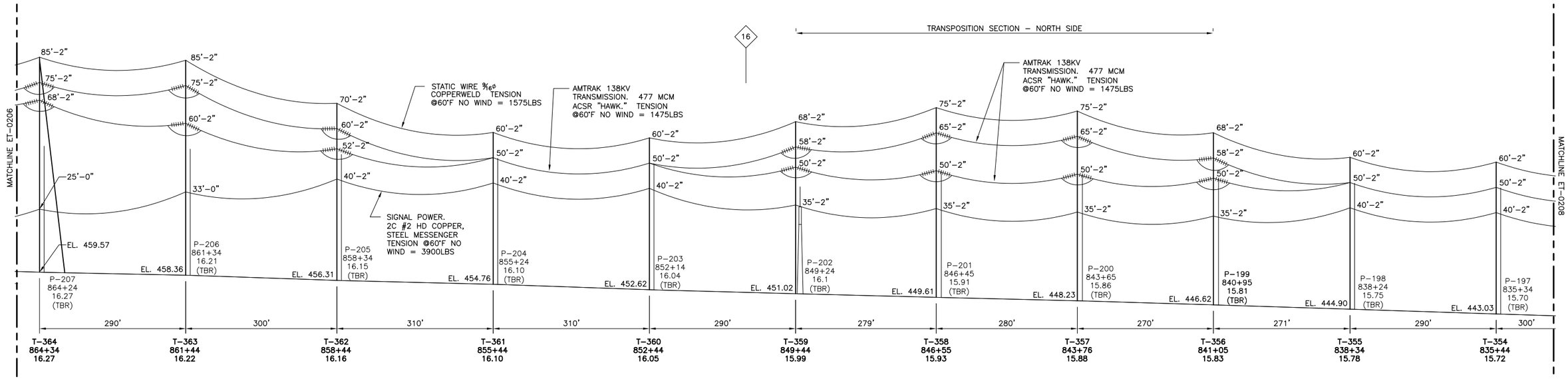
TRANSMISSION PROFILE
STA 894+12 TO 864+34

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

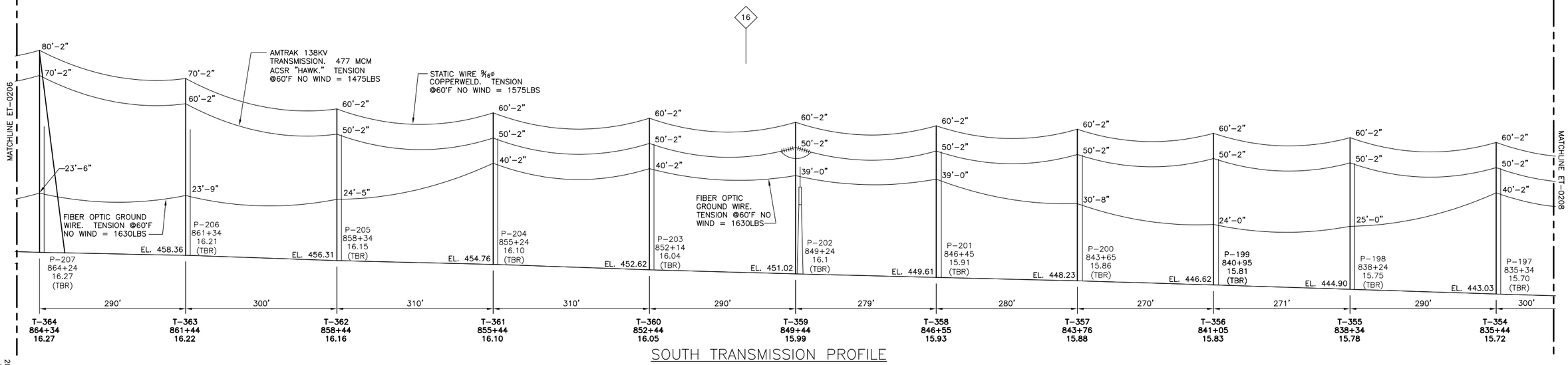
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Sheet No:	070 OF 565

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SOUTH TRANSMISSION PROFILE

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SCALE:1"=100'-0"

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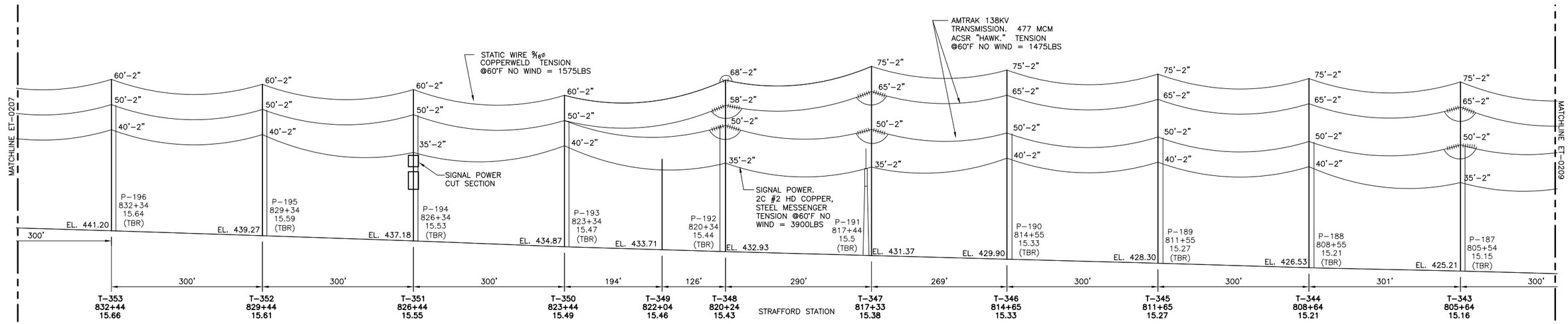
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 864+34 TO 832+44

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

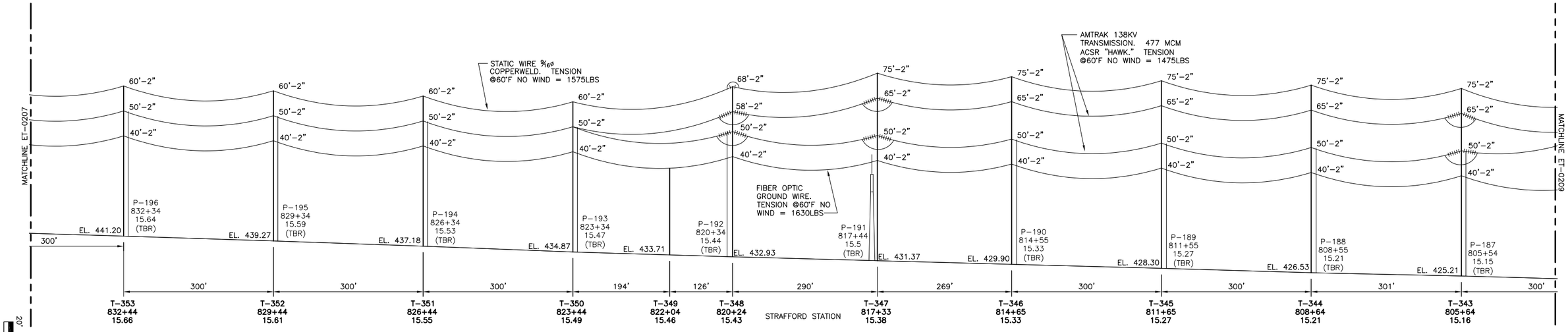
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Sheet No:	071 OF 565

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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

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SCALE:1"=100'-0"

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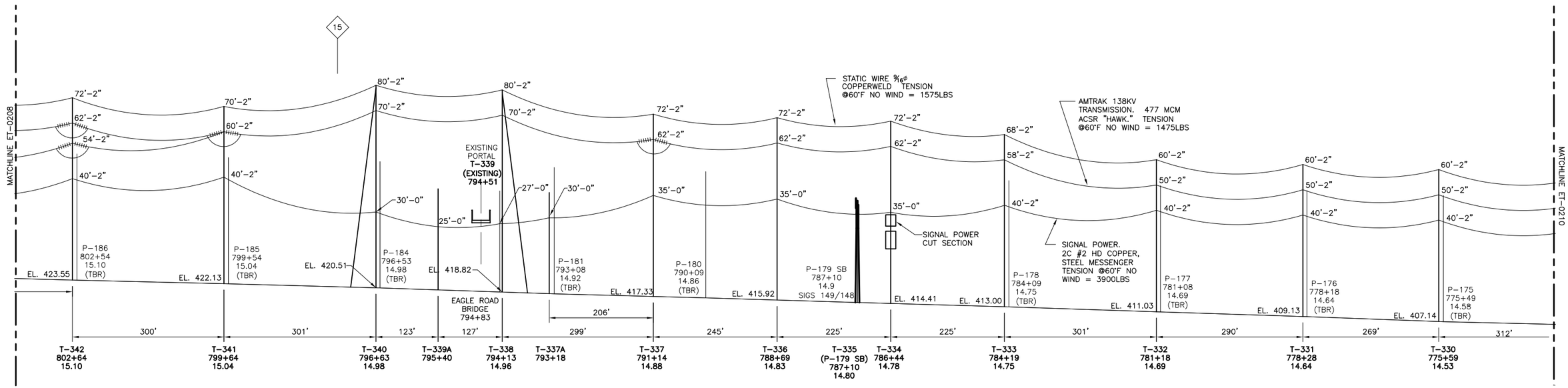
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 832+44 TO 802+64

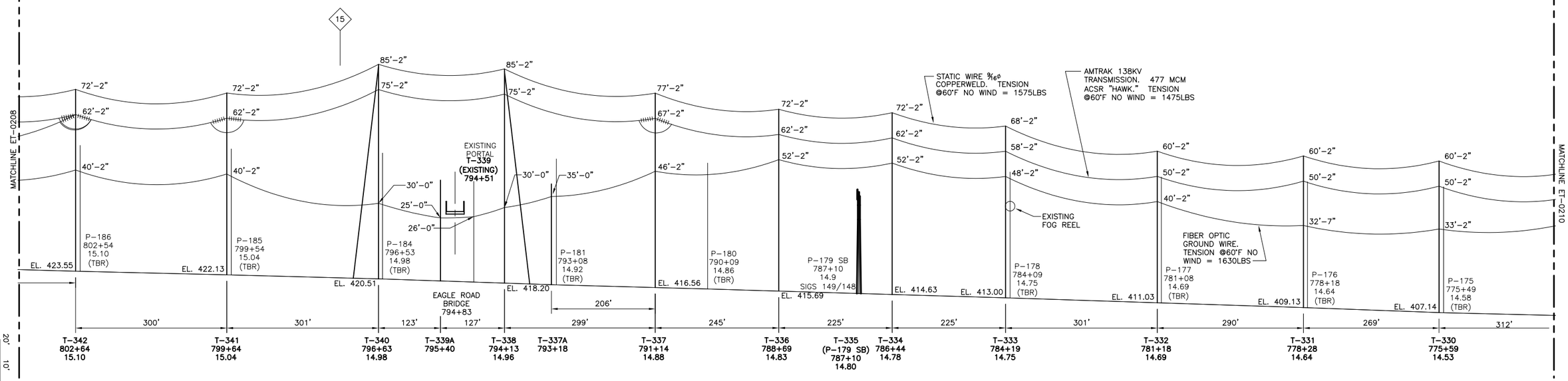
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Ref. No.:	2011-059
Sheet No:	072 OF 565

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 802+64 TO 772+47

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

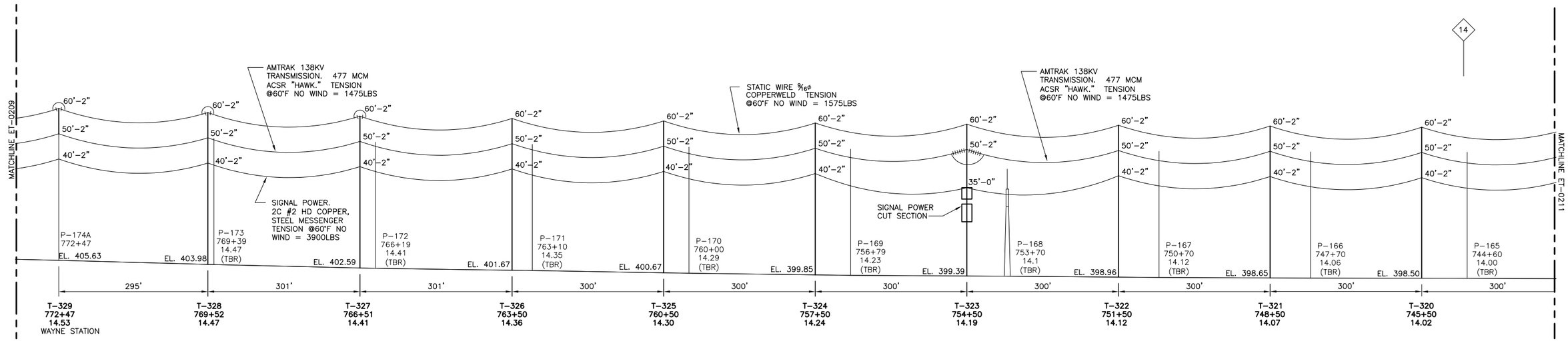
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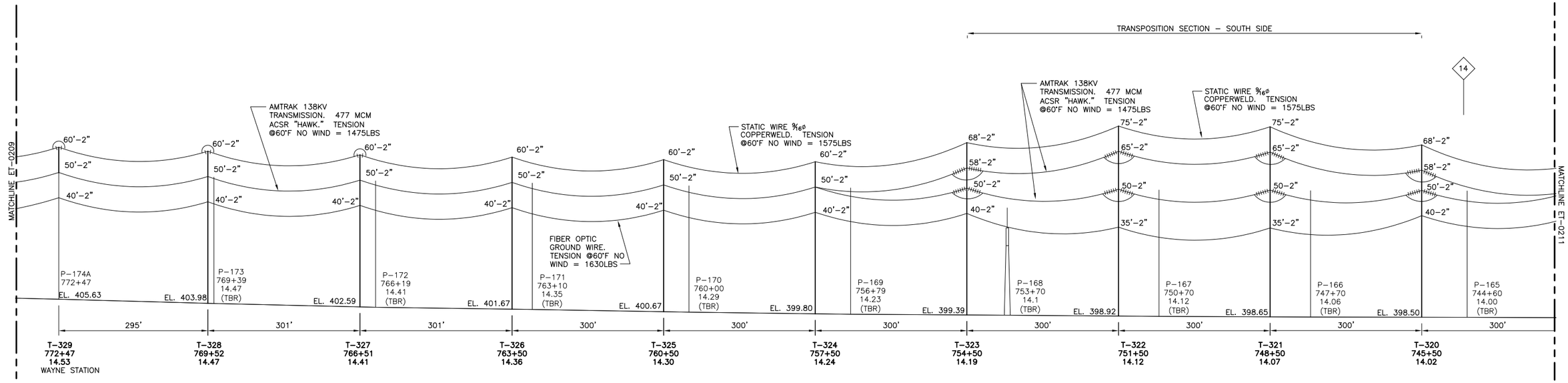
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TO HARRISBURG

TO PHILADELPHIA



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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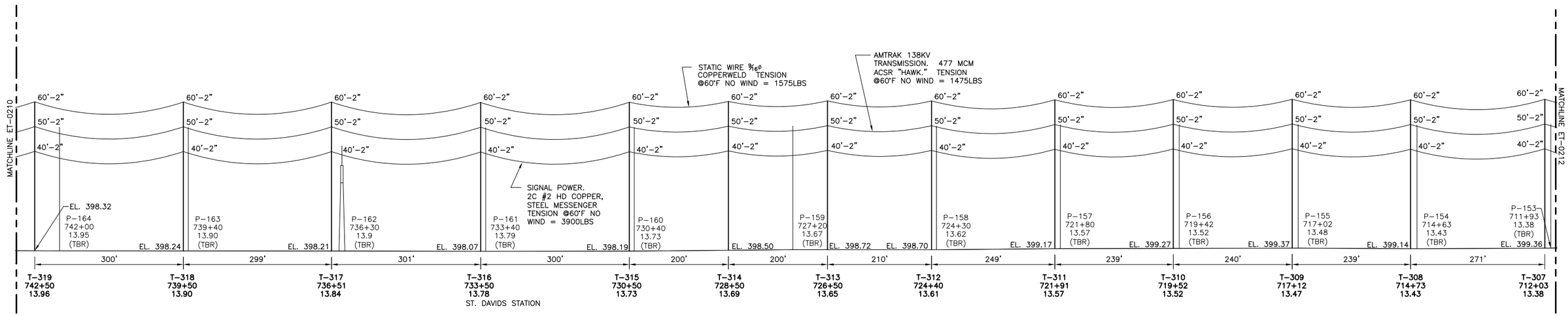
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 772+47 TO 742+50

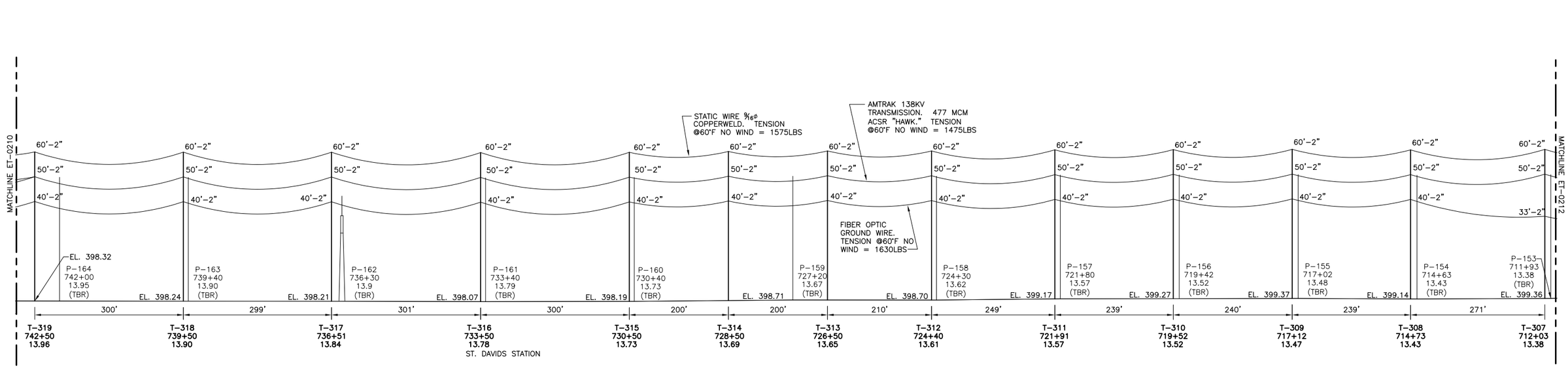
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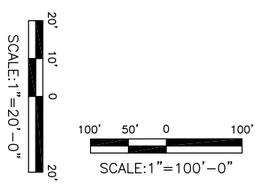
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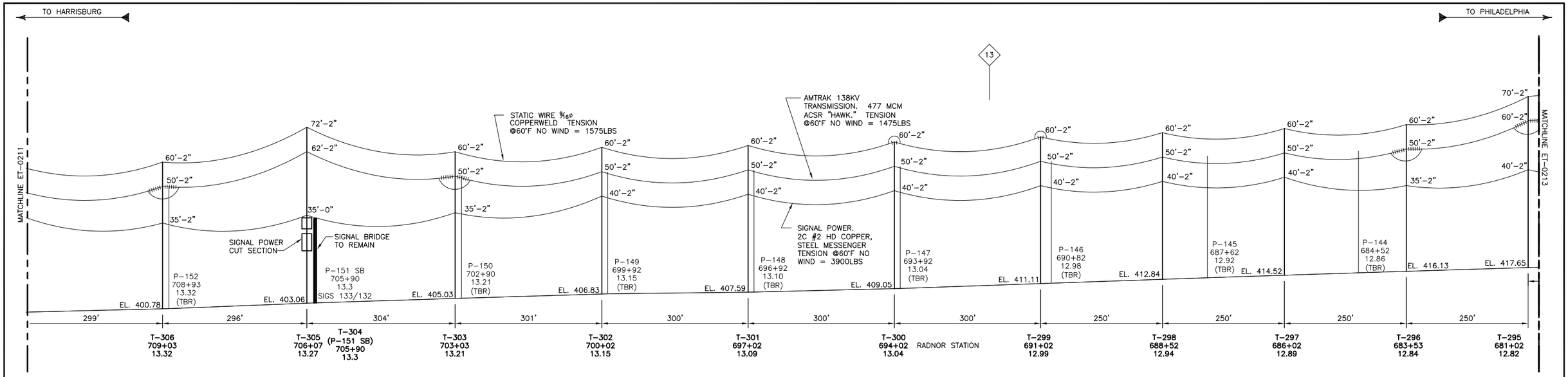
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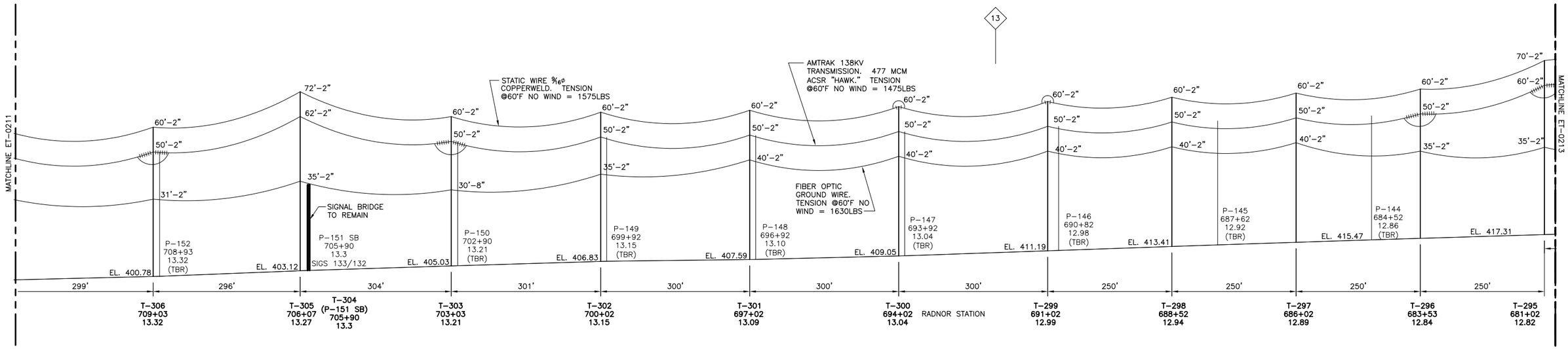
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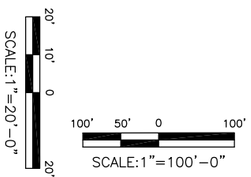
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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE



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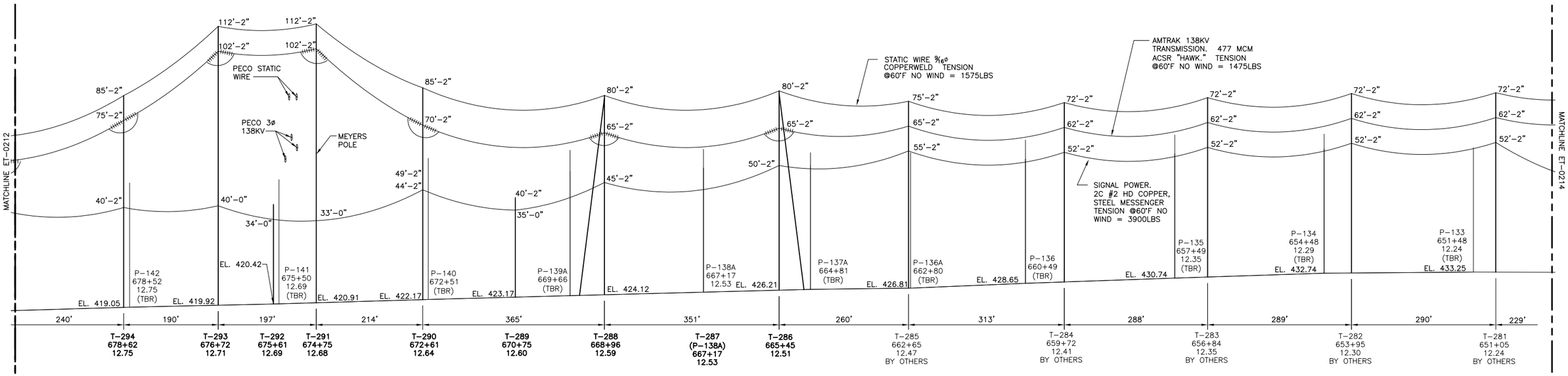
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 709+03 TO 678+62

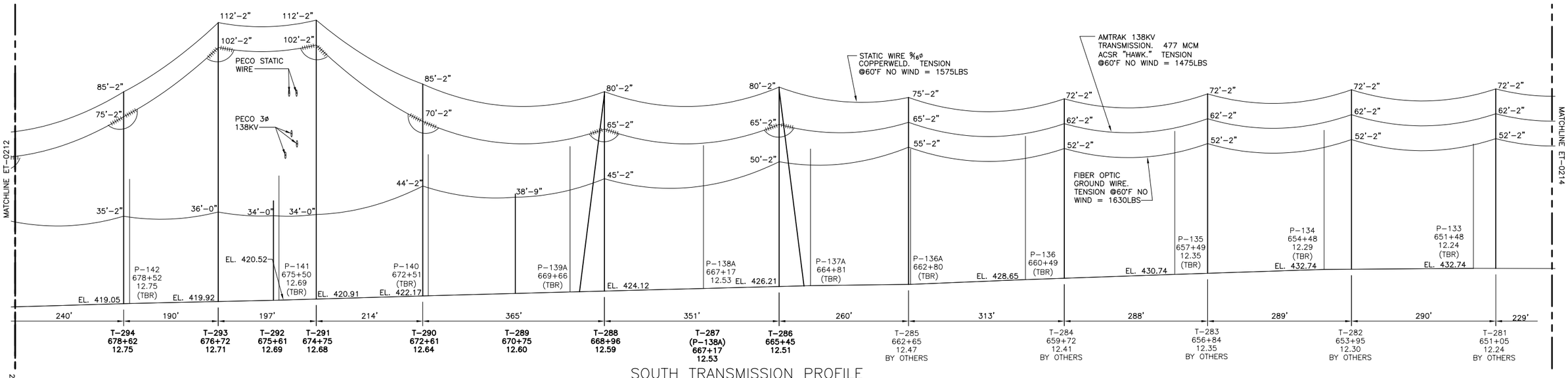
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Ref. No.:	2011-059
Sheet No:	076 OF 565

ET-0212



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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

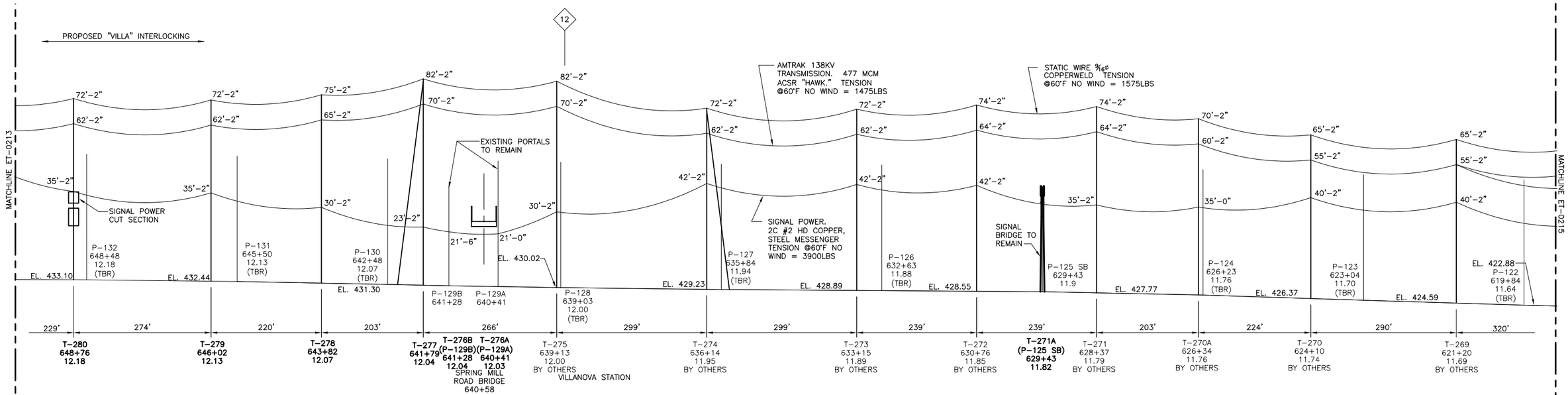
TRANSMISSION PROFILE
STA 678+62 TO 648+58

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

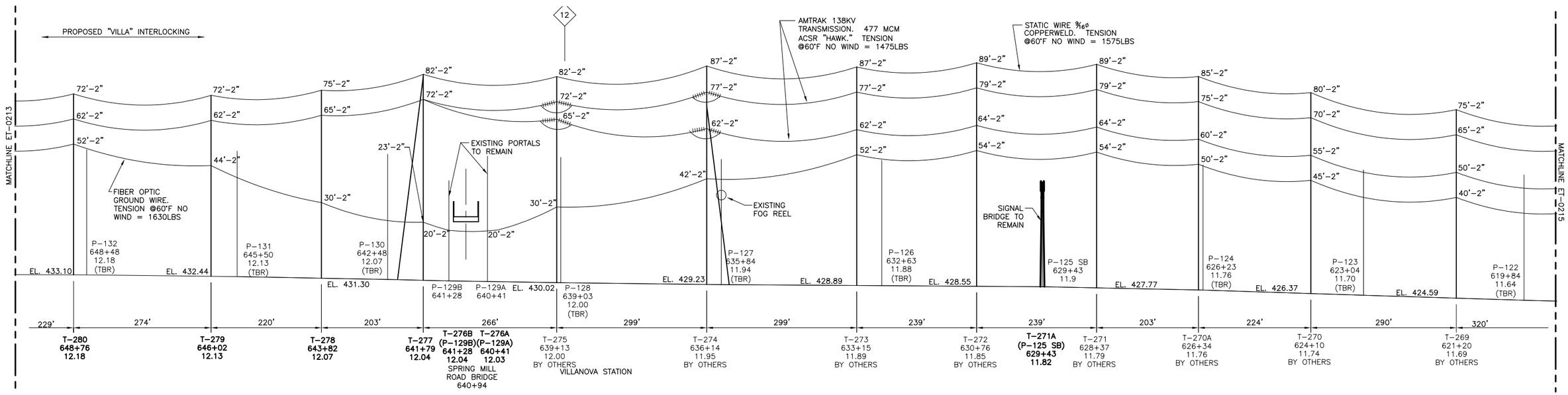
File No.:	2011-059-ET-0213.DWG
Ref. No.:	2011-059
Sheet No:	077 OF 565

ET-0213

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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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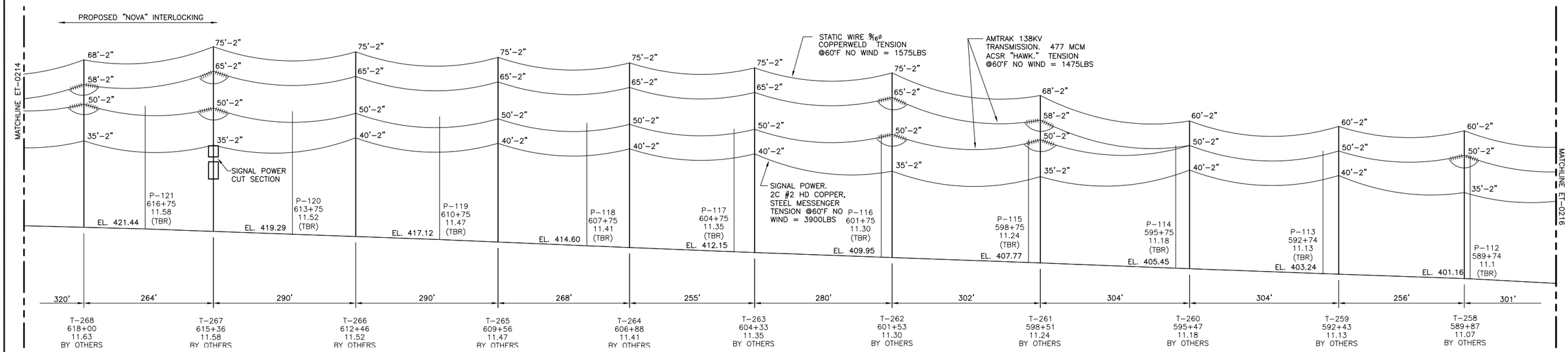
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 648+58 TO 616+85

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

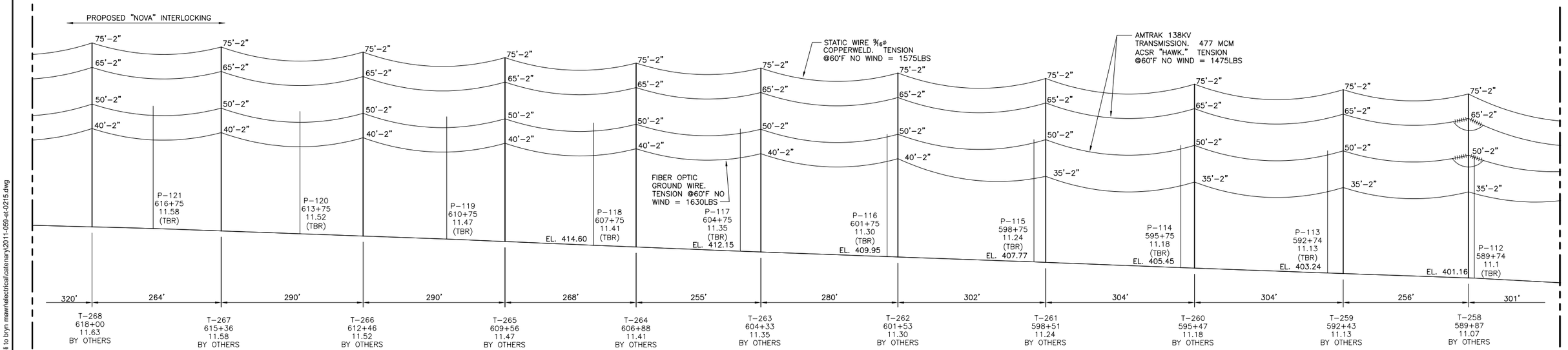
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Sheet No:	078 OF 565

ET-0214

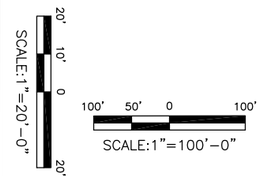
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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE



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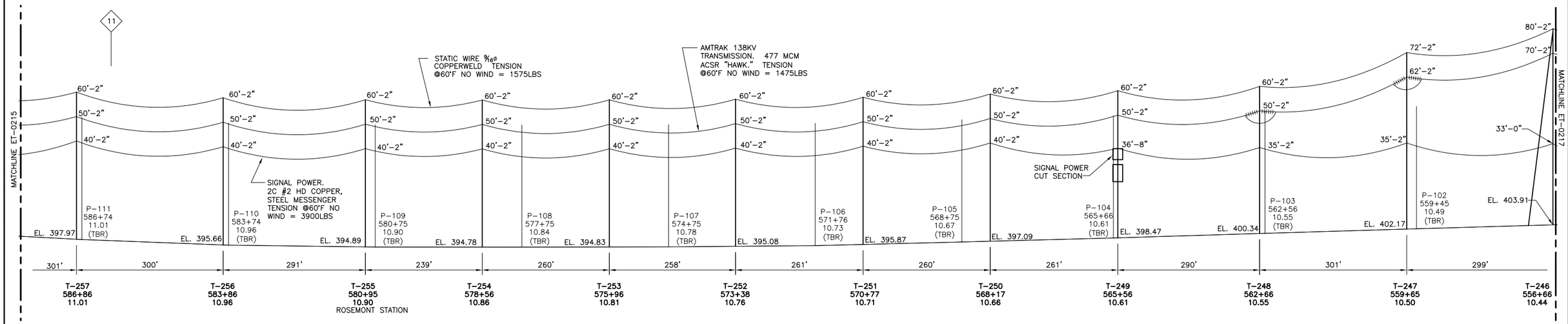
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA 616+85 TO 586+84

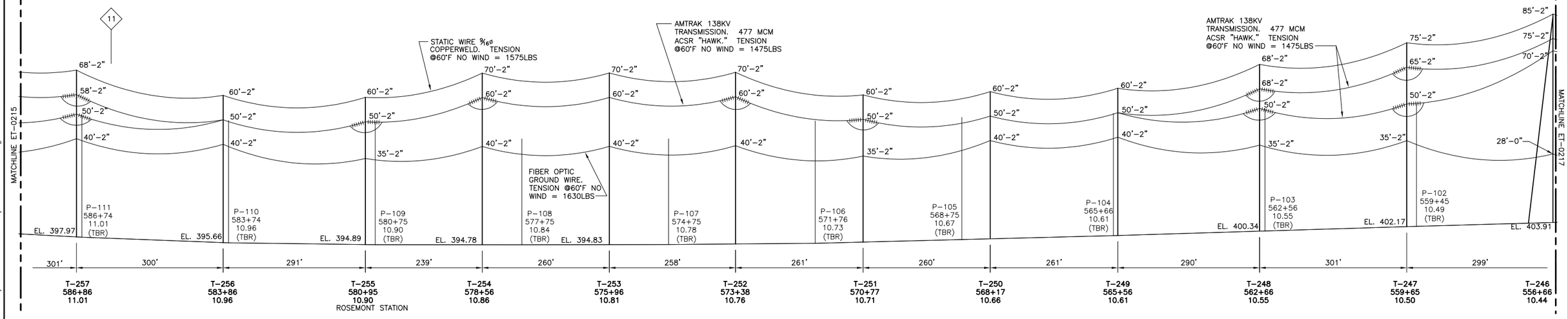
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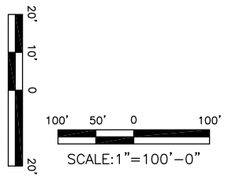
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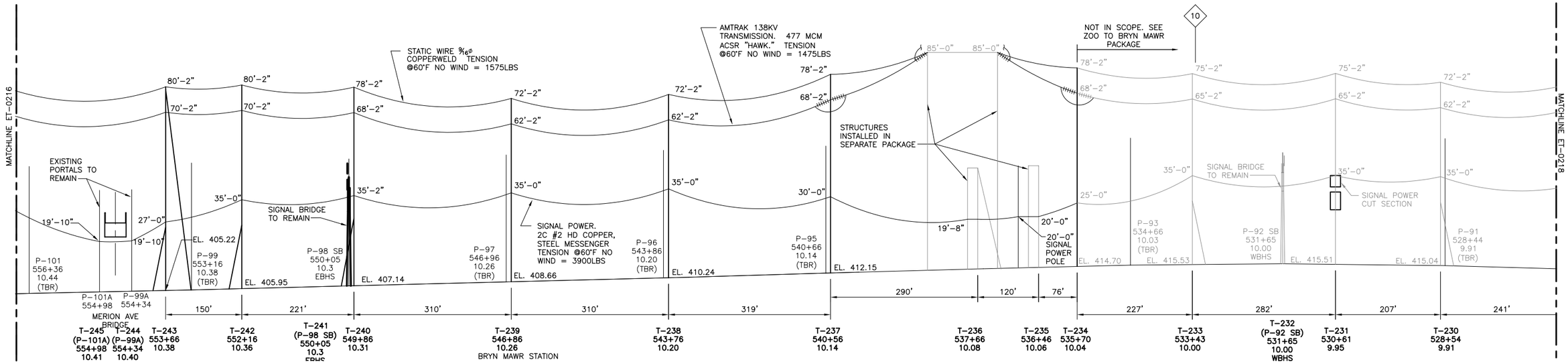
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 586+84 TO 556+66

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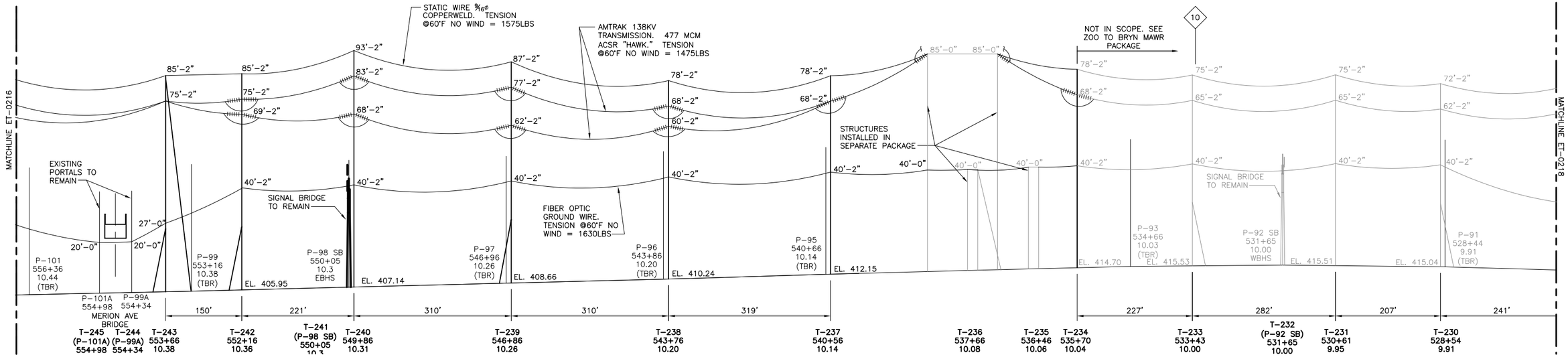
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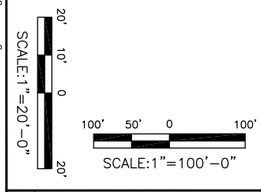
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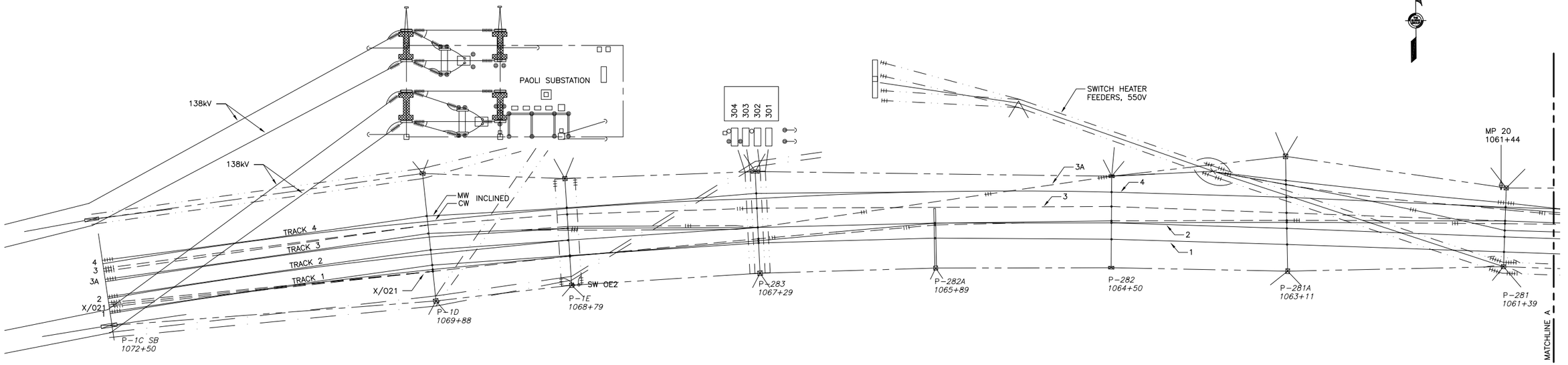
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TRANSMISSION PROFILE
STA 556+66 TO 525+35

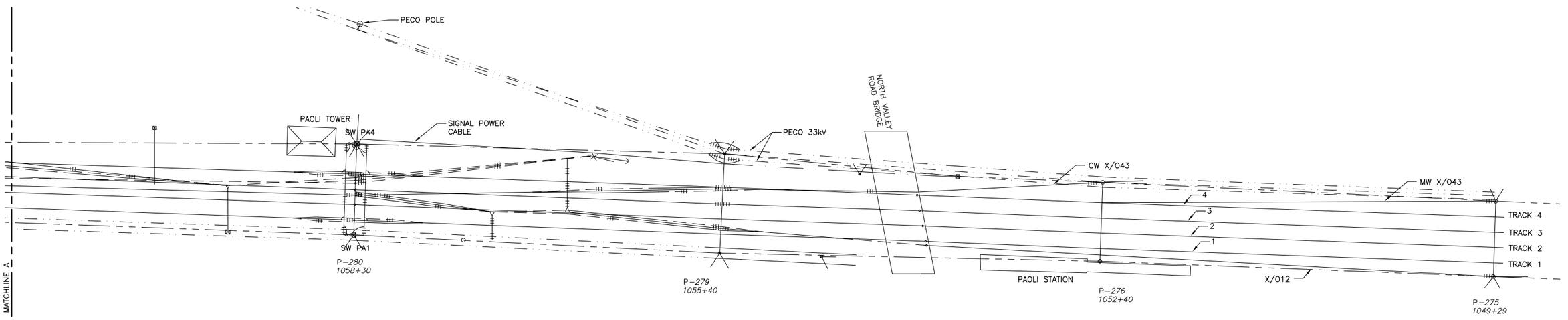
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Ref. No.:	2011-059
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ET-0217

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

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PAOLI INTERLOCKING EXISTING WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'–0"

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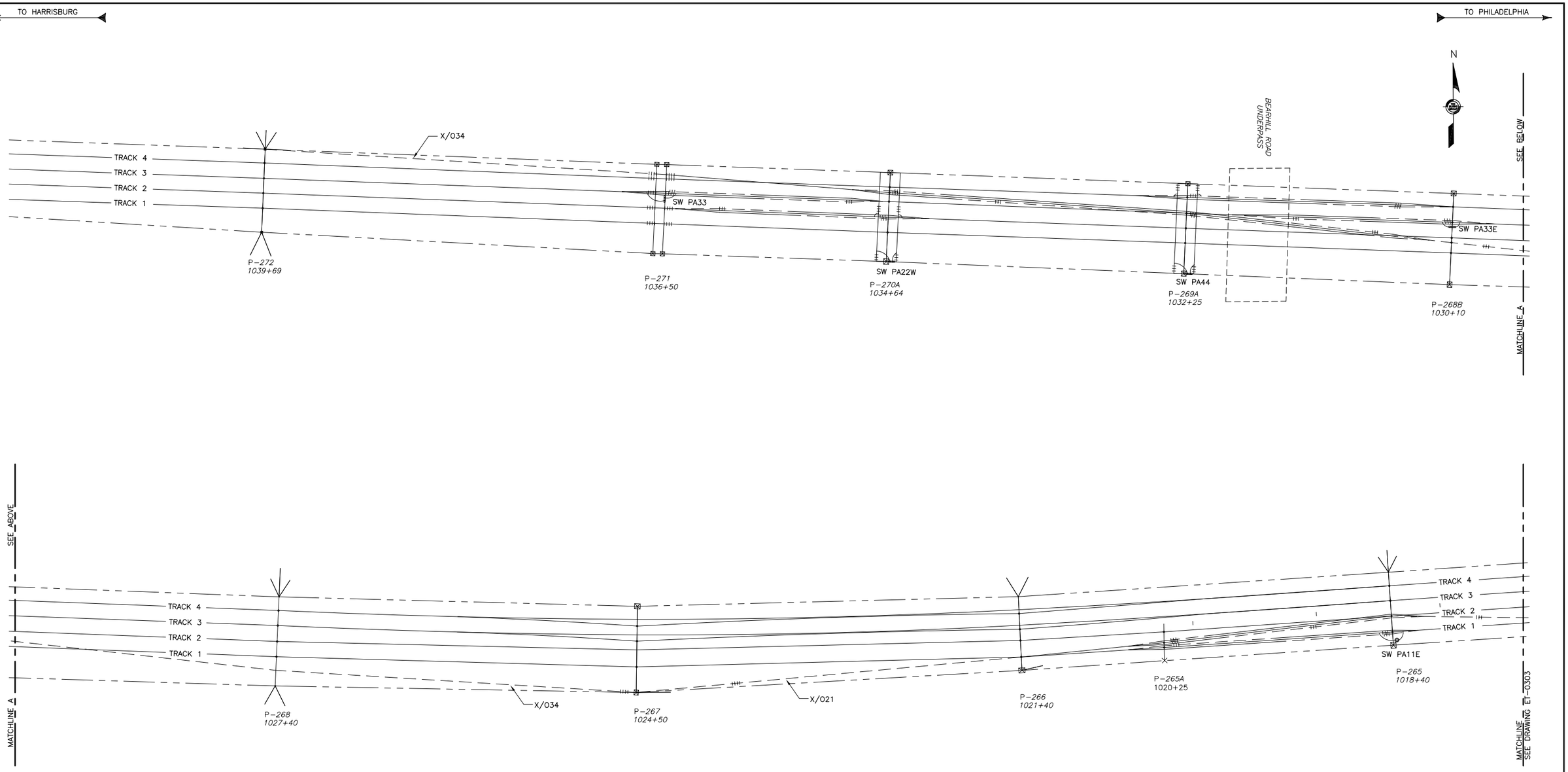
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
WIRE PLAN
PAOLI INTERLOCKING EXISTING WIRE PLAN

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

File No.:	2011-059-ET-0300.DWG
Ref. No.:	2011–059
Sheet No:	082 OF 565

ET–0300

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PAOLI EAST INTERLOCKING
EXISTING WIRE PLAN 1

40' 20' 0 40'

SCALE:1"=40'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING EXISTING WIRE PLAN
SHEET 1 OF 2

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

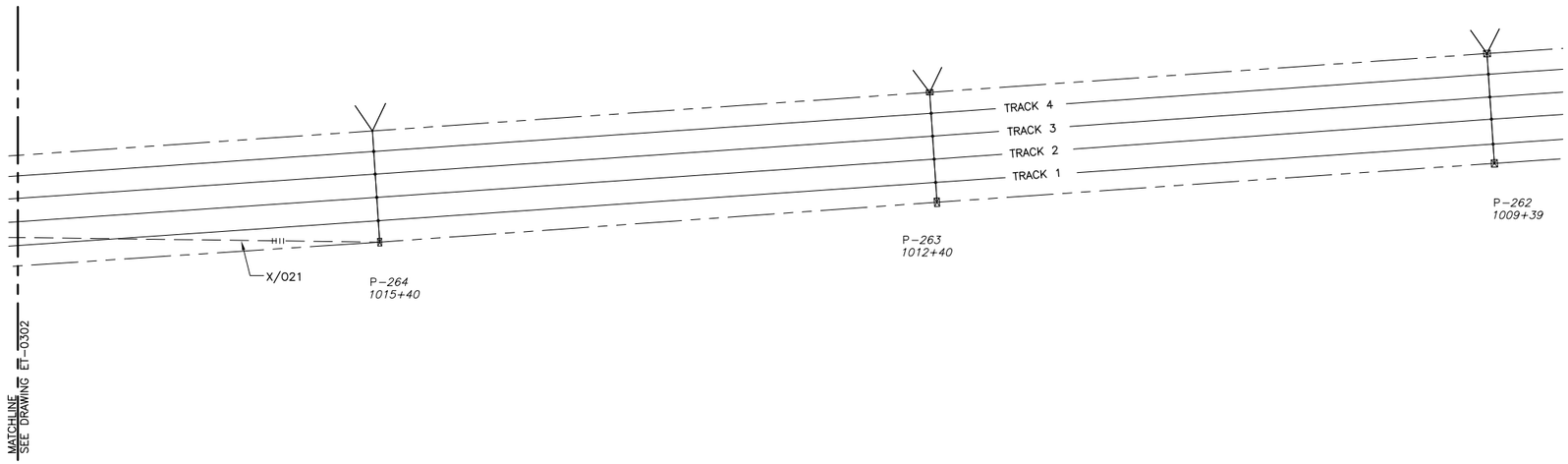
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Ref. No.:	2011-059
Sheet No:	083 OF 565

ET–0302

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TO HARRISBURG

TO PHILADELPHIA



N

PAOLI EAST INTERLOCKING
EXISTING WIRE PLAN 2

40' 20' 0 40'

SCALE:1"=40'–0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

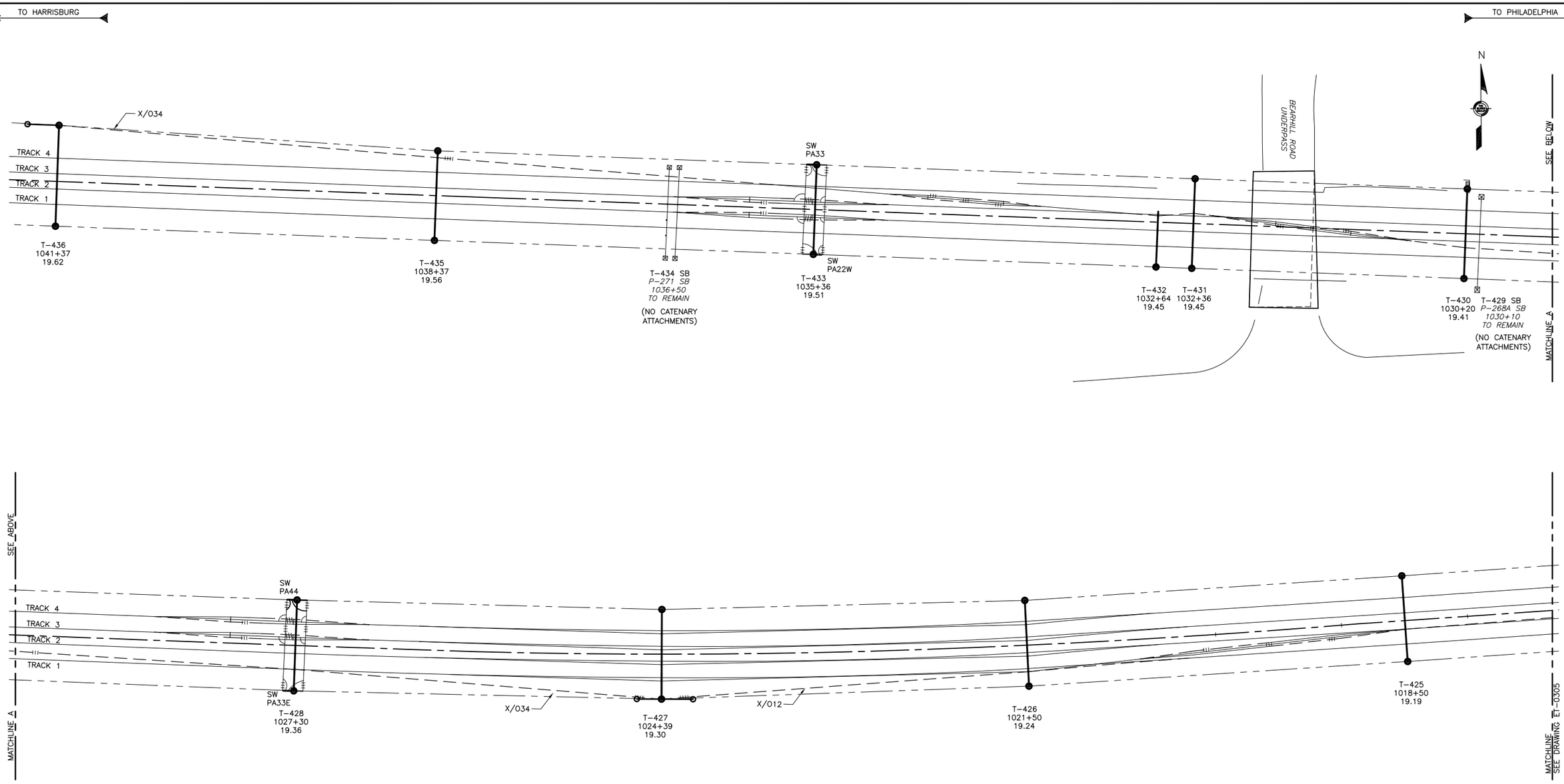
PAOLI EAST INTERLOCKING EXISTING WIRE PLAN
SHEET 2 OF 2

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

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Ref. No.:	2011–059
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ET–0303

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PAOLI EAST INTERLOCKING
PROPOSED WIRE PLAN 1

40' 20' 0 40'

SCALE:1"=40'-0"

NOTES:

1. PAOLI EAST PROPOSED WIRE PLAN MODIFIES THE EXISTING INTERLOCKING AND RELOCATES THE CATENARIES TO NEW TRANSMISSION AND PULL-OFF STRUCTURES PRIOR TO THE CONSTRUCTION OF NEW LLOYD AND RUSSELL INTERLOCKINGS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PLAN
SHEET 1 OF 2

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

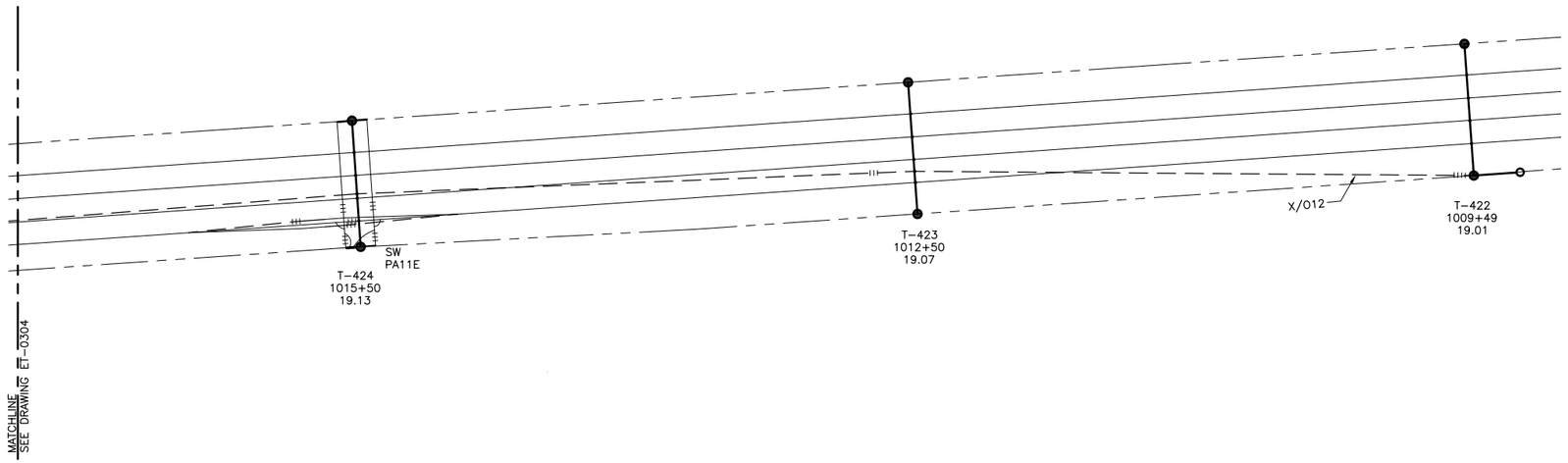
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Sheet No:	085 OF 565

ET-0304

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TO HARRISBURG

TO PHILADELPHIA



N

PAOLI EAST INTERLOCKING
PROPOSED WIRE PLAN 2

40' 20' 0 40'

SCALE:1"=40'-0"

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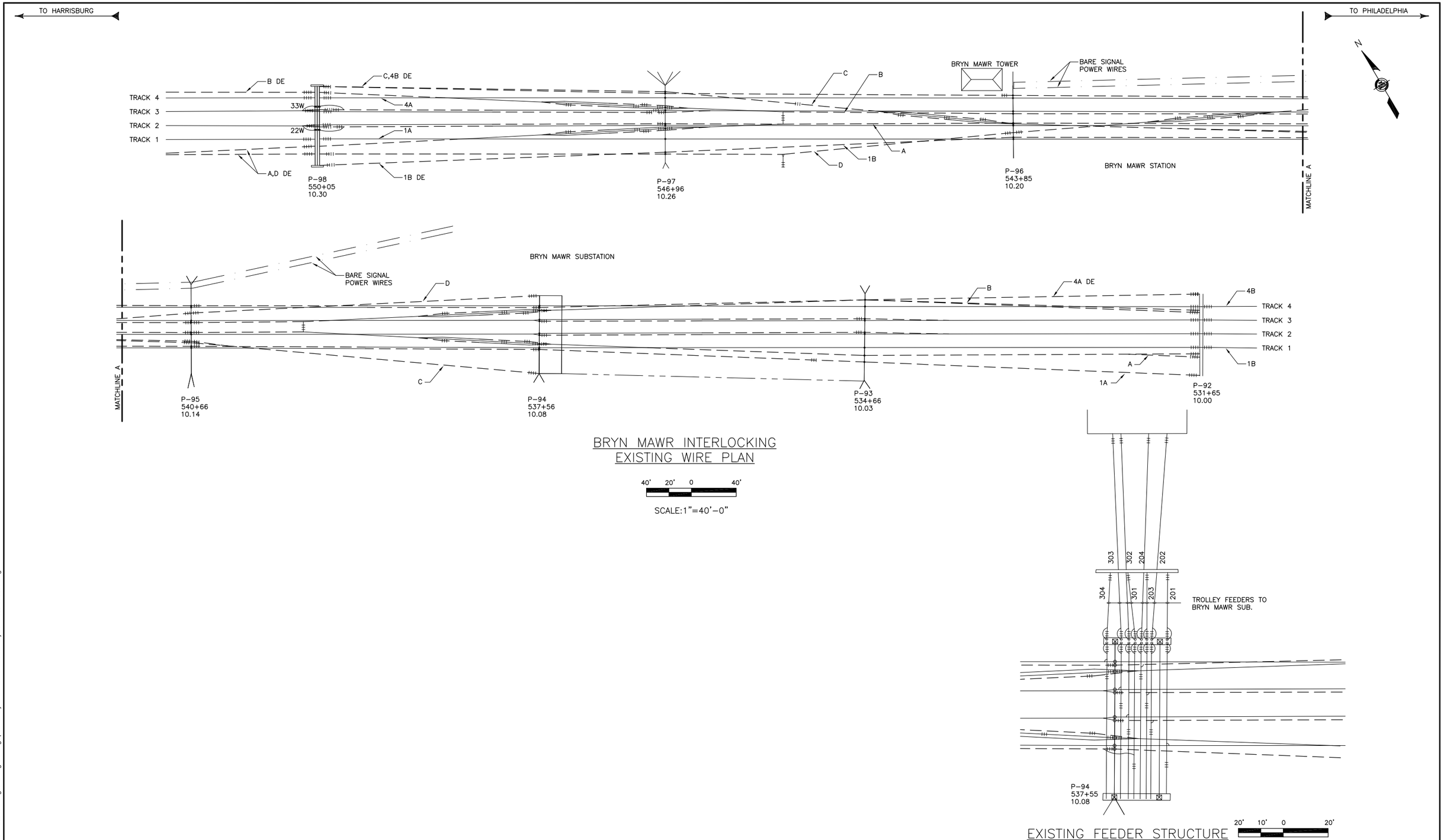
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PLAN
SHEET 2 OF 2

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

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BRYN MAWR INTERLOCKING
EXISTING WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'–0"

EXISTING FEEDER STRUCTURE

20' 10' 0 20'

SCALE:1"=20'–0"

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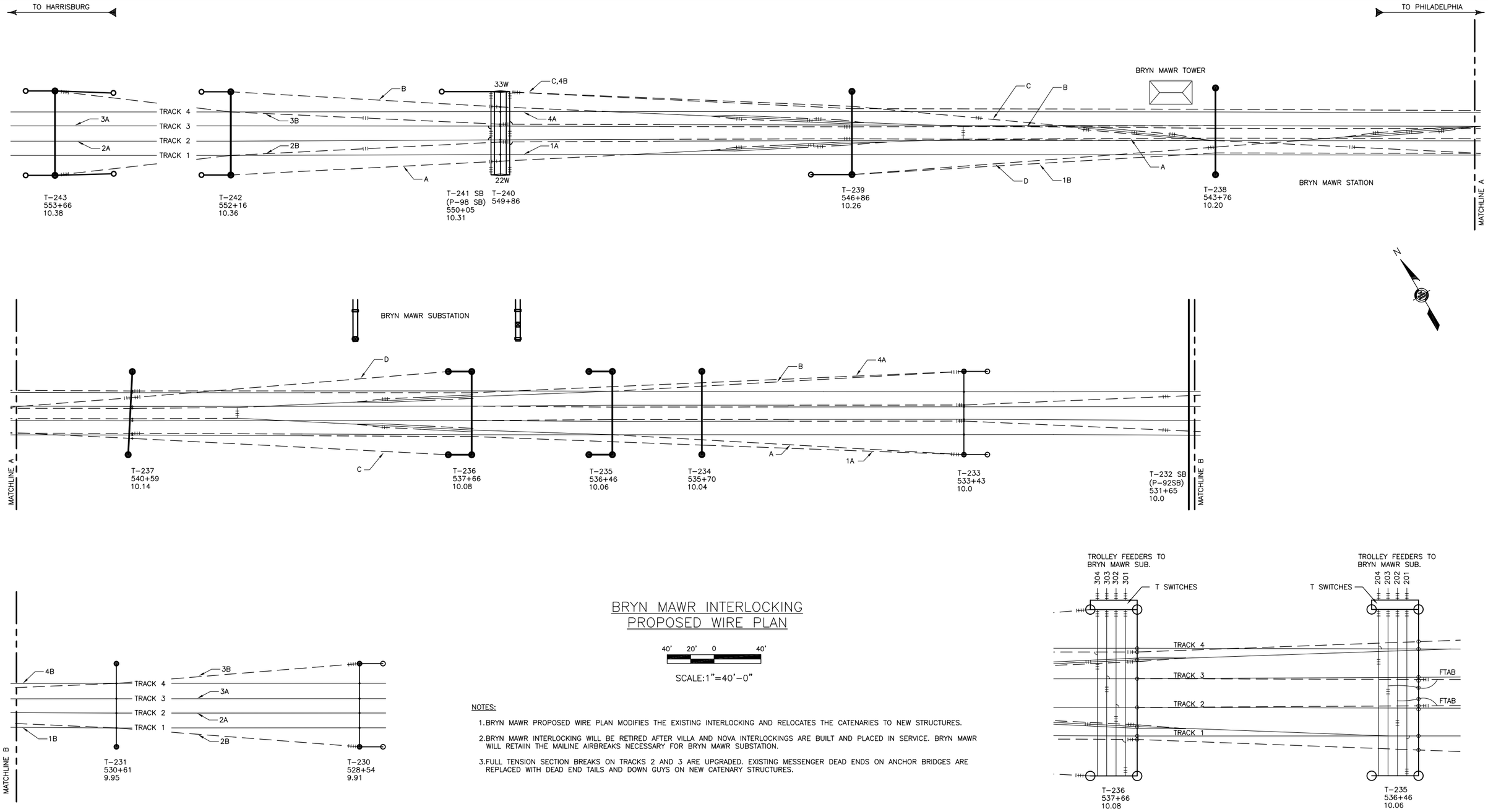
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
WIRE PLAN
BRYN MAWR INTERLOCKING EXISTING WIRE PLAN

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

File No.:	2011-059-ET-0306.DWG
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BRYN MAWR INTERLOCKING PROPOSED WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'-0"

NOTES:

1. BRYN MAWR PROPOSED WIRE PLAN MODIFIES THE EXISTING INTERLOCKING AND RELOCATES THE CATENARIES TO NEW STRUCTURES.
2. BRYN MAWR INTERLOCKING WILL BE RETIRED AFTER VILLA AND NOVA INTERLOCKINGS ARE BUILT AND PLACED IN SERVICE. BRYN MAWR WILL RETAIIN THE MAILINE AIRBREAKS NECESSARY FOR BRYN MAWR SUBSTATION.
3. FULL TENSION SECTION BREAKS ON TRACKS 2 AND 3 ARE UPGRADED. EXISTING MESSENGER DEAD ENDS ON ANCHOR BRIDGES ARE REPLACED WITH DEAD END TAILS AND DOWN GUYS ON NEW CATENARY STRUCTURES.

FEEDER STRUCTURE (INSTALLED IN SEPARATE PACKAAGE)

20' 10' 0 20'

SCALE:1"=20'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

WIRE PLAN

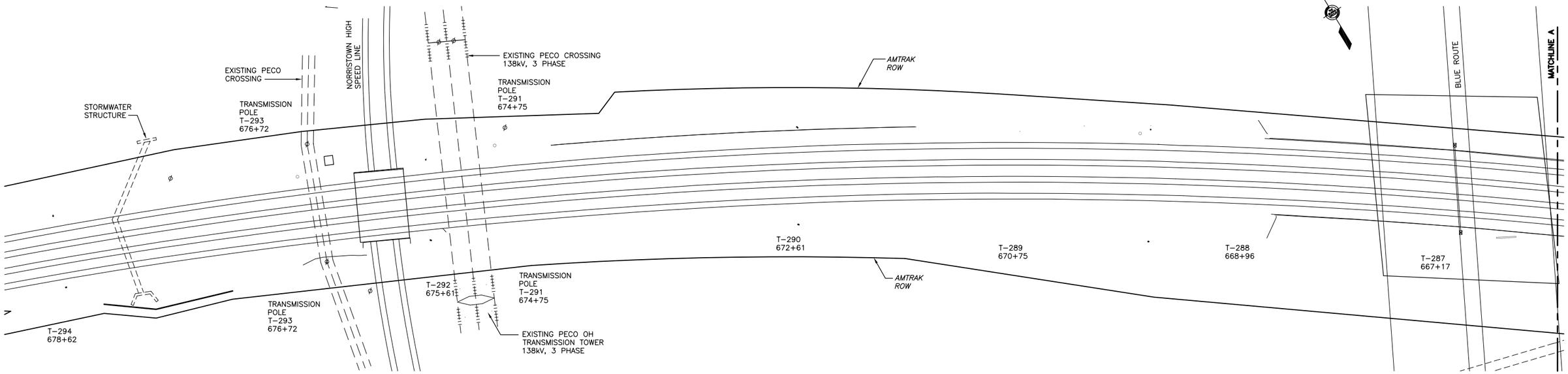
BRYN MAWR INTERLOCKING PROPOSED WIRE PLAN

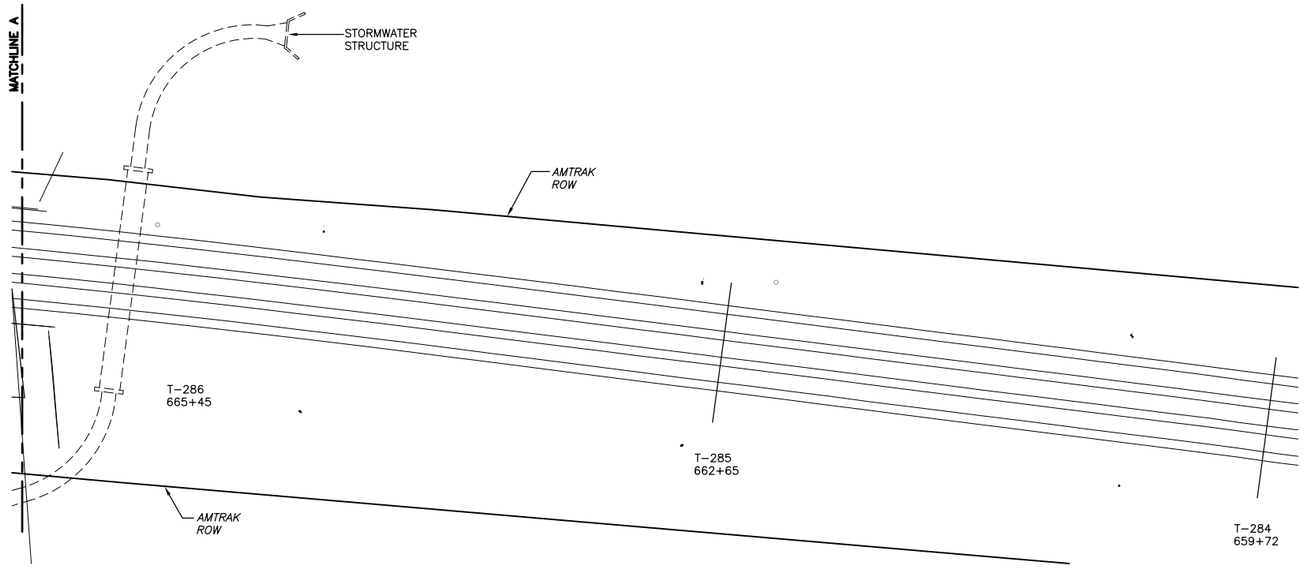
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BLUE ROUTE AND NORRISTOWN HIGH SPEED LINE WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'-0"

WORK STATEMENT:

1. INSTALL FOUNDATIONS AND MONO POLES FOR NEW TRANSMISSION WIRES.
2. INSTALL STATIC AND TRANSMISSION WIRES BETWEEN MONOPOLES SPANNING NORRISTOWN H.S. LINE, PECO'S 138KV CROSSING AND I-76 BLUE ROUTE.
3. INSTALL AERIAL GROUND WIRE TO EXISTING CATENARY STRUCTURES.
4. INSTALL INSULATED SIGNAL POWER CABLE.
5. RELOCATE FOG WIRE TO PROPOSED MONOPOLES.

NOTES:

1. NEW TRANSMISSION MONOPOLES WILL BE INSTALLED TO SUPPORT THE NEW TRANSMISSION WIRES BETWEEN 676+72 AND 674+75, CROSSING THE NHSL AND PECO.
2. PECO'S 138KV TRANSMISSION LINE CROSSES AMTRAK'S ROW AT 675+22.
3. AMTRAK'S TRANSMISSION WIRES WILL CROSS ABOVE PECO'S TRANSMISSION AND STATIC (FOG) WIRES.
4. PECO'S 33KV DISTRIBUTION LINE IS NOT ENERGIZED EAST OF (NORRISTOWN H.S. LINE) AND WILL BE REMOVED.
5. PECO'S EXISTING 33KV DISTRIBUTION LINE WILL BE REMOVED FROM THE ROW.

100% DESIGN SUBMISSION

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

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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
WIRE PLAN
BLUE ROUTE AND NORRISTOWN HIGH SPEED LINE

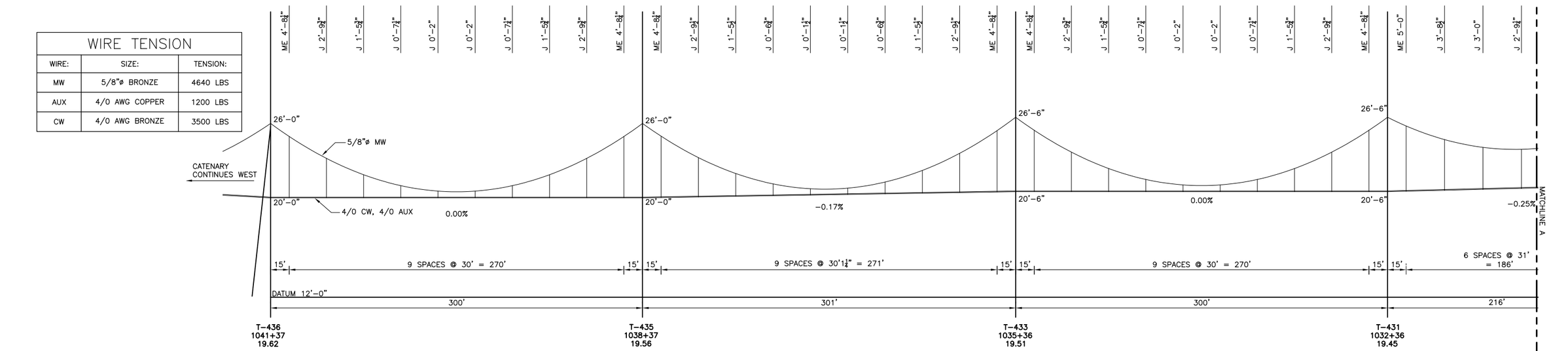
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Ref. No.:	2011-059
Sheet No:	089 OF 565

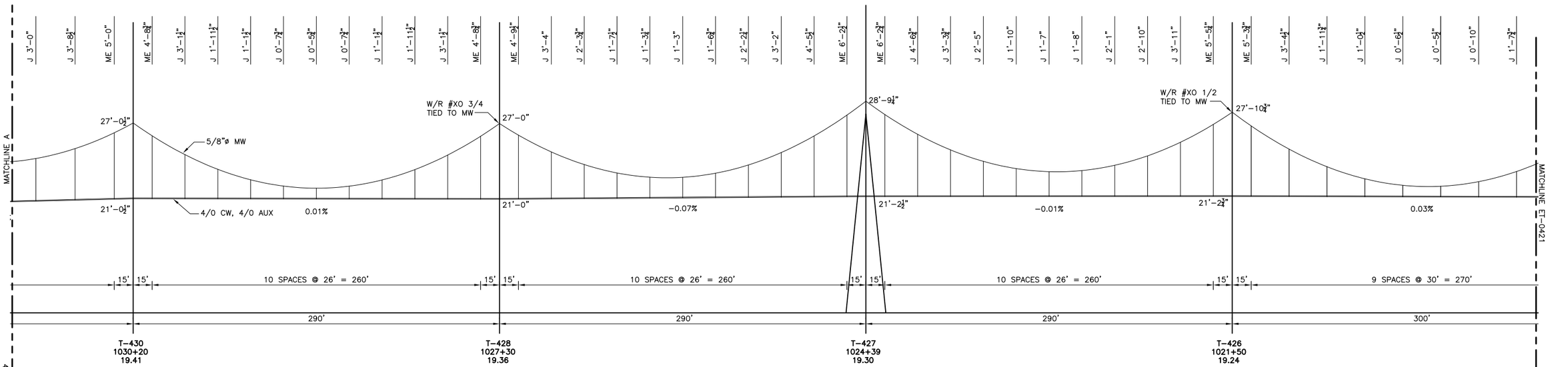
ET-0321

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WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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Baker
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE TRACK 1 – SHEET 1 OF 2

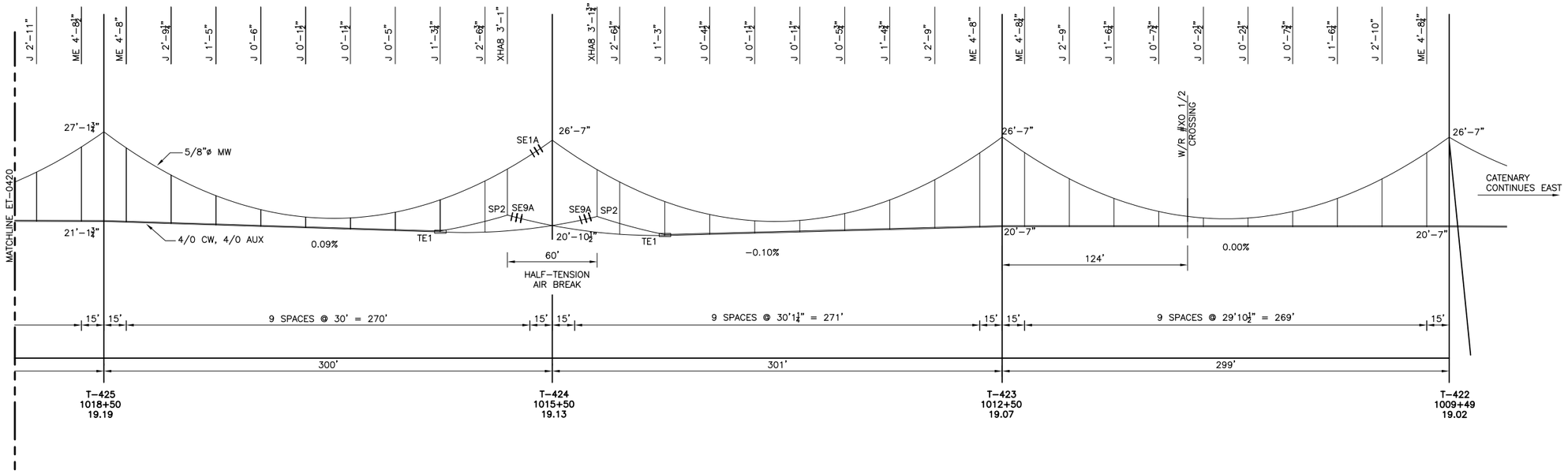
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File No.:	2011-059-ET-0420.DWG
Ref. No.:	2011-059
Sheet No:	090 OF 565

ET-0420

TO HARRISBURG

TO PHILADELPHIA



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL TRACK 1

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	A/R
	4/0 COPPER AUX WIRE	ET0092	A/R
	4/0 BRONZE CW	ET0092	A/R
J	HANGER ASSEMBLY	ET1900	90
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	1
SE9A	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	2
CC5/8	MW SPLICE	ET1909	2
CC4/0T	AUX SPLICE	ET1909	2
SPL3	CW SPLICE	ET1909	2
SP2	SPREADER ASSEMBLY	ET1916	2
TE1	TENSION EQUALIZER	ET1916	2

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 1 – SHEET 2 OF 2

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

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Ref. No.:	2011-059
Sheet No:	091 OF 565

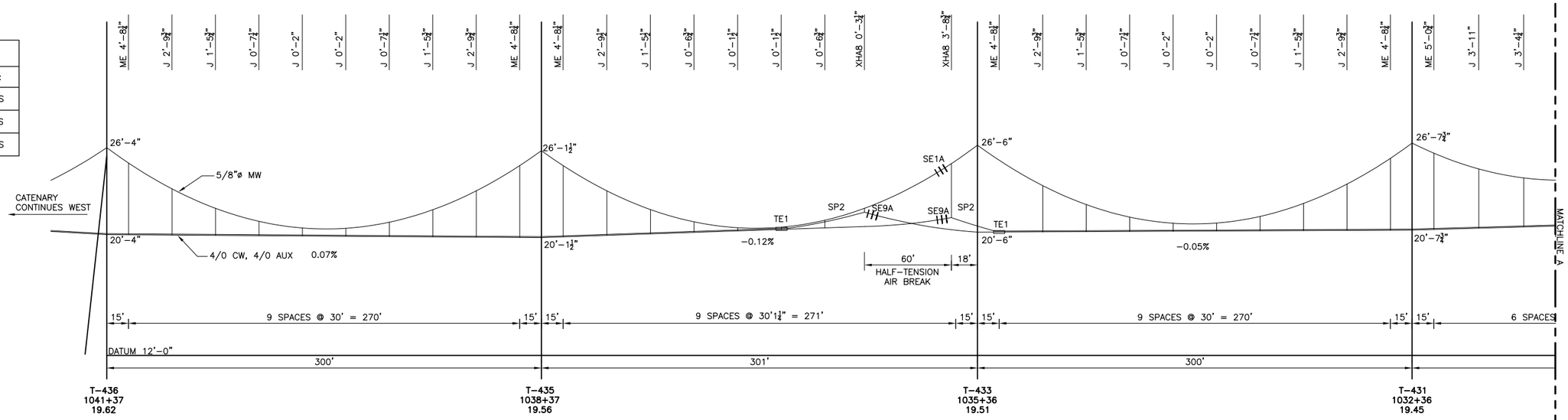
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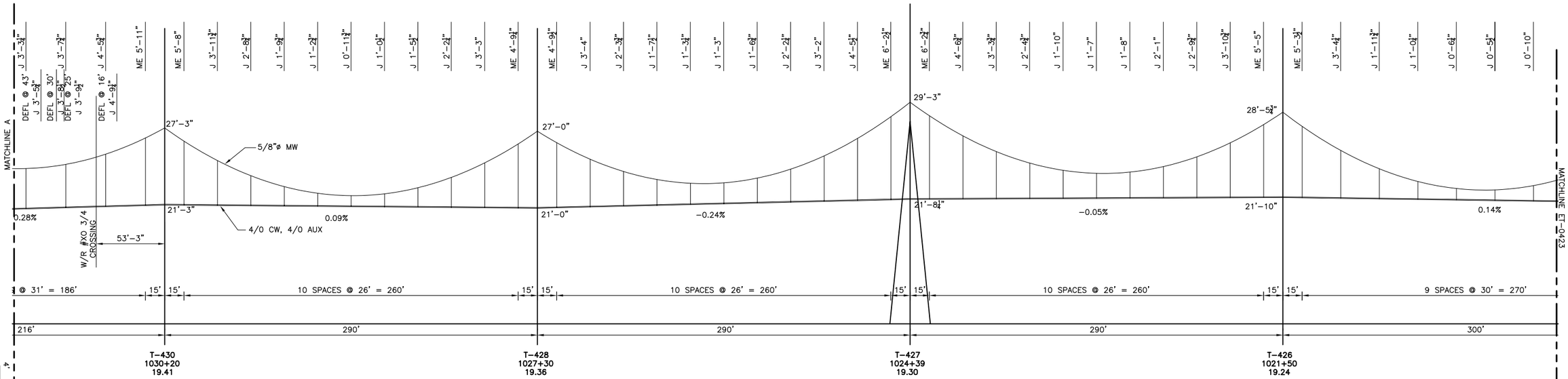
TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 2 – SHEET 1 OF 2

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

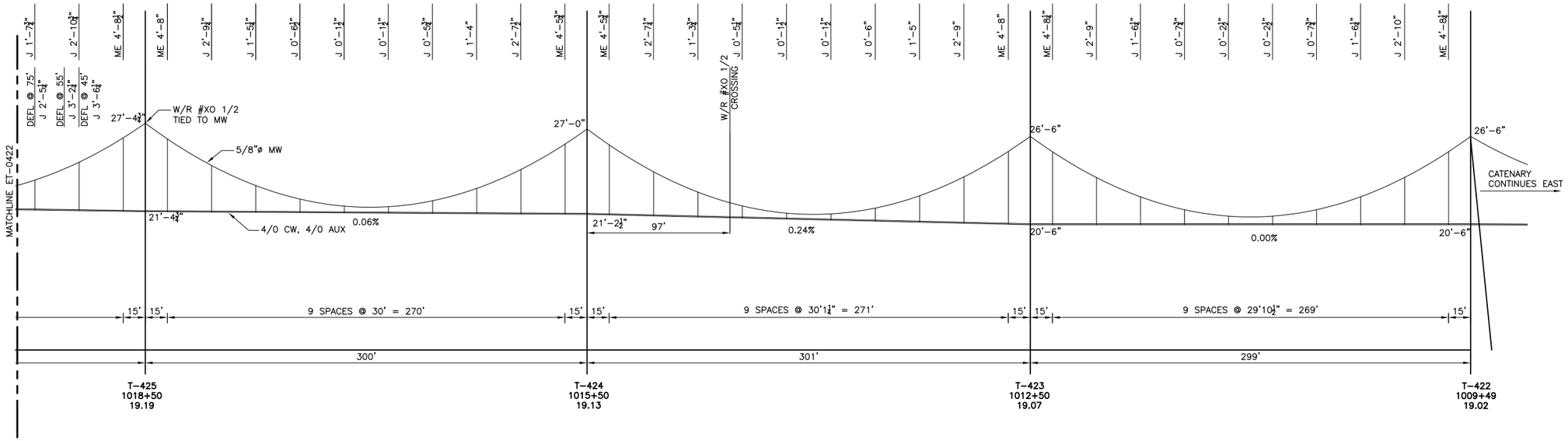
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Sheet No:	092 OF 565

ET-0422

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TO HARRISBURG

TO PHILADELPHIA



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL TRACK 2

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	A/R
	4/0 COPPER AUX WIRE	ET0092	A/R
	4/0 BRONZE CW	ET0092	A/R
J	HANGER ASSEMBLY	ET1900	93
ME	HANGER ASSEMBLY	ET1900	21
SE1A	INSULATOR	ET1905	1
SE9A	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	2
CC5/8	MW SPLICE	ET1909	2
CC4/0T	AUX SPLICE	ET1909	2
SPL3	CW SPLICE	ET1909	2
SP2	SPREADER ASSEMBLY	ET1916	2
TE1	TENSION EQUALIZER	ET1916	2

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 2 – SHEET 2 OF 2

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

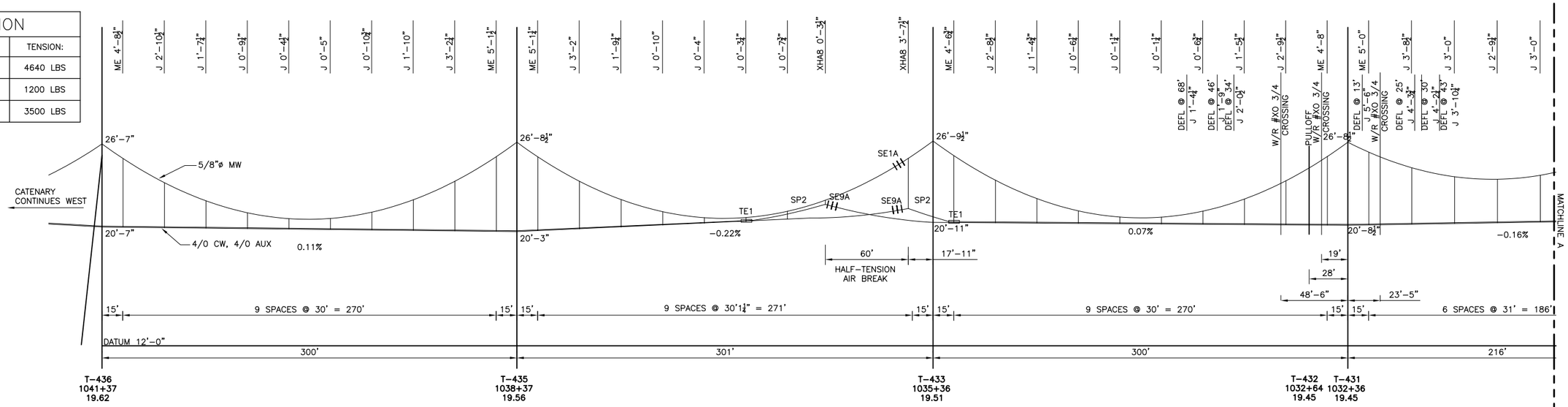
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Sheet No:	093 OF 565

ET-0423

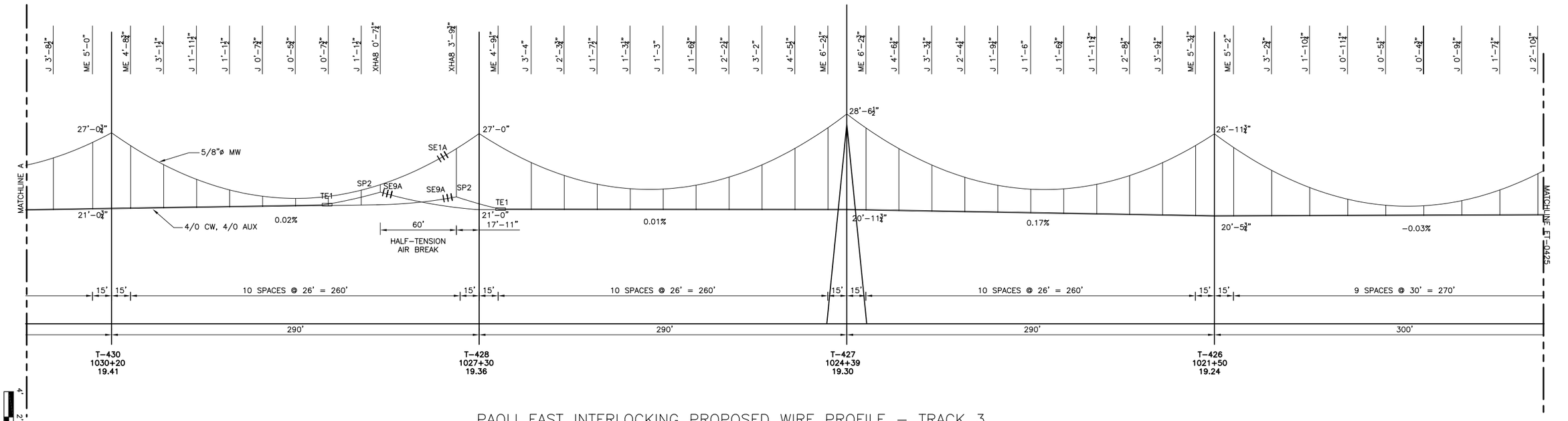
TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 3 – SHEET 1 OF 2

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

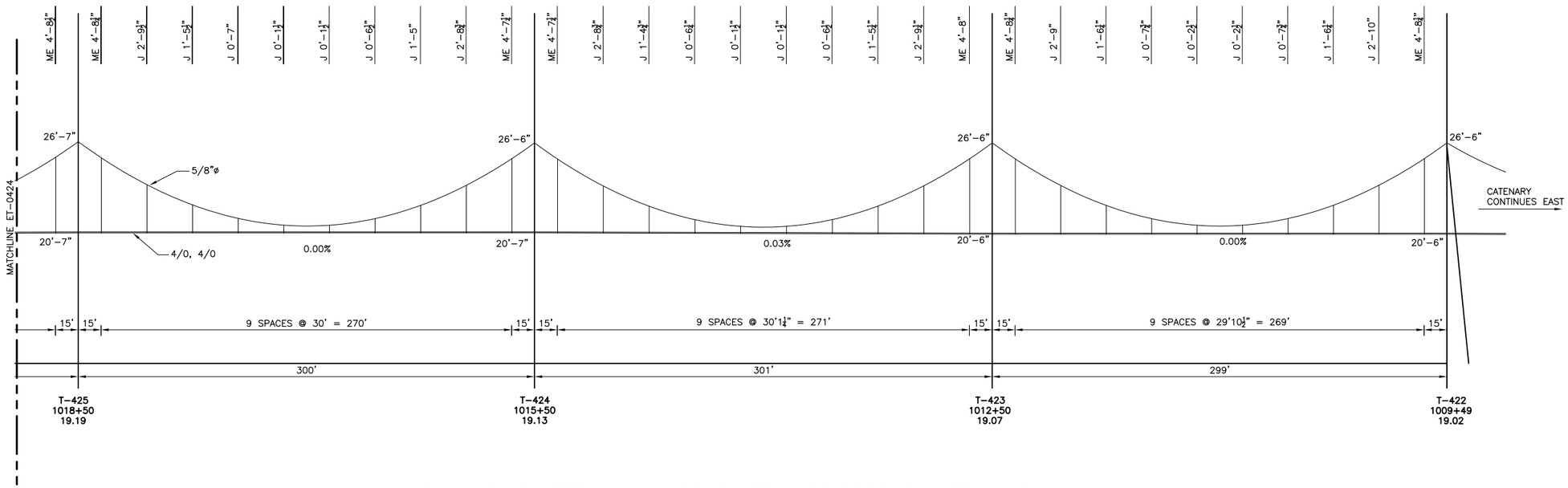
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Ref. No.:	2011-059
Sheet No:	094 OF 565

ET-0424

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TO HARRISBURG

TO PHILADELPHIA



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL TRACK 3

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	A/R
	4/0 COPPER AUX WIRE	ET0092	A/R
	4/0 BRONZE CW	ET0092	A/R
J	HANGER ASSEMBLY	ET1900	88
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	2
SE9A	INSULATOR	ET1905	4
XHA8	SPREADER	ET1901	4
CC5/8	MW SPLICE	ET1909	4
CC4/0T	AUX SPLICE	ET1909	4
SPL3	CW SPLICE	ET1909	4
SP2	SPREADER ASSEMBLY	ET1916	4
TE1	TENSION EQUALIZER	ET1916	4

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

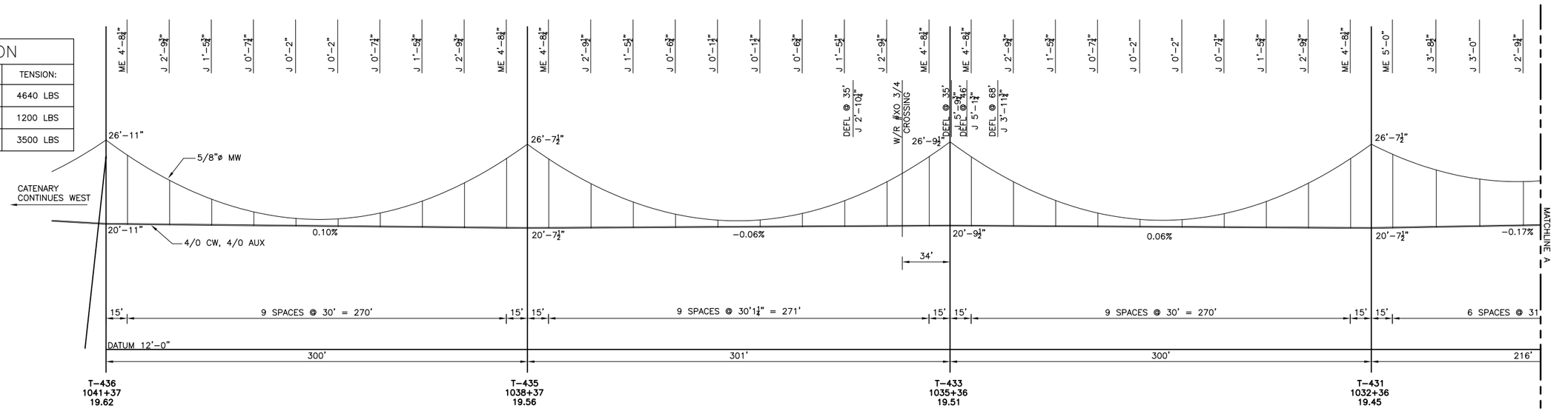
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE TRACK 3 – SHEET 2 OF 2

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

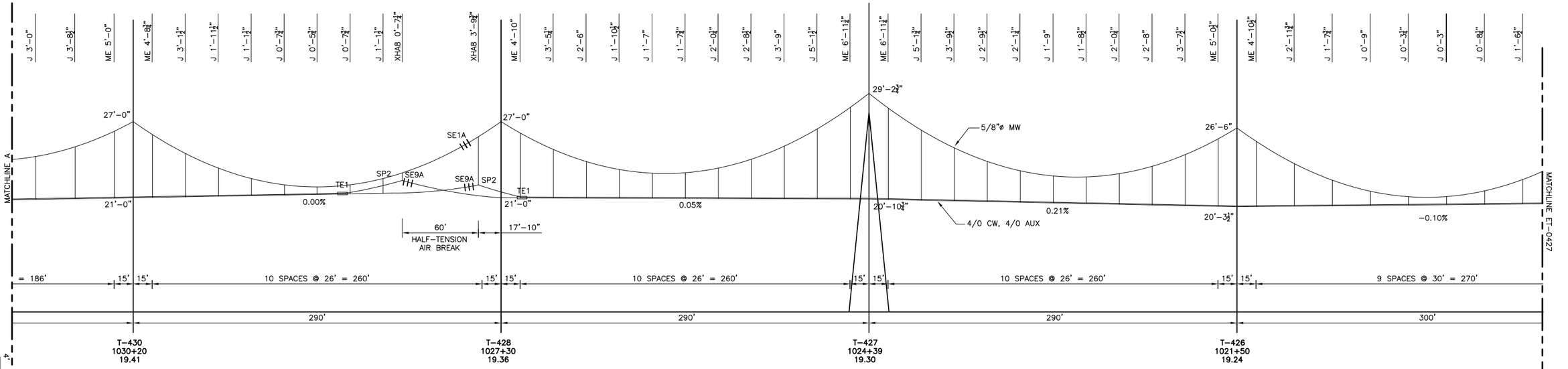
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Ref. No.:	2011-059
Sheet No:	095 OF 565

ET-0425

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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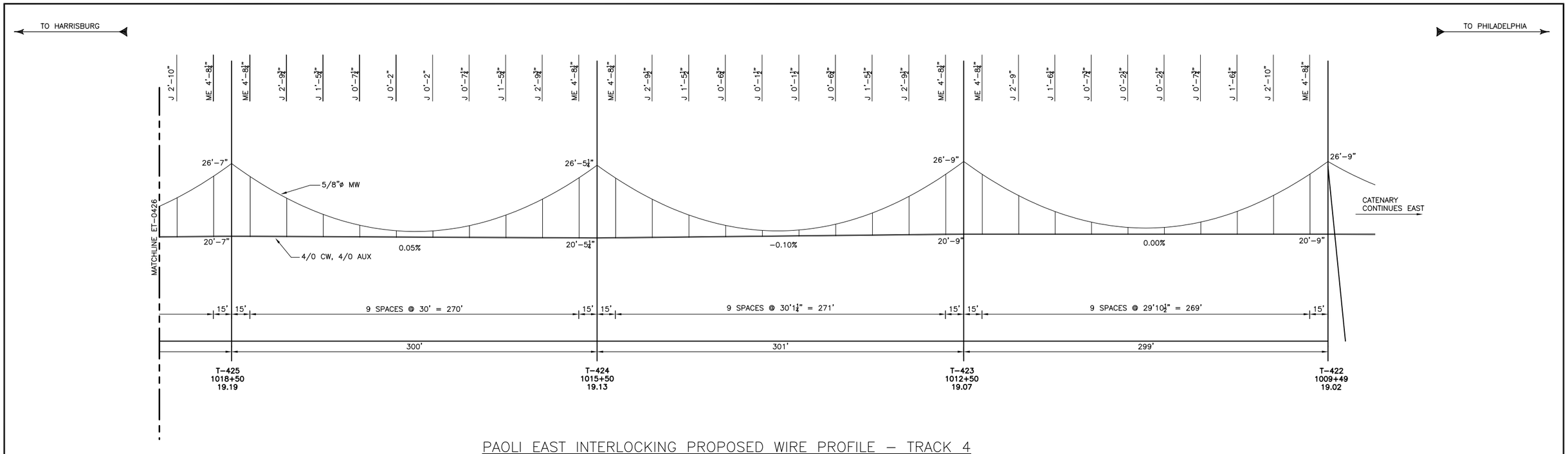
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 4 – SHEET 1 OF 2

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

File No.:	2011-059-ET-0426.DWG
Ref. No.:	2011-059
Sheet No:	096 OF 565

ET–0426

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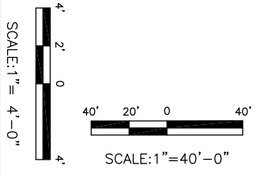
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL TRACK 4

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	A/R
	4/0 COPPER AUX WIRE	ET0092	A/R
	4/0 BRONZE CW	ET0092	A/R
J	HANGER ASSEMBLY	ET1900	88
ME	HANGER ASSEMBLY	ET1900	21
SE1A	INSULATOR	ET1905	1
SE9A	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	2
CC5/8	MW SPLICE	ET1909	2
CC4/0T	AUX SPLICE	ET1909	2
SPL3	CW SPLICE	ET1909	2
SP2	SPREADER ASSEMBLY	ET1916	2
TE1	TENSION EQUALIZER	ET1916	2



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

Approved	Date

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

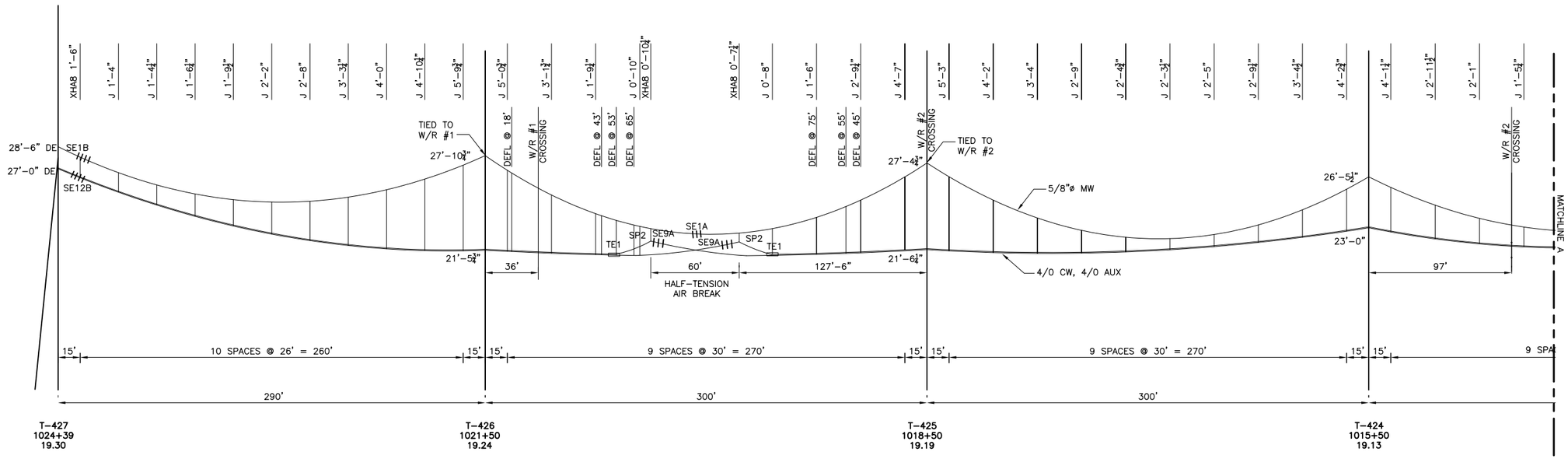
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
TRACK 4 – SHEET 2 OF 2

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

File No.:	2011-059-ET-0427.DWG
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Sheet No:	097 OF 565

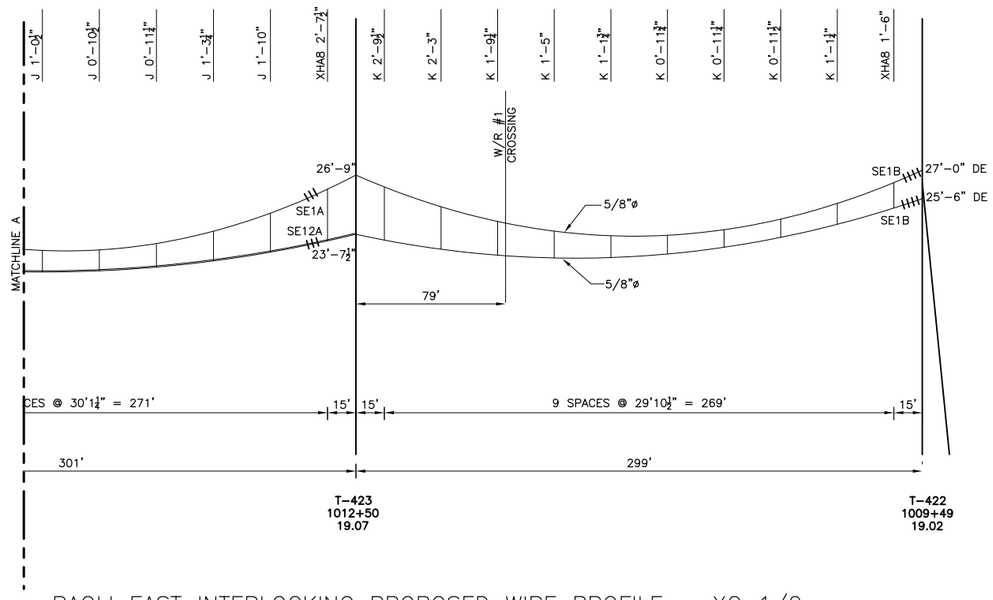
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PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – XO 1/2

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – XO 1/2

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL TRACK XO 1/2			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1500'
	4/0 COPPER AUX WIRE	ET0092	1500'
	4/0 BRONZE CW	ET0092	1500'
J	HANGER ASSEMBLY	ET1900	37
K	HANGER ASSEMBLY	ET1900	9
H	CATENARY CLIP	ET1900	35
SE1A	INSULATOR	ET1905	2
SE9A	INSULATOR	ET1905	2
SE12A	INSULATOR	ET1905	1
SE1B	INSULATOR	ET1905	3
SE12B	INSULATOR	ET1905	1
XHA8	SPREADER	ET1901	5
WL	WIRE LOCK	ET1915	12
SP1	DEFLECTOR	ET1903	7
SP2	SPREADER ASSEMBLY	ET1916	2
SP3	SPREADER ASSEMBLY	ET1916	7
TE1	TENSION EQUALIZER	ET1916	2

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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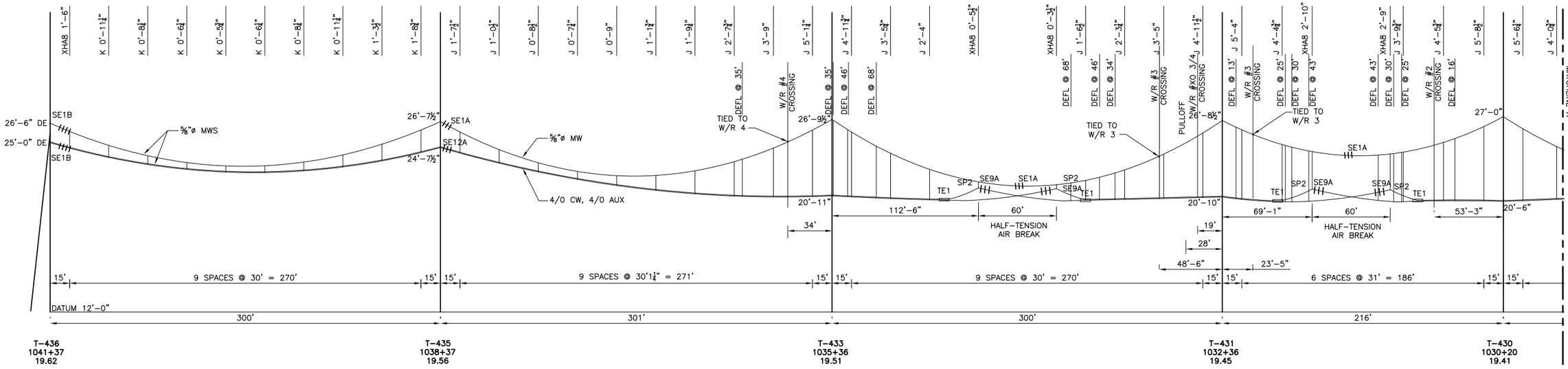
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
XO 1/2 – SHEET 1 OF 1

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

File No.:	2011-059-ET-0428.DWG
Ref. No.:	2011-059
Sheet No:	098 OF 565

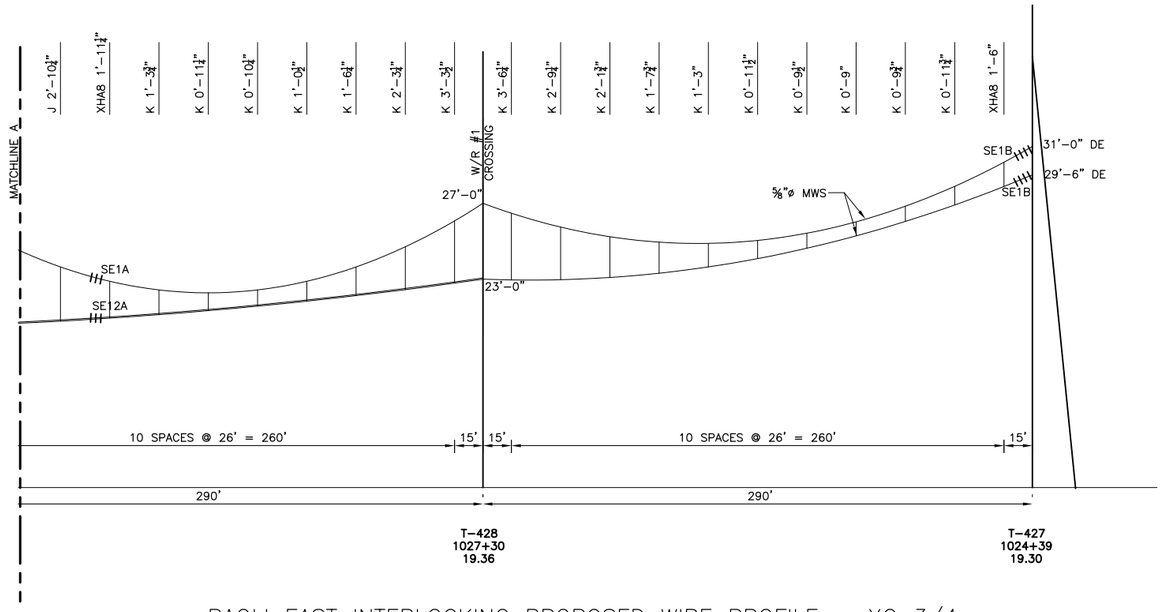
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PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – XO 3/4

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE – XO 3/4

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD HALF TENSION AIR BREAK.

BILL OF MATERIAL XO 3/4			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1700'
	4/0 COPPER AUX WIRE	ET0092	1700'
	4/0 BRONZE CW	ET0092	1700'
J	HANGER ASSEMBLY	ET1900	25
K	HANGER ASSEMBLY	ET1900	26
H	CATENARY CLIP	ET1900	21
SE1A	INSULATOR	ET1905	4
SE9A	INSULATOR	ET1905	4
SE12A	INSULATOR	ET1905	2
SE1B	INSULATOR	ET1905	4
XHA8	SPREADER	ET1901	7
WL	WIRE LOCK	ET1915	18
SP1	DEFLECTOR	ET1903	15
SP2	SPREADER ASSEMBLY	ET1916	4
SP3	SPREADER ASSEMBLY	ET1916	15
TE1	TENSION EQUALIZER	ET1916	4

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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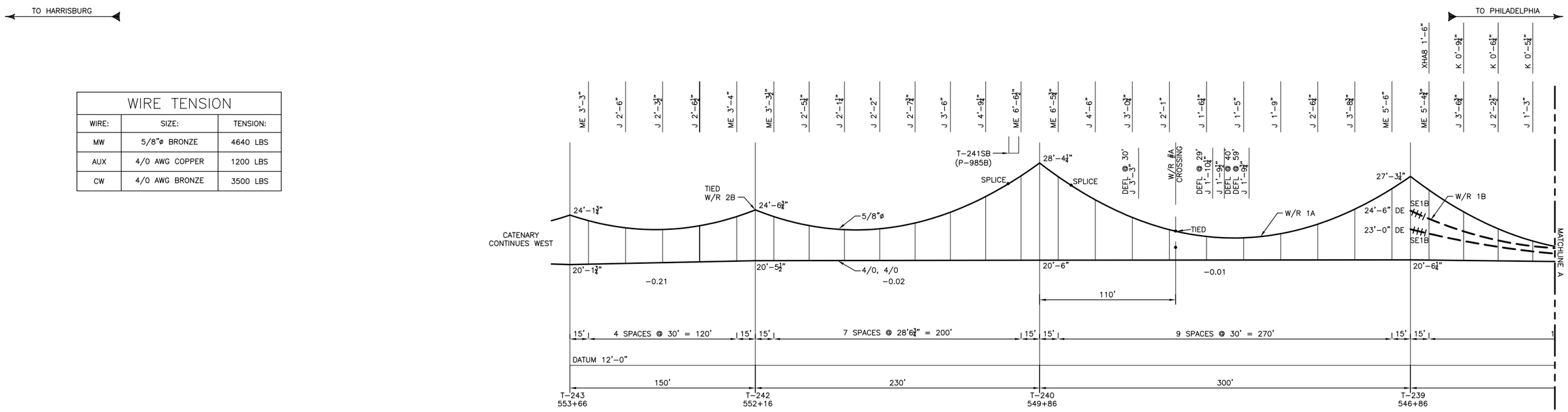
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
PAOLI EAST INTERLOCKING PROPOSED WIRE PROFILE
XO 3/4 – SHEET 1 OF 1

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

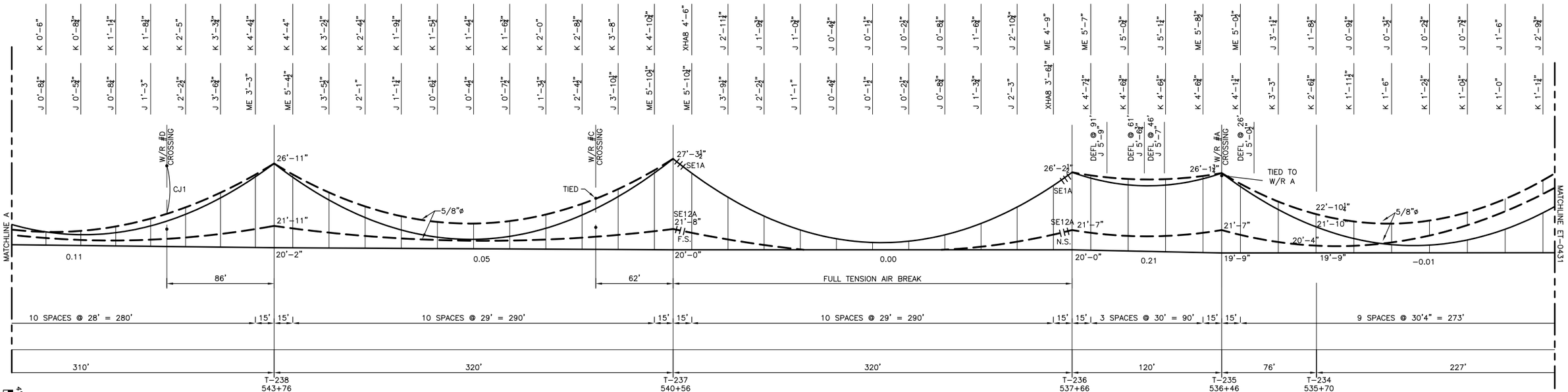
File No.:	2011-059-ET-0429.DWG
Ref. No.:	2011-059
Sheet No:	099 OF 565

ET-0429

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 1 – SHEET 1 OF 2

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

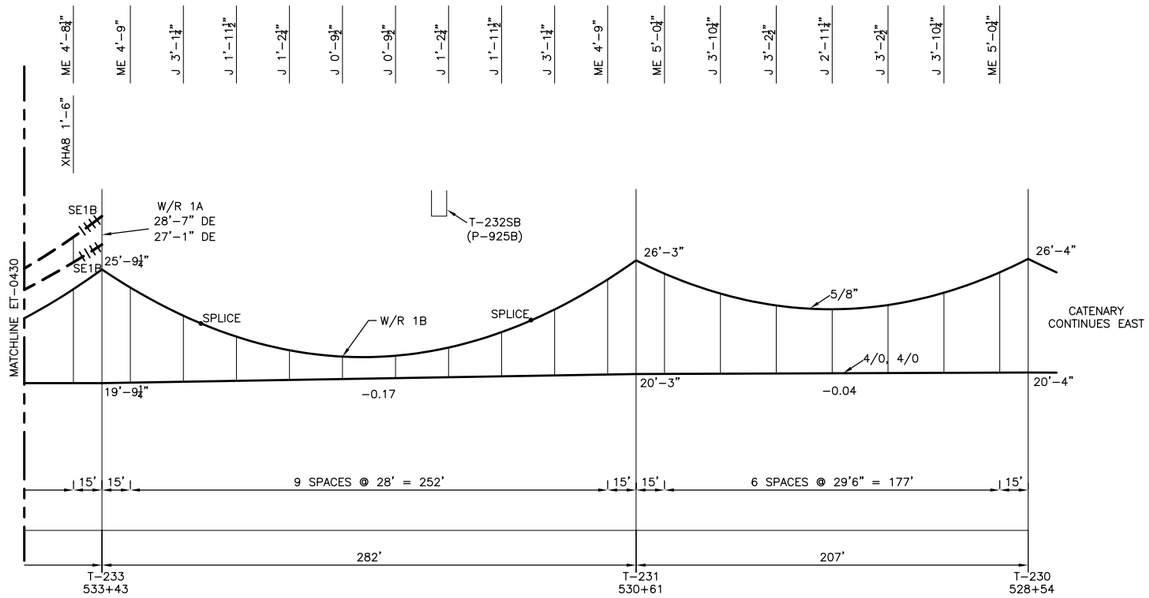
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Ref. No.:	2011-059
Sheet No:	100 OF 565

ET–0430

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TO HARRISBURG

TO PHILADELPHIA



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 1

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD FULL TENSION AIR BREAK.

BILL OF MATERIAL

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	300 FT
J	HANGER ASSEMBLY	ET1900	76
K	HANGER ASSEMBLY	ET1901	25
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	2
SE1B	INSULATOR	ET1905	4
SE12A	INSULATOR	ET1905	2
WL	WIRE LOCK	ET1915	12
XHA8	SPREADER	ET1901	4
CC5/8	MW SPLICE	ET1909	4
CJ1	CONTINUITY JUMPER	ET1907	1

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 1 – SHEET 2 OF 2

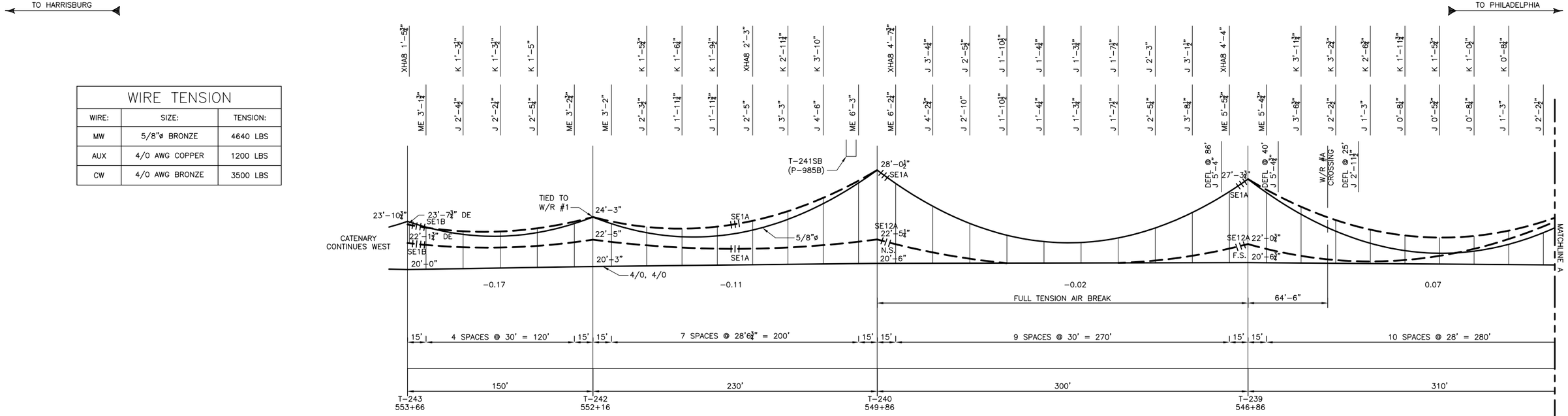
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Ref. No.:	2011-059
Sheet No:	101 OF 565

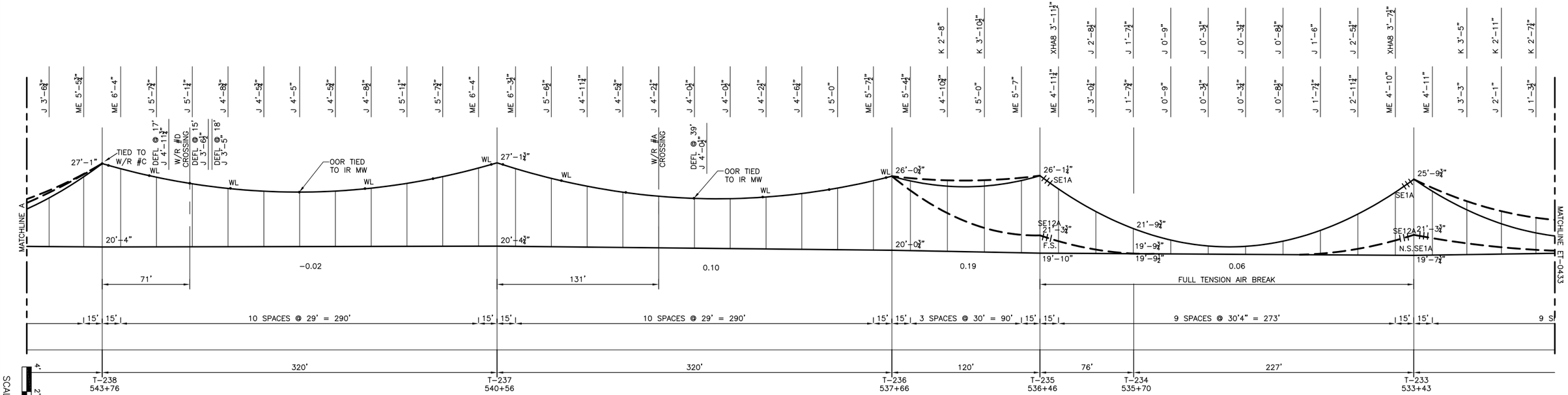
ET-0431

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WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 2 – SHEET 1 OF 2

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

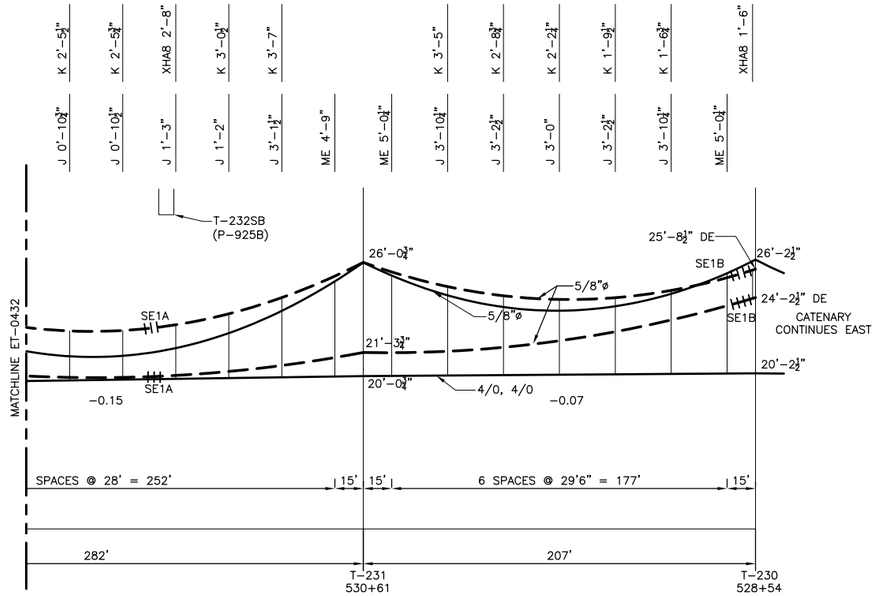
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TO HARRISBURG

TO PHILADELPHIA



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 2

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. INSTALL NEW DEADEND TAILS FOR FULL TENSION AIR BREAK.
3. RE-BUILD FULL TENSION AIR BREAK.

BILL OF MATERIAL

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	4800 FT
	4/0 AWG COPPER	ET0092	2600 FT
	4/0 AWG BRONZE	ET0092	2600 FT
J	HANGER ASSEMBLY	ET1900	83
H	CATENARY CLIP	ET1900	104
K	HANGER ASSEMBLY	ET1901	29
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	9
SE1B	INSULATOR	ET1905	4
SE12A	INSULATOR	ET1905	4
WL	WIRE LOCK	ET1915	22
XHA8	SPREADER	ET1901	8
CC5/8	MW SPLICE	ET1909	2

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 2 – SHEET 2 OF 2

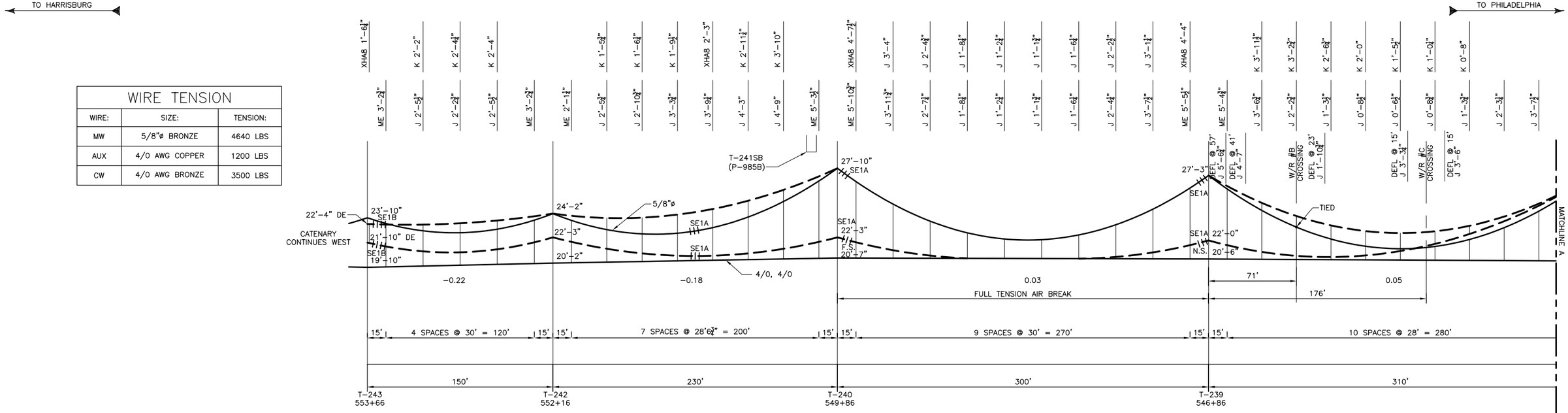
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Sheet No:	103 OF 565

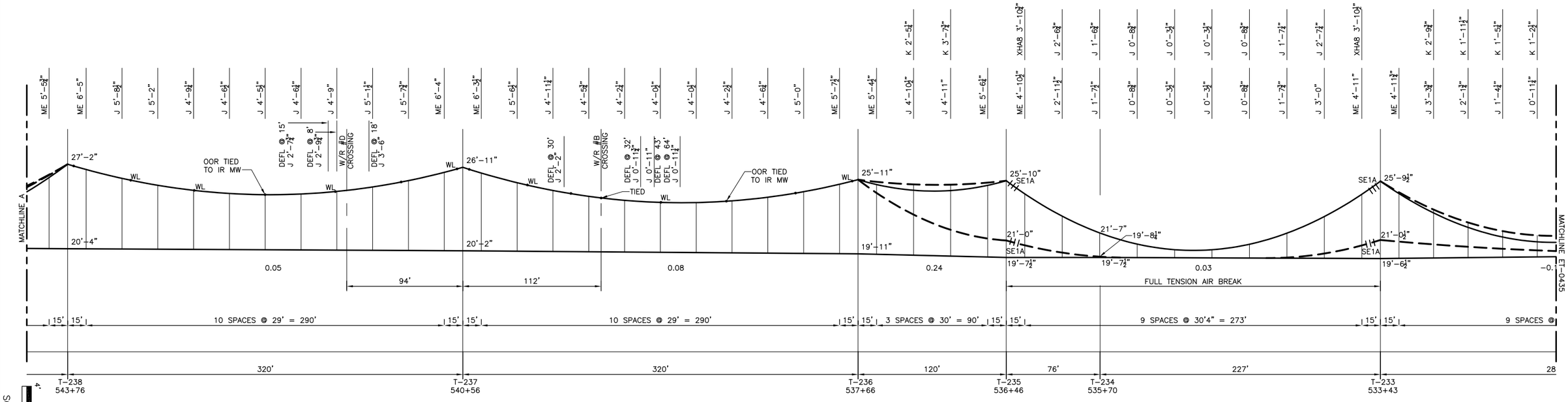
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WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE TRACK 3 – SHEET 1 OF 2

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

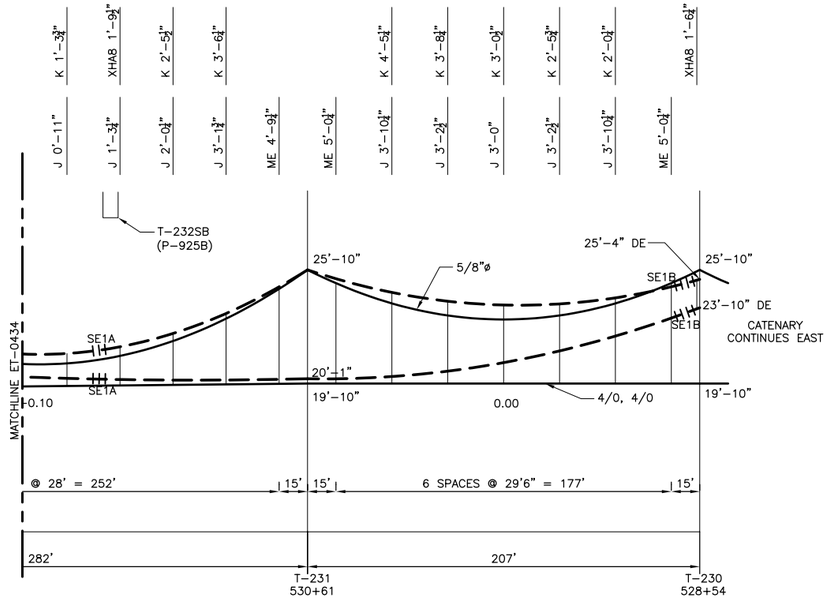
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Ref. No.:	2011-059
Sheet No:	104 OF 565

ET-0434

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TO HARRISBURG

TO PHILADELPHIA



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 3

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. INSTALL NEW DEADEND TAILS FOR FULL TENSION AIR BREAK.
3. RE-BUILD FULL TENSION AIR BREAK.

BILL OF MATERIAL

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	4800 FT
	4/0 AWG COPPER	ET0092	2600 FT
	4/0 AWG BRONZE	ET0092	2600 FT
J	HANGER ASSEMBLY	ET1900	83
H	CATENARY CLIP	ET1900	104
K	HANGER ASSEMBLY	ET1901	29
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	8
SE1B	INSULATOR	ET1905	4
SE12A	INSULATOR	ET1905	4
WL	WIRE LOCK	ET1915	22
XHA8	SPREADER	ET1901	8
CC5/8	MW SPLICE	ET1909	2

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 3 – SHEET 2 OF 2

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

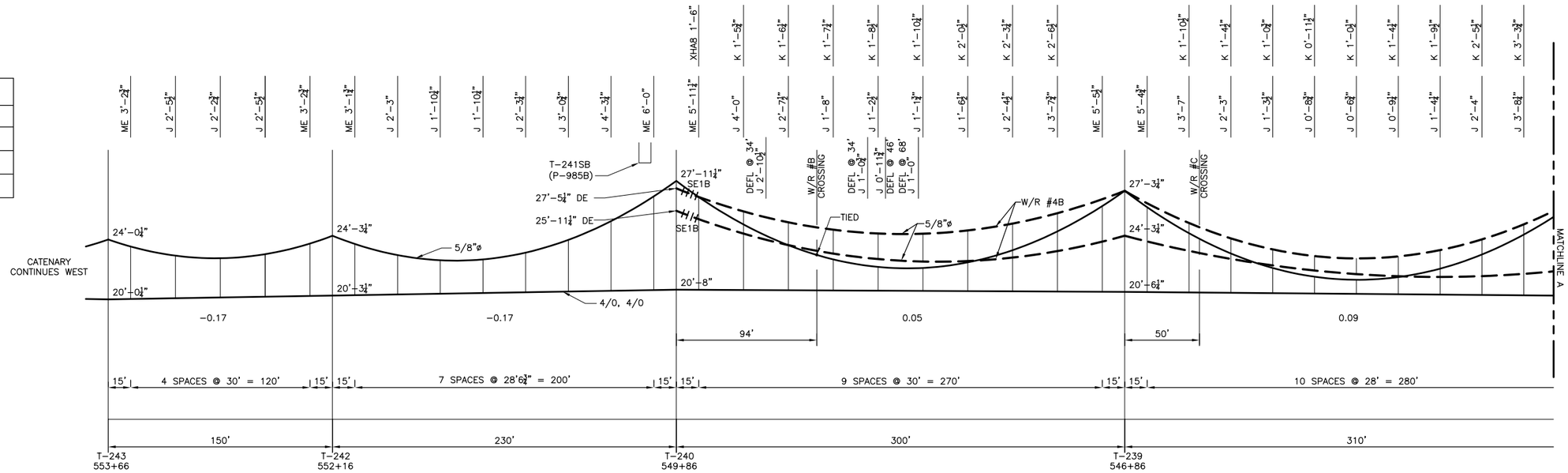
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ET-0435

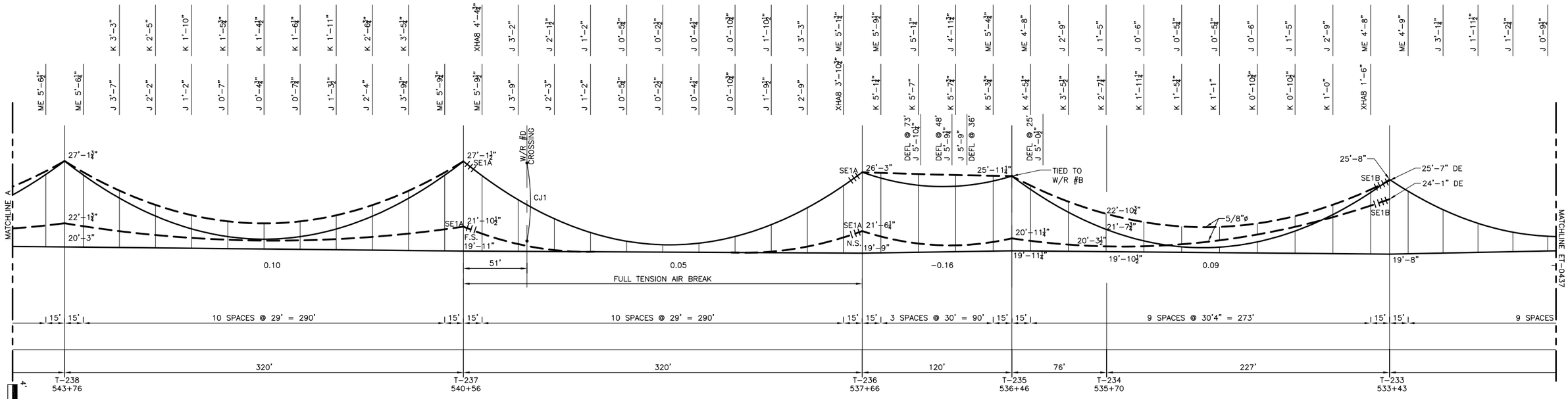
TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
TRACK 4 – SHEET 1 OF 2

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

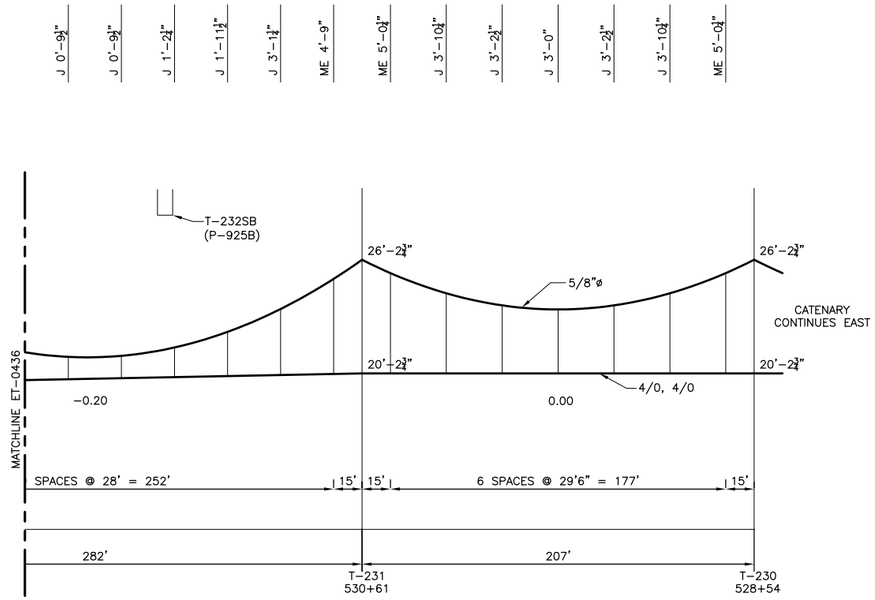
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Sheet No:	106 OF 565

ET-0436

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TO HARRISBURG

TO PHILADELPHIA



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – TRACK 4

WORK STATEMENT:

1. SHIFT CATENARY TO NEW STRUCTURES AND RE-HANGER CATENARY.
2. RE-BUILD FULL TENSION AIR BREAK.

BILL OF MATERIAL

MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	300 FT
J	HANGER ASSEMBLY	ET1900	85
H	CATENARY CLIP	ET1900	106
K	HANGER ASSEMBLY	ET1901	36
ME	HANGER ASSEMBLY	ET1900	20
SE1A	INSULATOR	ET1905	2
SE1B	INSULATOR	ET1905	4
SE12A	INSULATOR	ET1905	2
WL	WIRE LOCK	ET1915	12
XHA8	SPREADER	ET1901	4
CC5/8	MW SPLICE	ET1909	4
CJ1	CONTINUITY JUMPER	ET1907	1

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

Baker
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE TRACK 4 – SHEET 2 OF 2

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

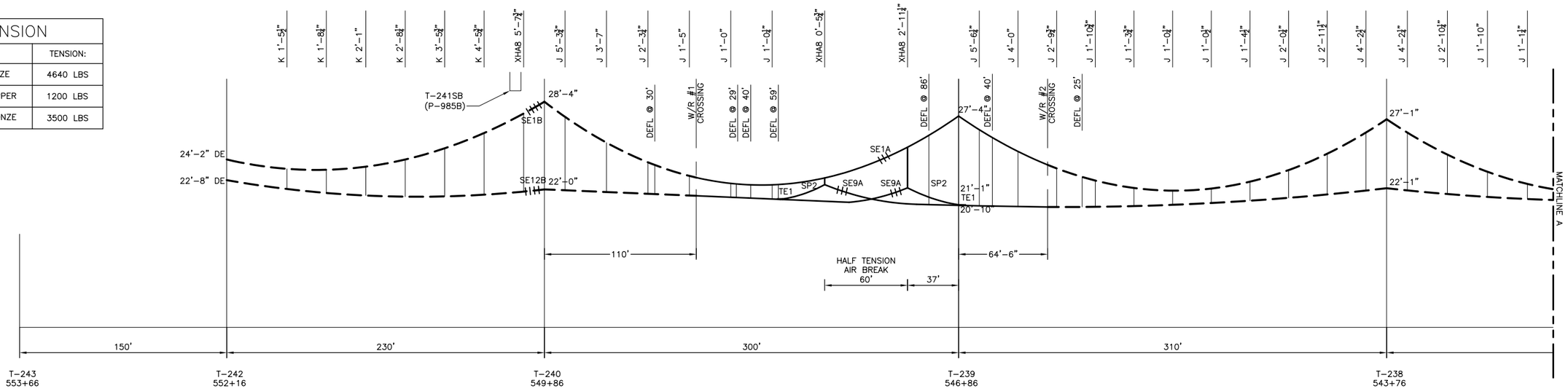
File No.:	2011-059-ET-0437.DWG
Ref. No.:	2011-059
Sheet No:	107 OF 565

ET-0437

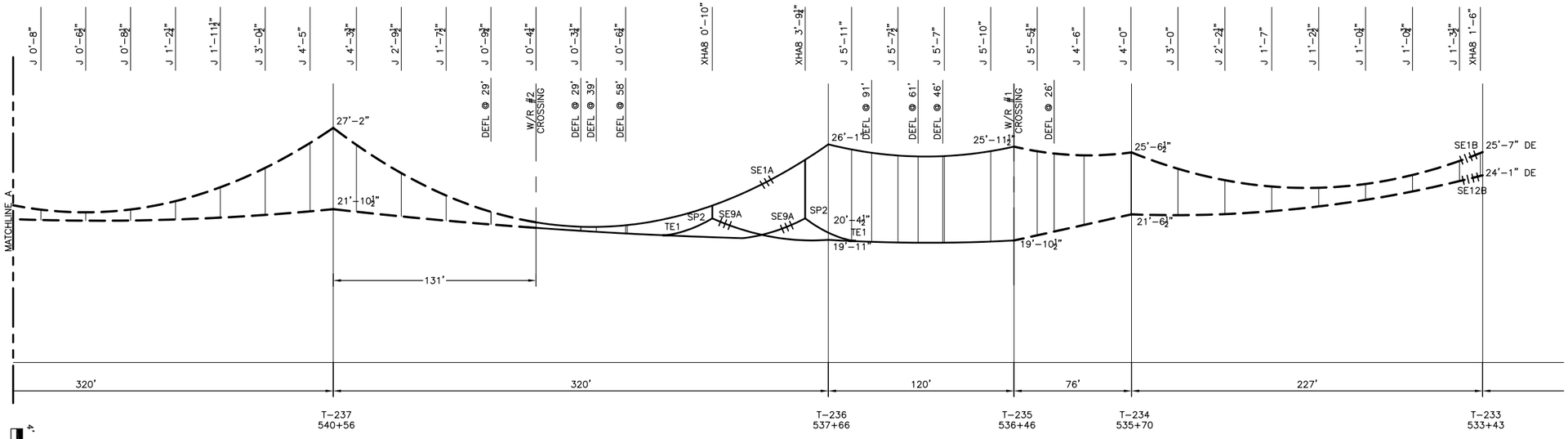
TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE A



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE A

BILL OF MATERIAL			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1900 FT
	4/0 AWG COPPER	ET0092	1900 FT
	4/0 AWG BRONZE	ET0092	1900 FT
J	HANGER ASSEMBLY	ET1900	49
H	CATENARY CLIP	ET1900	50
K	HANGER ASSEMBLY	ET1901	6
SE1A	INSULATOR	ET1905	2
SE1B	INSULATOR	ET1905	2
SE12B	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	4
SP1	SPREADER ASSEMBLY	ET1916	12
SP2	SPREADER ASSEMBLY	ET1916	4
SP3	SPREADER ASSEMBLY	ET1916	15
TE1	TENSION EQUALIZER	ET1916	4

SCALE:1"= 4'-0"

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
WIRE A – SHEET 1 OF 1

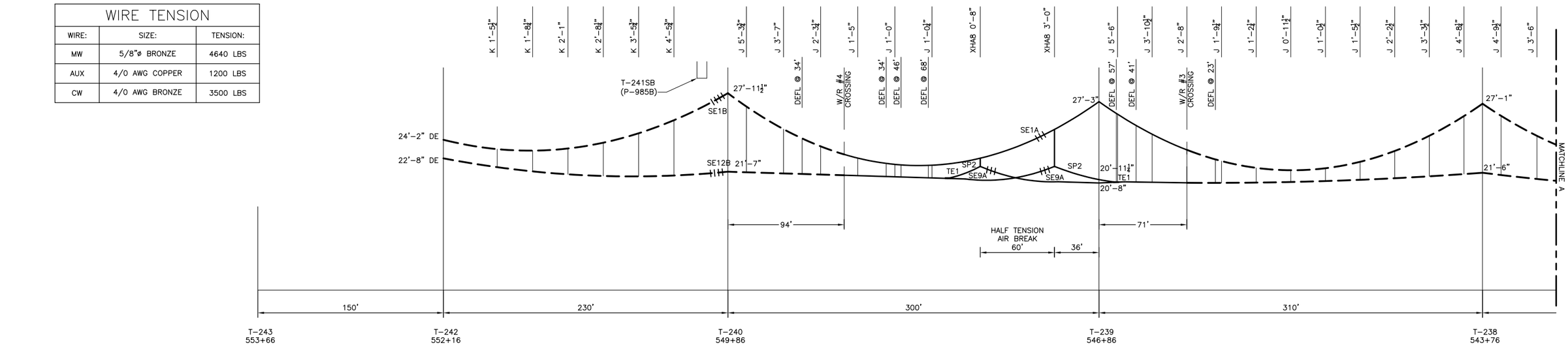
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-0438.DWG
Ref. No.:	2011–059
Sheet No:	108 OF 565

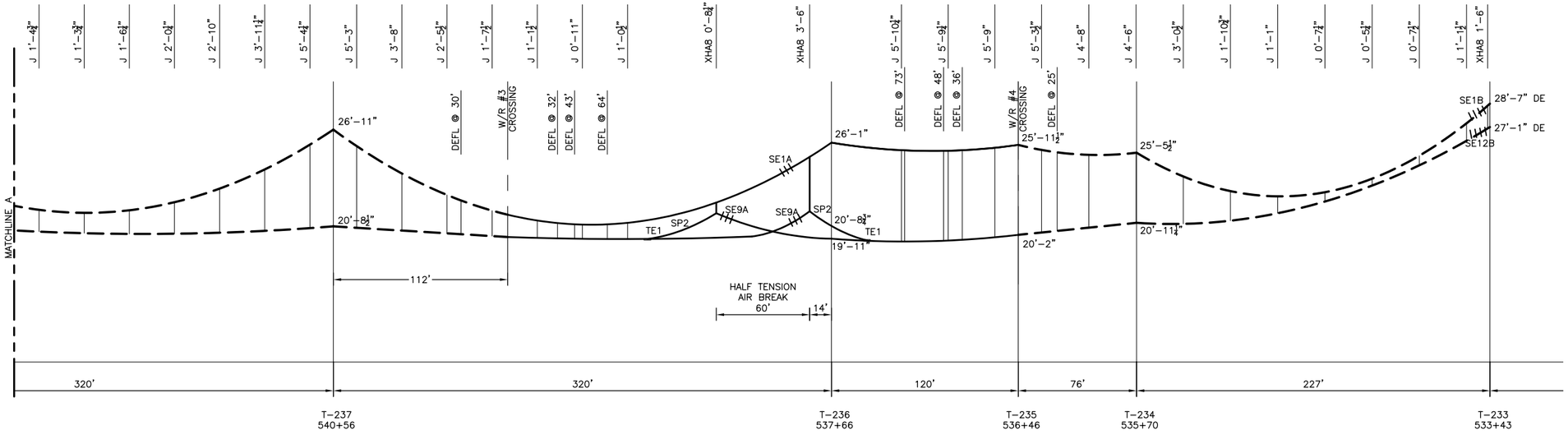
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WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE B



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE B

BILL OF MATERIAL			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1900 FT
	4/0 AWG COPPER	ET0092	1900 FT
	4/0 AWG BRONZE	ET0092	1900 FT
J	HANGER ASSEMBLY	ET1900	46
H	CATENARY CLIP	ET1900	47
K	HANGER ASSEMBLY	ET1901	6
SE1A	INSULATOR	ET1905	2
SE1B	INSULATOR	ET1905	2
SE9A	INSULATOR	ET1905	4
SE12B	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	6
SP2	SPREADER ASSEMBLY	ET1916	4
SP3	SPREADER ASSEMBLY	ET1916	15
TE1	TENSION EQUALIZER	ET1916	4

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
WIRE B – SHEET 1 OF 1

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

File No.:	2011-059-ET-0439.DWG
Ref. No.:	2011-059
Sheet No:	109 OF 565

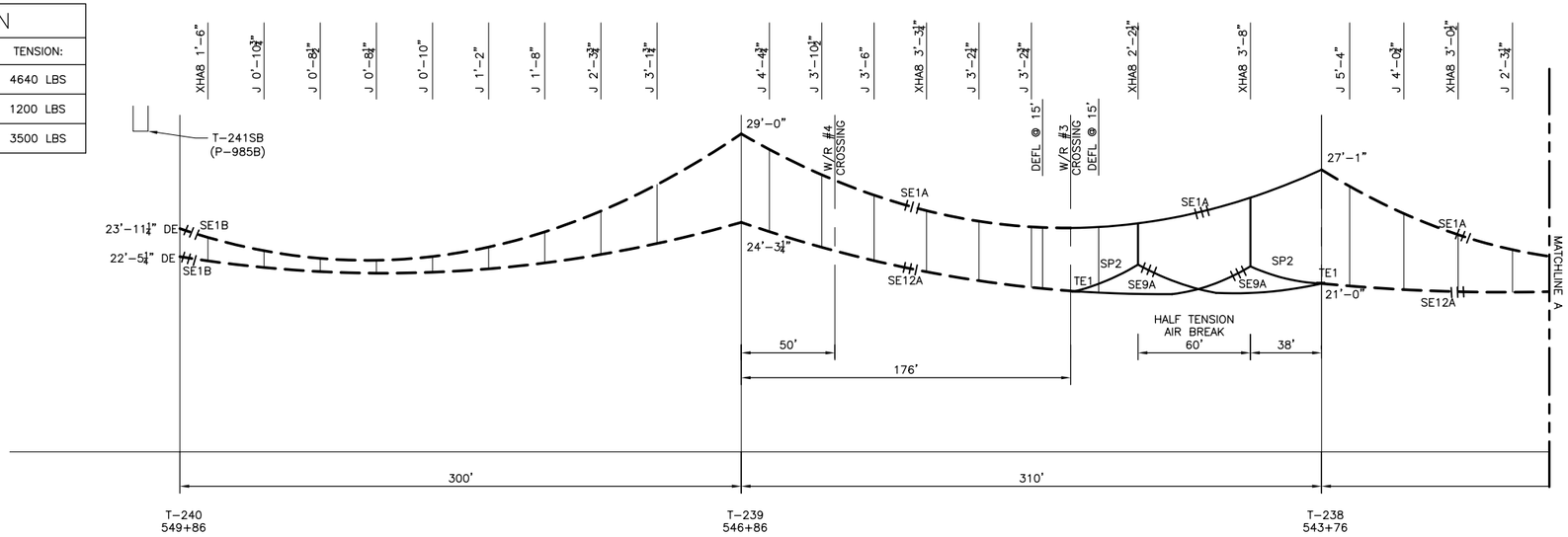
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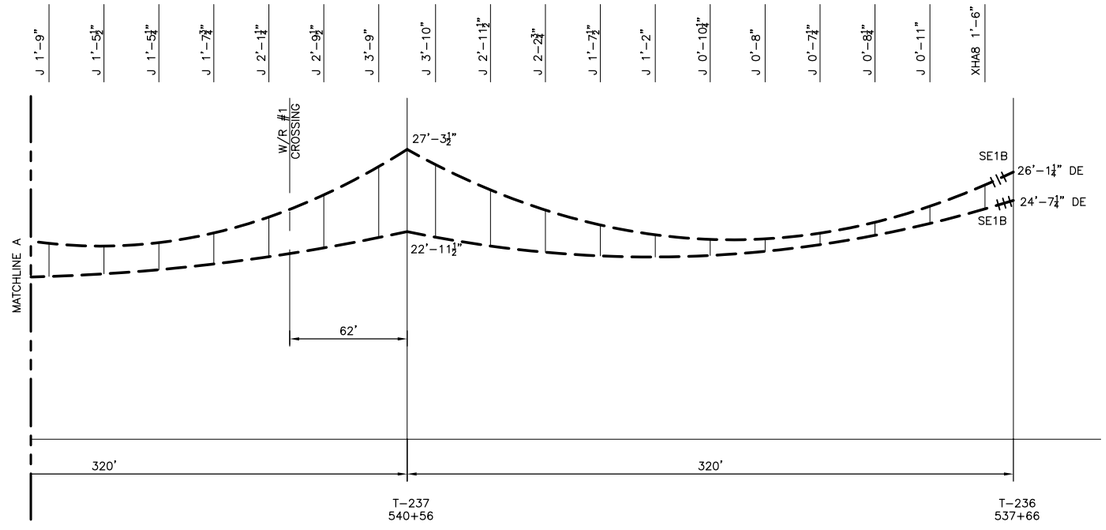
TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE C



BILL OF MATERIAL			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1300 FT
	4/0 AWG COPPER	ET0092	1300 FT
	4/0 AWG BRONZE	ET0092	1300 FT
J	HANGER ASSEMBLY	ET1900	34
H	CATENARY CLIP	ET1900	35
SE1A	INSULATOR	ET1905	3
SE1B	INSULATOR	ET1905	2
SE9A	INSULATOR	ET1905	2
SE12A	INSULATOR	ET1905	2
SE12B	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	6
SP1	SPREADER ASSEMBLY	ET1916	2
SP2	SPREADER ASSEMBLY	ET1916	2
TE1	TENSION EQUALIZER	ET1916	2

BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE C

SCALE:1"= 4'–0"

SCALE:1"=40'–0"

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BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
WIRE C – SHEET 1 OF 1

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

File No.:	2011-059-ET-0440.DWG
Ref. No.:	2011–059
Sheet No:	110 OF 565

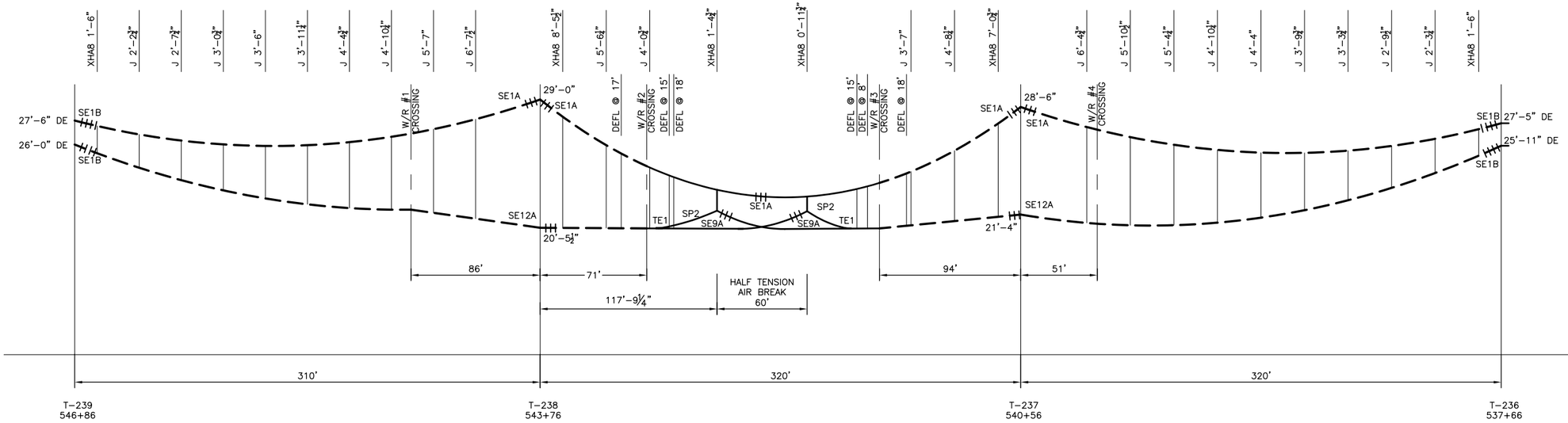
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TO HARRISBURG

TO PHILADELPHIA

WIRE TENSION		
WIRE:	SIZE:	TENSION:
MW	5/8"ø BRONZE	4640 LBS
AUX	4/0 AWG COPPER	1200 LBS
CW	4/0 AWG BRONZE	3500 LBS



BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE – WIRE D

BILL OF MATERIAL			
MARK	DESCRIPTION	REF DWG	QUANTITY
	5/8 COPPERWELD	ET0092	1000 FT
	4/0 AWG COPPER	ET0092	1000 FT
	4/0 AWG BRONZE	ET0092	1000 FT
J	HANGER ASSEMBLY	ET1900	22
H	CATENARY CLIP	ET1900	23
SE1A	INSULATOR	ET1905	5
SE1B	INSULATOR	ET1905	2
SE9A	INSULATOR	ET1905	2
SE12A	INSULATOR	ET1905	2
SE12B	INSULATOR	ET1905	2
XHA8	SPREADER	ET1901	6
SP1	SPREADER ASSEMBLY	ET1916	6
SP2	SPREADER ASSEMBLY	ET1916	2
TE1	TENSION EQUALIZER	ET1916	2

SCALE:1"= 4'-0"

4' 2' 0 4'

40' 20' 0 40'

SCALE:1"=40'-0"

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
BRYN MAWR INTERLOCKING PROPOSED WIRE PROFILE
WIRE D – SHEET 1 OF 1

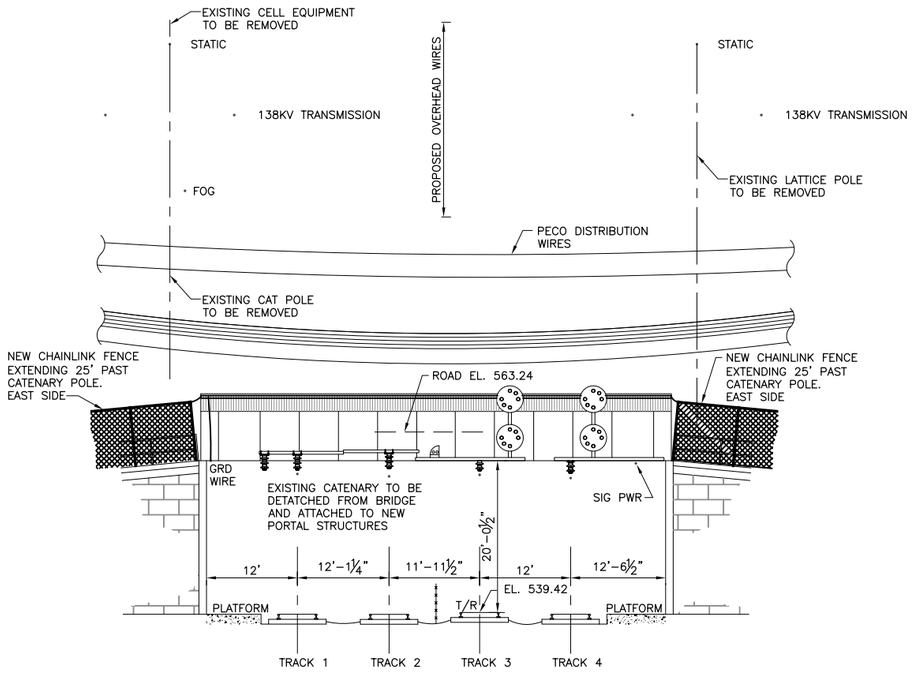
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File No.:	2011-059-ET-0441.DWG
Ref. No.:	2011-059
Sheet No:	111 OF 565

ET-0441

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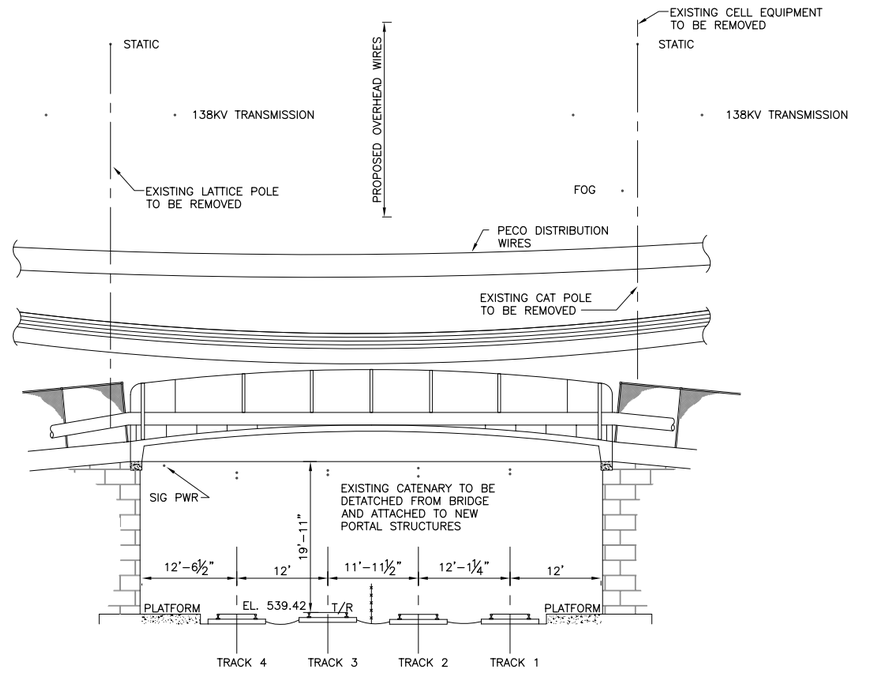
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	1



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

NORTH VALLEY ROAD BRIDGE

1054+00
MP 19.86

WORK STATEMENT:

1. INSTALL CHAINLINK FENCE ALONG EAST SIDE. BOND FENCE TO PEDESTRIAN BARRIER AND STATIC WIRE.
2. INSTALL AN ALUMINUM BAR ACROSS THE TOP OF THE EAST PEDESTRIAN BARRIER AND BOND TO STATIC WIRE.

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER PECO WIRES SHALL BE 10' WORST CASE.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES
NORTH VALLEY ROAD BRIDGE, EAST WEST ELEVATION

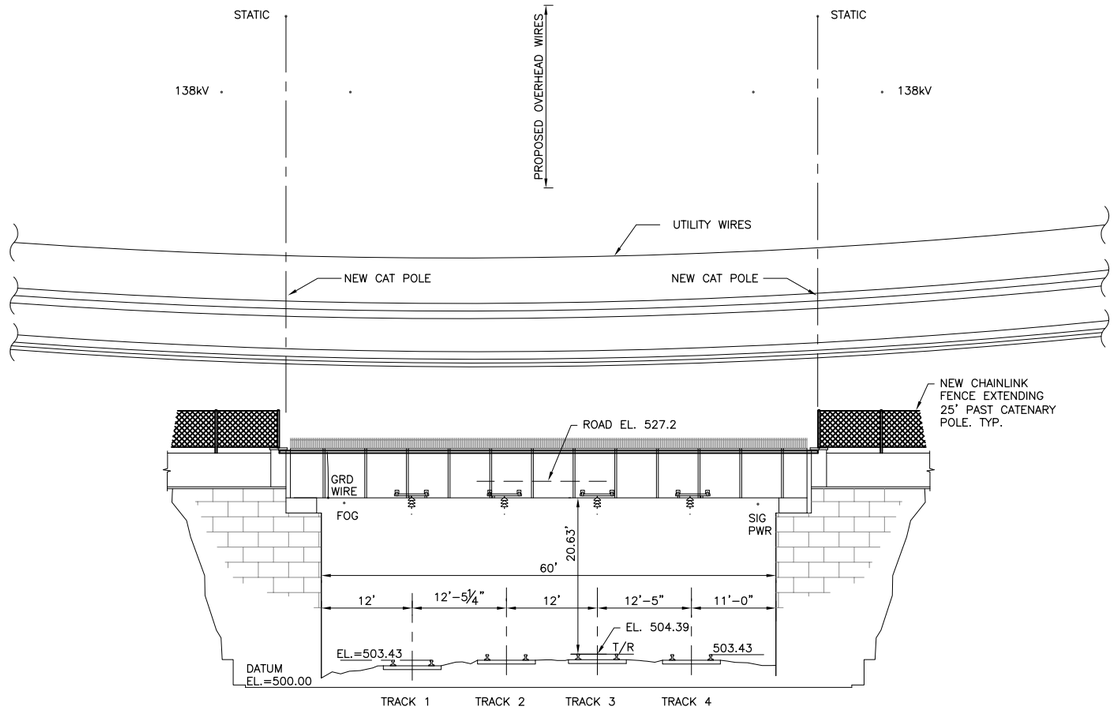
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-1000.DWG
Ref. No.:	2011-059
Sheet No:	112 OF 565

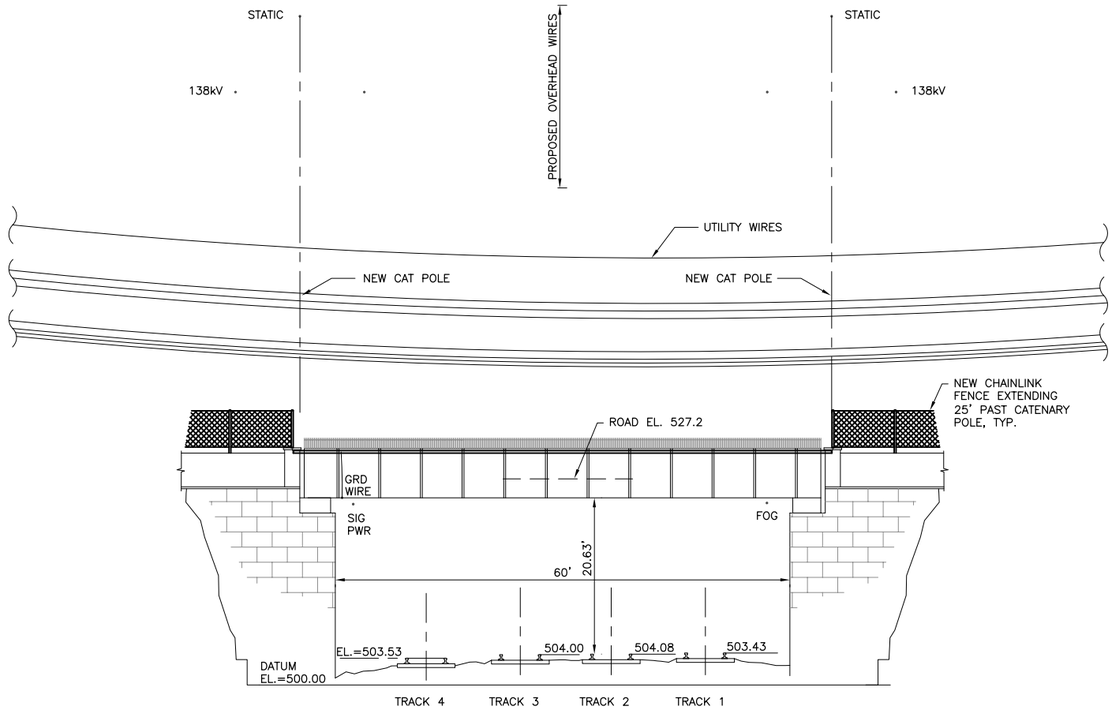
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	2



LOOKING WEST



LOOKING EAST

WEST AVENUE BRIDGE

942+25
MP 17.75

DESIGN NOTES:

1. WIRE HEIGHTS ARE DESIGNED FOR FUTURE BRIDGE REPLACEMENT, TOP OF ROADWAY 26' ABOVE RAIL.
2. CLEARANCE ALLOWS FOR RAISING EXISTING PECO WIRES CROSSING O.H. BRIDGE WHEN BRIDGE IS REPLACED.

WORK STATEMENT:

1. INSTALL CHAINLINK FENCES. BOND FENCES TO PEDESTRIAN BARRIER AND STATIC WIRE.
2. INSTALL ALUMINUM BARS ACROSS THE TOP OF THE PEDESTRIAN BARRIERS AND BOND TO STATIC WIRE.

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER PECO SHALL BE 10' WORST CASE.

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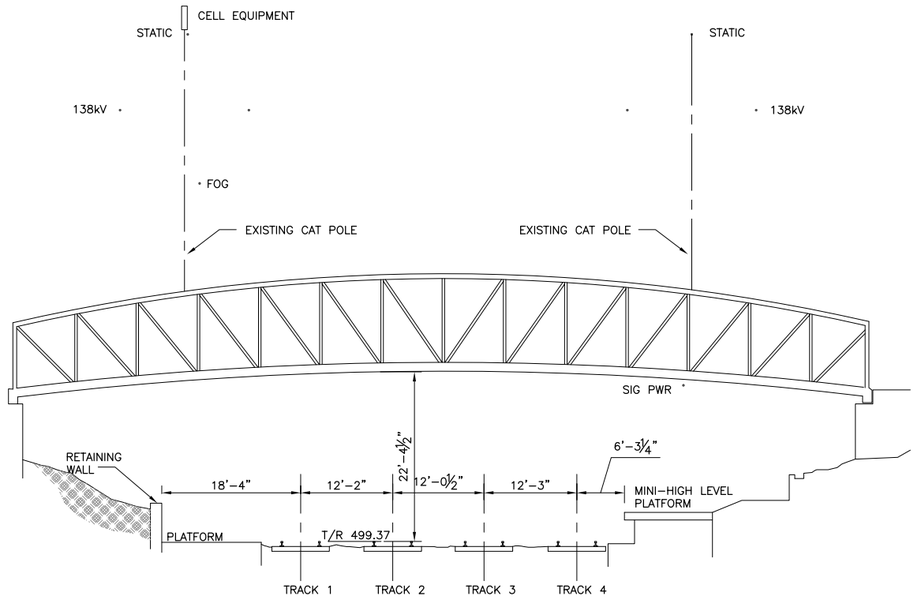
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
OVERHEAD BRIDGES
WEST BRIDGE AVE., EAST WEST ELEVATION

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

File No.:	2011-059-ET-1001.DWG
Ref. No.:	2011-059
Sheet No:	113 OF 565

ET-1001

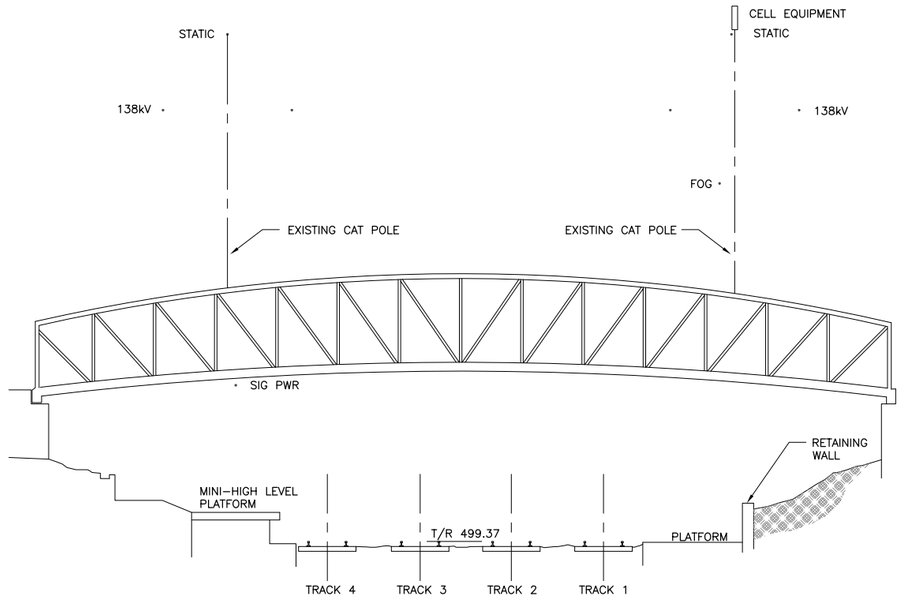
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LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

CASSATT AVENUE FOOTBRIDGE

933+83
MP 17.58

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER INTERMEDIATE STRUCTURE SHALL BE 15' WORST CASE.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES
CASSATT FOOT BRIDGE, EAST WEST ELEVATION

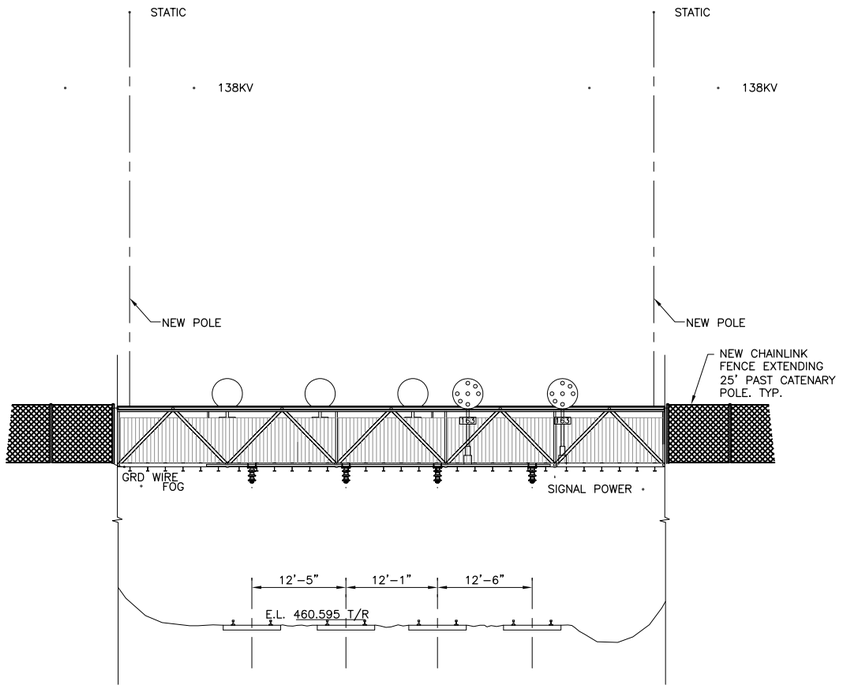
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-1002.DWG
Ref. No.:	2011-059
Sheet No:	114 OF 565

ET-1002

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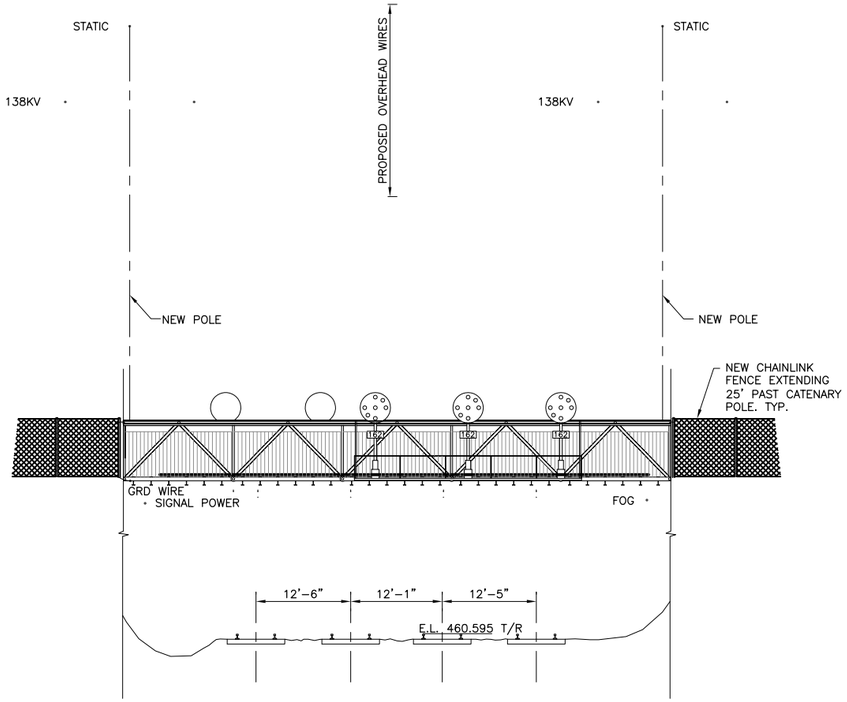
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	2



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

WORK STATEMENT:

1. INSTALL CHAINLINK FENCES. BOND FENCES TO PEDESTRIAN BARRIER AND STATIC WIRE.
2. INSTALL ALUMINUM BARS ACROSS THE TOP OF THE BRIDGE GRIDER AND BOND TO STATIC WIRE.

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER INTERMEDIATE STRUCTURES SHALL BE 15' MIN.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES
NORTH VALLEY FORGE ROAD BRIDGE, EAST WEST ELEVATION

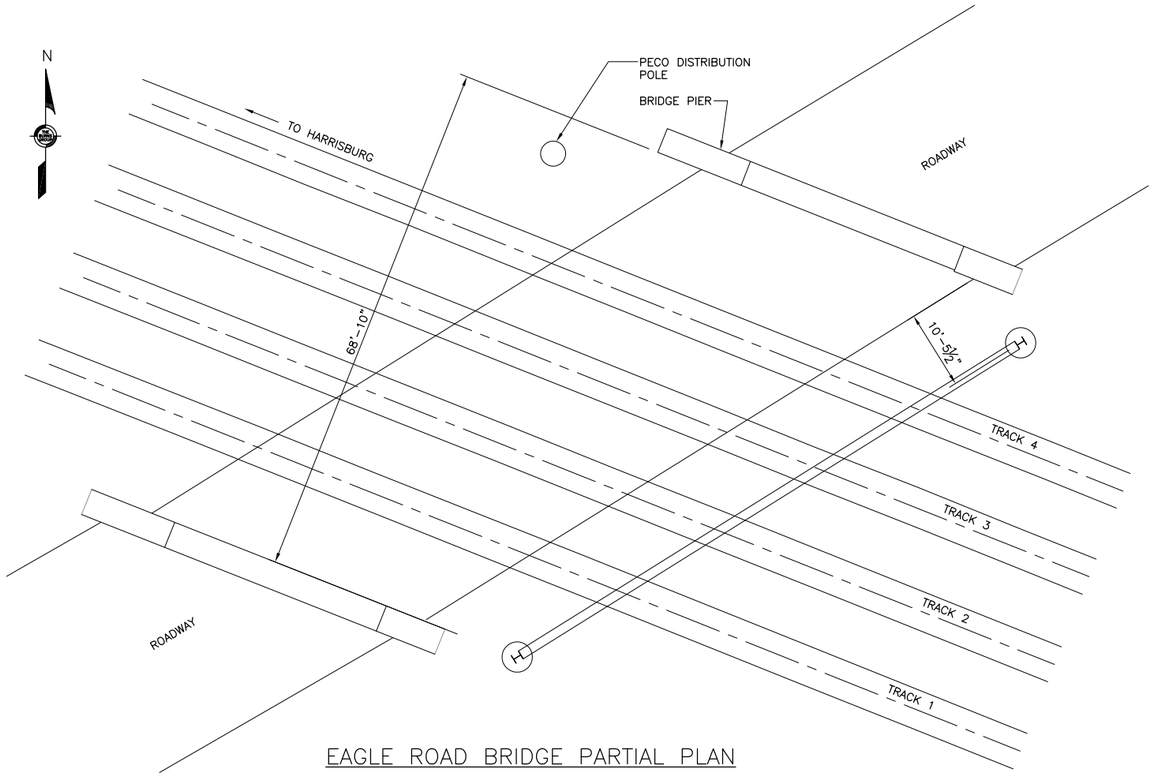
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-1003.DWG
Ref. No.:	2011-059
Sheet No:	115 OF 565

ET-1003

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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	2



EAGLE ROAD BRIDGE PARTIAL PLAN

10' 5' 0 10'

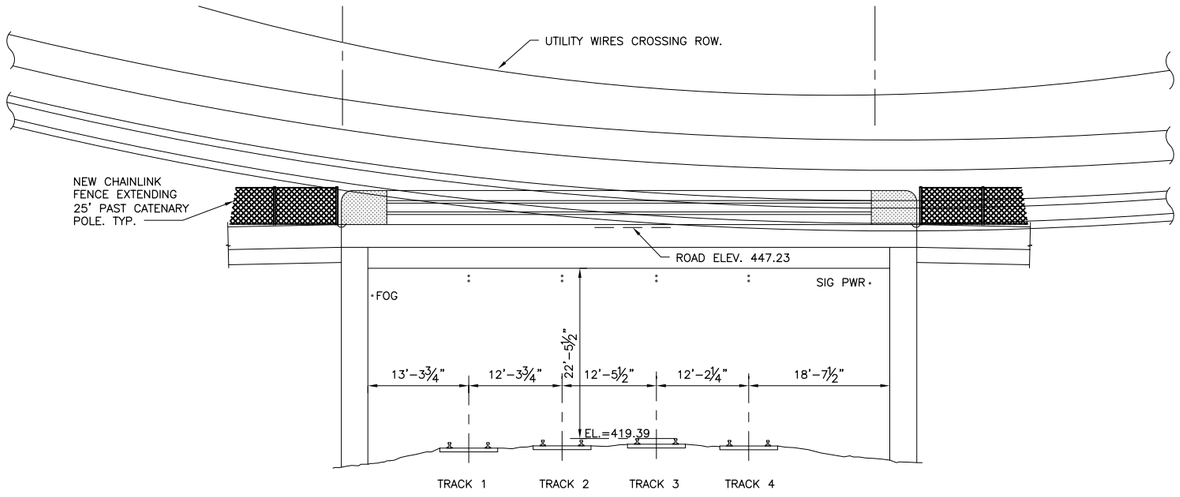
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WORK STATEMENT:

1. INSTALL CHAINLINK FENCES. BOND FENCES TO PEDESTRIAN BARRIER AND STATIC WIRE.

CLEARANCE NOTES:

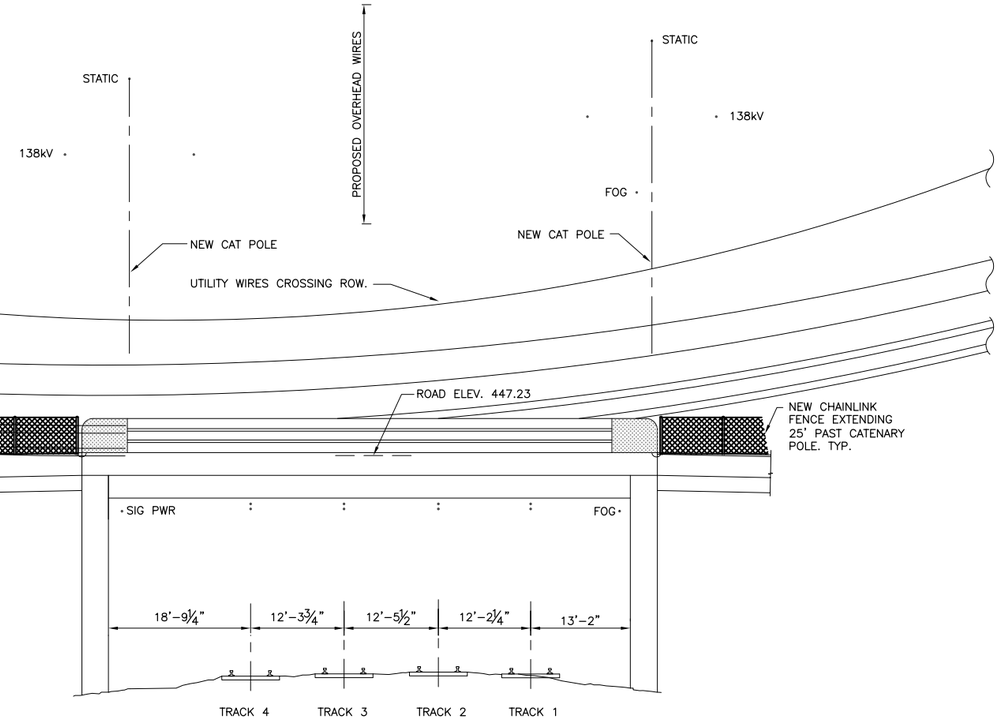
1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' MIN.



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

EAGLE ROAD BRIDGE

794+83
MP 14.95

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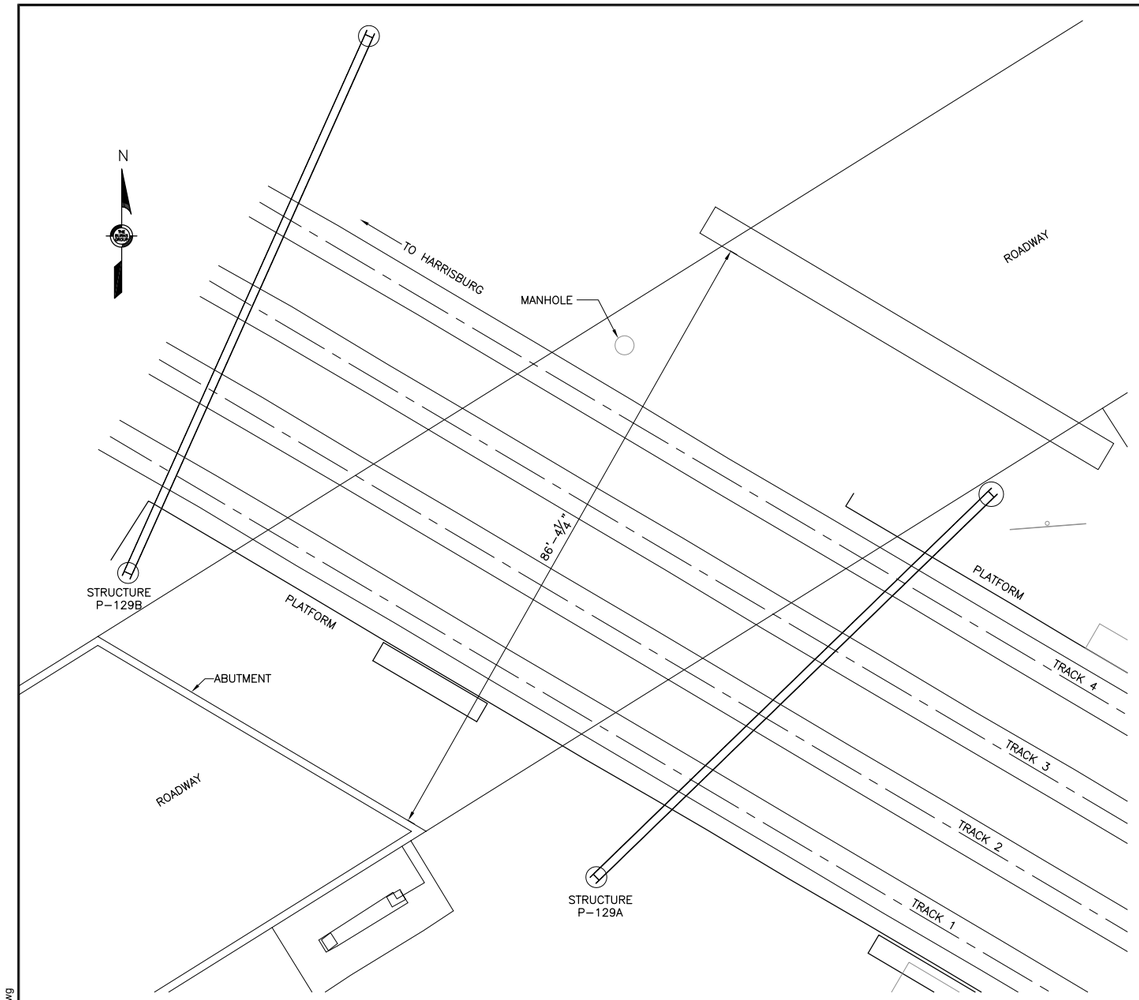
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES – EAGLE ROAD BRIDGE
PARTIAL PLAN AND EAST WEST ELEVATION

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

File No.:	2011-059-ET-1004.DWG
Ref. No.:	2011-059
Sheet No:	116 OF 565

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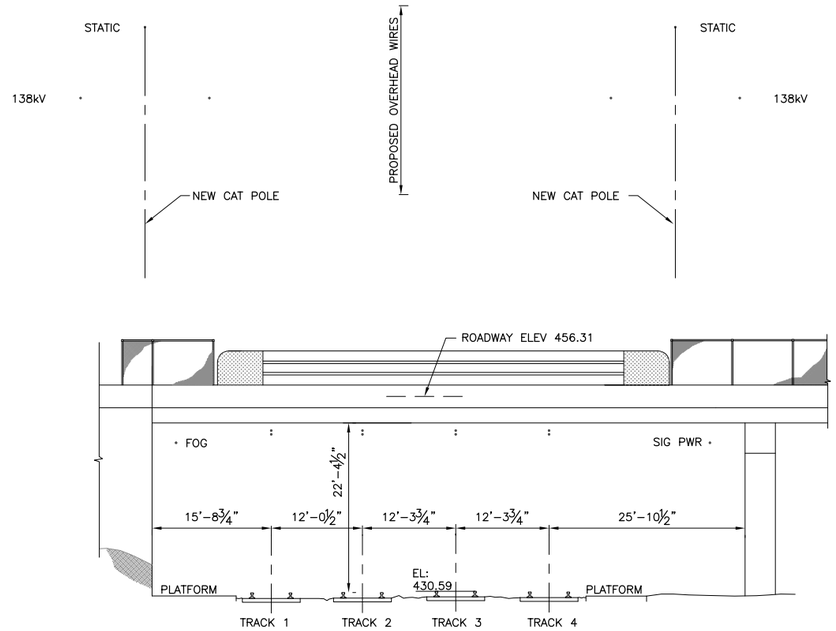
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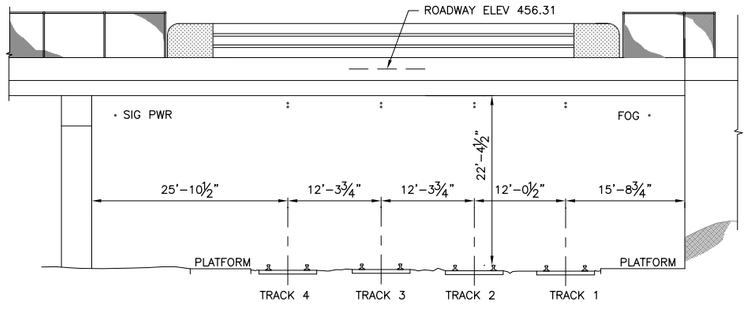
SPRING MILL ROAD BRIDGE PARTIAL PLAN

10' 5' 0 10'

SCALE:1"=10'–0"



LOOKING WEST



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'–0"

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.

SPRING MILL ROAD BRIDGE

641+30
MP 12.02

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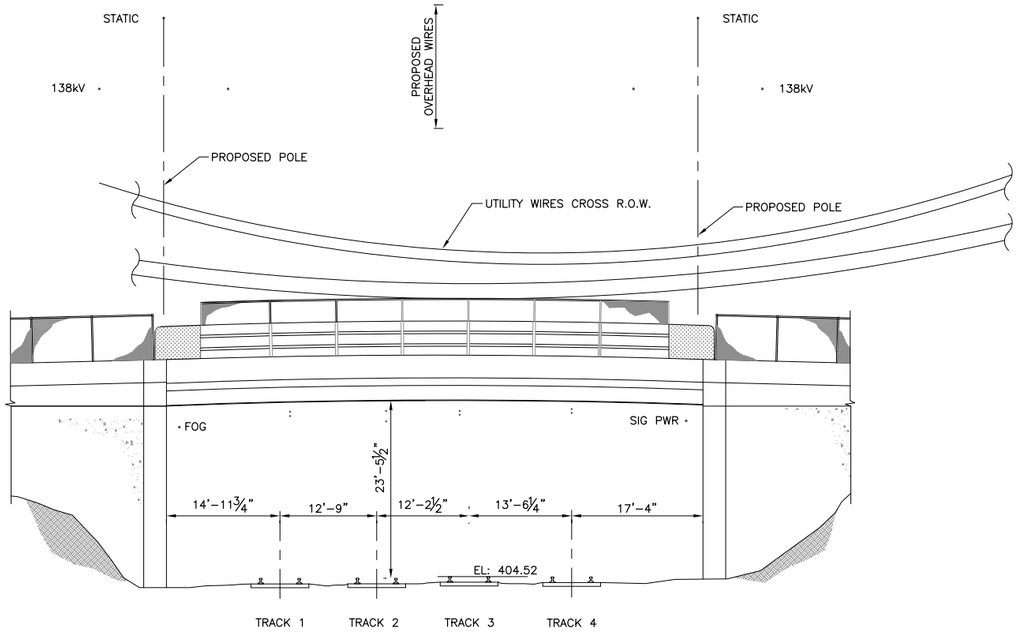
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES – SPRING MILL ROAD BRIDGE
PARTIAL PLAN AND EAST WEST ELEVATION

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

File No.:	2011–059–ET–1005.DWG
Ref. No.:	2011–059
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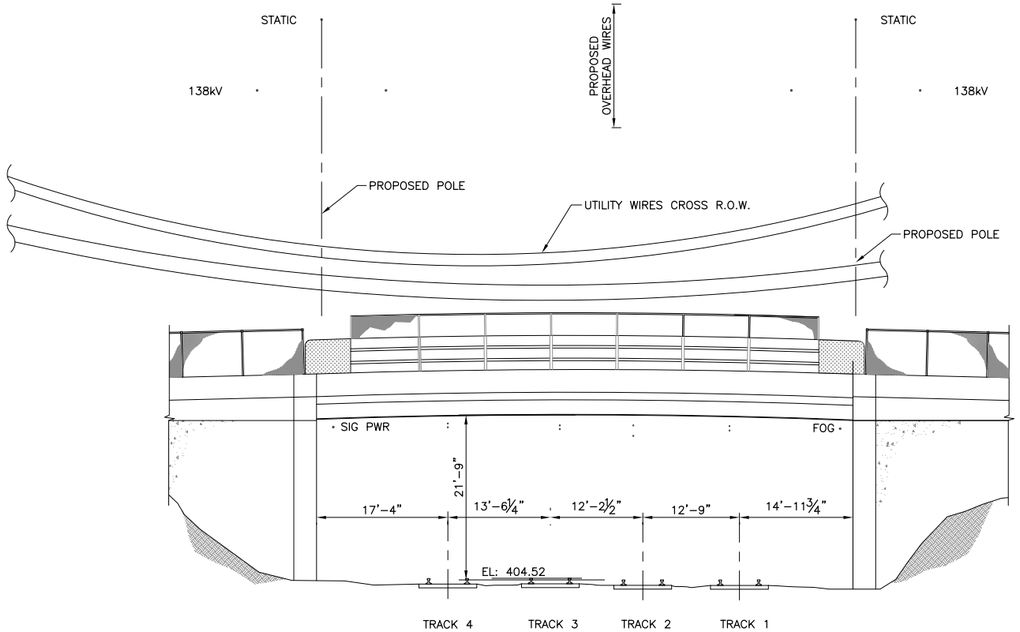
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LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' WORST CASE.

MERION AVENUE BRIDGE

554+65
MP 10.40

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
OVERHEAD BRIDGES
MERION AVENUE BRIDGE, EAST WEST ELEVATION

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

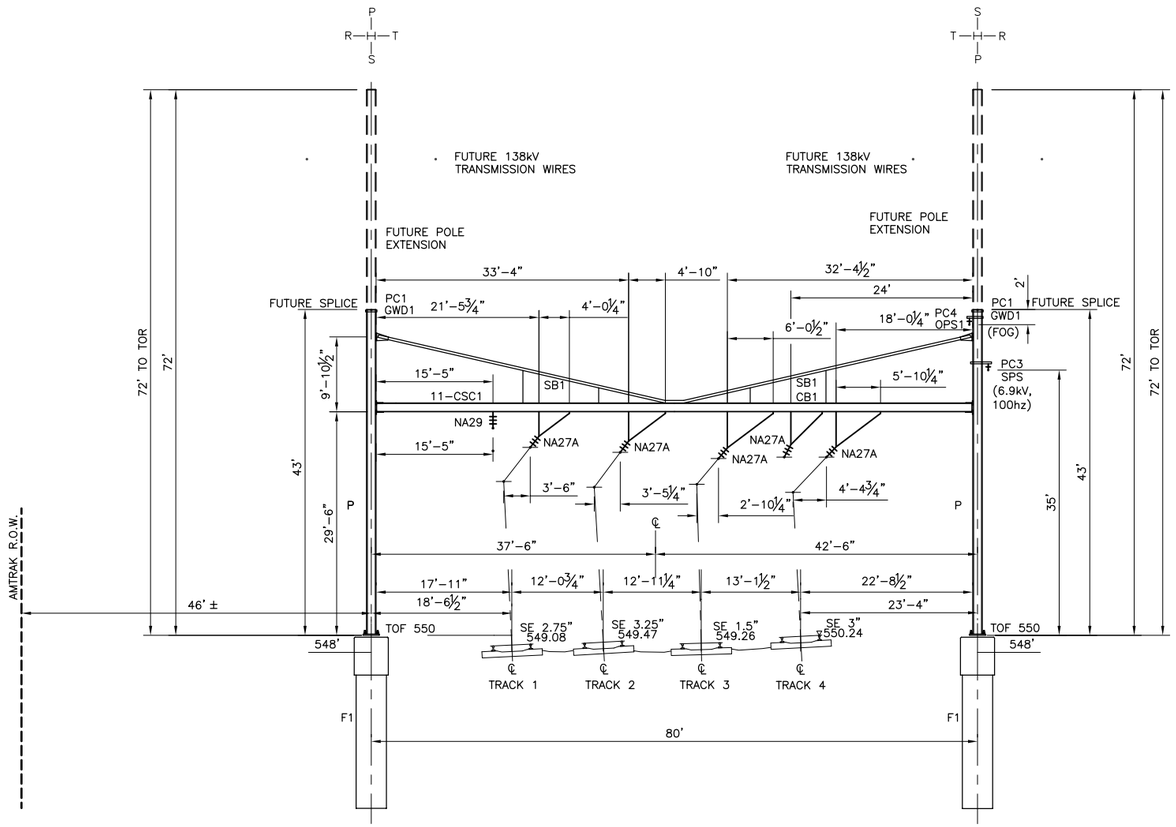
File No.:	2011-059-ET-1006.DWG
Ref. No.:	2011-059
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CATENARY WIRE HEIGHTS (ABOVE HIGH RAIL)						
	X/O	TRACK 1	TRACK 2	W/R 3A	W/R 3	TRACK 4
MW	28'–11"	25'–11½"	24'–11"	24'–3½"	23'–6¼"	23'–6¼"
CW	25'–11"	21'–5½"	20'–3¾"	20'–10¾"	---	18'–10½"

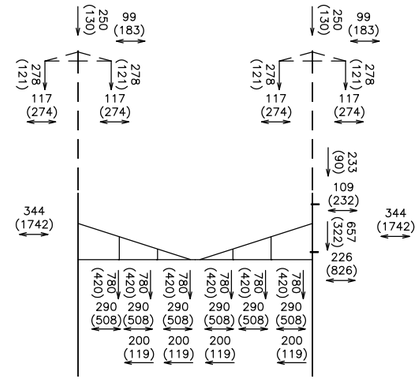
MESSENGER SUPPORT NA27A DIMENSIONS					
	TRACK 1	TRACK 2	W/R 3A	W/R 3	TRACK 4
T1	2'–4¾"	3'–0¼"	3'–11"	3'–6"	3'–9½"
T2	4'–4¼"	5'–4¾"	6'–10½"	5'–2"	6'–8"



STRUCTURE ERECTION DIAGRAM T–450

1069+98
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	5
NA29	MESSENGER SUPPORT	ET–1904	1
GWD1	GROUND WIRE ASSEMBLY	ET–1909	2
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	2
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
CSC1	SLIDING BRACKET	S–5214	11

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–450

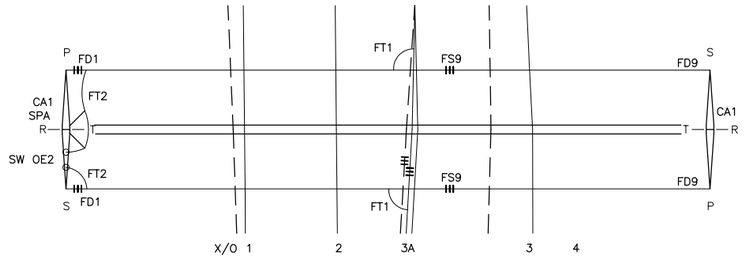
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

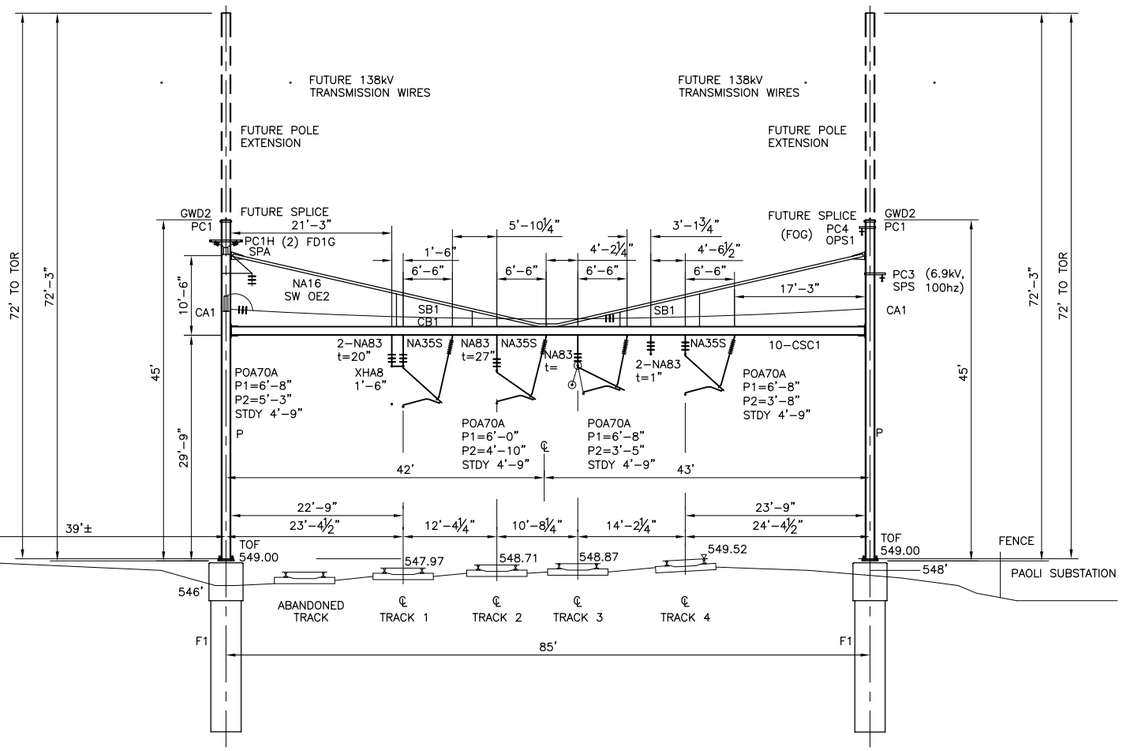
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Ref. No.:	2011–059
Sheet No:	119 OF 565

ET–1205

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CATENARY WIRE HEIGHTS						
	X/O	TRACK 1	TRACK 2	W/R 3A	TRACK 3	TRACK 4
MW	26'-7¾"	26'-7¾"	25'-7½"	26'-2"	26'-2"	27'-0¼"
CW	21'-7¾"	21'-3¾"	21'-4"	23'-7¼"	22'-5¼"	21'-8¼"

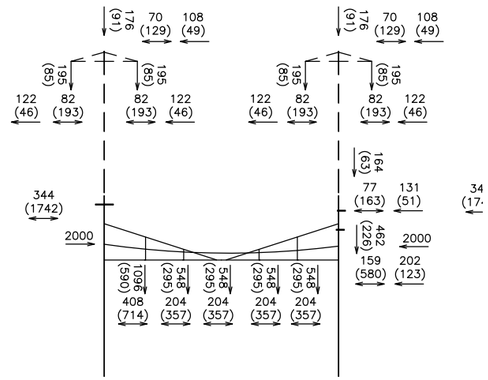




STRUCTURE ERECTION DIAGRAM T–449

1068+89
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	6
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
XHA8	SPREADER ASSEMBLY	ET–1901	1
SW	DISCONNECT SWITCH	ET–1910	1
MOD	MOTOR OPERATOR	ET–1910	1
FD1	FEEDER DEADEND	ET–1907	2
FD1G	FEEDER DEADEND	ET–1920	2
FD9	FEEDER DEADEND	ET–1907	2
FS9	FEEDER ASSEMBLY	ET–1907	2
FT1	FEEDER TAP	ET–1907	2
FT2	FEEDER TAP	ET–1907	2
NA16	FEEDER INSULATOR	ET–1906	2
CA1	FEEDER CROSS ARM	S–5212	2
SPA	SPIDER ARM	S–5213	1
PC1H	SLIDING CLAMP	S–5211	1
PC1	SLIDING CLAMP	S–5214	2
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
CSC1	SLIDING BRACKET	S–5214	10

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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3/14/2016 2:38:15 PM

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

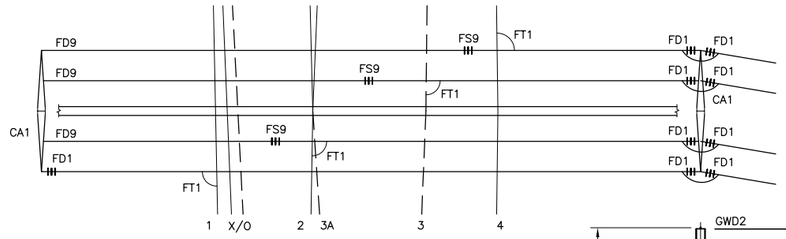
STRUCTURAL ERECTION DIAGRAM T–449

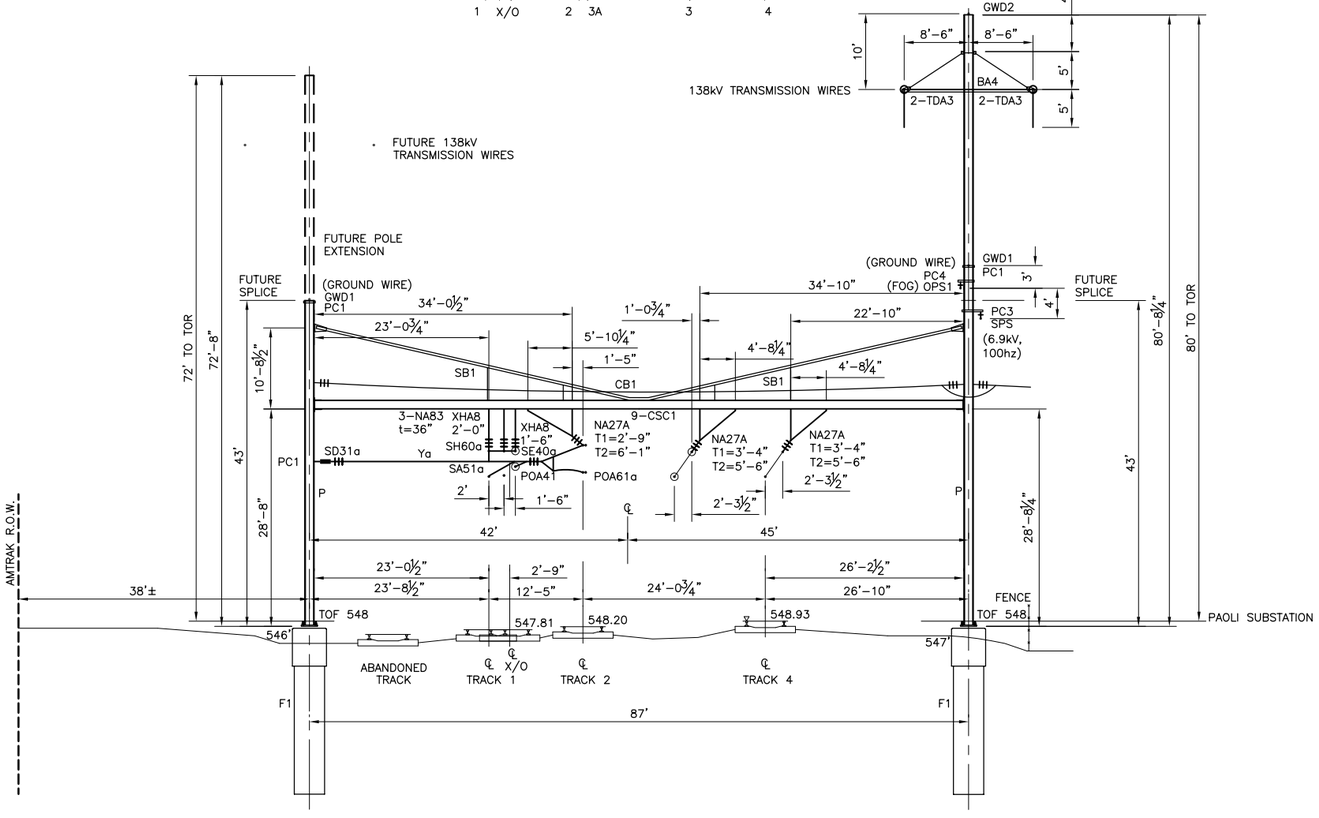
Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-1206.DWG
Ref. No.:	2011–059
Sheet No:	120 OF 565

ET–1206

CATENARY WIRE HEIGHTS						
	TRACK 1	X/O 1A	X/O 1B	TRACK 2	TRACK 3	TRACK 4
MW	23'–7"	23'–7"	23'–11½"	23'–11½"	22'–4"	22'–4"
CW	20'–2½"	20'–4¼"	21'–6¼"	20'–4½"	19'–0¾"	19'–0¾"

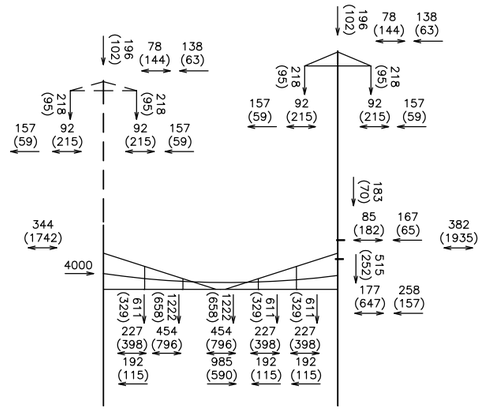




STRUCTURE ERECTION DIAGRAM T–448

1067+39
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	3
NA27A	MESSENGER SUPPORT	ET–1904	3
XHA8	SPREADER ASSEMBLY	ET–1901	2
POA61a	PULL OFF ASSEMBLY	ET–1903	1
SA51a	STEADY ASSEMBLY	ET–1902	1
POA41	PULL OFF ASSEMBLY	ET–1903	1
SD31a	STEADY SPAN ASSEMBLY	ET–1914	1
SE40a	STEADY SPAN INSULATORS	ET–1914	1
Ya	STEADY SPAN ASSEMBLY	ET–1914	1
SH60a	STEADY SPAN HANGER	ET–1914	1
GWD1	GROUND WIRE DEADEND	ET–1909	2
GWD2	GROUND WIRE DEADEND	ET–1909	1
TDA3	TRANSMISSION DEADEND	ET–1800	4
FD1	FEEDER DEADEND	ET–1907	9
FD9	FEEDER DEADEND	ET–1907	3
FS9	FEEDER INSULATOR ASSEMBLY	ET–1907	3
FT1	FEEDER TAP	ET–1907	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
BA4	TRANSMISSION BRACKET	S–5203	1
CA1	CROSS TRACK FEEDER BRACKET	S–5212	2
PC1	SLIDING CLAMP	S–5214	3
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
CSC1	SLIDING BRACKET	S–5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–448

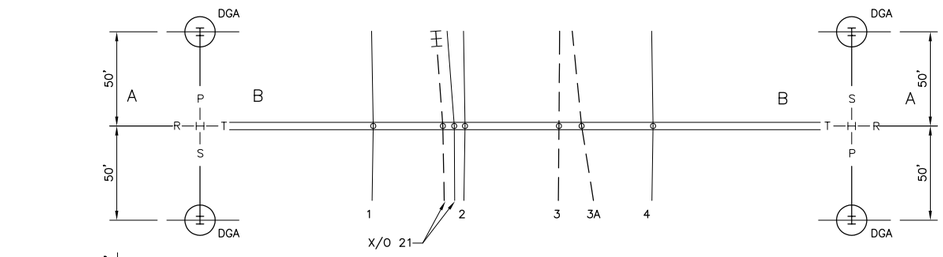
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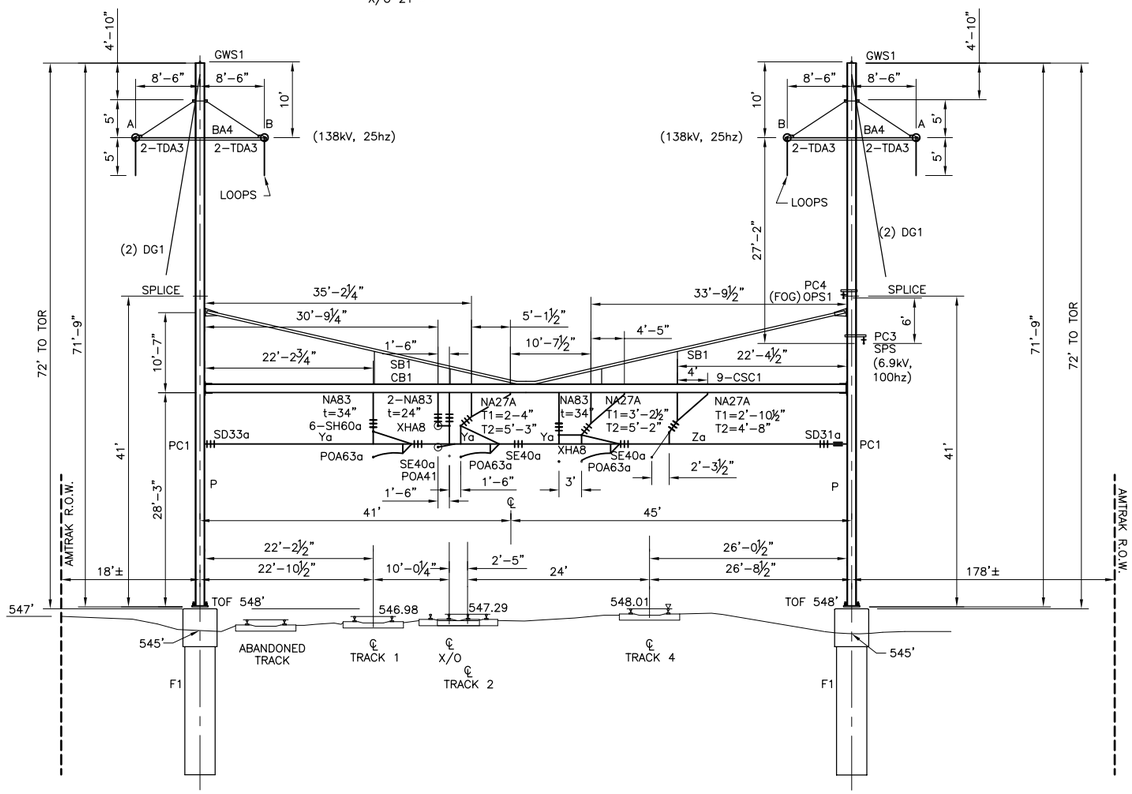
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Ref. No.:	2011–059
Sheet No:	121 OF 565

ET–1207

3/14/2016 2:38:21 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\structural\2011-059-ET-1207.dwg

CATENARY WIRE HEIGHTS							
	TRACK 1	X/O 21A	X/O 2B	TRACK 2	3A	TRACK 3	TRACK 4
MW	24'-5"	24'-10¼"	24'-10¼"	24'-10½"	22'-11¼"	22'-11¼"	23'-3¼"
CW	21'-0½"	22'-0½"	20'-10½"	20'-9"	19'-5¼"	19'-5¼"	19'-11¾"

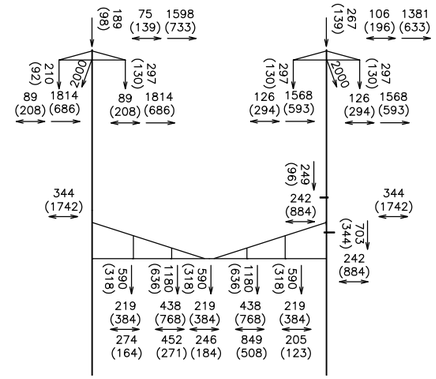




STRUCTURE ERECTION DIAGRAM T-447

1065+99
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA27A	MESSENGER SUPPORT	ET-1904	3
XHA8	SPREADER ASSEMBLY	ET-1901	1
POA63a	PULL OFF ASSEMBLY	ET-1903	3
POA41	PULL OFF ASSEMBLY	ET-1903	1
SD33a	STEADY SPAN ASSEMBLY	ET-1914	1
SD31a	STEADY SPAN ASSEMBLY	ET-1914	1
SE40a	STEADY SPAN INSULATOR	ET-1914	3
SH60a	STEADY SPAN HANGER	ET-1914	6
Ya	STEADY SPAN ASSEMBLY	ET-1914	3
Za	STEADY SPAN ASSEMBLY	ET-1914	1
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION DEADEND ASSEMBLY	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
DG1	DOWN GUYS	ET-1908	4
BA4	TRANSMISSION BRACKET	S-5203	2
DGA	DOWNGUY ANCHOR	S-5101	4
PC1	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
DGB2	DOWN GUY BRACKET	S-5230	2
CSC1	SLIDING BRACKET	S-5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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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
STRUCTURAL ERECTION DIAGRAM
T-447

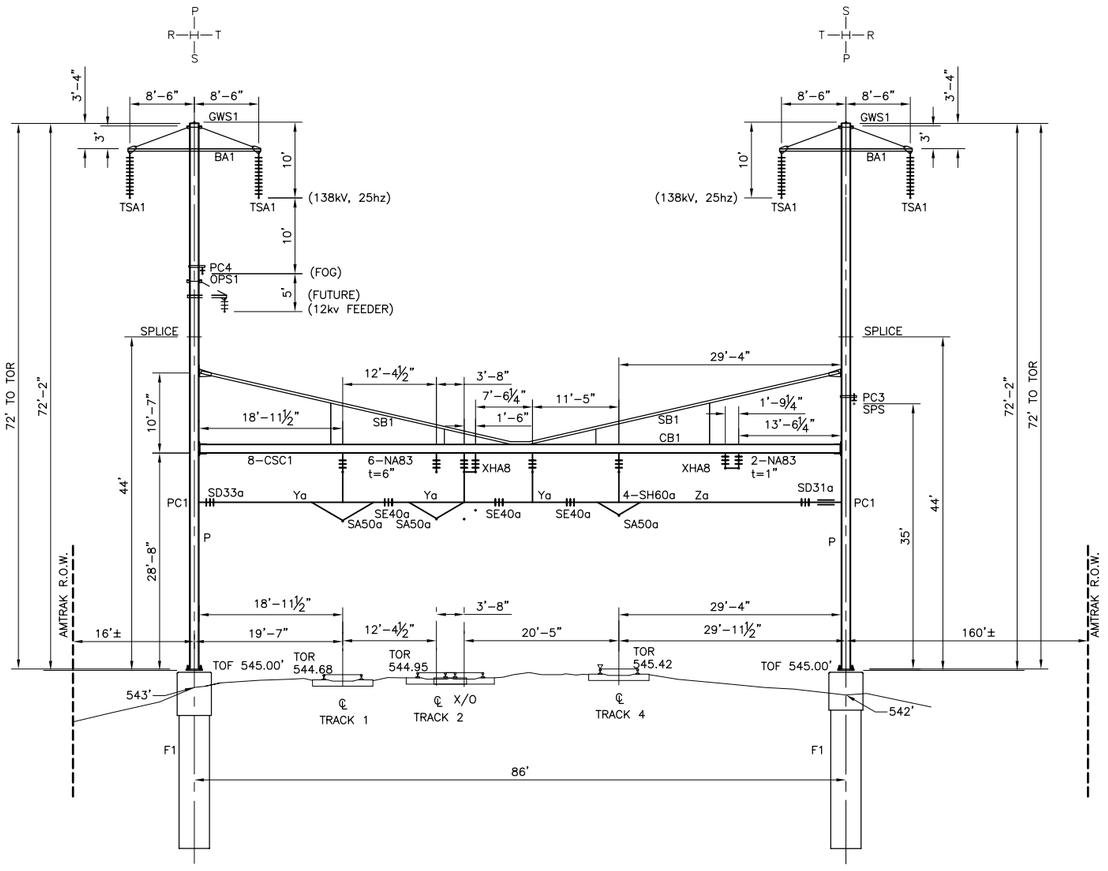
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File No.:	2011-059-ET-1208.DWG
Ref. No.:	2011-059
Sheet No:	122 OF 565

ET-1208

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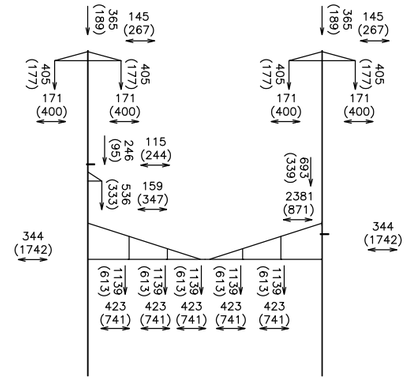
CATENARY WIRE HEIGHTS						
	TRACK 1	TRACK 2	X/O	OOR	TRACK 4	OOR
MW	26'-9"	26'-6"	26'-6"	26'-0"	26'-0"	26'-0"
CW	20'-3"	20'-3"	20'-4"		20'-3"	



STRUCTURE ERECTION DIAGRAM T-446

1063+35
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	8
XHA8	SPREADER ASSEMBLY	ET-1901	2
SA50a	REGISTRATION ASSEMBLY	ET-1902	3
SD33a	STEADY SPAN ASSEMBLY	ET-1914	1
SD31a	STEADY SPAN ASSEMBLY	ET-1914	1
SE40a	STEADY SPAN INSULATOR	ET-1914	3
SH60a	STEADY SPAN HANGER	ET-1914	4
Ya	STEADY SPAN ASSEMBLY	ET-1914	3
Za	STEADY SPAN ASSEMBLY	ET-1914	1
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
BA1	TRANSMISSION BRACKET	S-5201	2
PC1	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-446

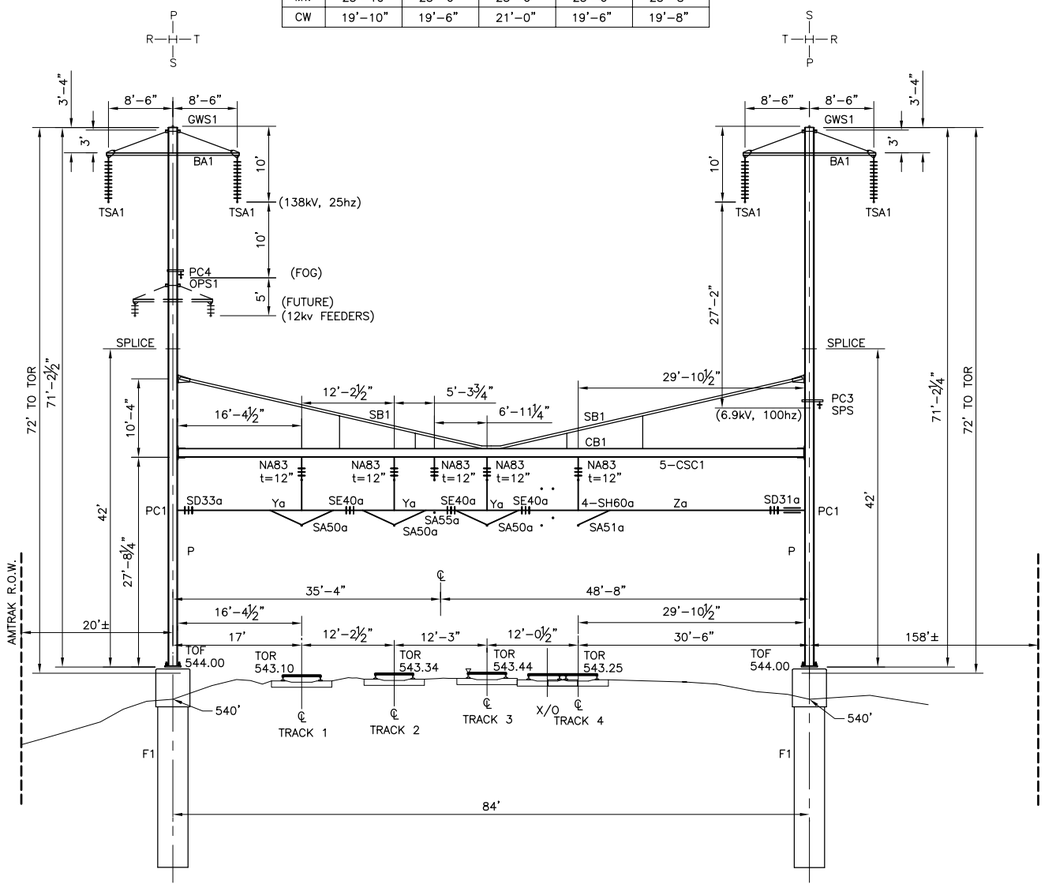
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Ref. No.:	2011-059
Sheet No:	123 OF 565

ET-1209

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

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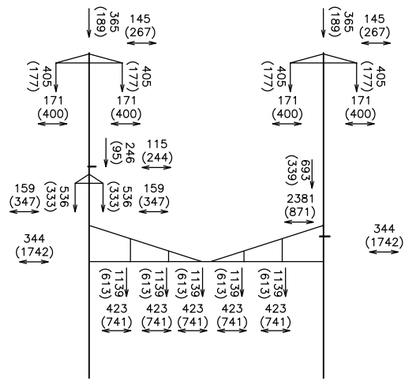
CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	OOR	TRACK 3	TRACK 4
MW	25'–10"	25'–6"	25'–6"	25'–6"	25'–8"
CW	19'–10"	19'–6"	21'–0"	19'–6"	19'–8"



STRUCTURE ERECTION DIAGRAM T–445

1060+65
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
SA50a	REGISTRATION ASSEMBLY	ET–1902	3
SA51a	REGISTRATION ASSEMBLY	ET–1902	1
SA55a	REGISTRATION ASSEMBLY	ET–1903	1
SD33a	STEADY SPAN ASSEMBLY	ET–1914	1
SD31a	STEADY SPAN ASSEMBLY	ET–1914	1
SE40a	STEADY SPAN INSULATOR	ET–1914	3
SH60a	STEADY SPAN HANGER	ET–1914	4
Ya	STEADY SPAN ASSEMBLY	ET–1914	3
Za	STEADY SPAN ASSEMBLY	ET–1914	1
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
BA1	TRANSMISSION BRACKET	S–5201	2
PC1	SLIDING CLAMP	S–5214	2
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
CSC1	SLIDING BRACKET	S–5214	5

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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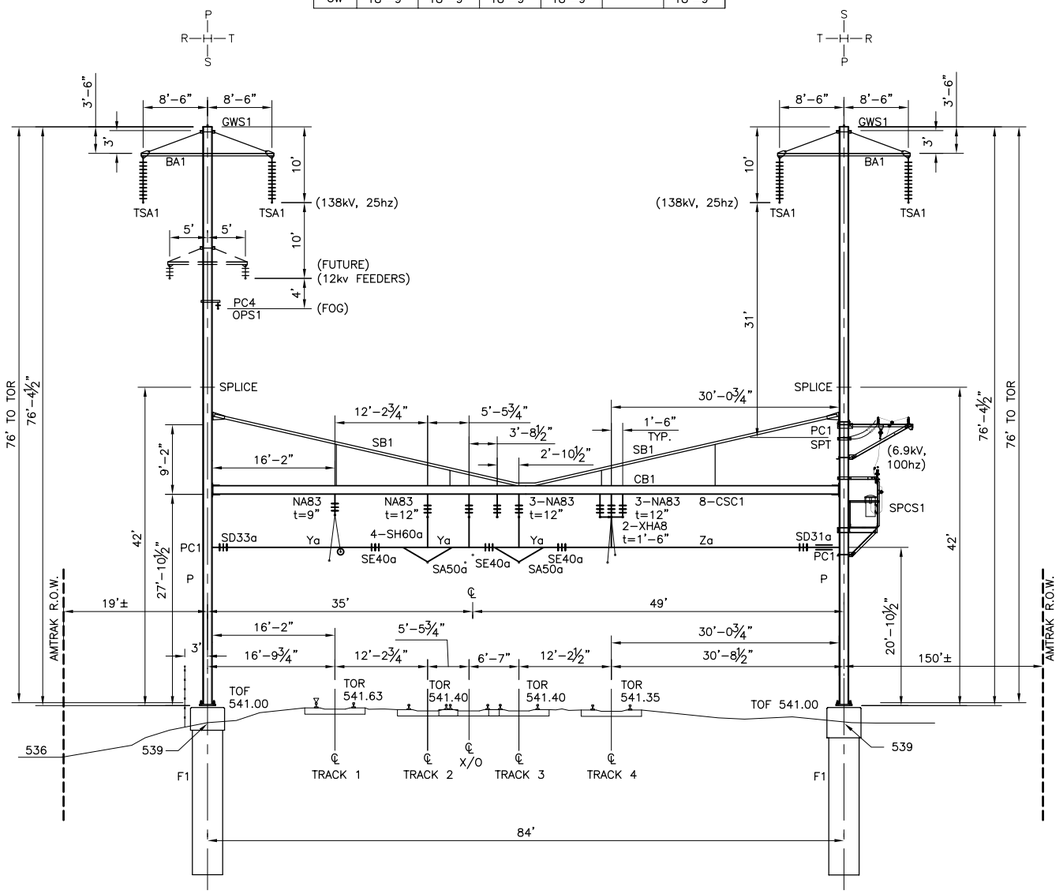
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–445

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

File No.:	2011–059–ET–1210.DWG
Ref. No.:	2011–059
Sheet No:	124 OF 565

ET–1210

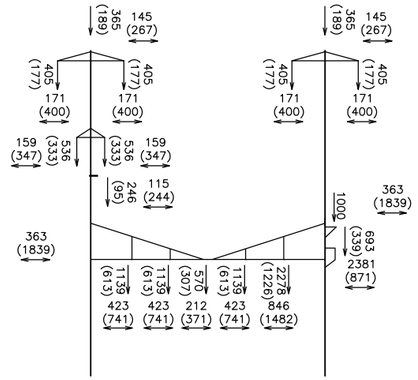
CATENARY WIRE HEIGHTS						
	TRACK 1	TRACK 2	X/O	TRACK 3	OOR	TRACK 4
MW	24'-9"	24'-9"	24'-9"	24'-9"	24'-9"	24'-9"
CW	18'-9"	18'-9"	18'-9"	18'-9"		18'-9"



STRUCTURE ERECTION DIAGRAM T—444

1057+95
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET—1904	8
XHA8	SPREADER ASSEMBLY	ET—1901	1
SA50a	REGISTRATION ASSEMBLY	ET—19	2
SD33a	STEADY SPAN ASSEMBLY	ET—1914	1
SD31a	STEADY SPAN ASSEMBLY	ET—1914	1
SE40a	STEADY SPAN INSULATOR	ET—1914	3
SH60a	STEADY SPAN HANGER	ET—1914	4
Ya	STEADY SPAN ASSEMBLY	ET—1914	3
Za	STEADY SPAN ASSEMBLY	ET—1914	1
GWS1	GROUND WIRE ASSEMBLY	ET—1909	2
TSA1	TRANSMISSION SUPPORT	ET—1800	4
SPT	SIGNAL POWER TERMINATION	ET—1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET—1810	1
OPS1	FOG WIRE SUPPORT	ET—1906	1
BA1	TRANSMISSION BRACKET	S—5201	2
PC1	SLIDING CLAMP	S—5214	3
PC3	SLIDING CLAMP	S—5215	1
PC4	SLIDING CLAMP	S—5215	1
P	POLE	S—5103	2
F1	FOUNDATION	S—5102	2
SB1	SAG BRACE	S—5105	2
CB1	CROSS BEAM	S—5104	1
CSC1	SLIDING BRACKET	S—5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T—444

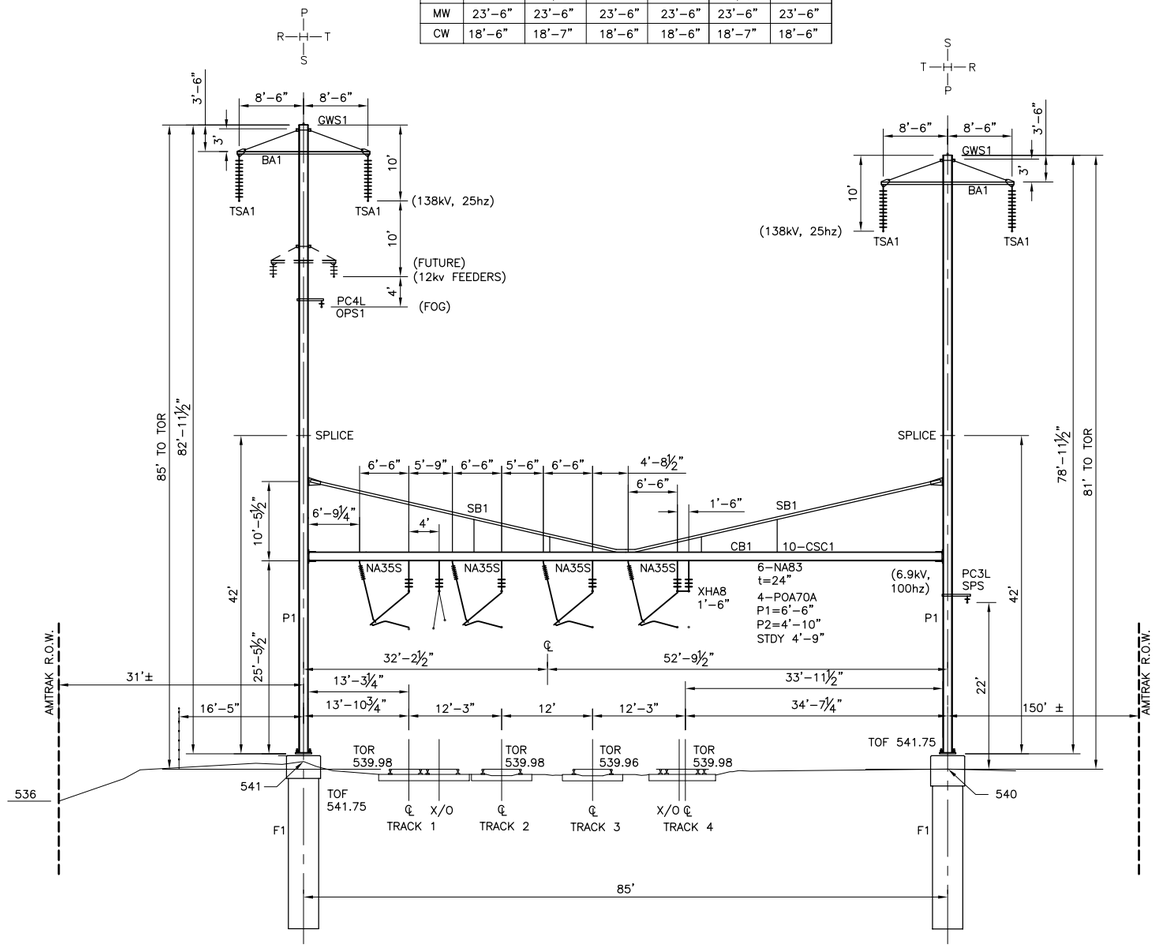
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Ref. No.:	2011—059
Sheet No:	125 OF 565

ET—1211

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

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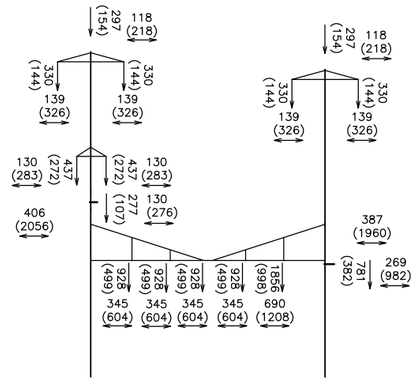
CATENARY WIRE HEIGHTS						
	TRACK 1	X/O	TRACK 2	TRACK 3	X/O	TRACK 4
MW	23'-6"	23'-6"	23'-6"	23'-6"	23'-6"	23'-6"
CW	18'-6"	18'-7"	18'-6"	18'-6"	18'-7"	18'-6"



STRUCTURE ERECTION DIAGRAM T-443

1055+23
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	6
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
XHA8	SPREADER	ET-1901	1
PC3L	SLIDING CLAMP	S-5215	1
PC4L	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING BRACKET	S-5214	10

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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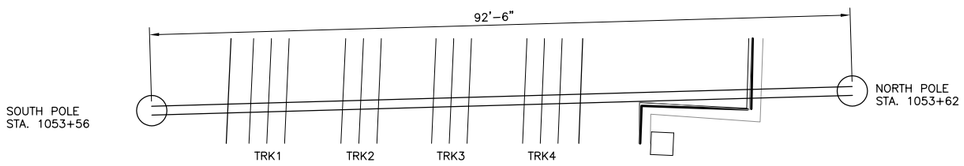
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-443

File No.:	2011-059-ET-1212.DWG
Ref. No.:	2011-059
Sheet No:	126 OF 565

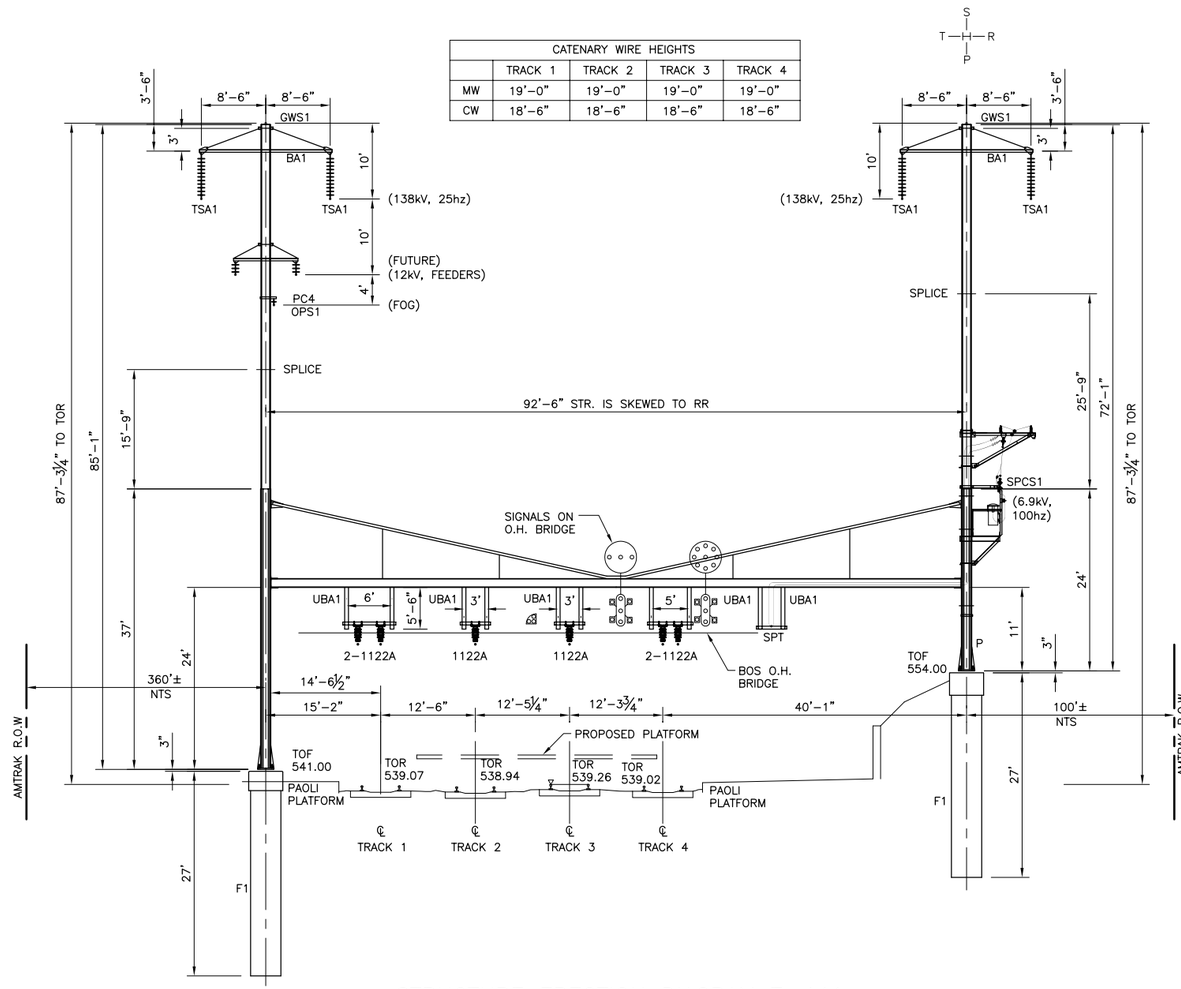
ET-1212

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

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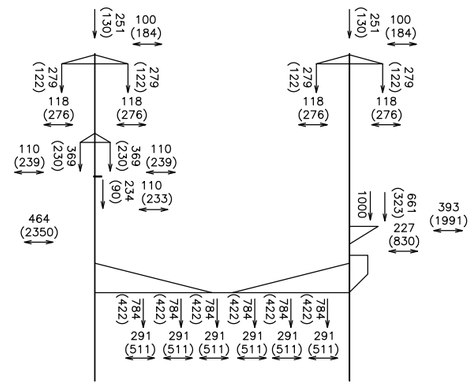
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	19'-0"	19'-0"	19'-0"	19'-0"
CW	18'-6"	18'-6"	18'-6"	18'-6"



STRUCTURE ERECTION DIAGRAM T-441

1053+62 (SKEWED)
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
1122A	MESSENGER SUPPORT	ET-1909	6
SPT	SIGNAL POWER TERMINATION	ET-1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET-1810	1
OPS1	FOG WIRE SUPPORT	ET-1906	1
PC4	SLIDING CLAMP	S-5215	1
UBA1	DROPPER BRACKET	S-5228	5

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.
2. STRUCTURE AND CATENARY WIRE HEIGHTS ARE DESIGNED BY OTHERS AND INSTALLED AS PART OF PAOLI STATION AND DARBY RD PROJECT.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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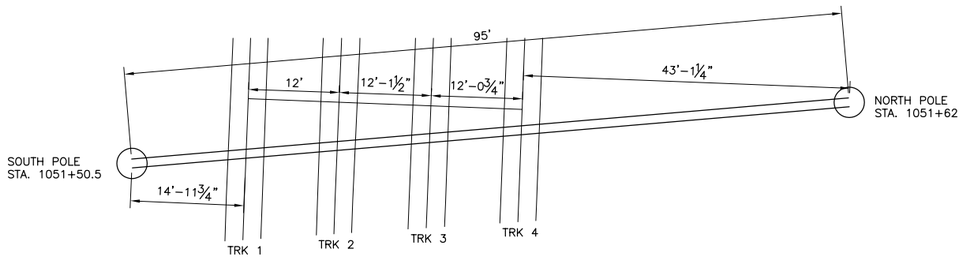
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-441

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

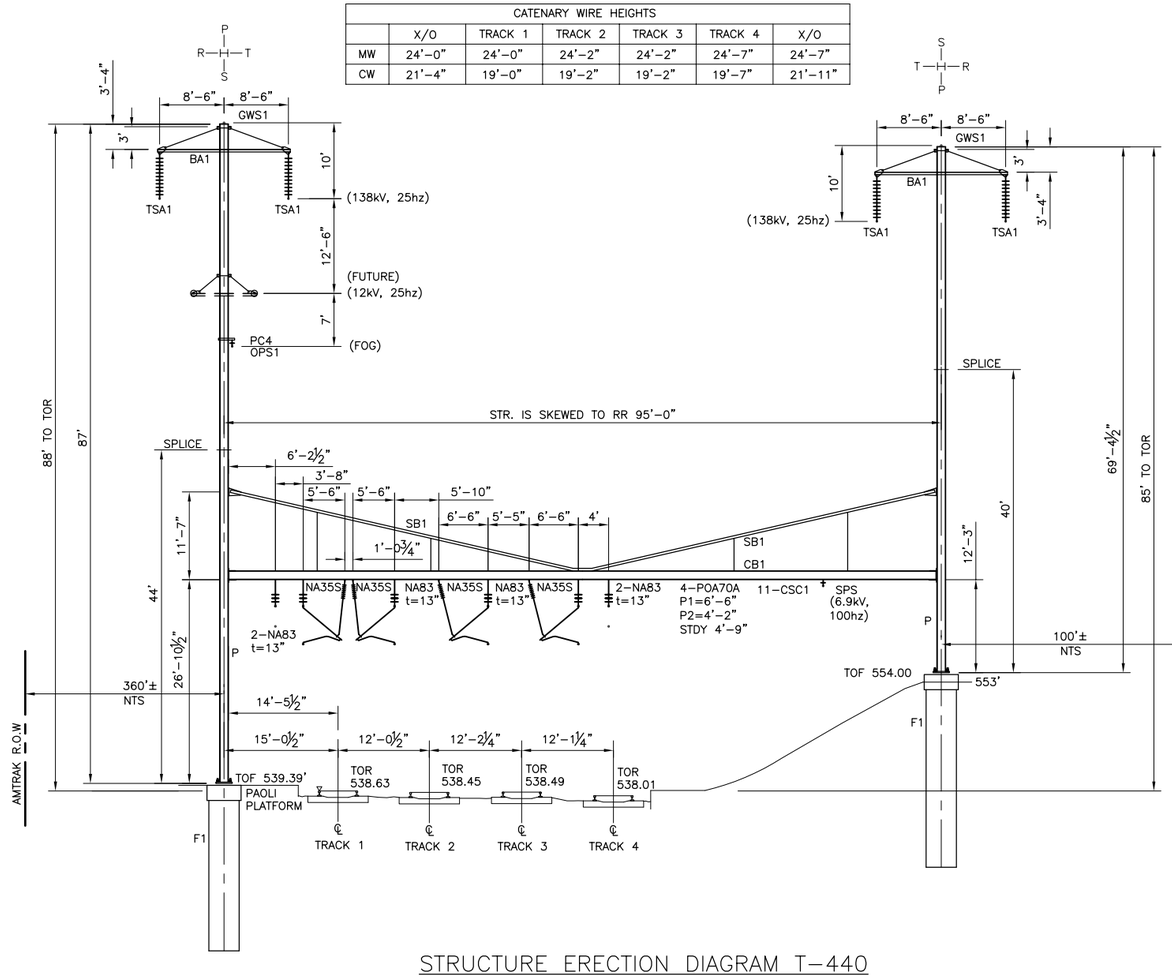
File No.:	2011-059-ET-1214.DWG
Ref. No.:	2011-059
Sheet No:	127 OF 565

ET-1214

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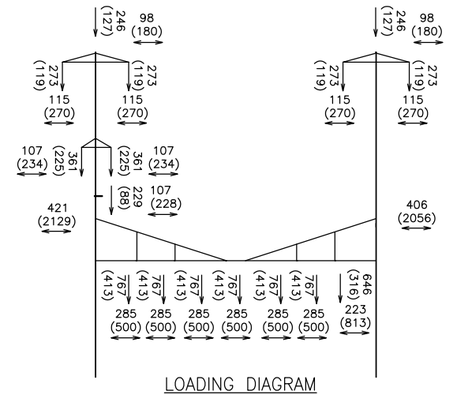
CATENARY WIRE HEIGHTS						
	X/O	TRACK 1	TRACK 2	TRACK 3	TRACK 4	X/O
MW	24'-0"	24'-0"	24'-2"	24'-2"	24'-7"	24'-7"
CW	21'-4"	19'-0"	19'-2"	19'-2"	19'-7"	21'-11"



STRUCTURE ERECTION DIAGRAM T-440

1051+55
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	6
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
GWD1	GROUND WIRE ASSEMBLY	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC1	SLIDING CLAMP	S-5214	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING BRACKET	S-5214	11

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.
2. CATENARY WIRE HEIGHTS WILL BE AFFECTED BY PAOLI STATION AND DARBY RD PROJECT – DESIGNED BY OTHERS.

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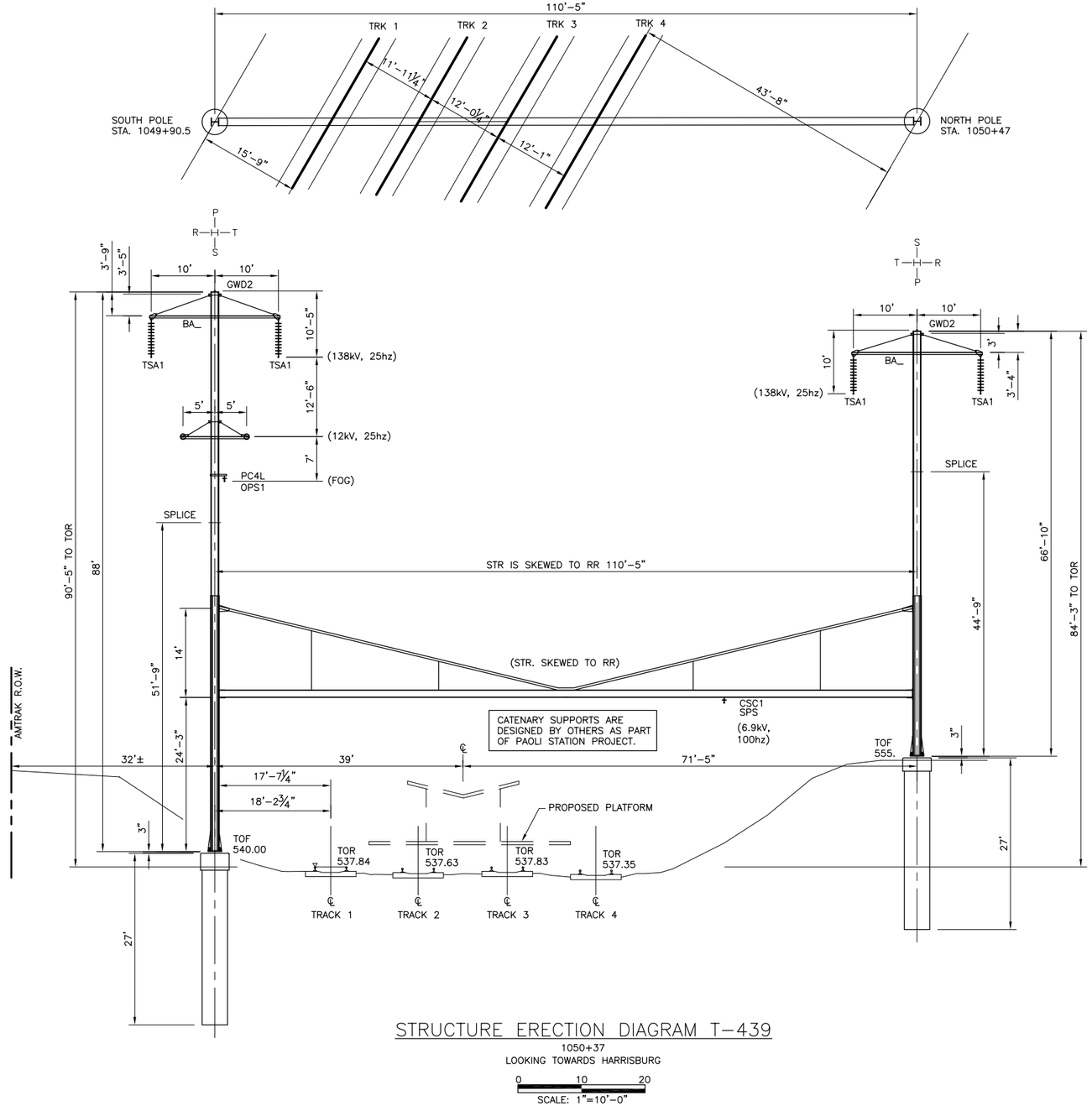
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-440

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

File No.:	2011-059-ET-1215.DWG
Ref. No.:	2011-059
Sheet No:	128 OF 565

ET-1215

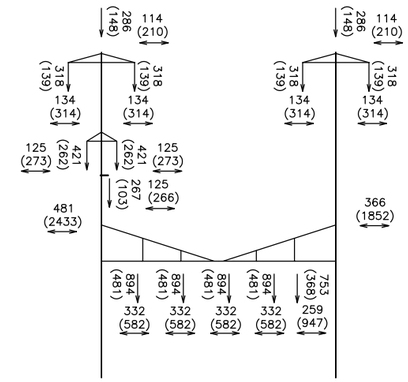
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STRUCTURE ERECTION DIAGRAM T-439

1050+37
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC4L	SLIDING CLAMP	S-5215	1
CSC1	SLIDING CLAMP	S-5214	1
BA_	TRANSMISSION BRACKET -DOUBLE	S-52__	2

WORK STATEMENT:

1. INSTALL TRANSMISSION BRACKETS.
2. INSTALL SIGNAL POWER SUPPORT BRACKET.
3. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
4. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
5. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.
2. STRUCTURE AND CATENARY WIRE HEIGHTS ARE DESIGNED BY OTHERS AND INSTALLED AS PART OF PAOLI STATION AND DARBY RD PROJECT.

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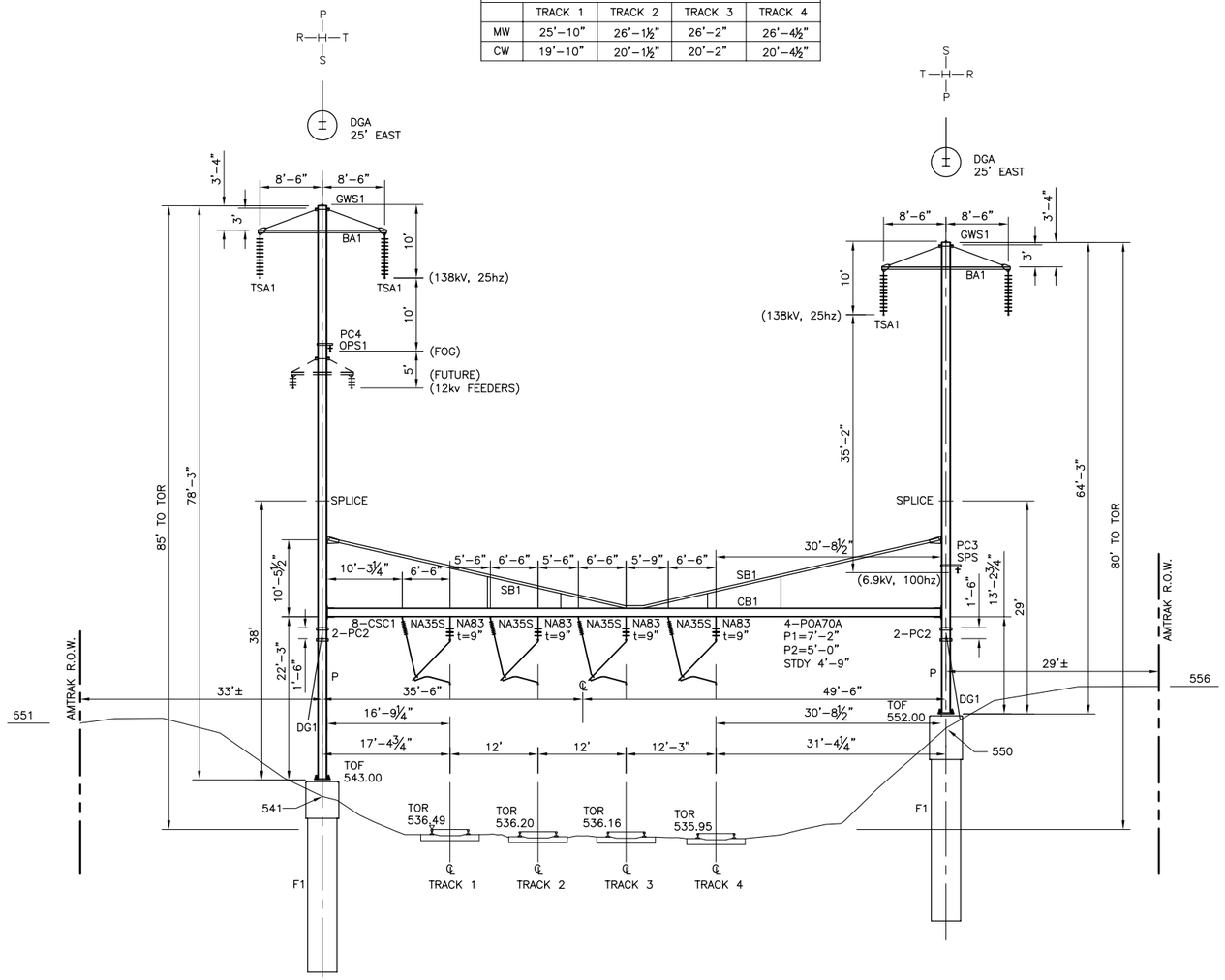
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-439

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

File No.:	2011-059-ET-1216.DWG
Ref. No.:	2011-059
Sheet No:	129 OF 565

ET-1216

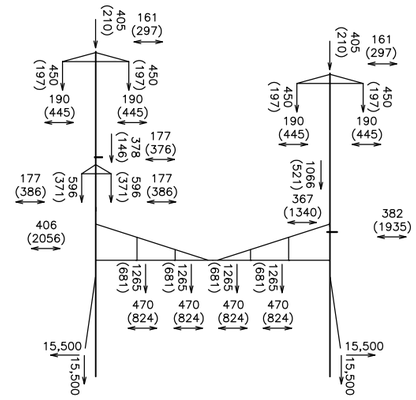
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–10"	26'–1½"	26'–2"	26'–4½"
CW	19'–10"	20'–1½"	20'–2"	20'–4½"



STRUCTURE ERECTION DIAGRAM T–438

1047+37
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWN GUY	ET–1908	2
PC2	SLIDING CLAMP	S–5214	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8
DGA	DOWN GUY FOUNDATION	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. PAOLI INTERLOCKING WILL BE RETIRED ONCE LLOYD AND RUSSELL INTERLOCKINGS ARE BUILT.

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IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–438

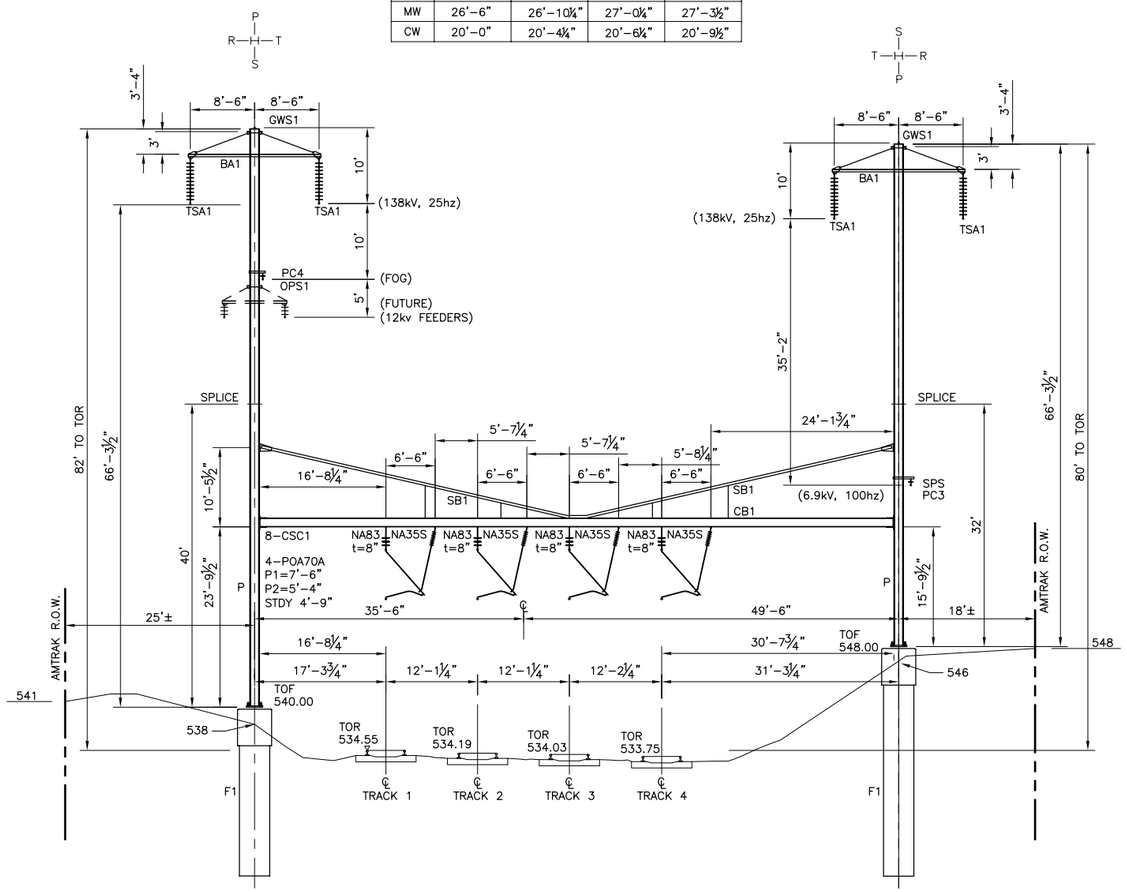
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Ref. No.:	2011–059
Sheet No:	130 OF 565

ET–1217

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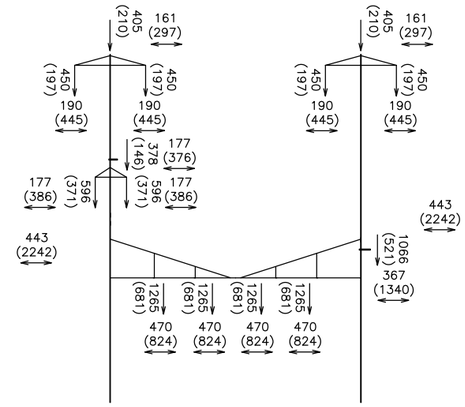
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-6"	26'-10¼"	27'-0¼"	27'-3½"
CW	20'-0"	20'-4¼"	20'-6¼"	20'-9½"



STRUCTURE ERECTION DIAGRAM T-437

1044+37
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-437

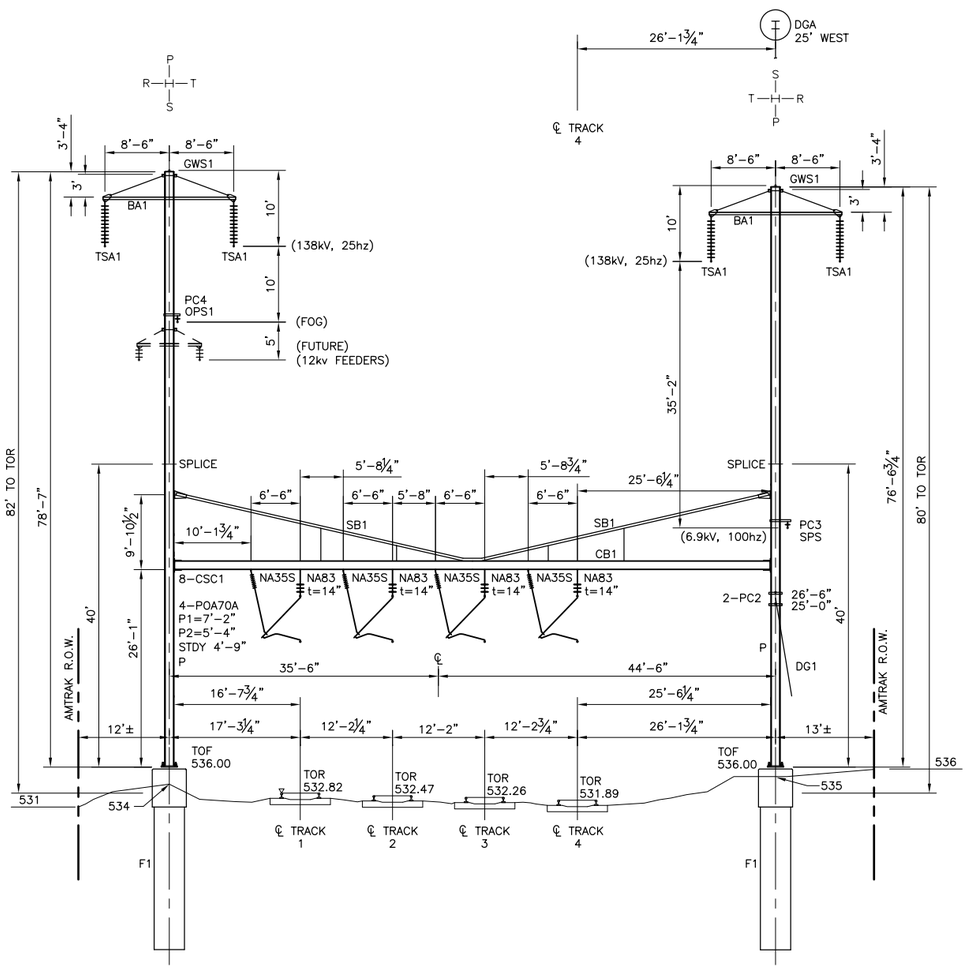
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Ref. No.:	2011-059
Sheet No:	131 OF 565

ET-1218

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–0"	26'–4"	26'–7"	26'–11"
CW	20'–0"	20'–4"	20'–7"	20'–11"



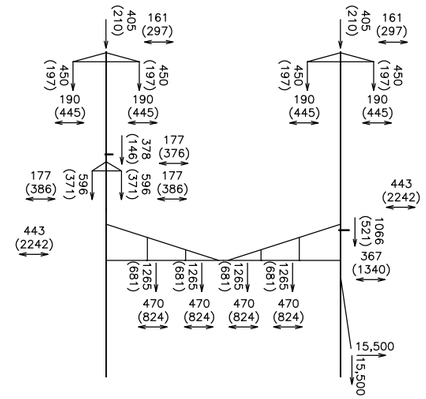
STRUCTURE ERECTION DIAGRAM T–436

1041+37

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWN GUY	ET–1908	1
PC2	SLIDING CLAMP	S–5214	2
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–436

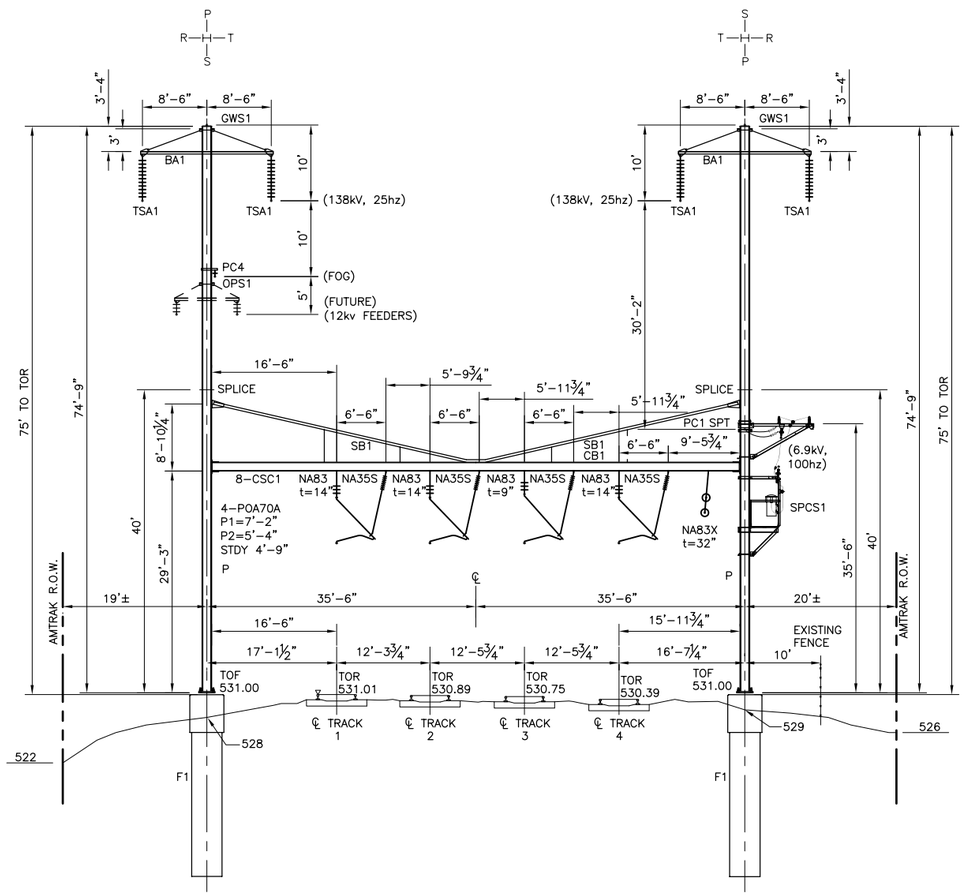
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–1219.DWG
Ref. No.:	2011–059
Sheet No:	132 OF 565

ET–1219

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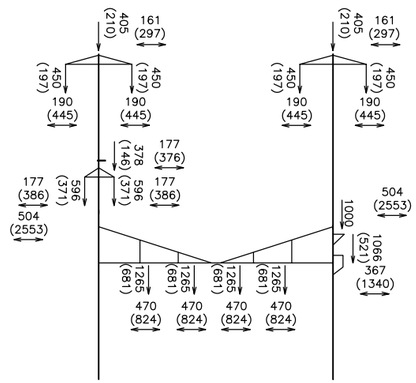
CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	TRACK 3	TRACK 4	X/O
MW	26'–0"	26'–1½"	26'–8½"	26'–7½"	26'–7½"
CW	20'–0"	20'–1½"	20'–3"	20'–7½"	24'–7½"



STRUCTURE ERECTION DIAGRAM T–435

1038+37
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
NA83X	MESSENGER SUPPORT – NO INSUL	ET–1904	1
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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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 600
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IN ASSOCIATION WITH Baker AECOM

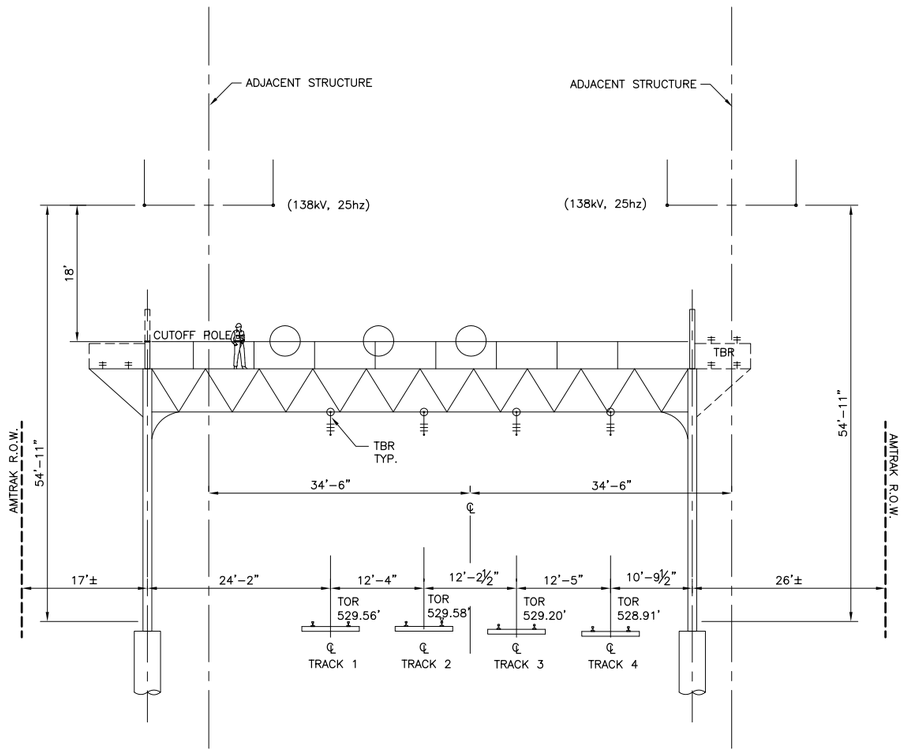
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–435

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

File No.:	2011–059–ET–1220.DWG
Ref. No.:	2011–059
Sheet No:	133 OF 565

ET–1220

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STRUCTURE ERECTION DIAGRAM T-434 SB (EXISTING P-271 SB)

STATION 1036+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. GROUND STRUCTURE.
2. REMOVE CATENARY ATTACHMENTS FROM SIGNAL BRIDGE.
3. REMOVE BRACKETS AND INSULATORS SUPPORTING PECO DISTRIBUTION WIRES.
4. CUTOFF POLE EXTENSIONS LEVEL WITH RAILINGS..

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-434 SB (P-271 SB)

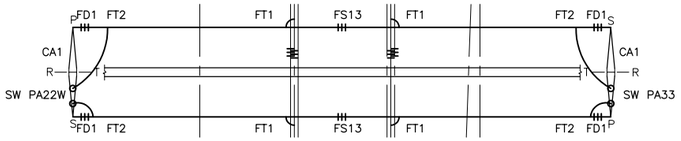
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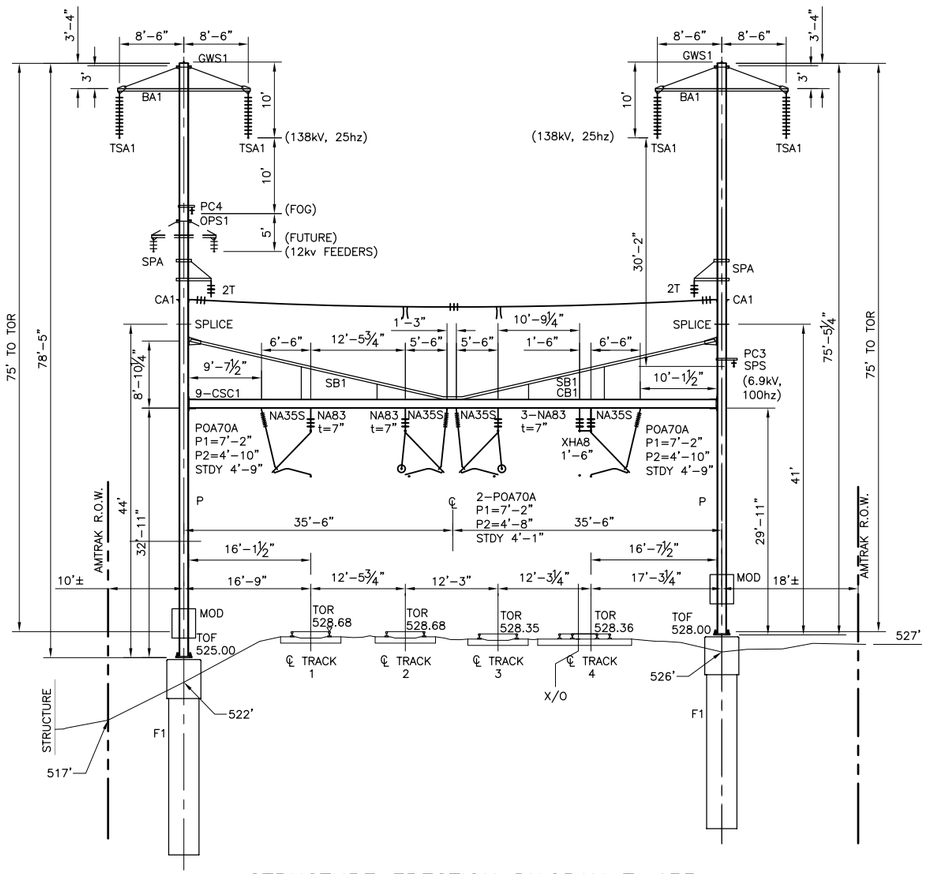
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Ref. No.:	2011-059
Sheet No:	134 OF 565

ET-1221

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CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	TRACK 3	X/O	TRACK 4
MW	26'–6"	26'–6"	26'–9½"	26'–9½"	26'–9½"
OOR		21'–6"	21'–9½"		
CW	20'–6"	20'–6"	20'–9½"	20'–11"	20'–9½"

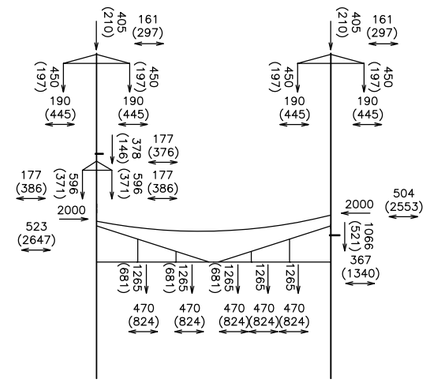




STRUCTURE ERECTION DIAGRAM T–433

1035+36
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
XHA8	SPREADER	ET–1901	1
SW	DISCONNECT SWITCH	ET–1910	2
MOD	MOTOR OPERATOR	ET–1910	2
2T	FEEDER INSULATOR	ET–1907	2
FD1	FEEDER DEADEND	ET–1907	4
FS13	FEEDER INSULATOR	ET–1907	2
FT1	FEEDER TAP	ET–1907	4
FT2	FEEDER TAP	ET–1907	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING CLAMP	S–5214	9
SPA	SPIDER ARM	S–5213	2
CA1	FEEDER CROSS ARM	S–5212	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

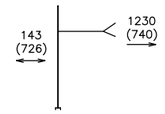
STRUCTURAL ERECTION DIAGRAM T–433

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	File No.:	2011–059–ET–1222.DWG
				Ref. No.:	2011–059
				Sheet No:	135 OF 565

ET–1222

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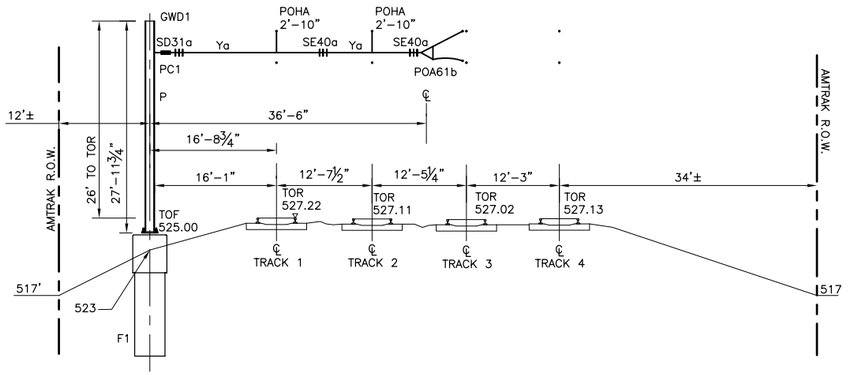
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
POA61b	PULLOFF ASSEMBLY	ET–1903	1
POHA	HANGER ASSEMBLY	ET–19	2
SE40a	INSULATOR ASSEMBLY	ET–1905	2
SD31a	INSULATOR ASSEMBLY	ET–1905	1
PC1	SLIDING CLAMP	S–5214	1
P	POLE	S–5103	1
F1	FOUNDATION	S–5102	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)

(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T–432

1032+64

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE
3. INSTALL GROUND WIRE

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–432

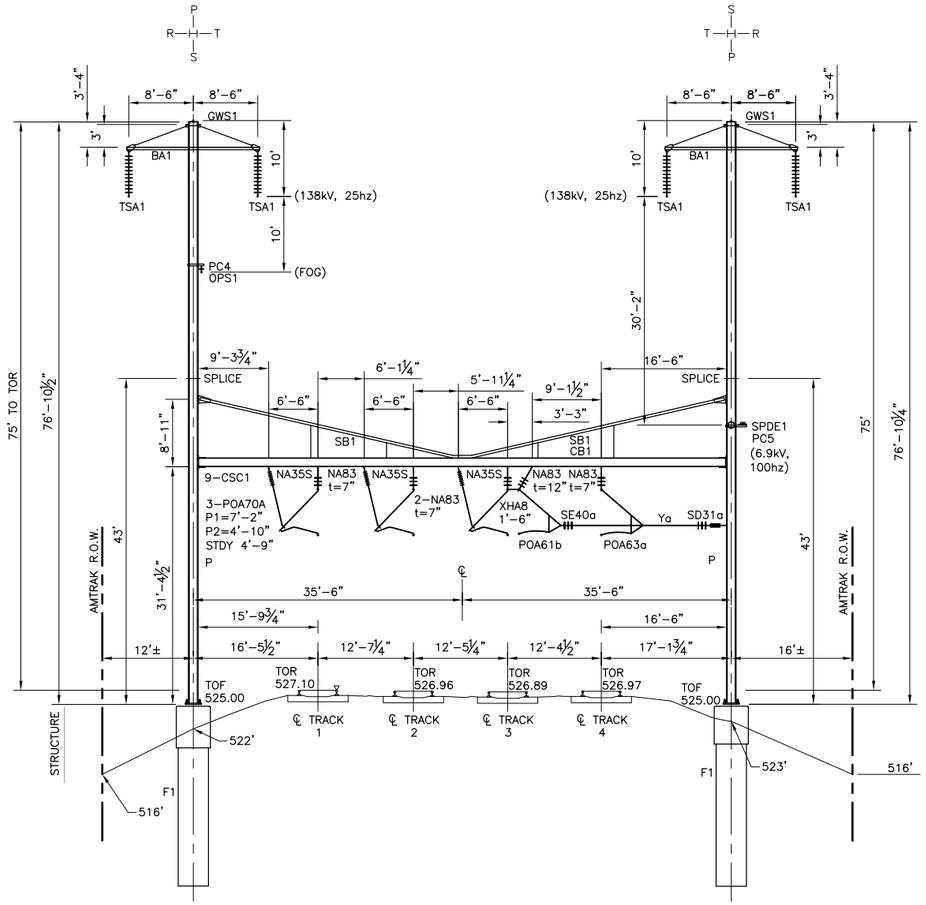
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–1223.DWG
Ref. No.:	2011–059
Sheet No:	136 OF 565

ET–1223

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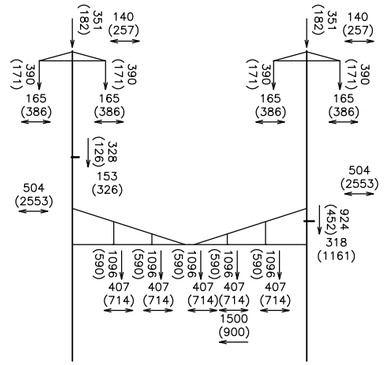
CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	TRACK 3	X/O	TRACK 4
MW	26'–6"	26'–7¾"	26'–8½"	26'–8½"	26'–7½"
CW	20'–6"	20'–7¾"	20'–8½"	20'–10½"	20'–7½"



STRUCTURE ERECTION DIAGRAM T–431

1032+36
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	3
XHA8	SPREADER ASSEMBLY	ET–1901	1
POA61b	PULLOFF ASSEMBLY	ET–1903	1
POA63a	PULLOFF ASSEMBLY	ET–1903	1
SD31a	STEADY SPAN ASSEMBLY	ET–1914	1
SD40a	STEADY SPAN INSULATOR	ET–1914	1
Ya	STEADY SPAN ASSEMBLY	ET–1914	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPDE1	SIGNAL POWER DEADEND	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	3
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–431

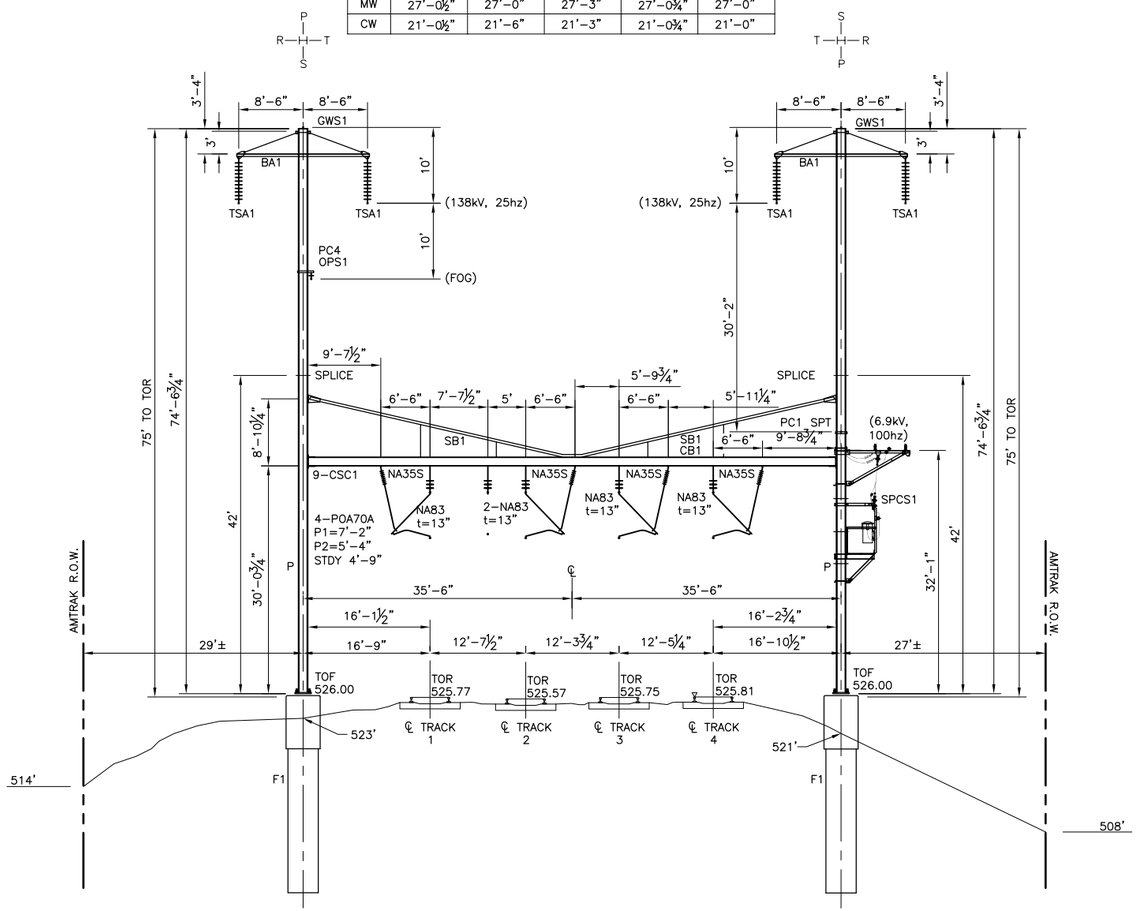
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File No.:	2011–059–ET–1224.DWG
Ref. No.:	2011–059
Sheet No:	137 OF 565

ET–1224

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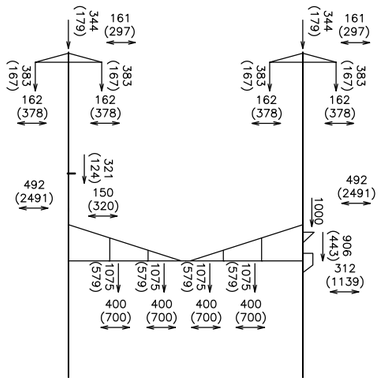
CATENARY WIRE HEIGHTS					
	TRACK 1	X/O	TRACK 2	TRACK 3	TRACK 4
MW	27'-0½"	27'-0"	27'-3"	27'-0¾"	27'-0"
CW	21'-0½"	21'-6"	21'-3"	21'-0¾"	21'-0"



STRUCTURE ERECTION DIAGRAM T–430

1030+20
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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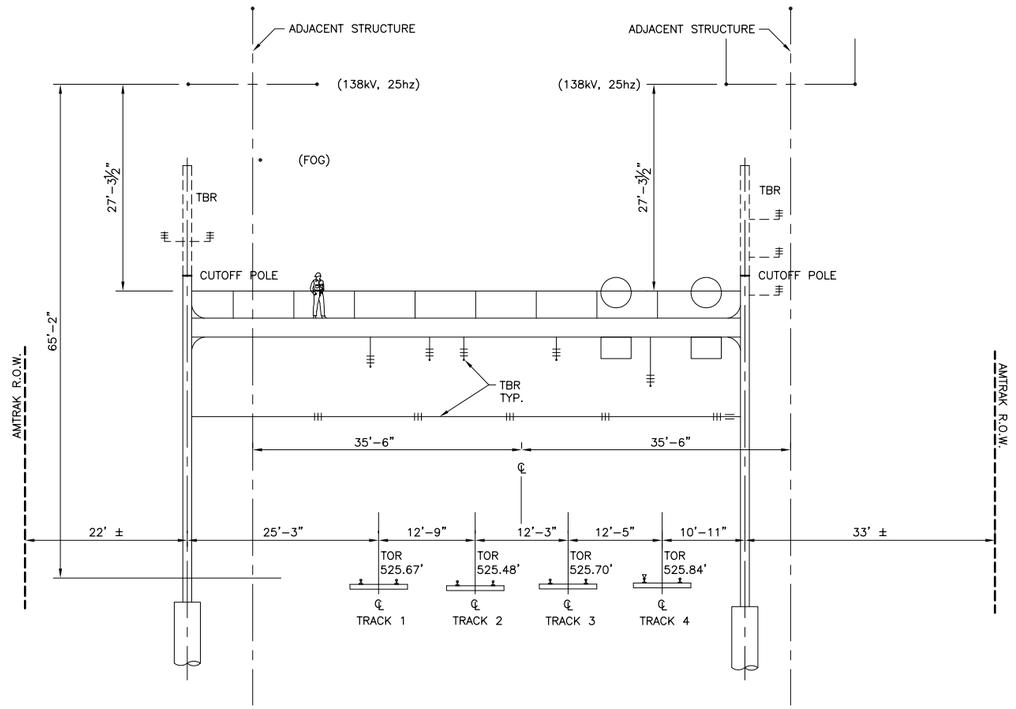
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–430

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

File No.:	2011–059–ET–1225.DWG
Ref. No.:	2011–059
Sheet No:	138 OF 565

ET–1225



STRUCTURE ERECTION DIAGRAM T-429 SB (P-268A SB)

STATION 1030+10
LOOKING TOWARDS HARRISBURG

WORK STATEMENT:

1. REMOVE CATENARY ATTACHMENTS FROM SIGNAL BRIDGE.
2. CUTOFF POLE EXTENSIONS.

0 10 20
SCALE: 1"=10'-0"

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PHILADELPHIA, PA 19103

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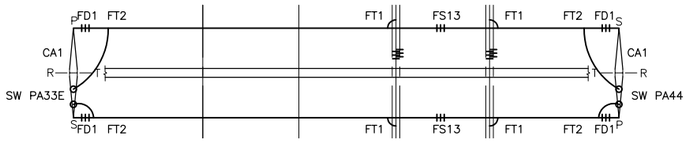
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-429 SB (P-268A SB)

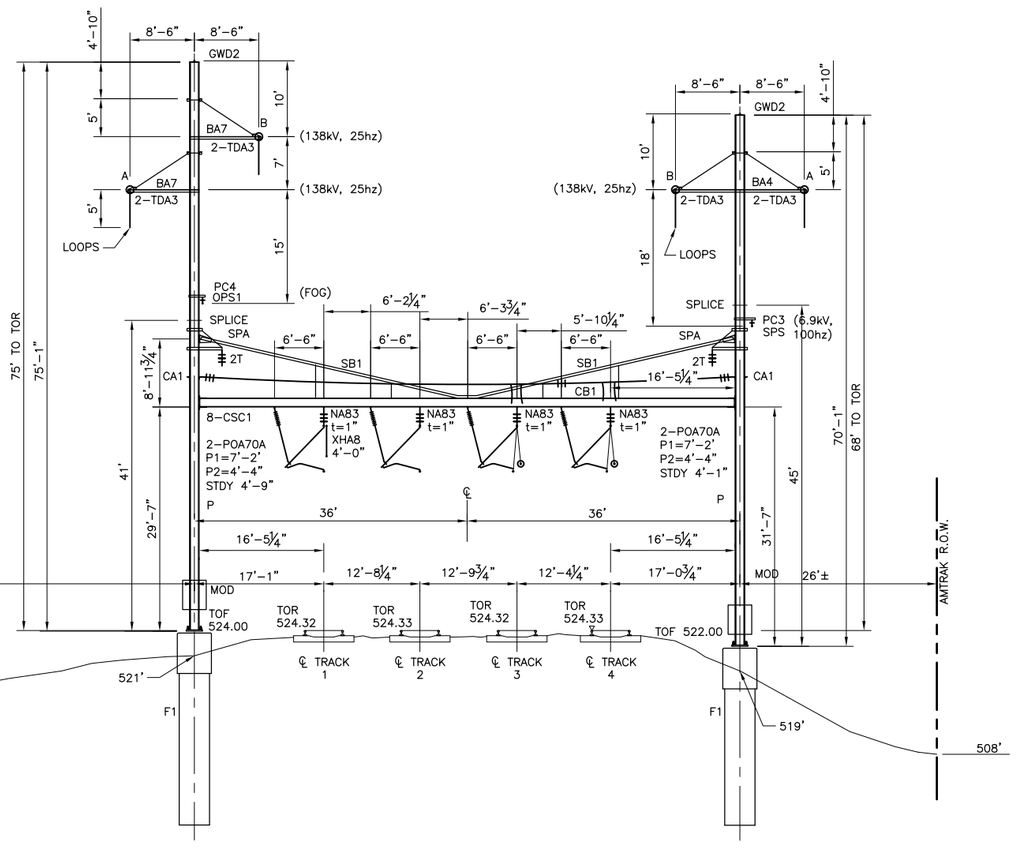
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-1226.DWG
Ref. No.:	2011-059
Sheet No:	139 OF 565

ET-1226

CATENARY WIRE HEIGHTS					
	TRACK 1	X/O	TRACK 2	TRACK 3	TRACK 4
MW	27'–0"	27'–0"	27'–0"	27'–0"	27'–0"
OOR		23'–0"		22'–0"	22'–0"
CW	21'–0"		21'–0"	21'–0"	21'–0"

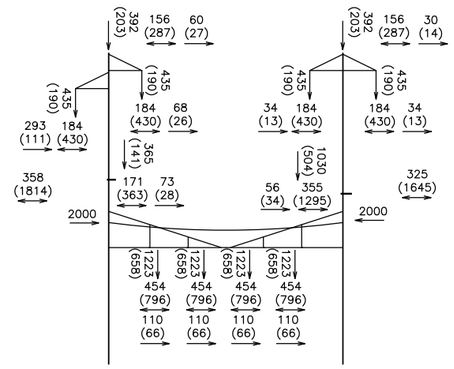




STRUCTURE ERECTION DIAGRAM T–428

1027+30
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
XHA8	SPREADER	ET–1901	1
SW	DISCONNECT SWITCH	ET–1910	2
MOD	MOTOR OPERATOR	ET–1910	2
2T	FEEDER SUPPORT	ET–1907	2
FD1	FEEDER DEADEND	ET–1907	4
FS13	FEEDER INSULATOR	ET–1907	2
FT1	FEEDER TAP	ET–1907	4
FT2	FEEDER TAP	ET–1907	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	1
BA7	TRANSMISSION BRACKET	S–5205	2
CA1	FEEDER CROSS ARM	S–5212	2
SPA	SPIDER ARM	S–5213	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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

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

IN ASSOCIATION WITH

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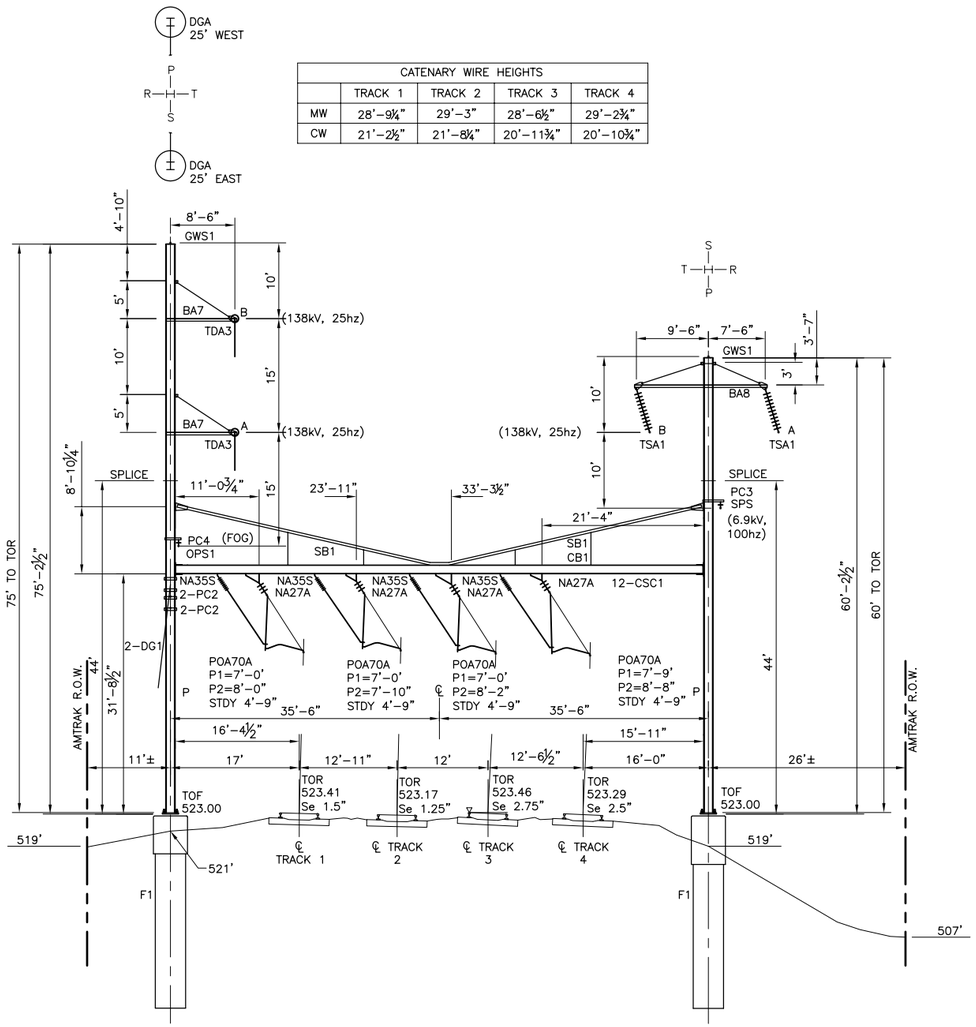
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–428

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

File No.:	2011–059–ET–1227.DWG
Ref. No.:	2011–059
Sheet No:	140 OF 565

ET–1227

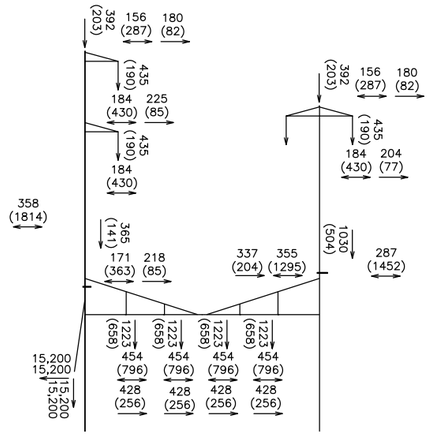
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STRUCTURE ERECTION DIAGRAM T–427

1024+40
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWN GUYS	ET–1908	2
PC2	SLIDING BRACKET	S–5214	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	2
BA8	TRANSMISSION BRACKET	S–5206	1
DGA	DOWN GUY FOUNDATION	S–5101	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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

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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
STRUCTURAL ERECTION DIAGRAM T–427

File No.:	2011–059–ET–1228.DWG
Ref. No.:	2011–059
Sheet No:	141 OF 565

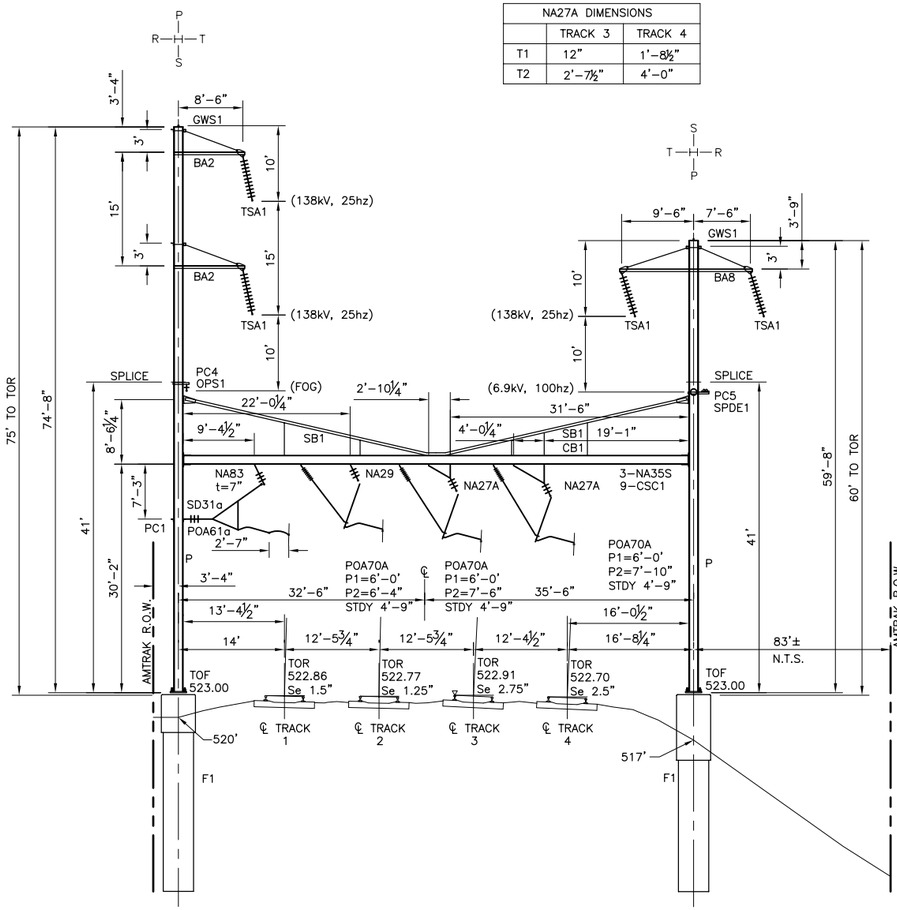
ET–1228

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

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CATENARY WIRE HEIGHTS					
	X/O	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–10¾"	27'–10¾"	28'–5¾"	26'–11¾"	26'–6"
CW	21'–5¾"	21'–2¾"	21'–10"	20'–3¾"	20'–1½"

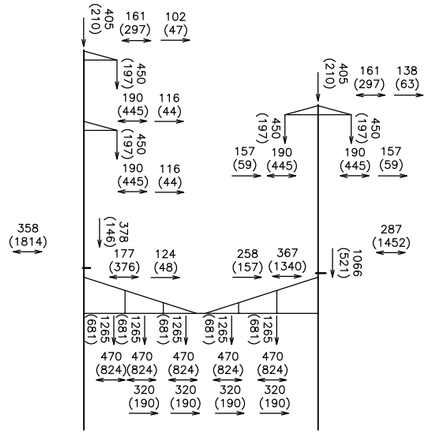
NA27A DIMENSIONS		
	TRACK 3	TRACK 4
T1	12"	1'–8½"
T2	2'–7½"	4'–0"



STRUCTURE ERECTION DIAGRAM T–426

1021+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	2
NA83	MESSENGER SUPPORT	ET–1904	1
NA29	MESSENGER SUPPORT	ET–1904	1
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	3
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPDE1	SIGNAL POWER DEADEND	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	3
POA61a	PULLOFF ASSEMBLY	ET–1903	1
SD31a	STEADY ASSEMBLY	ET–1902	1
PC1	SLIDING CLAMP	S–5214	1
PC5	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET – SINGLE	S–5201	2
BA8	TRANSMISSION BRACKET – DOUBLE	S–5206	1
CSC1	SLIDING BRACKET	S–5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
Baker
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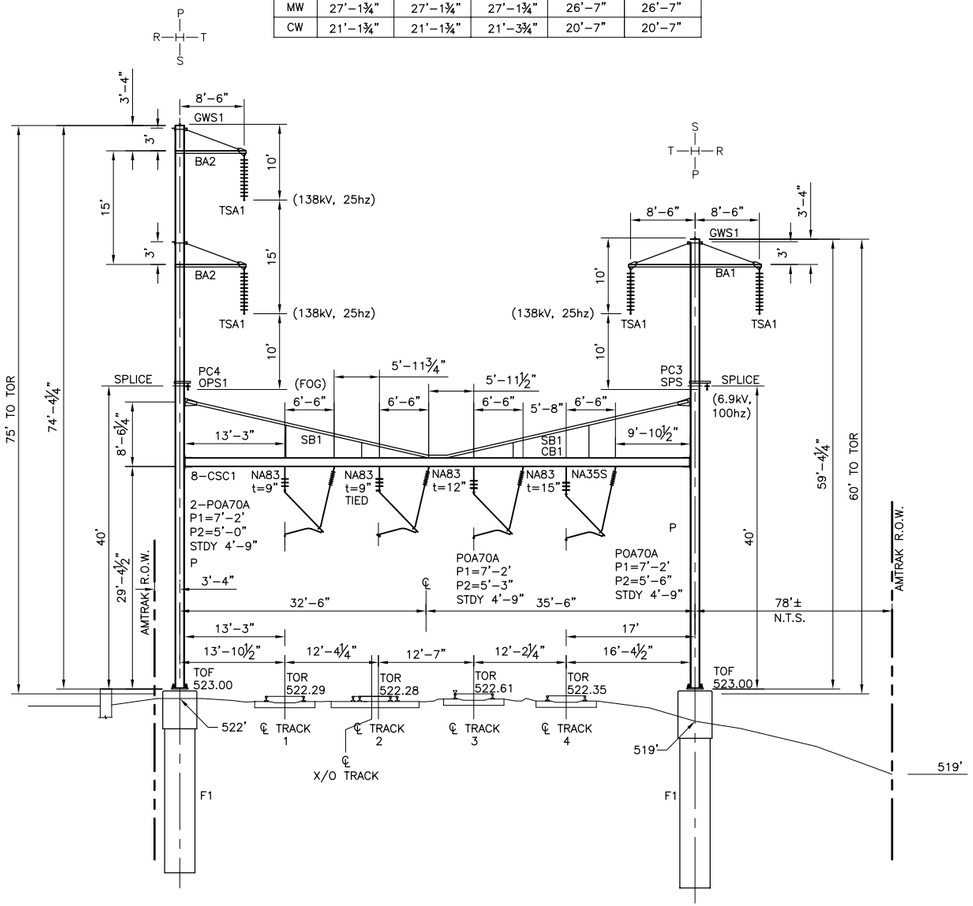
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–426

File No.:	2011–059–ET–1229.DWG
Ref. No.:	2011–059
Sheet No:	142 OF 565

ET–1229

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

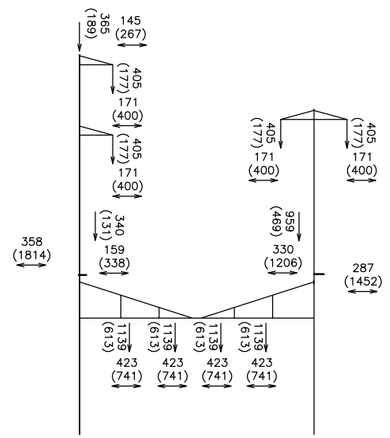
CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	XO 1/2	TRACK 3	TRACK 4
MW	27'–1¾"	27'–1¾"	27'–1¾"	26'–7"	26'–7"
CW	21'–1¾"	21'–1¾"	21'–3¾"	20'–7"	20'–7"



STRUCTURE ERECTION DIAGRAM T–425

1018+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
XHA8	SPREADER	ET–1901	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–425

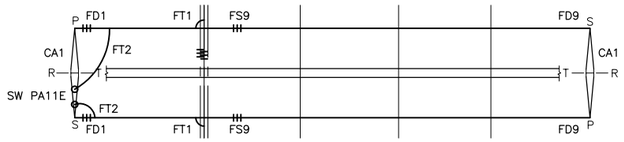
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Ref. No.:	2011–059
Sheet No:	143 OF 565

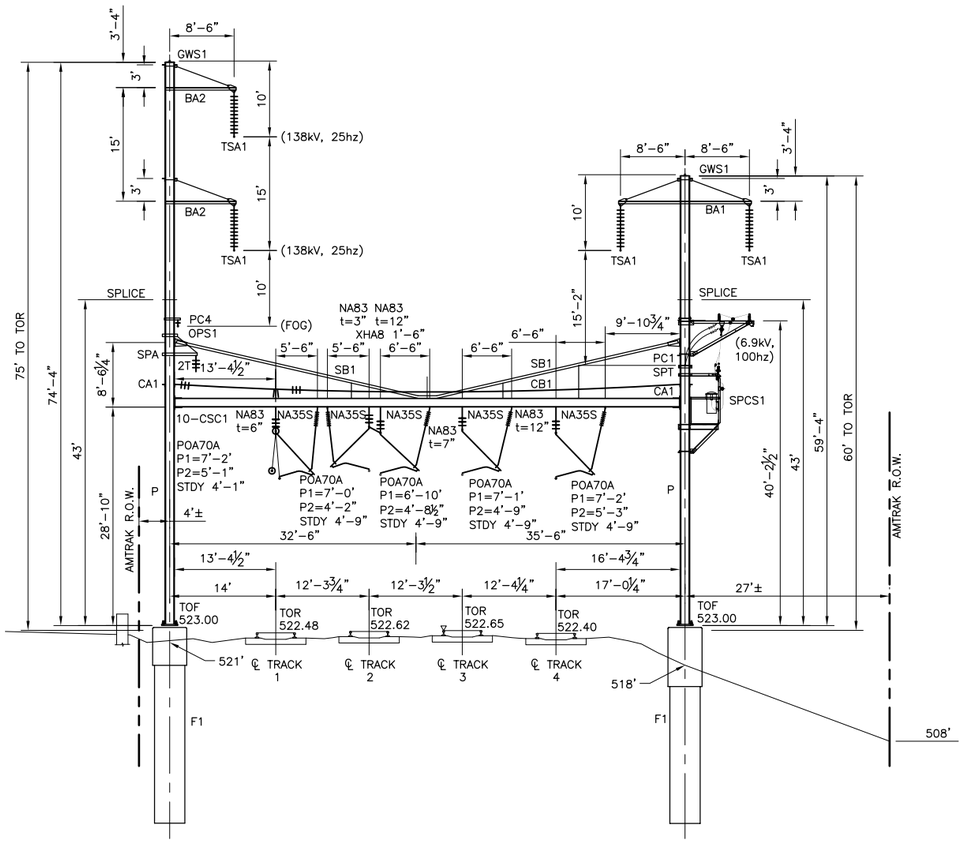
ET–1230

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

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CATENARY WIRE HEIGHTS					
	TRACK 1	TRACK 2	XO 1/2	TRACK 3	TRACK 4
MW	26'-7"	27'-0"	26'-8½"	26'-6"	26'-5¼"
CW	20'-4½"	21'-2½"	20'-8½"	20'-7"	20'-5¼"





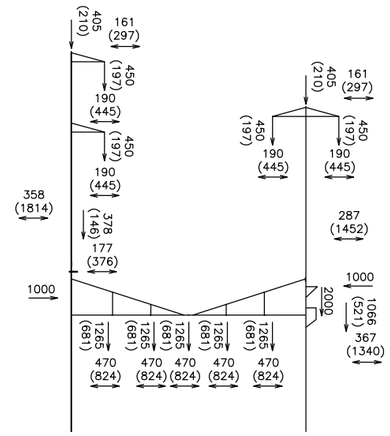
STRUCTURE ERECTION DIAGRAM T-424

1015+50

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	5
XHA8	SPREADER ASSEMBLY	ET-1901	1
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPT	SIGNAL POWER TERMINATION	ET-1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET-1810	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	5
FD1	FEEDER DEADEND	ET-1907	1
FD9	FEEDER DEADEND	ET-1907	1
FT1	FEEDER TAP	ET-1907	1
FT2	FEEDER TAP	ET-1907	1
SW	DISCONNECT SWITCH	ET-1910	1
MOD	SWITCH OPERATOR	ET-1910	1
CA1	CROSS TRACK FEEDER BRACKET	S-5212	2
SPA	SPIDER ARM BRACKET	S-5213	2
PC1	SLIDING CLAMP	S-5214	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	1
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
CSC1	SLIDING BRACKET	S-5214	10

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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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 ERECTION DIAGRAM T-424

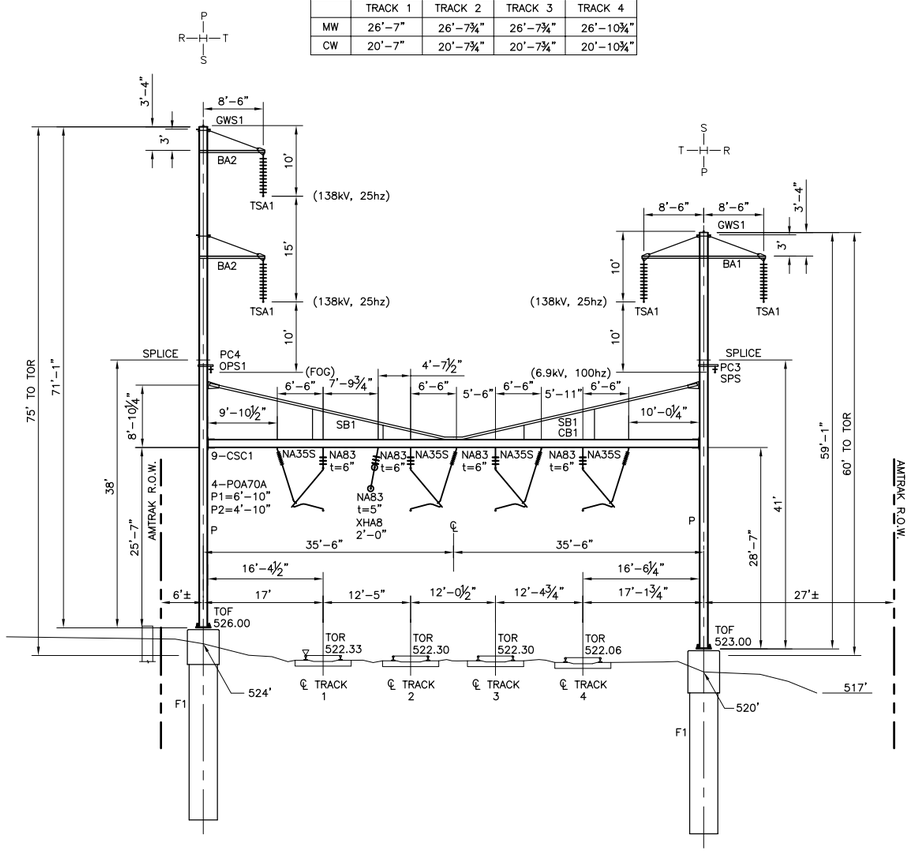
Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-1231.DWG
Ref. No.:	2011-059
Sheet No:	144 OF 565

ET-1231

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-7"	26'-7¾"	26'-7¾"	26'-10¾"
CW	20'-7"	20'-7¾"	20'-7¾"	20'-10¾"



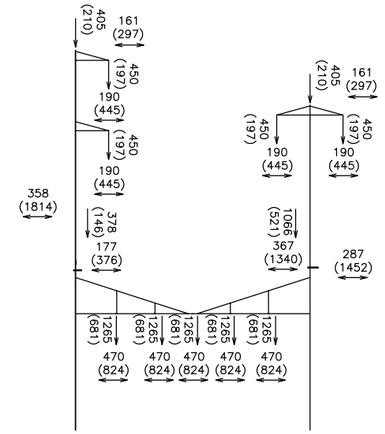
STRUCTURE ERECTION DIAGRAM T-423

1012+50

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)

300' LOAD SPAN

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
XHA8	SPREADER ASSEMBLY	ET-1901	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	1
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
CSC1	SLIDING BRACKET	S-5214	9

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH
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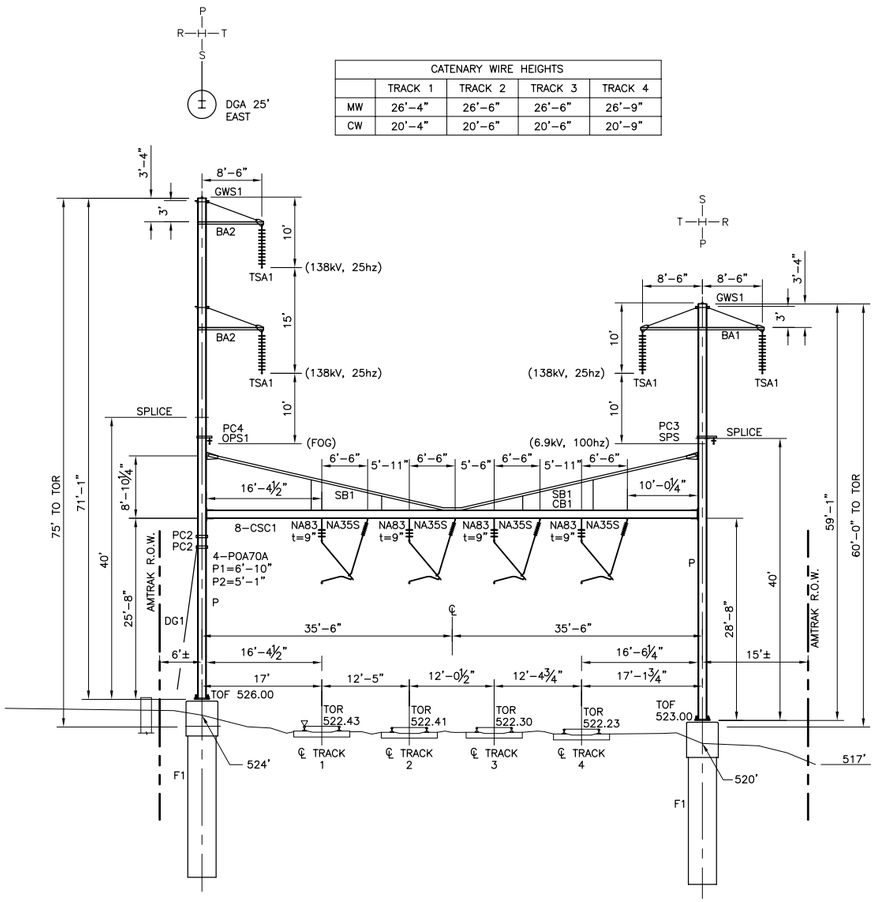
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-423

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

File No.:	2011-059-ET-1232.DWG
Ref. No.:	2011-059
Sheet No:	145 OF 565

ET-1232

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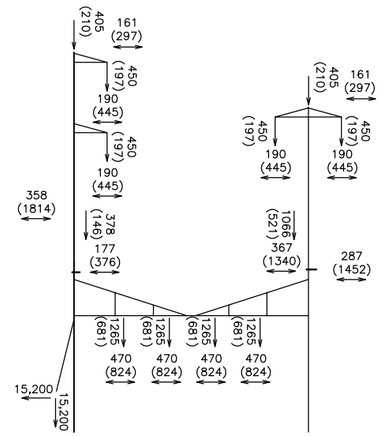


CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-4"	26'-6"	26'-6"	26'-9"
CW	20'-4"	20'-6"	20'-6"	20'-9"

STRUCTURE ERECTION DIAGRAM T-422

1009+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
300' LOAD SPAN

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
DG1	DOWN GUY	ET-1908	1
PC2	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	1
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
DGA	DOWN GUY FOUNDATION	S-5101	1
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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

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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-422

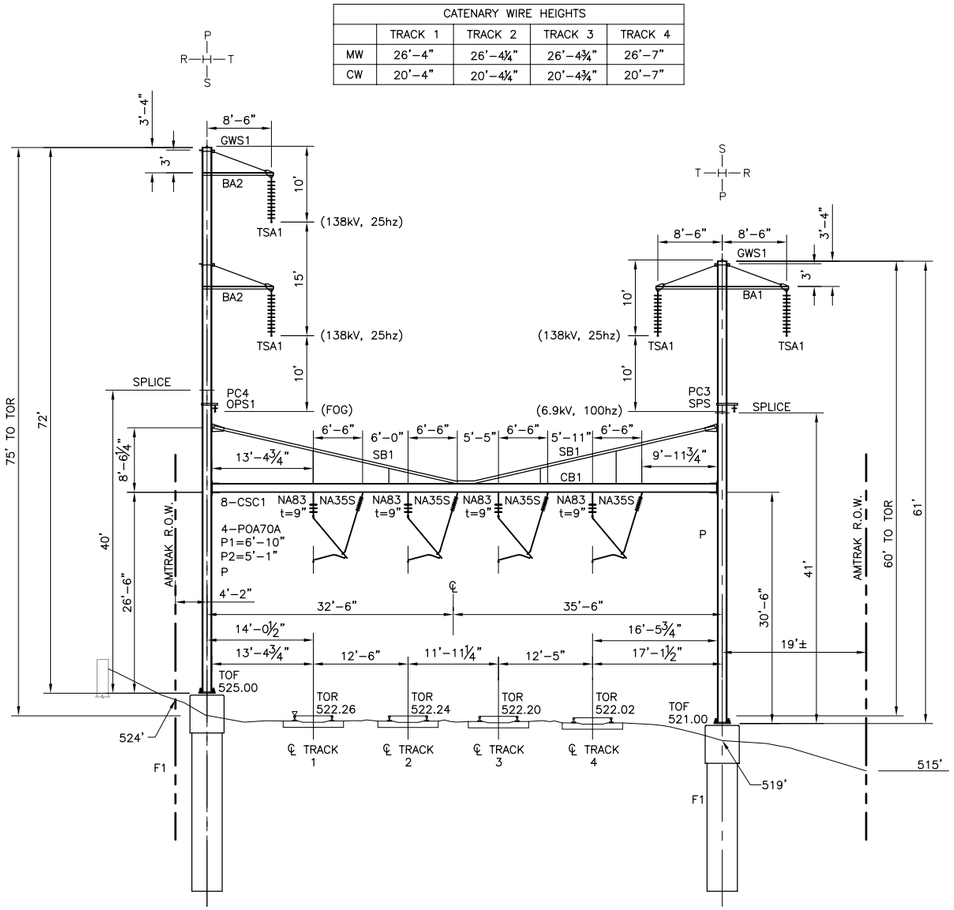
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-1233.DWG
Ref. No.:	2011-059
Sheet No:	146 OF 565

ET-1233

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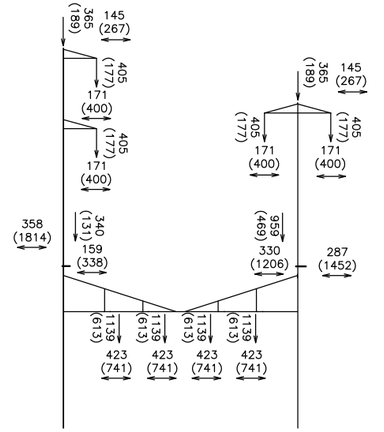
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	26'–4¼"	26'–4¾"	26'–7"
CW	20'–4"	20'–4¼"	20'–4¾"	20'–7"



STRUCTURE ERECTION DIAGRAM T–420

1006+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
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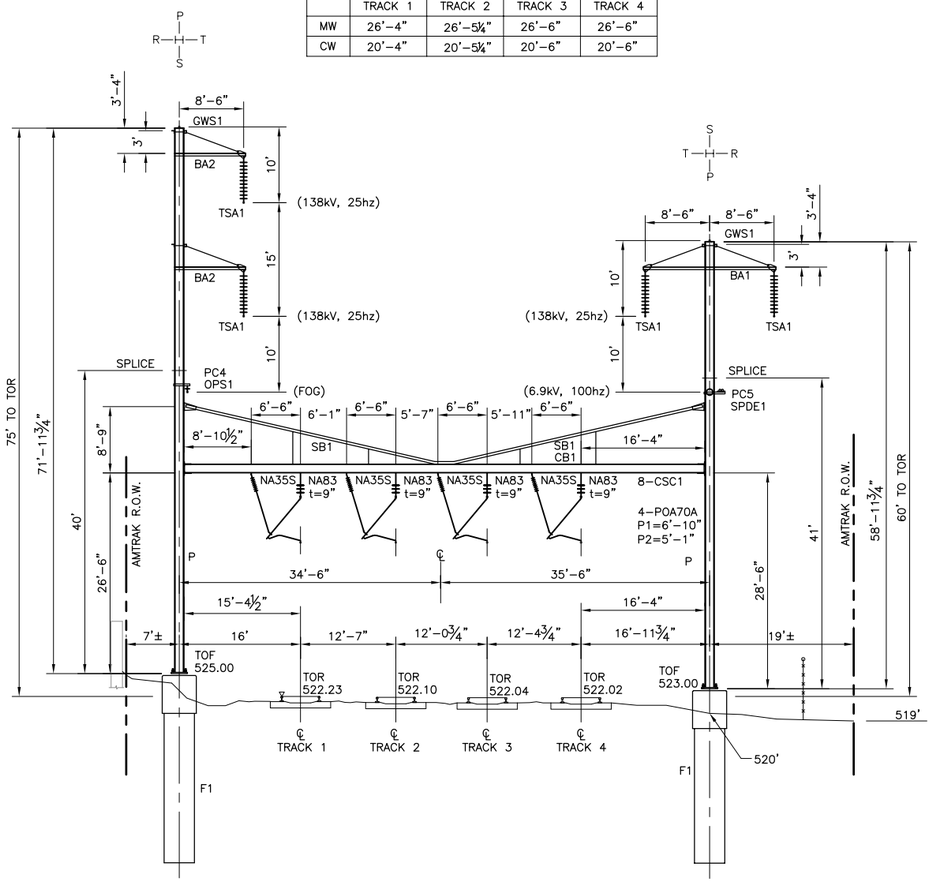
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–420

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

File No.:	2011–059–ET–1235.DWG
Ref. No.:	2011–059
Sheet No:	147 OF 565

ET–1235

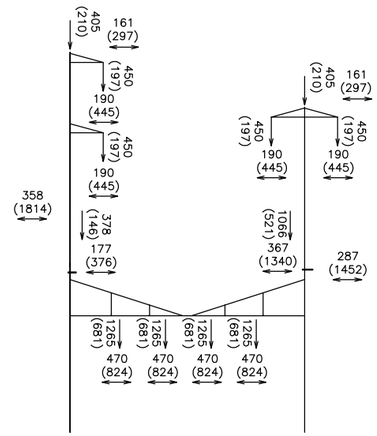
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	26'–5¼"	26'–6"	26'–6"
CW	20'–4"	20'–5¼"	20'–6"	20'–6"



STRUCTURE ERECTION DIAGRAM T–419

1003+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPDE1	SIGNAL POWER DEADEND	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC5	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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

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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 ERECTION DIAGRAM
T–419

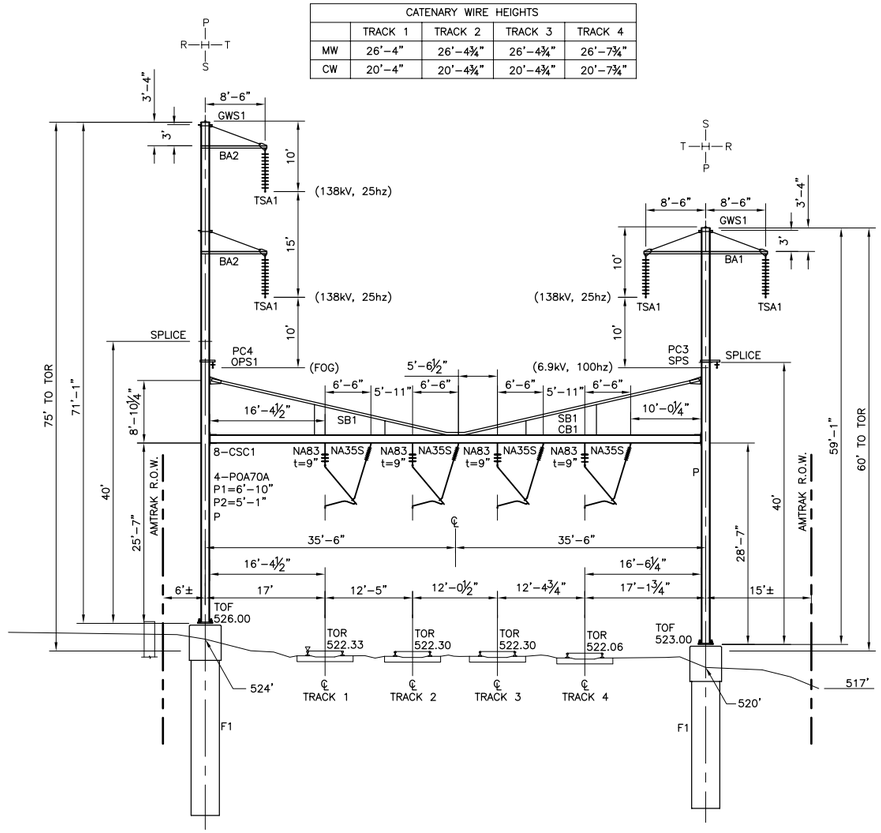
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–1236.DWG
Ref. No.:	2011–059
Sheet No:	148 OF 565

ET–1236

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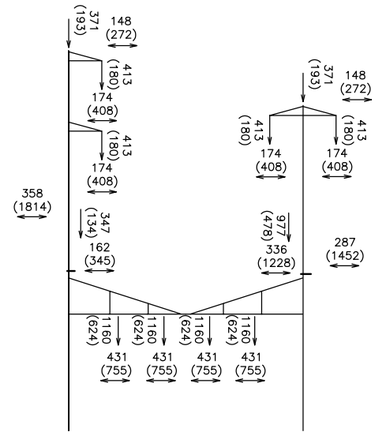
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-4"	26'-4¾"	26'-4¾"	26'-7¾"
CW	20'-4"	20'-4¾"	20'-4¾"	20'-7¾"



STRUCTURE ERECTION DIAGRAM T-418

1000+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	1
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-418

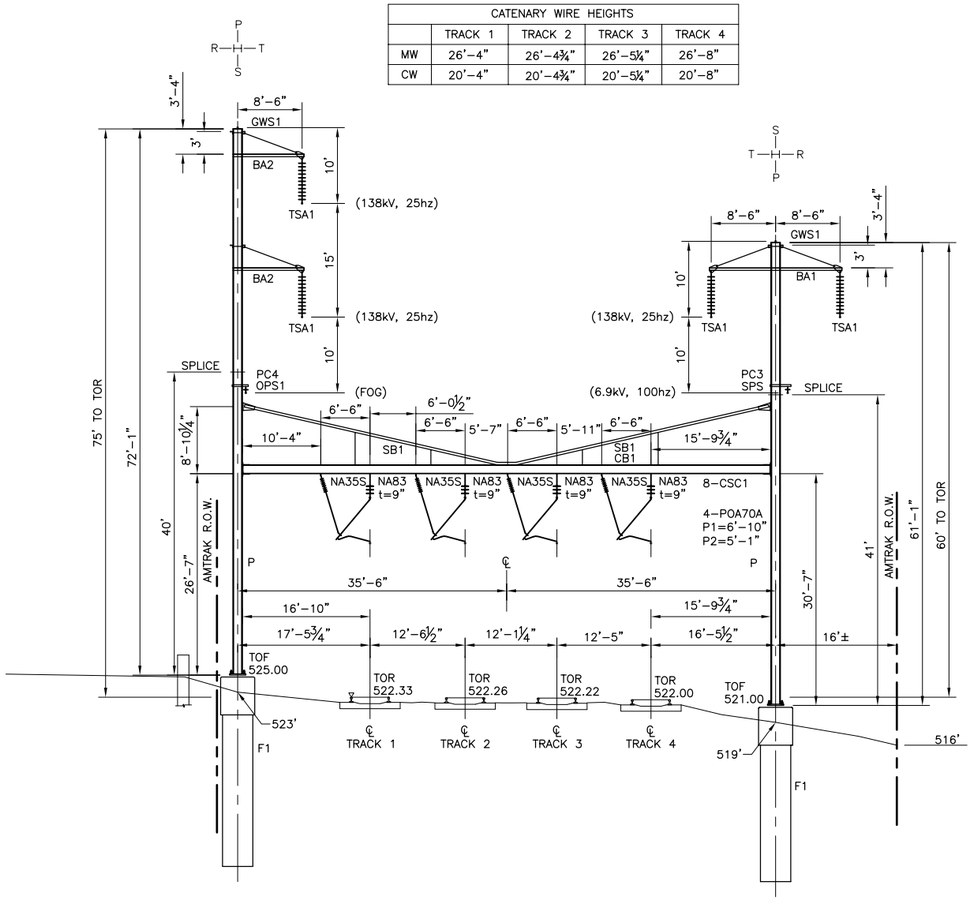
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Ref. No.:	2011-059
Sheet No:	149 OF 565

ET-1237

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	26'–4¾"	26'–5¼"	26'–8"
CW	20'–4"	20'–4¾"	20'–5¼"	20'–8"



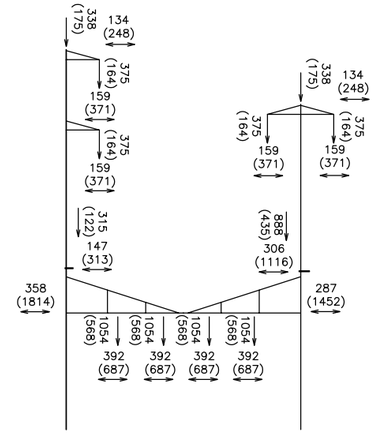
STRUCTURE ERECTION DIAGRAM T–417

998+00

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
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AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–417

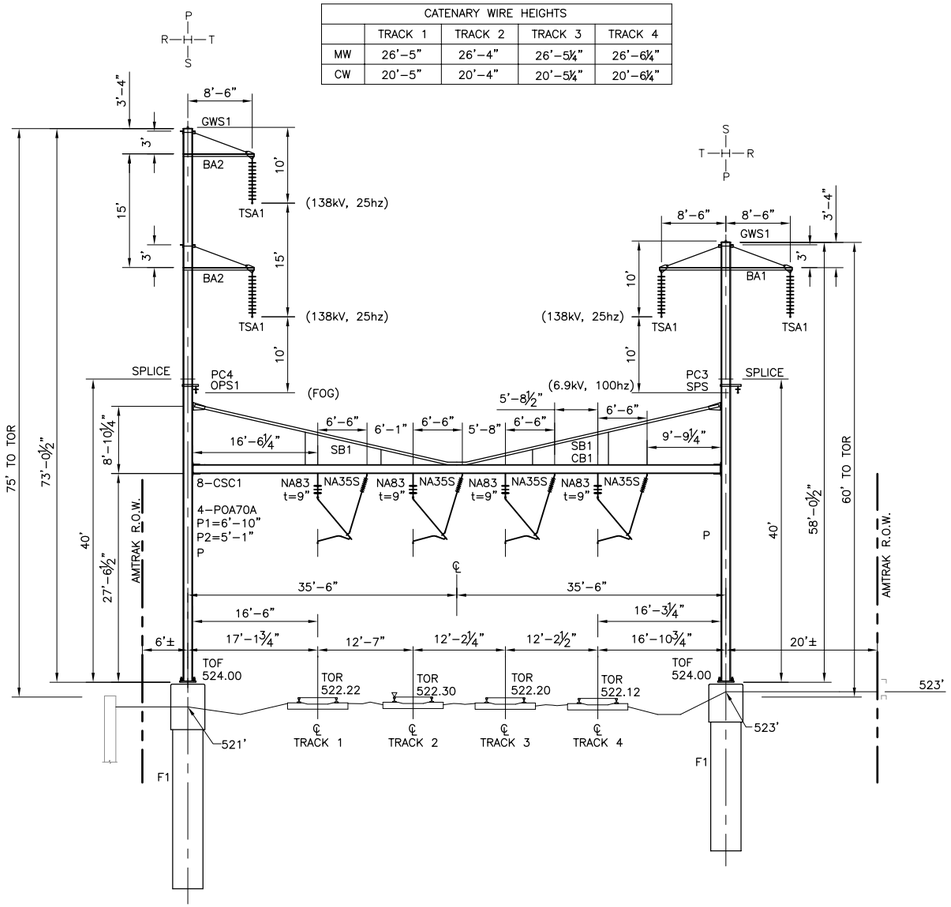
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–1238.DWG
Ref. No.:	2011–059
Sheet No:	150 OF 565

ET–1238

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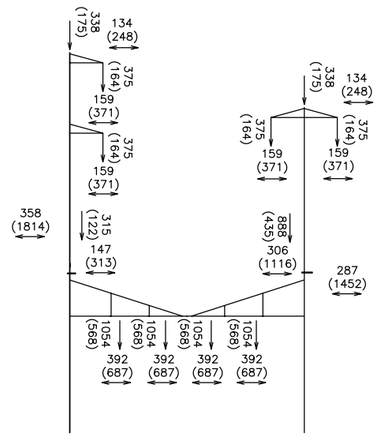
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–5"	26'–4"	26'–5¼"	26'–6¼"
CW	20'–5"	20'–4"	20'–5¼"	20'–6¼"



STRUCTURE ERECTION DIAGRAM T–416

995+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

3/14/2016 2:41:33 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\structural\2011-059-ET-1239.dwg

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30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

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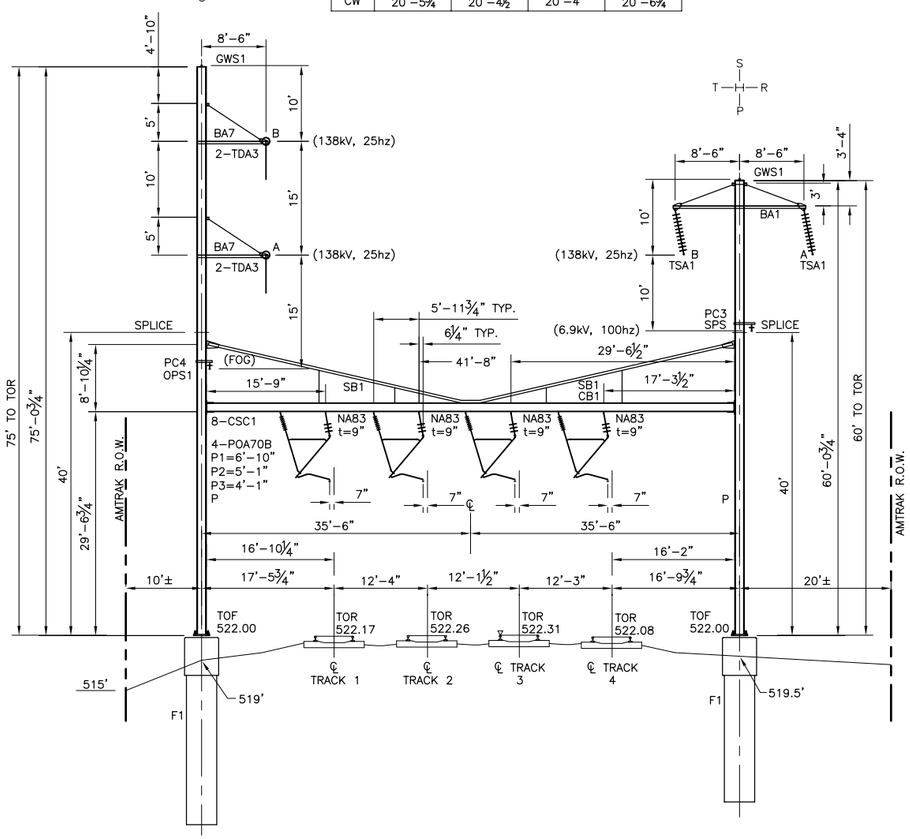
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–416

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

File No.:	2011–059–ET–1239.DWG
Ref. No.:	2011–059
Sheet No:	151 OF 565

ET–1239

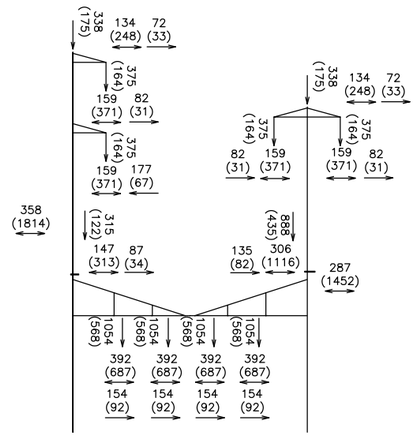
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-5¾"	26'-4½"	26'-4"	26'-6¾"
CW	20'-5¾"	20'-4½"	20'-4"	20'-6¾"



STRUCTURE ERECTION DIAGRAM T–415

993+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA7	TRANSMISSION BRACKET –SINGLE	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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

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IN ASSOCIATION WITH Baker AECOM

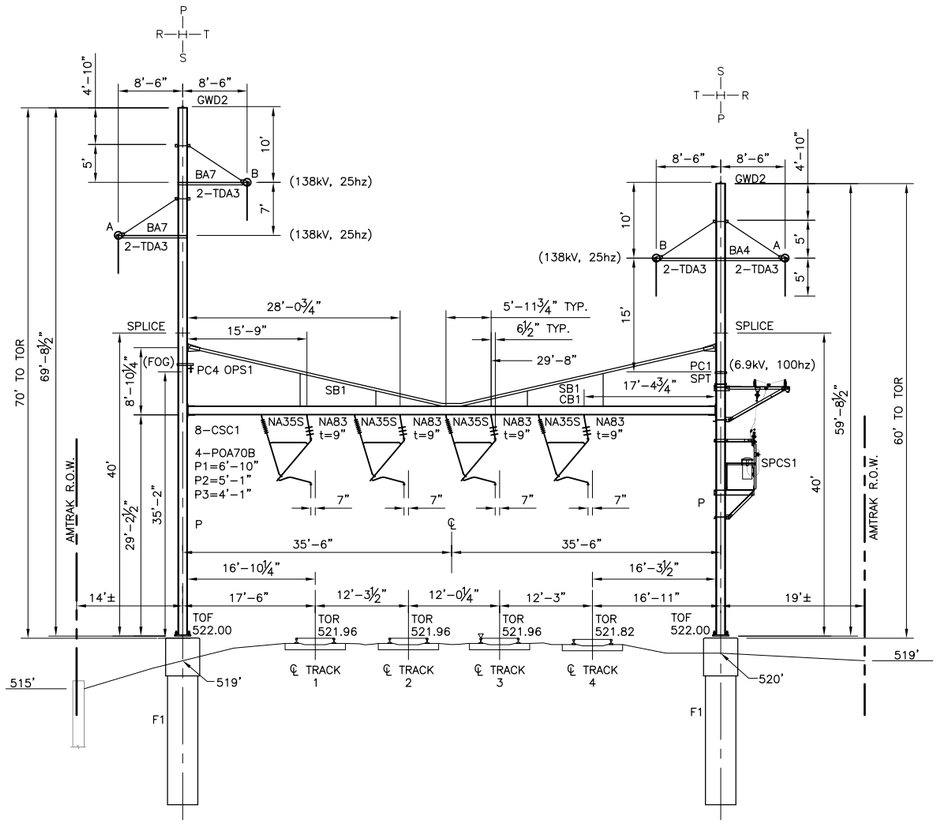
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–415

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

File No.:	2011–059–ET–1240.DWG
Ref. No.:	2011–059
Sheet No:	152 OF 565

ET–1240

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	26'–4"	26'–4"	26'–5½"
CW	20'–4"	20'–4"	20'–4"	20'–5½"



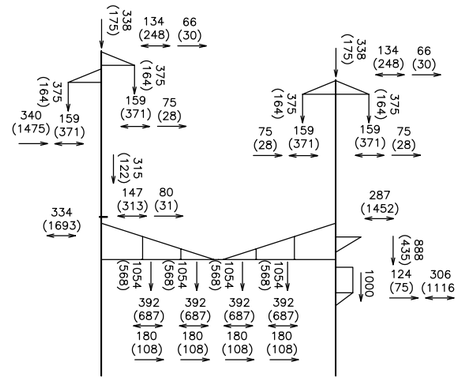
STRUCTURE ERECTION DIAGRAM T–414

990+50

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
OPS1	FOG WIRE SUPPORT	ET–1906	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
SPT	SIGNAL POWER TERMINATION	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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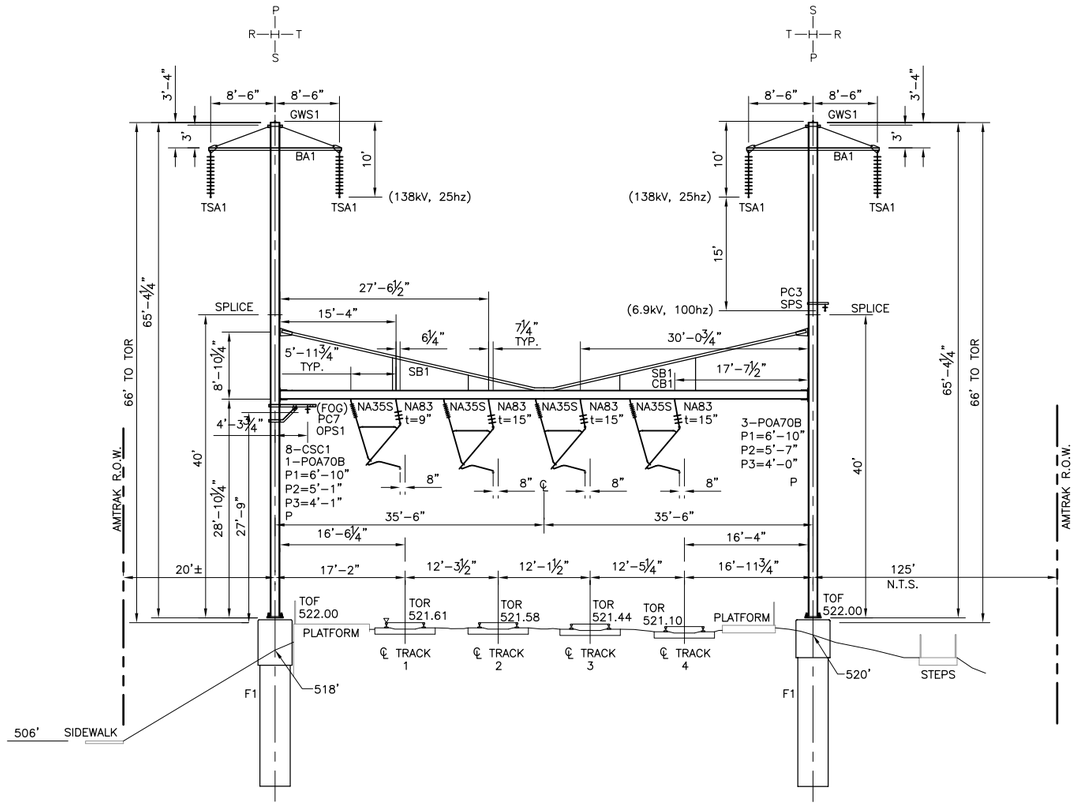
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–414

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

File No.:	2011–059–ET–1241.DWG
Ref. No.:	2011–059
Sheet No:	153 OF 565

ET–1241

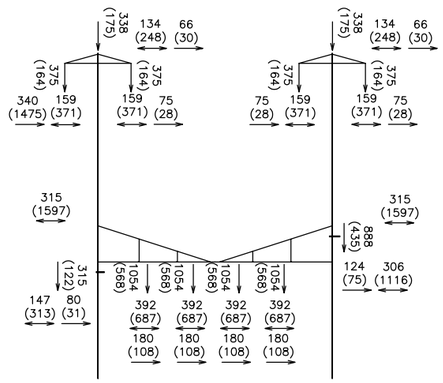
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	25'–10"	26'–0"	26'–4"
CW	20'–4"	19'–10"	20'–0"	20'–4"



STRUCTURE ERECTION DIAGRAM T–413

988+32
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
PC7	SLIDING CLAMP	S–5239	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–413

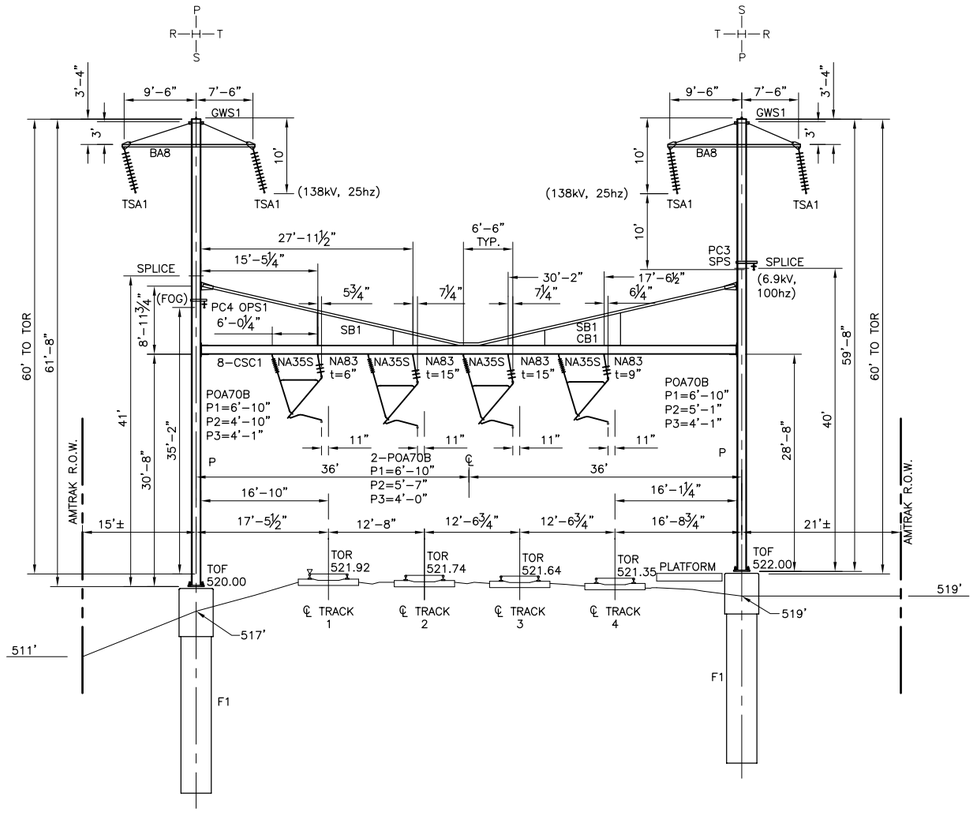
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011–059–ET–1242.DWG
Ref. No.:	2011–059
Sheet No:	154 OF 565

ET–1242

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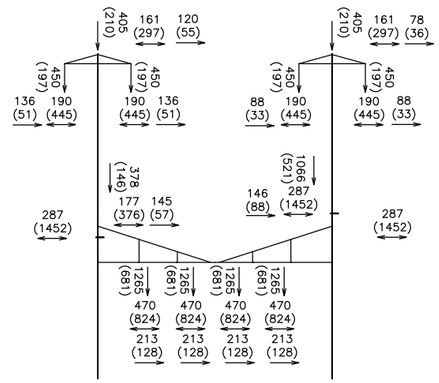
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1"	25'–6¼"	25'–7¼"	26'–4¾"
CW	20'–1"	19'–6¼"	19'–7¼"	20'–4¾"



STRUCTURE ERECTION DIAGRAM T–412

985+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PA070B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–412

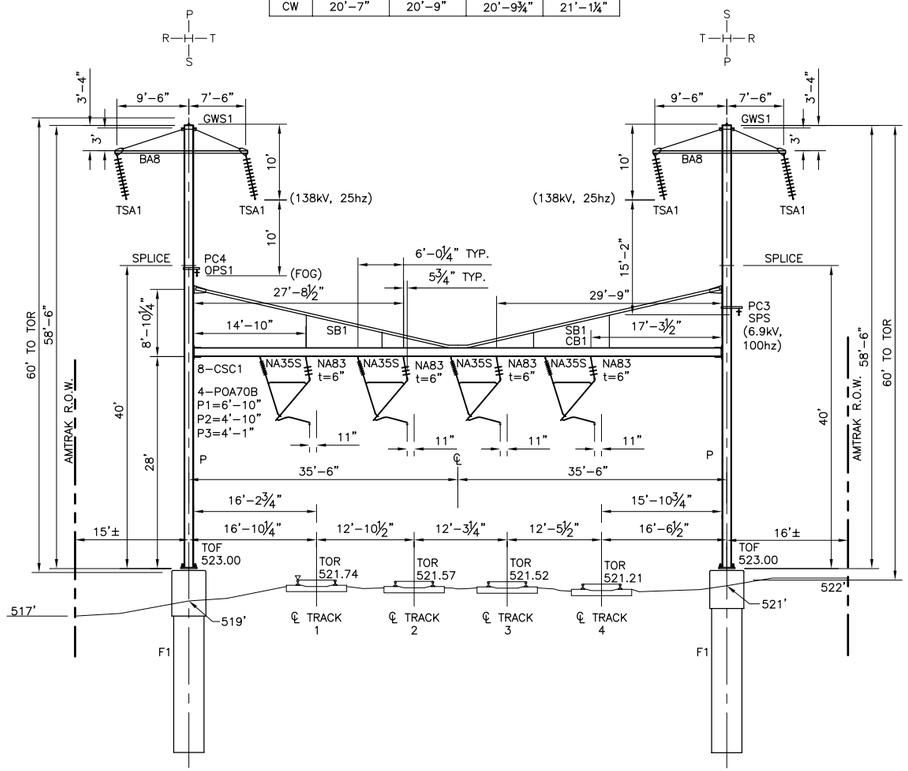
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-1243.DWG
Ref. No.:	2011–059
Sheet No:	155 OF 565

ET–1243

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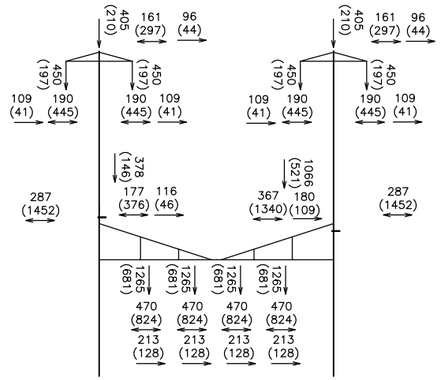
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–7"	26'–9"	26'–9¾"	27'–1¼"
CW	20'–7"	20'–9"	20'–9¾"	21'–1¼"



STRUCTURE ERECTION DIAGRAM T–411

982+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC4	SLIDING CLAMP	S–5215	1
PC3	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–411

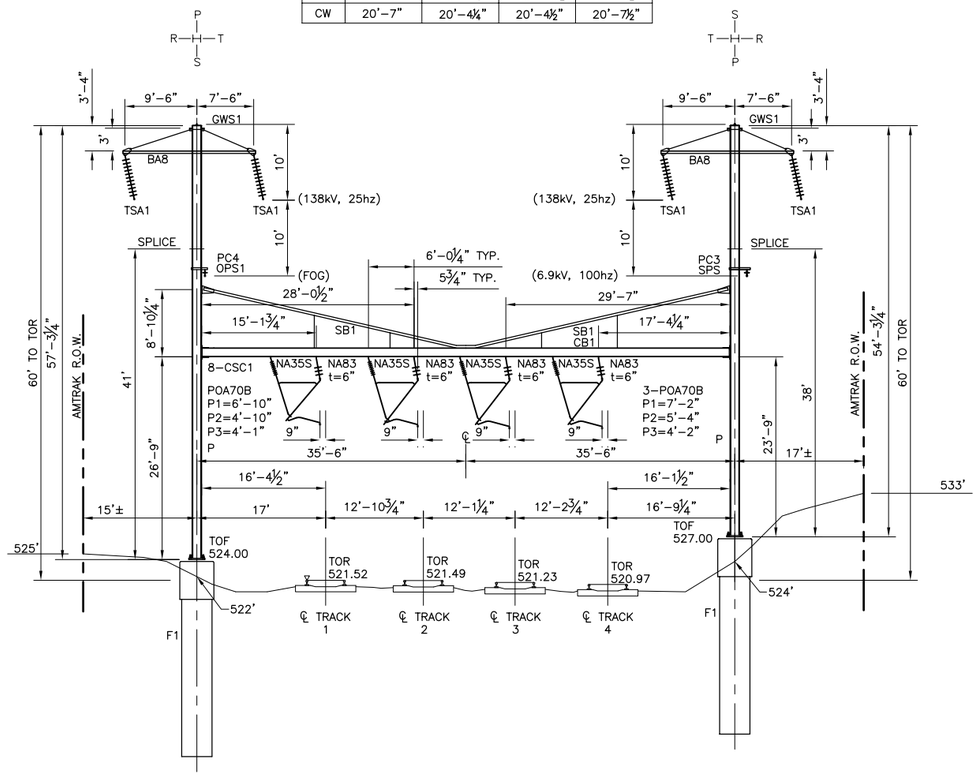
File No.:	2011–059–ET–1244.DWG
Ref. No.:	2011–059
Sheet No:	156 OF 565

ET–1244

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

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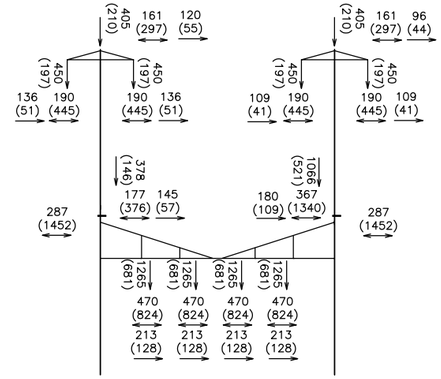
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–7"	26'–7⅛"	26'–10½"	27'–7½"
CW	20'–7"	20'–4¼"	20'–4½"	20'–7½"



STRUCTURE ERECTION DIAGRAM T–410

979+48
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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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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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 ERECTION DIAGRAM T–410

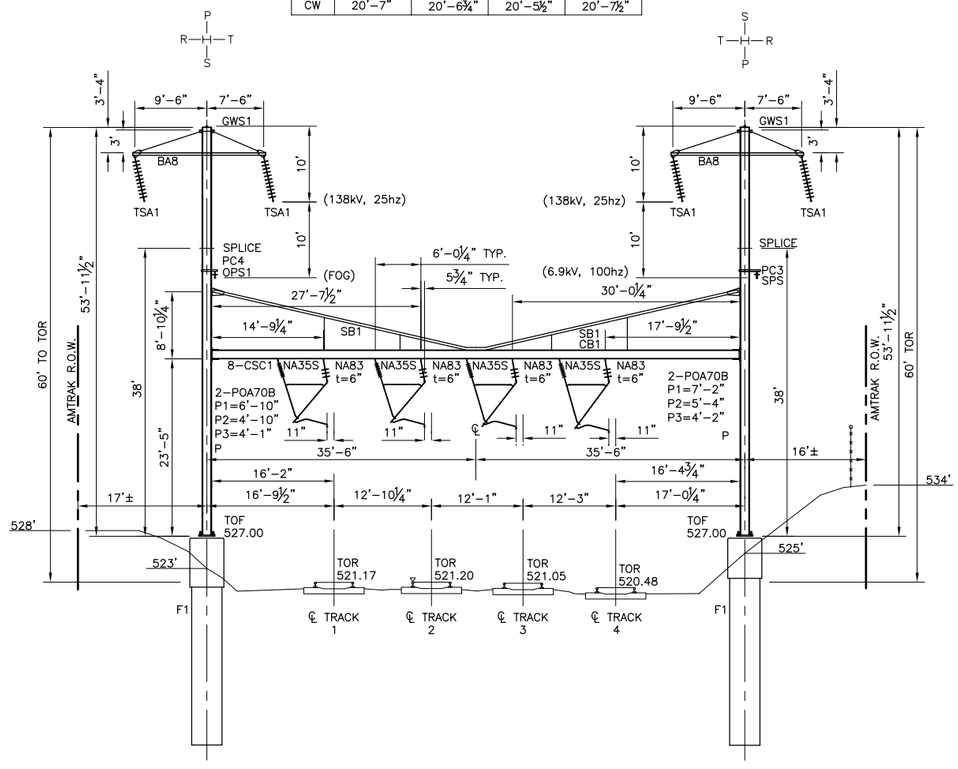
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File No.:	2011–059–ET–1245.DWG
Ref. No.:	2011–059
Sheet No:	157 OF 565

ET–1245

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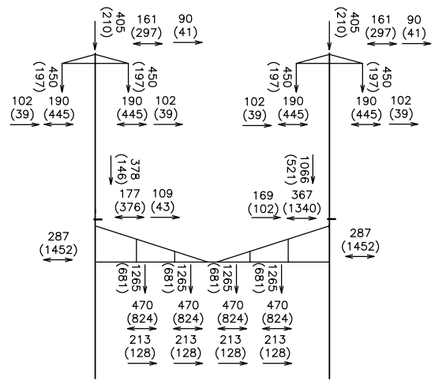
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–7"	26'–6¾"	26'–8½"	27'–7½"
CW	20'–7"	20'–6¾"	20'–5½"	20'–7½"



STRUCTURE ERECTION DIAGRAM T–409

976+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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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
STRUCTURAL ERECTION DIAGRAM
T–409

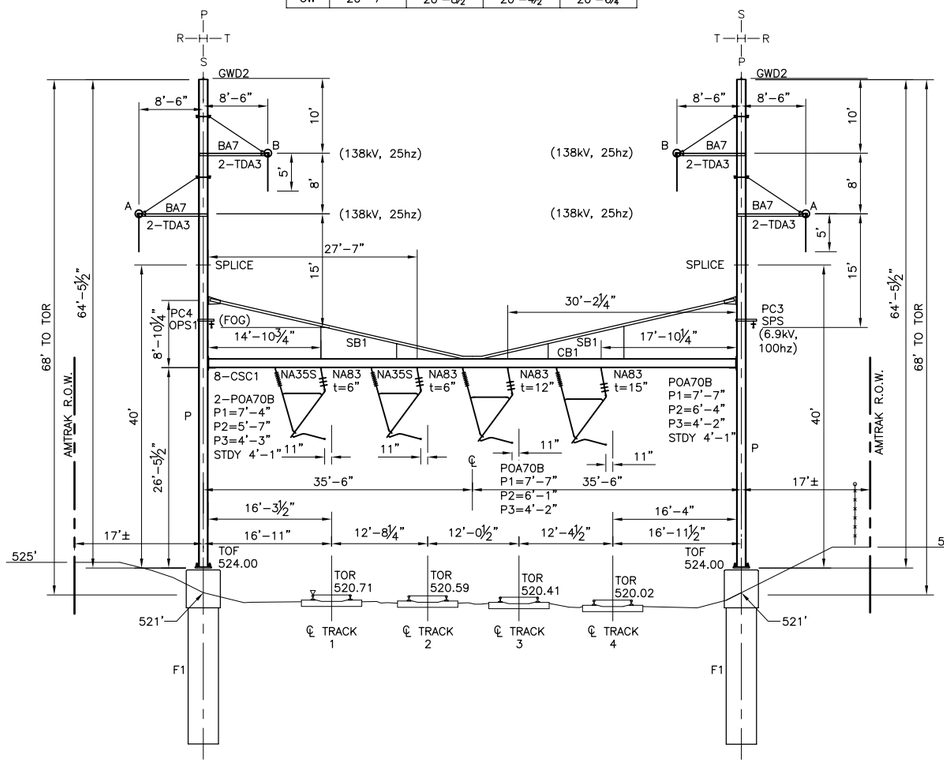
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File No.:	2011–059–ET–1246.DWG
Ref. No.:	2011–059
Sheet No:	158 OF 565

ET–1246

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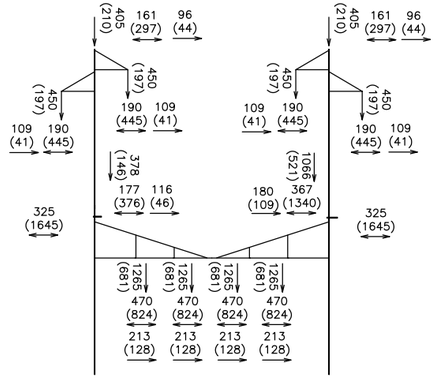
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–1"	27'–2½"	26'–10½"	27'–0¼"
CW	20'–7"	20'–8½"	20'–4½"	20'–6¼"



STRUCTURE ERECTION DIAGRAM T–408

973+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE ASSEMBLY DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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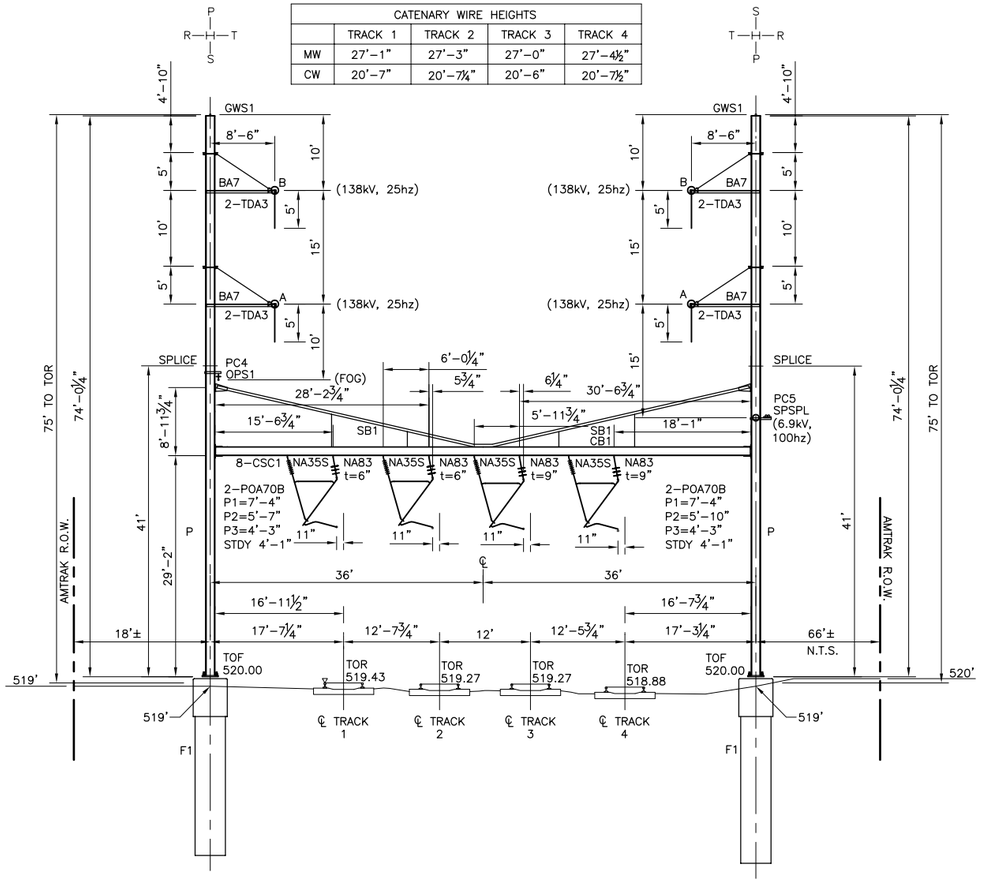
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–408

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

File No.:	2011-059-ET-1247.DWG
Ref. No.:	2011–059
Sheet No:	159 OF 565

ET–1247

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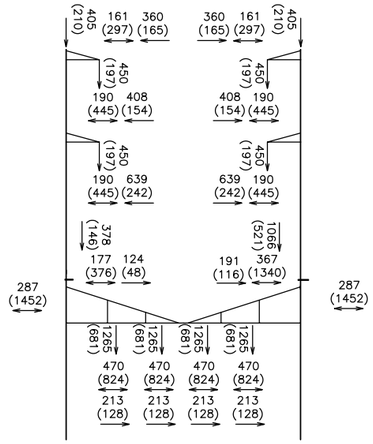
STRUCTURE ERECTION DIAGRAM T–407

970+49

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–407

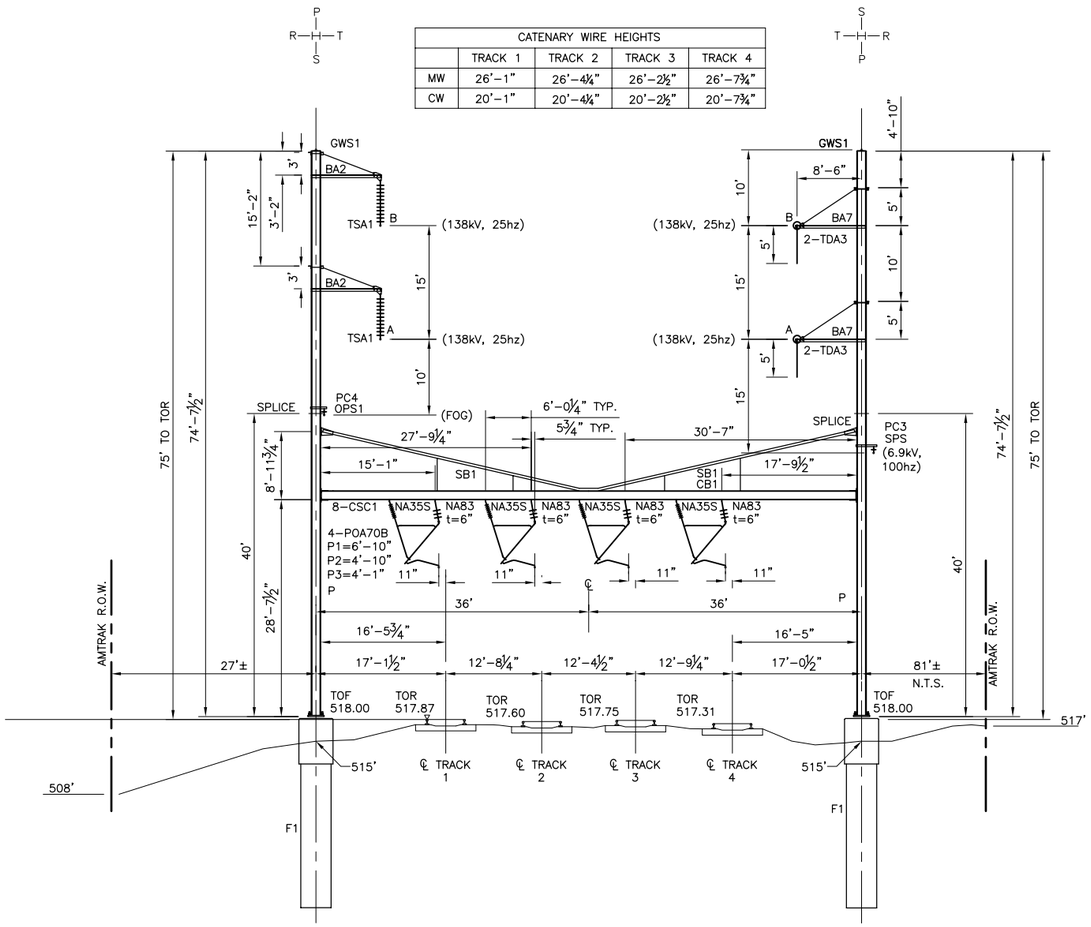
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Ref. No.:	2011–059
Sheet No:	160 OF 565

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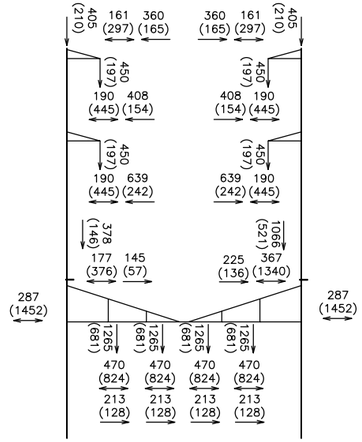
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1"	26'–4¼"	26'–2½"	26'–7¾"
CW	20'–1"	20'–4¼"	20'–2½"	20'–7¾"



STRUCTURE ERECTION DIAGRAM T–406

967+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	4
CSC1	SLIDING BRACKET	S–5214	8

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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–406

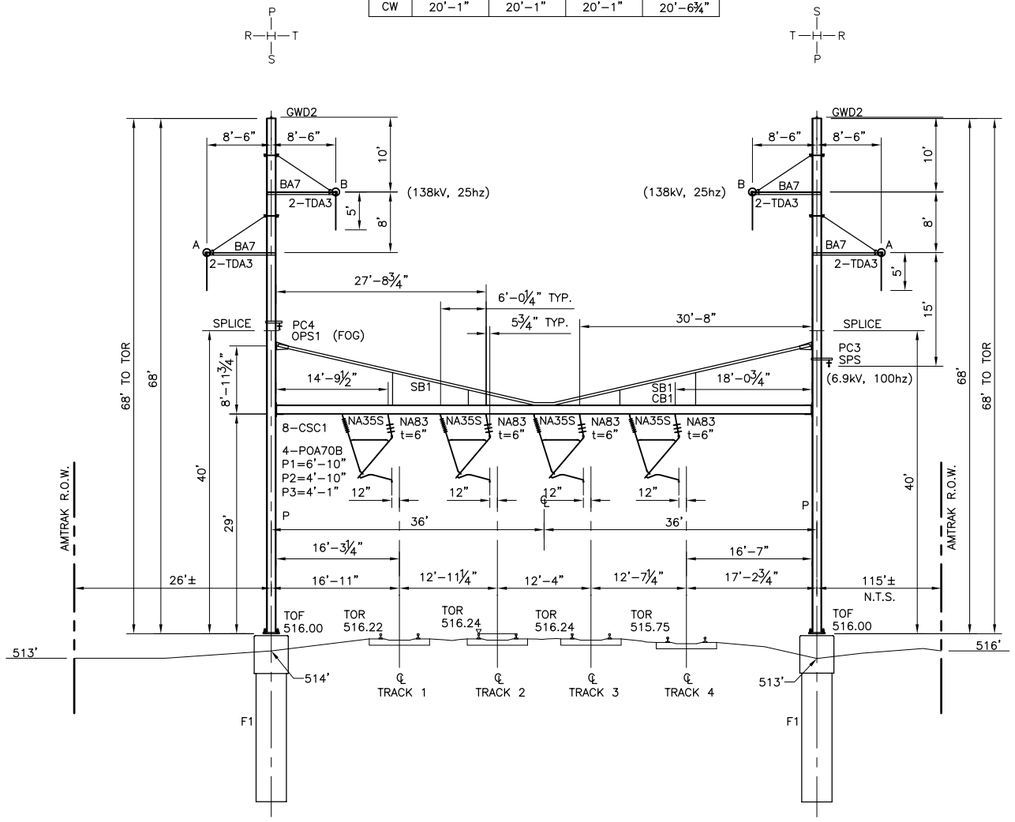
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Ref. No.:	2011–059
Sheet No:	161 OF 565

ET–1249

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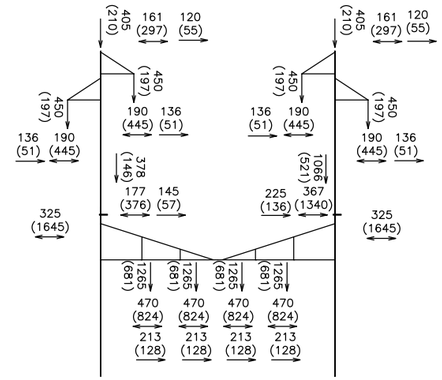
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1"	26'–1"	26'–1"	26'–6¾"
CW	20'–1"	20'–1"	20'–1"	20'–6¾"



STRUCTURE ERECTION DIAGRAM T–405

964+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE ASSEMBLY	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET DEADEND	S–5205	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

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AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–405

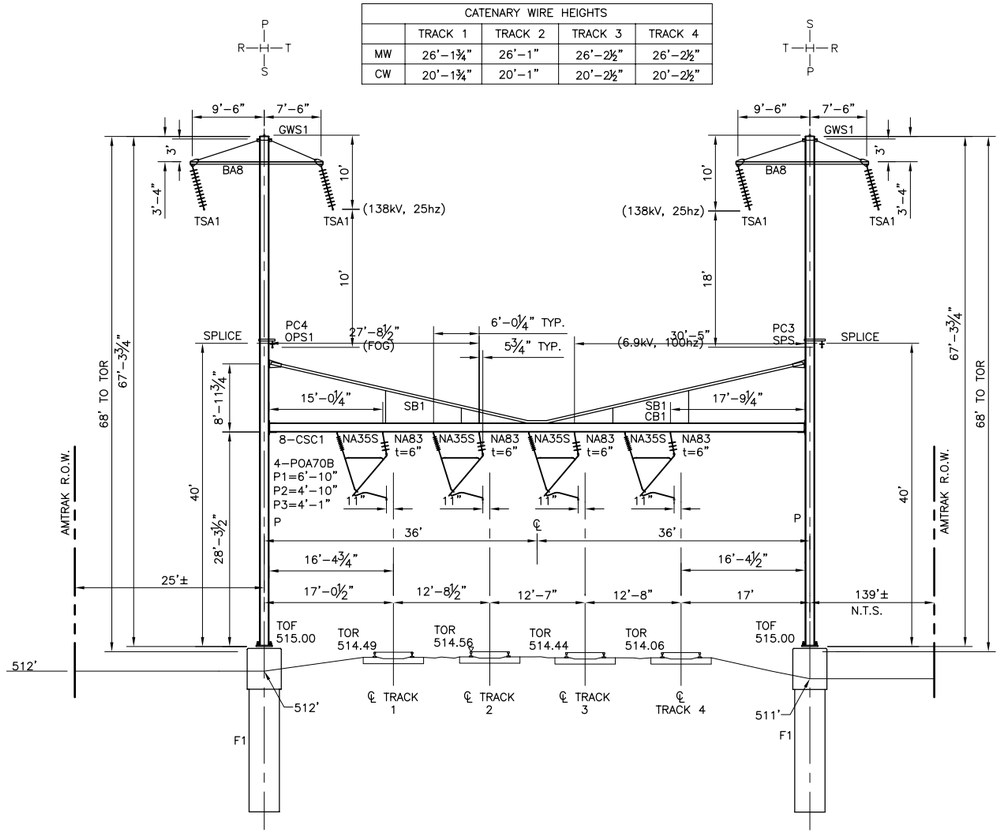
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File No.:	2011–059–ET–1250.DWG
Ref. No.:	2011–059
Sheet No:	162 OF 565

ET–1250

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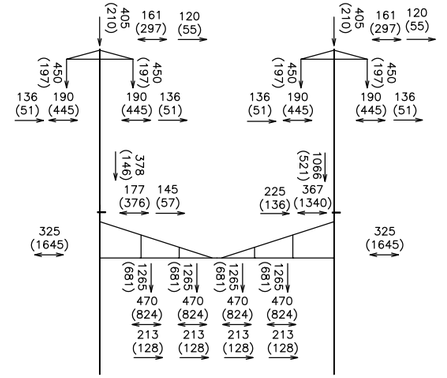
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1¾"	26'–1"	26'–2½"	26'–2½"
CW	20'–1¾"	20'–1"	20'–2½"	20'–2½"



STRUCTURE ERECTION DIAGRAM T–404

961+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5206	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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

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

IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–404

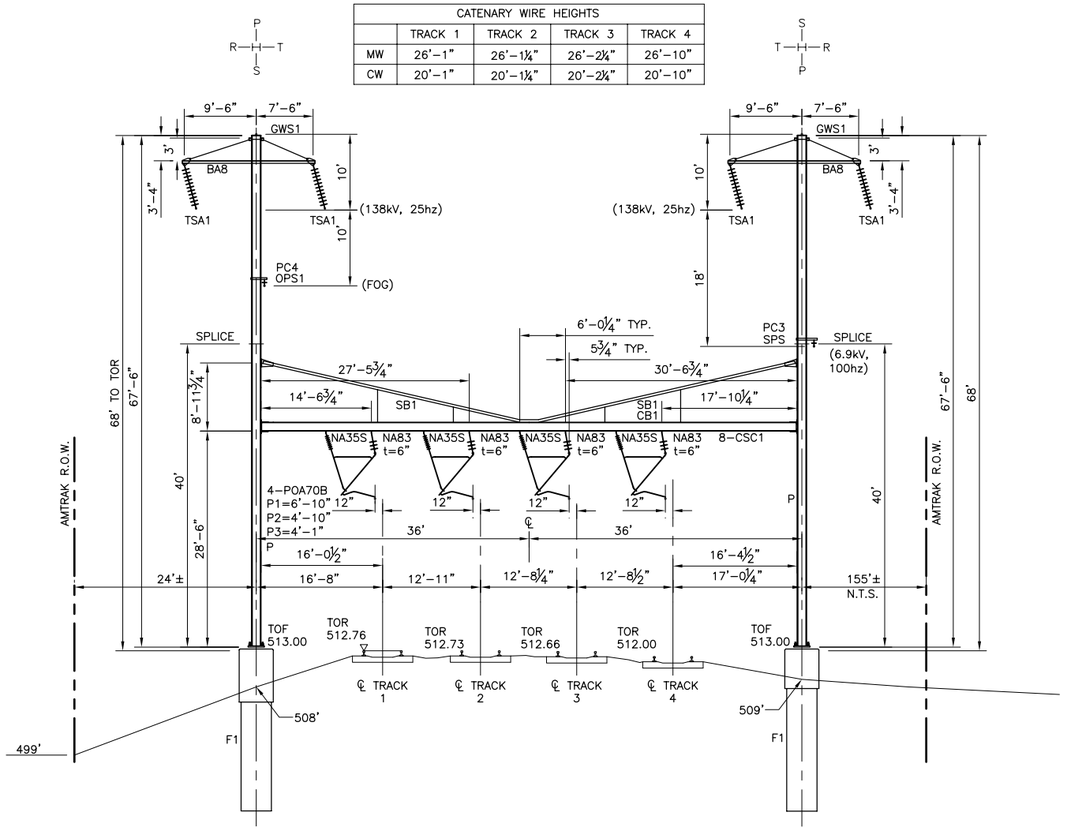
File No.:	2011–059–ET–1251.DWG
Ref. No.:	2011–059
Sheet No:	163 OF 565

ET–1251

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

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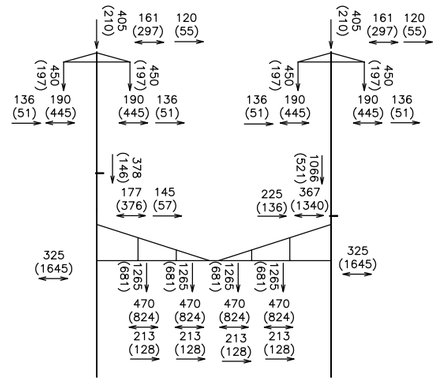
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1"	26'–1¼"	26'–2¼"	26'–10"
CW	20'–1"	20'–1¼"	20'–2¼"	20'–10"



STRUCTURE ERECTION DIAGRAM T–403

958+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5206	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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IN ASSOCIATION WITH

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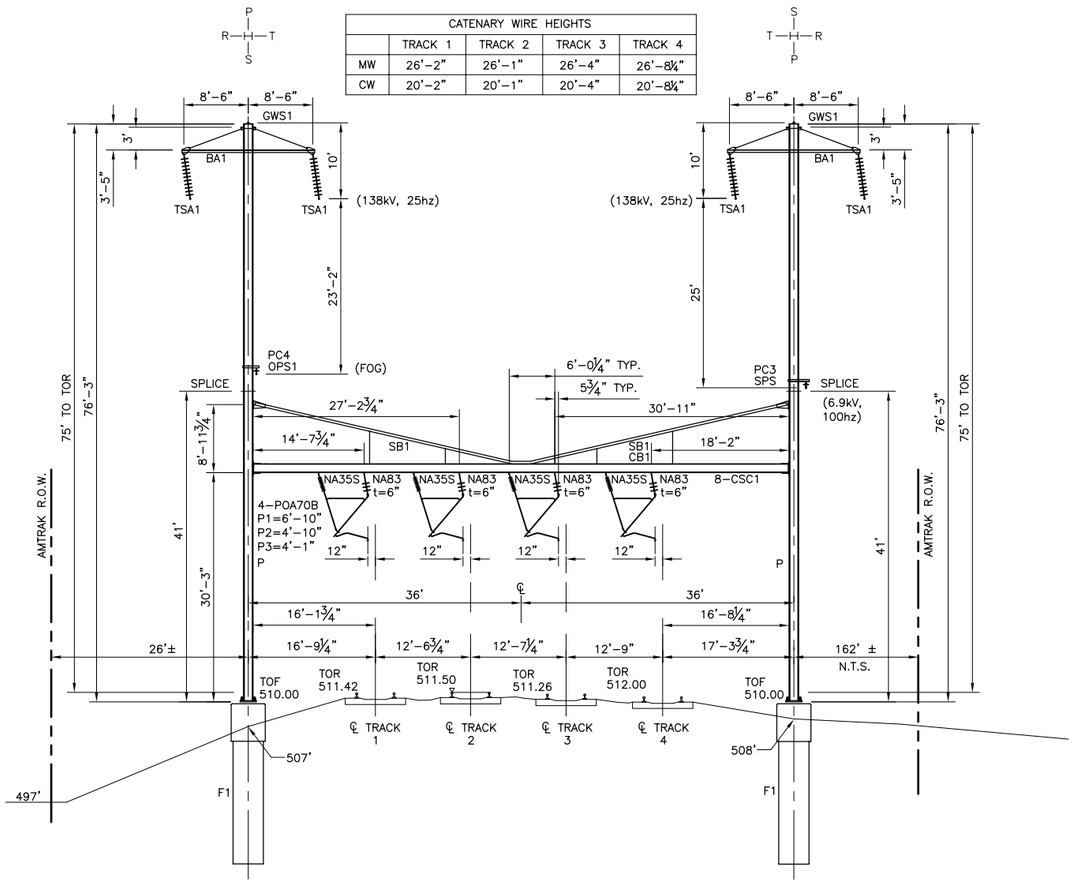
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–403

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

File No.:	2011–059–ET–1252.DWG
Ref. No.:	2011–059
Sheet No:	164 OF 565

ET–1252

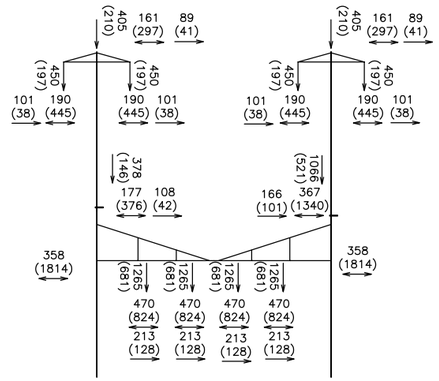
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STRUCTURE ERECTION DIAGRAM T–402

955+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5206	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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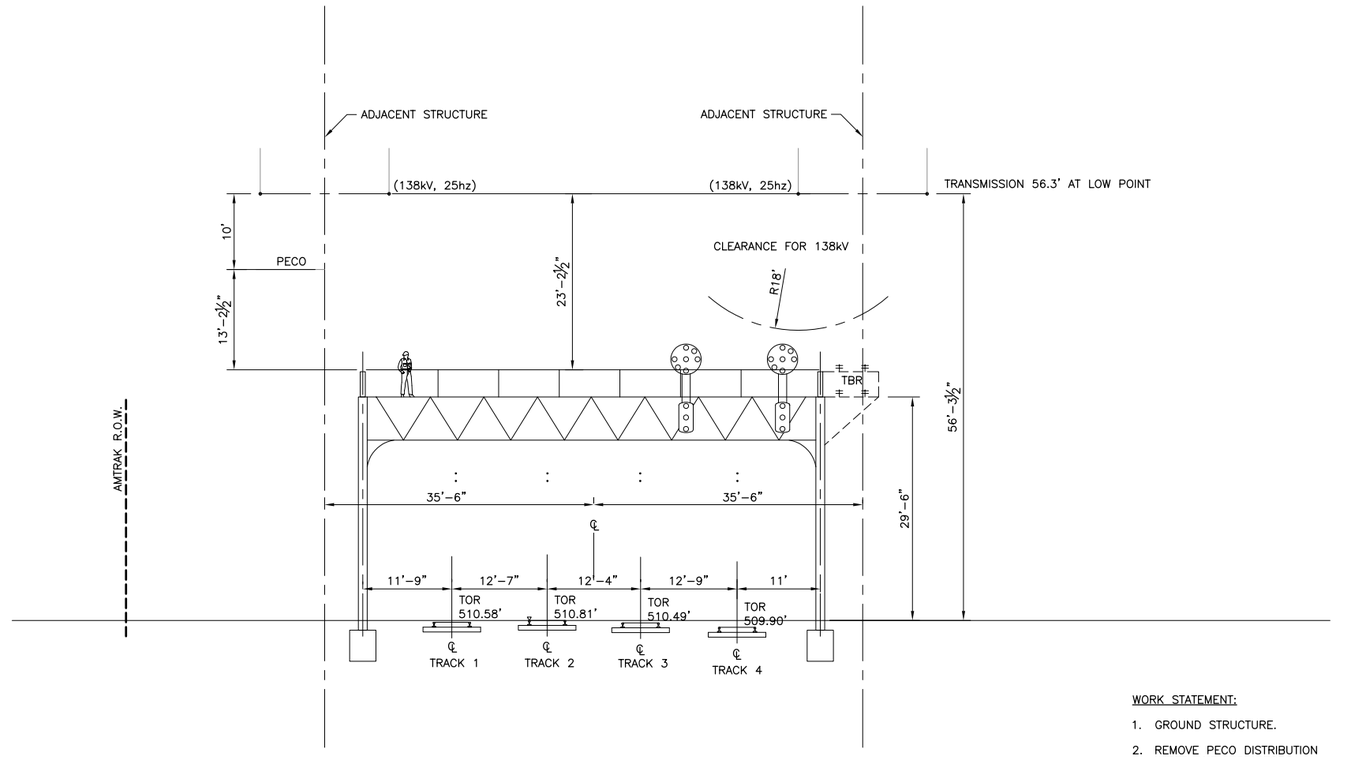
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–402

File No.:	2011–059–ET–1253.DWG
Ref. No.:	2011–059
Sheet No:	165 OF 565

ET–1253

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

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WORK STATEMENT:

1. GROUND STRUCTURE.
2. REMOVE PECO DISTRIBUTION WIRES AND INSULATORS.

STRUCTURE ERECTION DIAGRAM T-401 SB (EXISTING P-243A SB)

STATION 953+89
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-401 SB (P-243A SB)

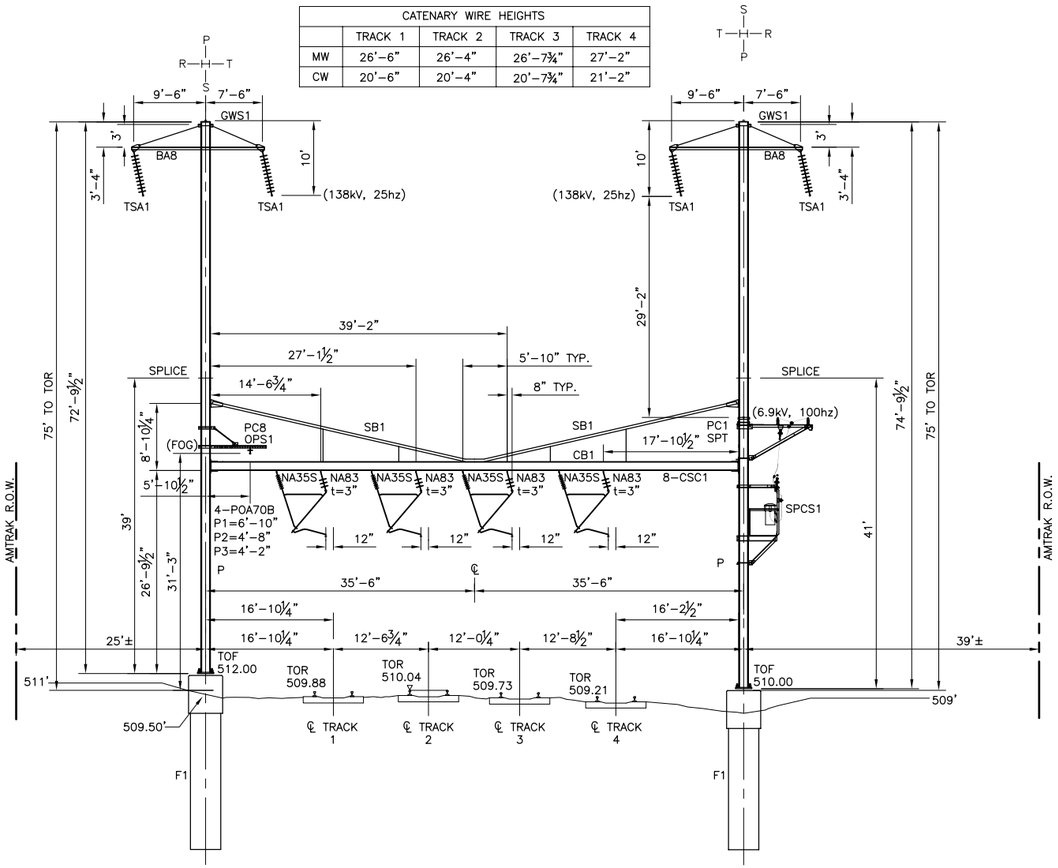
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-1254.DWG
Ref. No.:	2011-059
Sheet No:	166 OF 565

ET-1254

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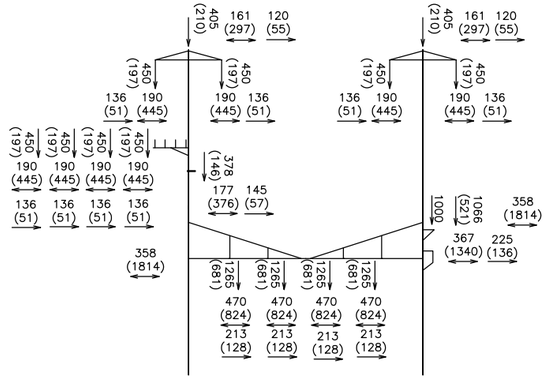
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–6"	26'–4"	26'–7¾"	27'–2"
CW	20'–6"	20'–4"	20'–7¾"	21'–2"



STRUCTURE ERECTION DIAGRAM T–400

952+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC1	SLIDING CLAMP	S–5215	1
PC8	SLIDING CLAMP	S–5240	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5206	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–400

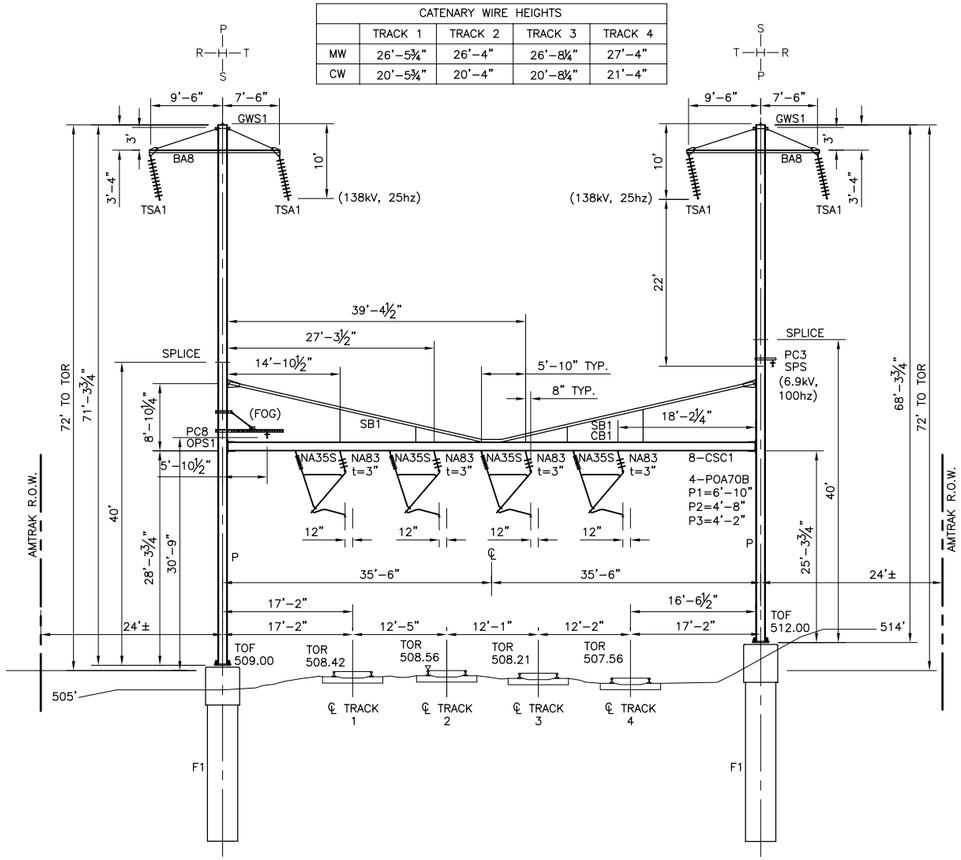
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Ref. No.:	2011–059
Sheet No:	167 OF 565

ET–1255

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–5¾"	26'–4"	26'–8¼"	27'–4"
CW	20'–5¾"	20'–4"	20'–8¼"	21'–4"



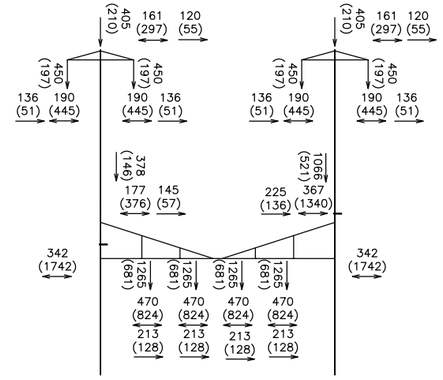
STRUCTURE ERECTION DIAGRAM T–399

949+49

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC8	SLIDING CLAMP	S–5240	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5206	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–399

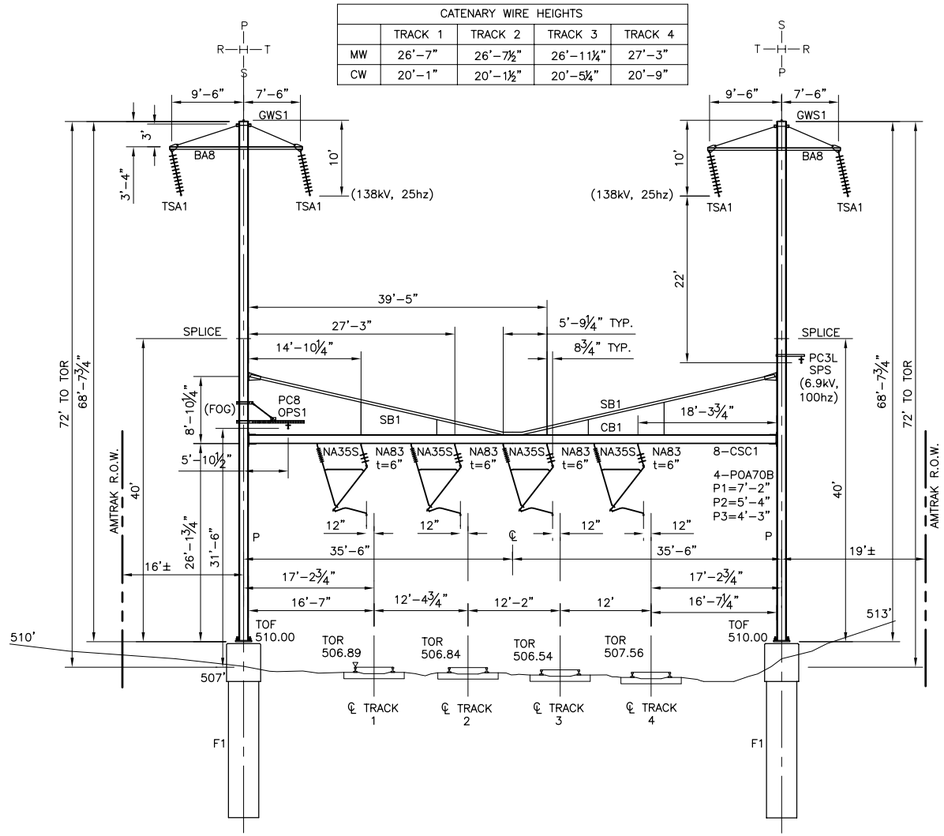
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File No.:	2011–059–ET–1256.DWG
Ref. No.:	2011–059
Sheet No:	168 OF 565

ET–1256

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-7"	26'-7½"	26'-11¼"	27'-3"
CW	20'-1"	20'-1½"	20'-5¼"	20'-9"



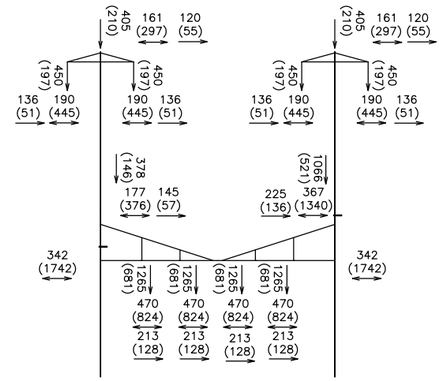
STRUCTURE ERECTION DIAGRAM T-398

946+49

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER TERMINATION	ET-1913	1
POA70B	REGISTRATION ASSEMBLY	ET-1902	4
PC3L	SLIDING CLAMP	S-5215	1
PC8	SLIDING CLAMP	S-5240	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET -DOUBLE	S-5206	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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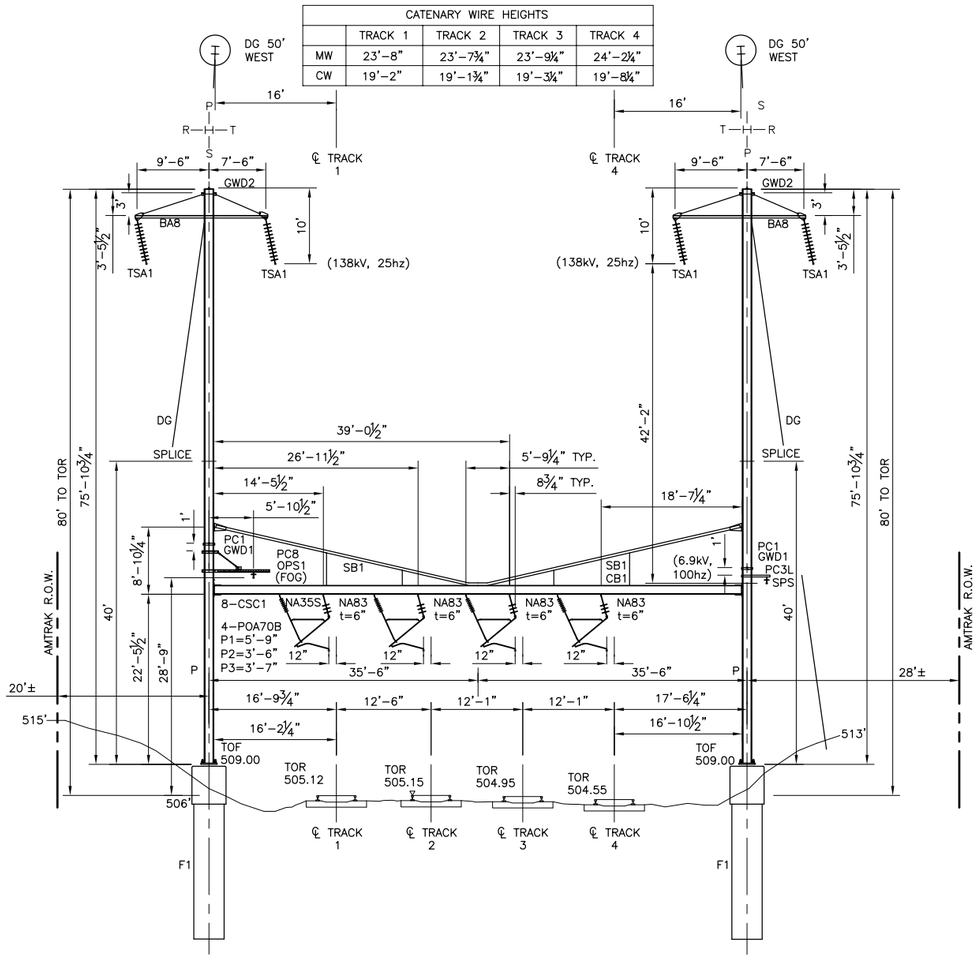
PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-398

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

File No.:	2011-059-ET-1257.DWG
Ref. No.:	2011-059
Sheet No:	169 OF 565

ET-1257

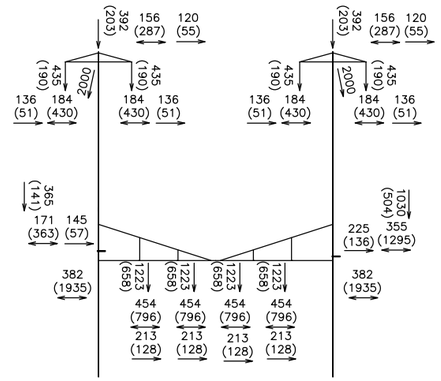
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STRUCTURE ERECTION DIAGRAM T-397

943+69
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWD2	GROUND WIRE ASSEMBLY	ET-1909	2
GWD1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70B	REGISTRATION ASSEMBLY	ET-1902	4
DG	DOWN GUY	ET-1908	2
PC1	SLIDING CLAMP	S-5214	2
PC3L	SLIDING CLAMP	S-5215	1
PC8	SLIDING CLAMP	S-5240	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET -DOUBLE	S-5206	2
DGA	DOWN GUY ANCHOR	S-5101	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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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 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-397

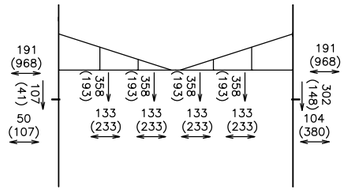
Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-1258.DWG
Ref. No.:	2011-059
Sheet No:	170 OF 565

ET-1258

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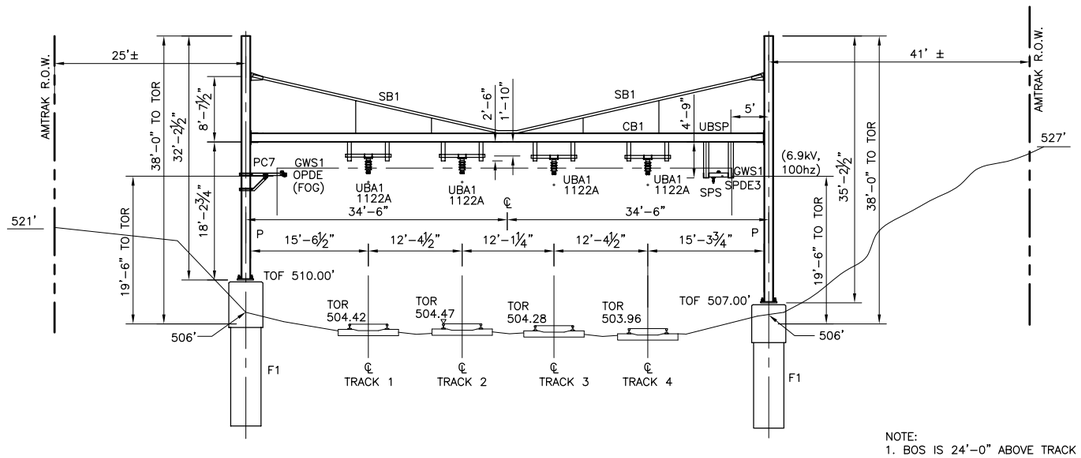
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
1122A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE SUPPORT	ET-1909	2
OPDE	FOG WIRE DEADEND	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEADEND	ET-1913	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
UBA1	UNDER BRIDGE BRACKET	S-5228	4
UBSP	SIGNAL POWER BRACKET	S-5240	1
PC7	SLIDING BRACKET	S-5239	1
PC4	SLIDING BRACKET	S-5215	1



LOADING DIAGRAM

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

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	20'-0"	19'-11"	20'-0½"	20'-5"
CW	18'-9"	18'-8½"	18'-7"	18'-11½"



NOTE:
1. BOS IS 24'-0" ABOVE TRACK 2

STRUCTURE ERECTION DIAGRAM T-396

942+51
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

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

Approved	Date

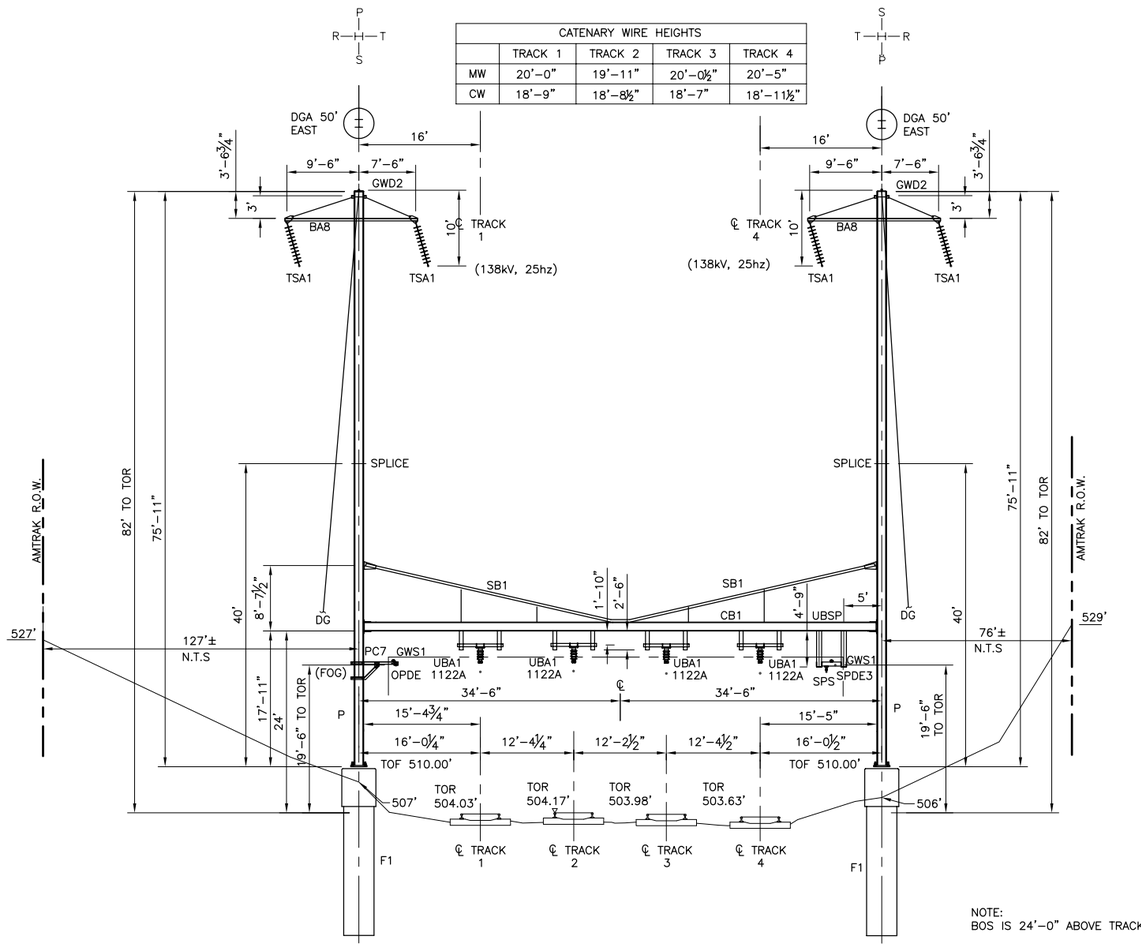
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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-396

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

File No.:	2011-059-ET-1259.DWG
Ref. No.:	2011-059
Sheet No:	171 OF 565

ET-1259



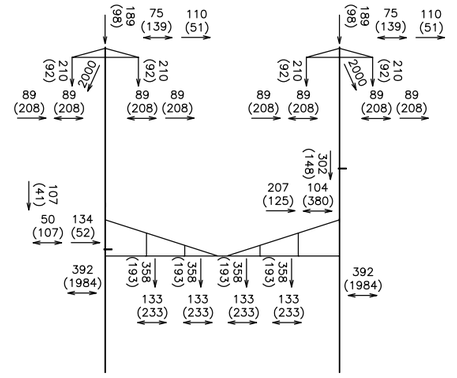
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	20'-0"	19'-11"	20'-0½"	20'-5"
CW	18'-9"	18'-8½"	18'-7"	18'-11½"

NOTE:
BOS IS 24'-0" ABOVE TRACK 2.

STRUCTURE ERECTION DIAGRAM T-395

942+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
140' TRANSMISSION SPAN
85' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
1122A	MESSENGER SUPPORT	ET-1904	4
GWD2	GROUND WIRE ASSEMBLY	ET-1909	2
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPDE	FOG WIRE DEADEND	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEADEND	ET-1913	1
DG	DOWNGUY	ET-1902	2
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET - DOUBLE	S-5200	2
UBA1	UNDER BRIDGE BRACKET	S-5228	4
UBSP	SIGNAL POWER BRACKET	S-5240	1
PC4	SLIDING CLAMP	S-5215	1
PC7	SLIDING CLAMP	S-5239	1
DGA	DOWNGUY ANCHOR	S-5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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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
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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-395

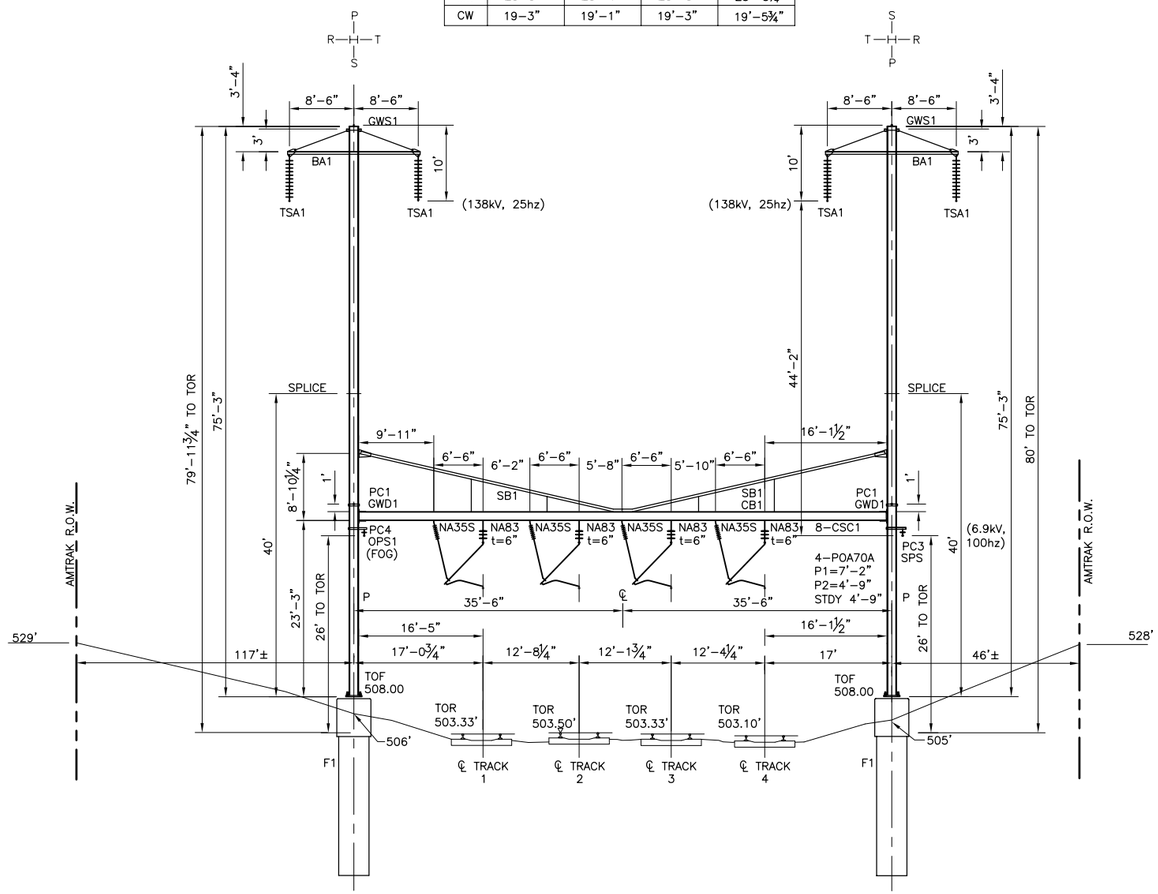
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Ref. No.:	2011-059
Sheet No:	172 OF 565

ET-1260

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

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'-3"	25'-1"	25'-3"	25'-5¾"
CW	19'-3"	19'-1"	19'-3"	19'-5¾"



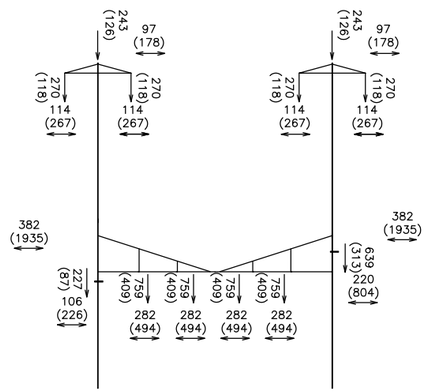
STRUCTURE ERECTION DIAGRAM T-394

940+89

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
GWD1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC1	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-394

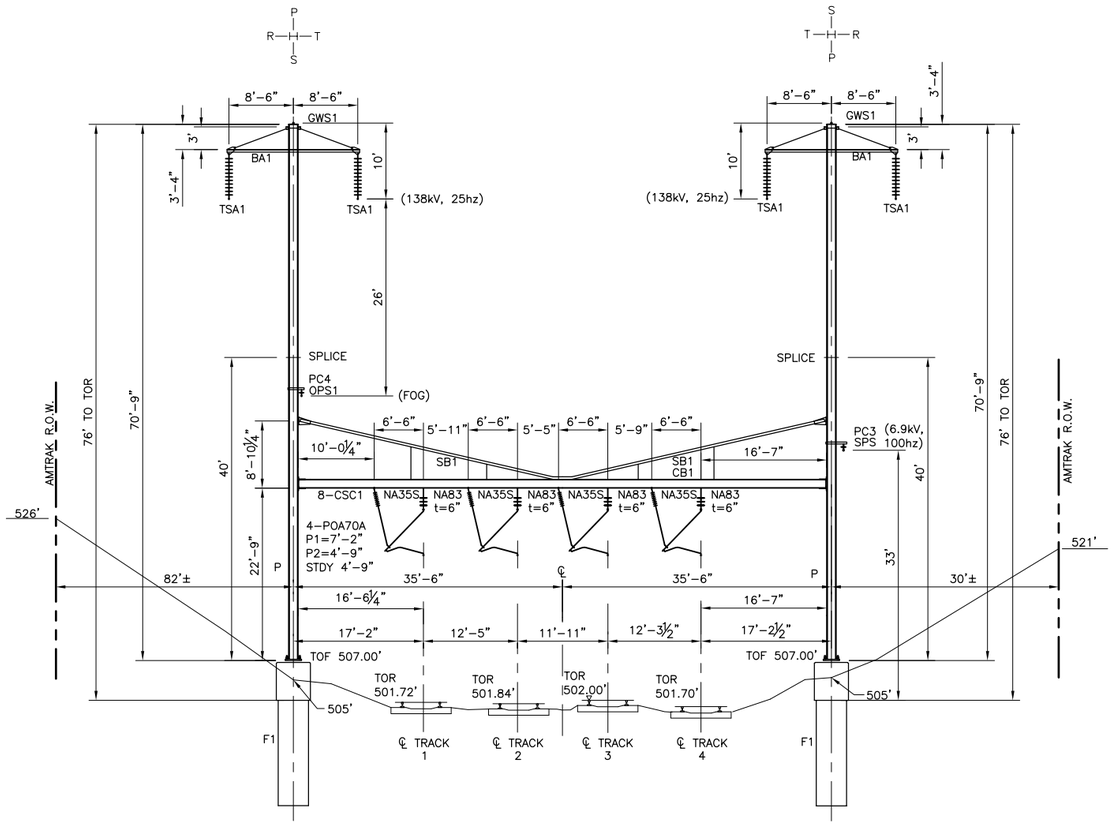
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File No.:	2011-059-ET-1261.DWG
Ref. No.:	2011-059
Sheet No:	173 OF 565

ET-1261

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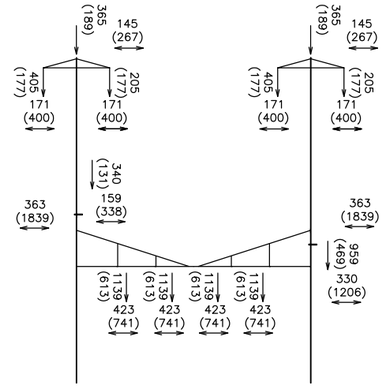
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–5"	25'–7¼"	25'–2"	26'–0"
CW	19'–5"	19'–7¼"	19'–2"	20'–0"



STRUCTURE ERECTION DIAGRAM T–393

938+49
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–393

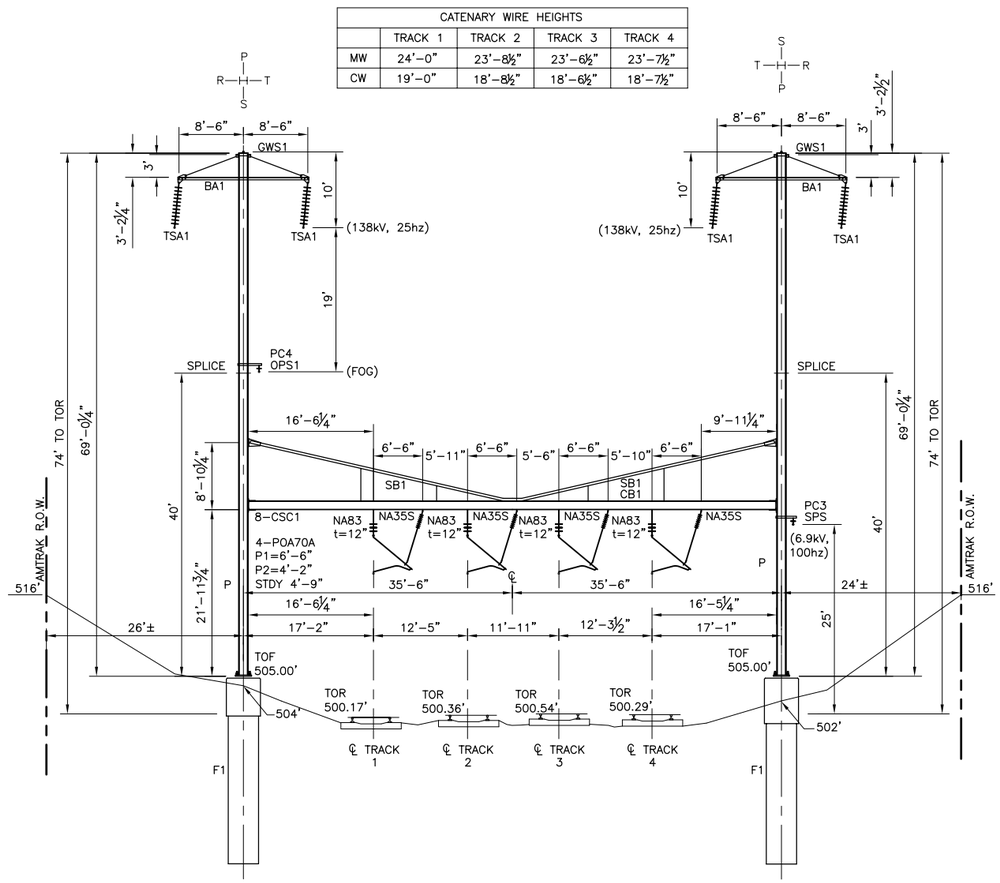
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File No.:	2011–059–ET–1262.DWG
Ref. No.:	2011–059
Sheet No:	174 OF 565

ET–1262

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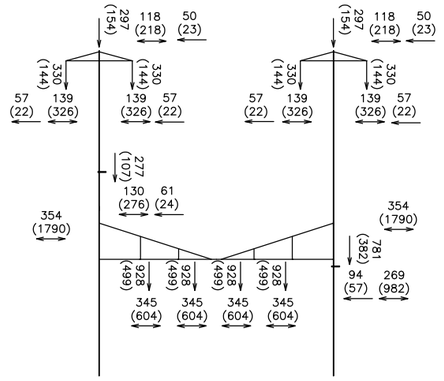
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–0"	23'–8½"	23'–6½"	23'–7½"
CW	19'–0"	18'–8½"	18'–6½"	18'–7½"



STRUCTURE ERECTION DIAGRAM T–392

935+94
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ARM	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET – DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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No	Revisions	Date	By

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Approved	Date

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

IN ASSOCIATION WITH

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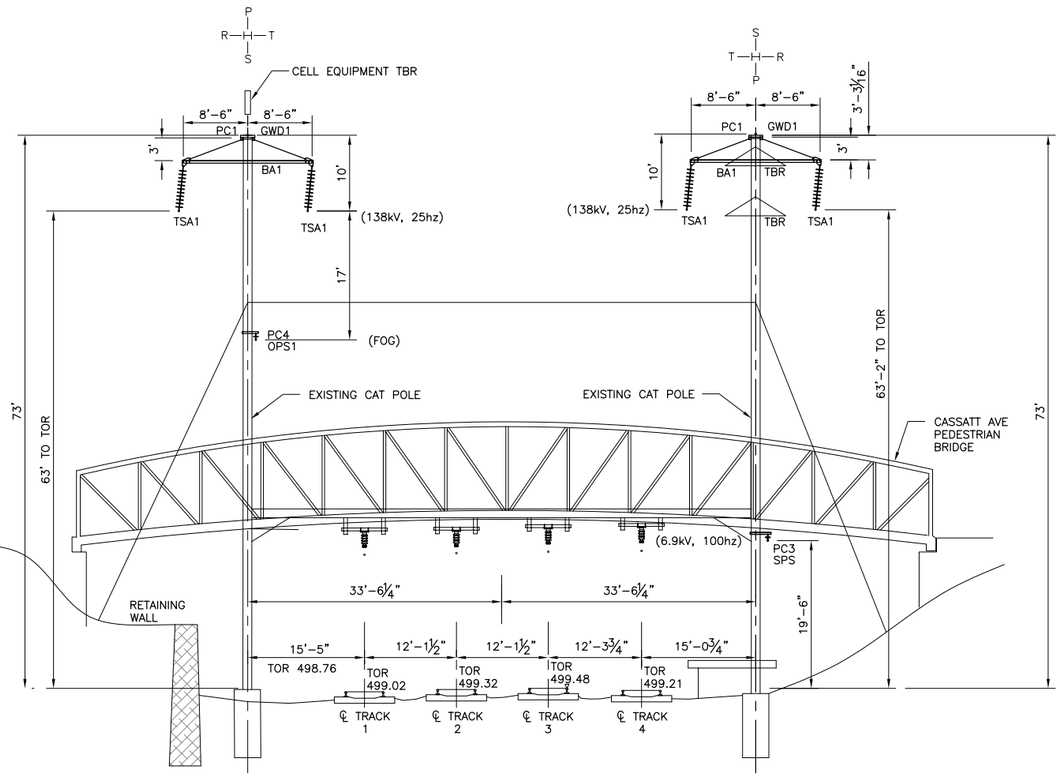
PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–392

File No.:	2011–059–ET–1263.DWG
Ref. No.:	2011–059
Sheet No:	175 OF 565

ET–1263

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

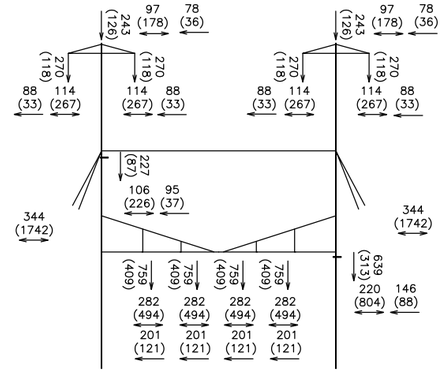
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STRUCTURE ERECTION DIAGRAM T-391 (EXISTING P-235A)

STATION 934+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)
180' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC1	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
BA1	TRANSMISSION BRACKET	S-5200	2

WORK STATEMENT:

1. DEMO EXISTING PECO BRACKETS.
2. INSTALL TRANSMISSION, PECO, FOG, STATIC AND SIGNAL POWER BRACKETS.
3. INSTALL STATIC, TRANSMISSION, PECO AND SIGNAL POWER WIRES.
4. TRANSFER FOG TO NEW SUPPORT BRACKET.

100% DESIGN SUBMISSION

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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 ERECTION DIAGRAM T-391 (P-235A)

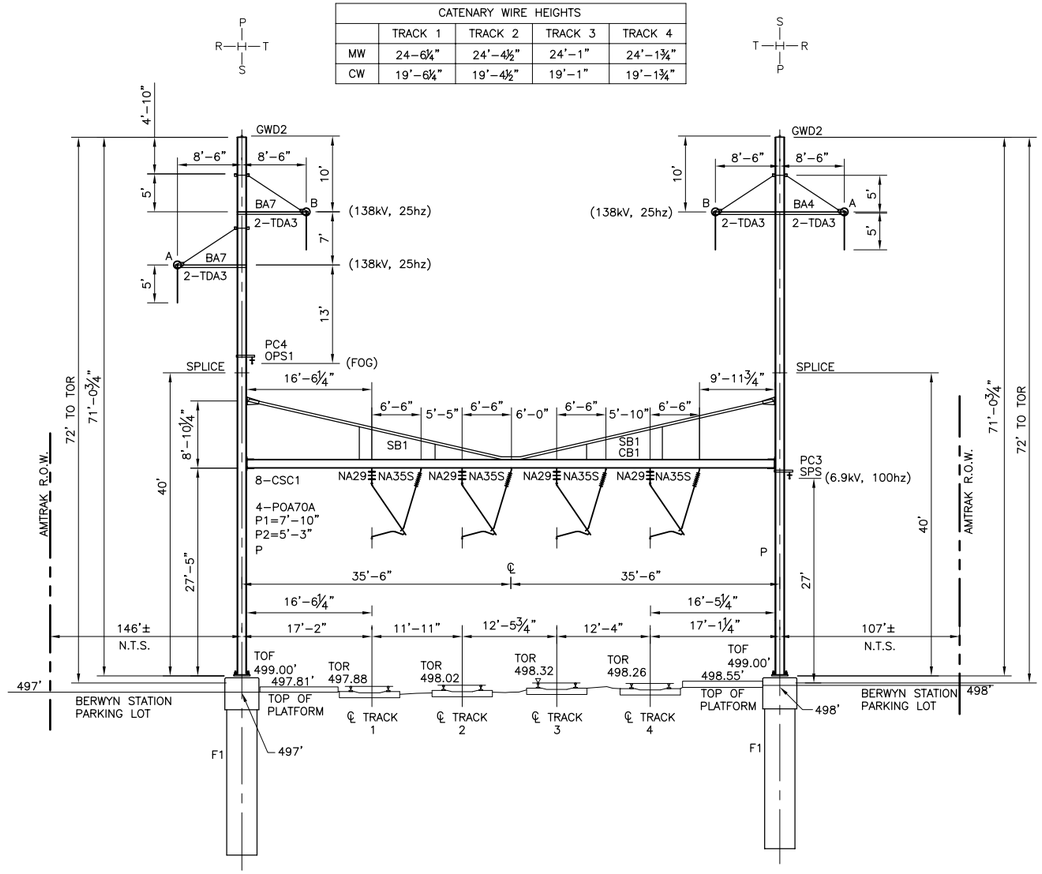
Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-1264.DWG
Ref. No.:	2011-059
Sheet No:	176 OF 565

ET-1264

3/14/2016 2:44:18 PM J:\2011\2011-059\Drawings\working drawings paoli to bryn mawr\structural\2011-059-ET-1264.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24–6¼"	24'–4½"	24'–1"	24'–1¾"
CW	19'–6¼"	19'–4½"	19'–1"	19'–1¾"



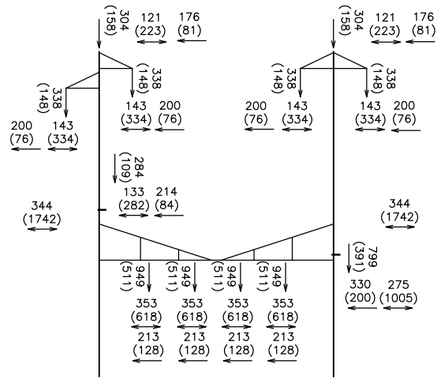
STRUCTURE ERECTION DIAGRAM T–390

931+94

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA29	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ARM	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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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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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 ERECTION DIAGRAM
T–390

File No.:	2011–059–ET–1265.DWG
Ref. No.:	2011–059
Sheet No:	177 OF 565

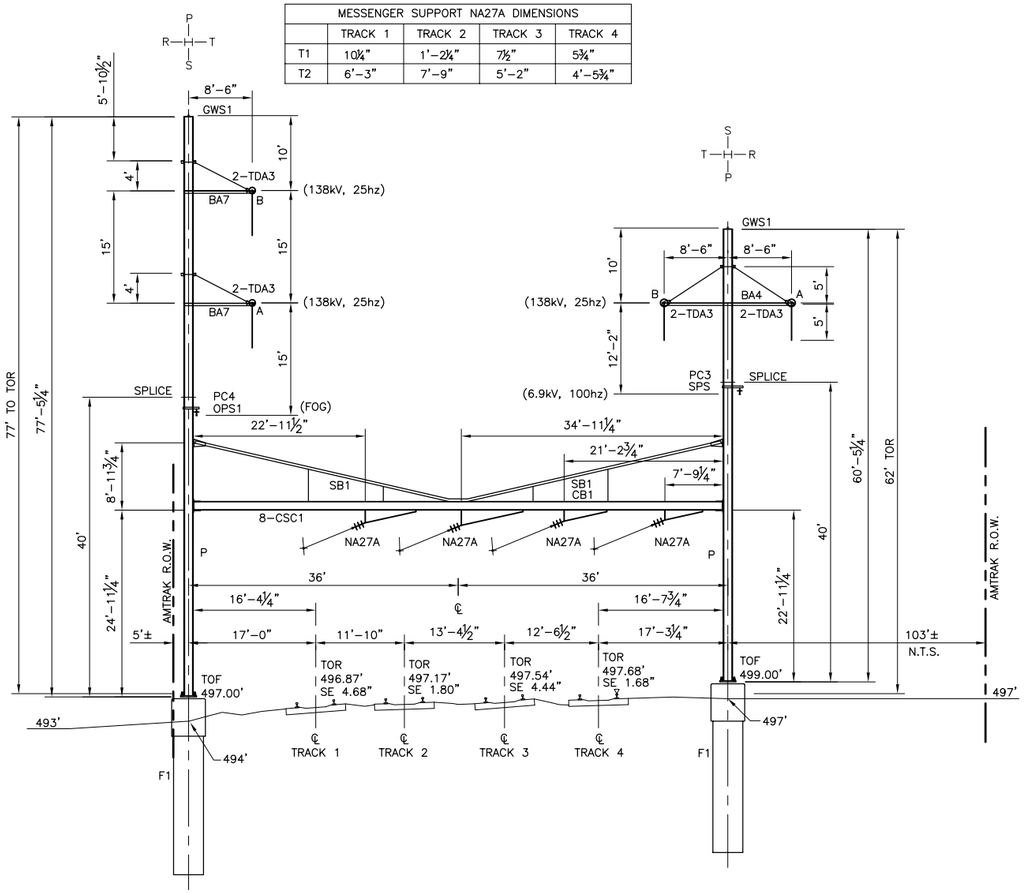
ET–1265

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

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	22'–11"	22'–3½"	22'–5¼"	22'–5¼"
CW	20'–2¾"	19'–7¼"	19'–3"	19'–3½"

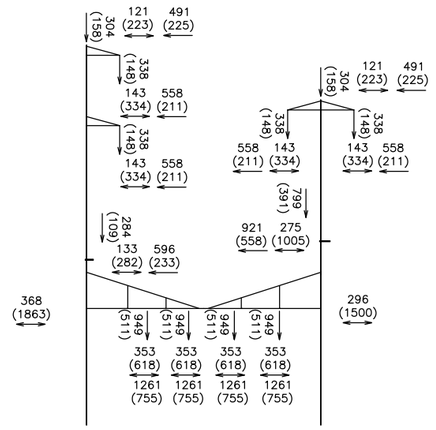
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	10¼"	1'–2¼"	7½"	5¾"
T2	6'–3"	7'–9"	5'–2"	4'–5¾"



STRUCTURE ERECTION DIAGRAM T–389

929+65
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET–DOUBLE	S–5203	1
BA7	TRANSMISSION BRACKET–SINGLE	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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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 ERECTION DIAGRAM T–389

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

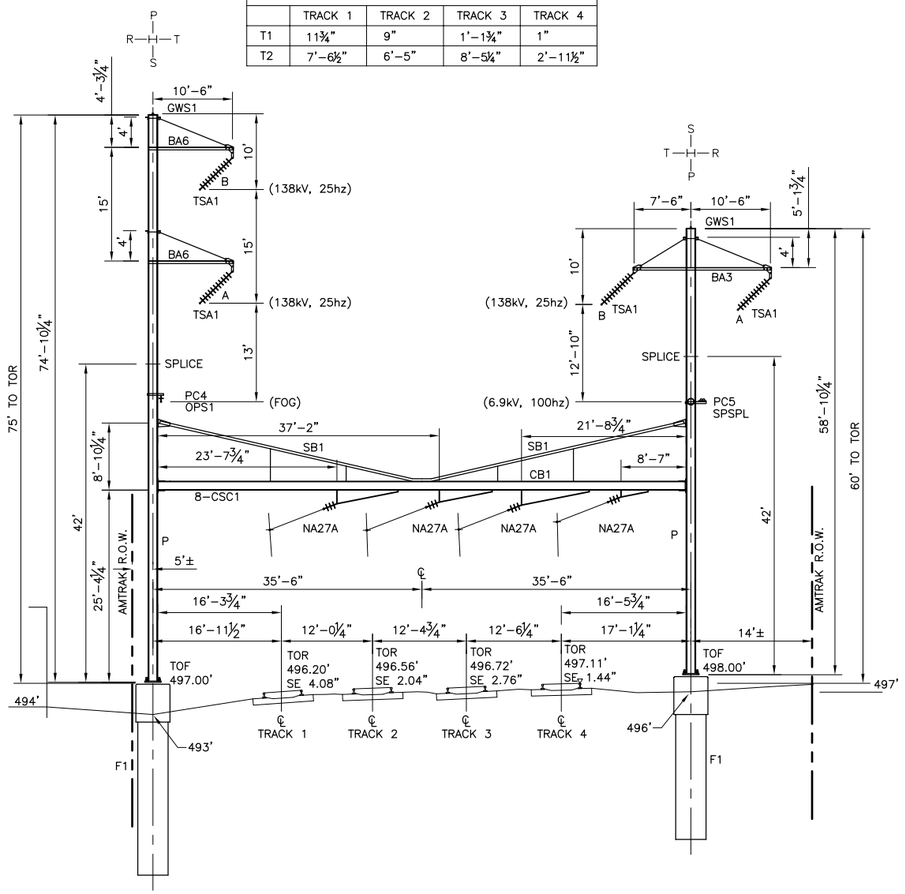
File No.:	2011–059–ET–1266.DWG
Ref. No.:	2011–059
Sheet No:	178 OF 565

ET–1266

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–11¼"	23'–9½"	23'–3"	23'–11"
CW	21'–2"	20'–9"	20'–8½"	21'–3¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	11¾"	9"	1'–1¾"	1"
T2	7'–6½"	6'–5"	8'–5¼"	2'–11½"



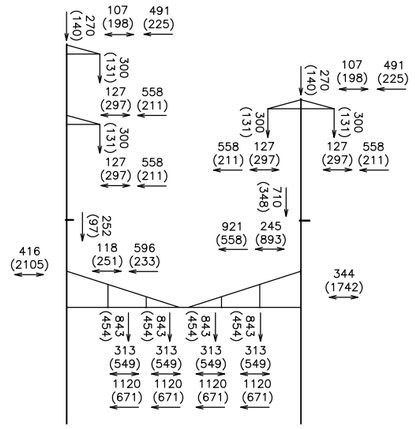
STRUCTURE ERECTION DIAGRAM T–388

927+65

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET – DOUBLE	S–5202	1
BA6	TRANSMISSION BRACKET – SINGLE	S–5204	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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

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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 ERECTION DIAGRAM
T–388

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

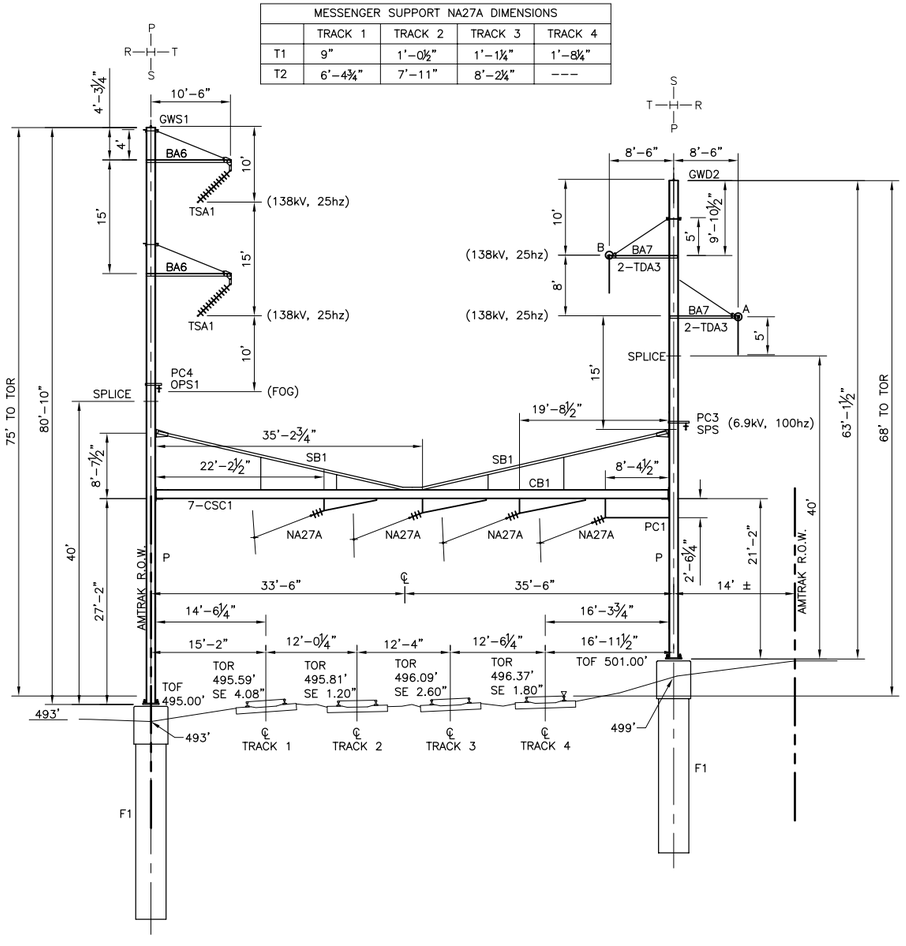
File No.:	2011–059–ET–1267.DWG
Ref. No.:	2011–059
Sheet No:	179 OF 565

ET–1267

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–2¾"	24'–0¾"	23'–8¾"	22'–10½"
CW	21'–4"	21'–2½"	20'–6"	20'–2½"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	9"	1'–0½"	1'–1¼"	1'–8¼"
T2	6'–4¾"	7'–11"	8'–2¼"	---



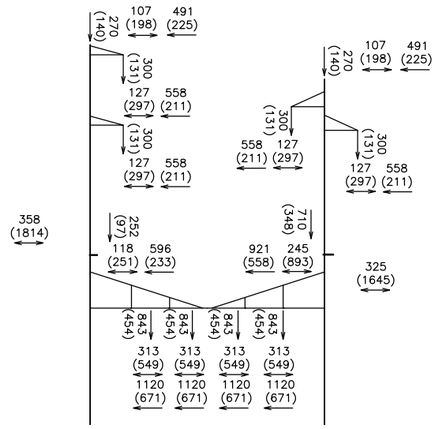
STRUCTURE ERECTION DIAGRAM T–387

925+65

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA6	TRANSMISSION BRACKET	S–5204	2
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. REAL ESTATE DEED CONTAINS LANGUAGE THAT ALLOWS FOR POLE REPLACEMENT.

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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 Baker AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–387

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

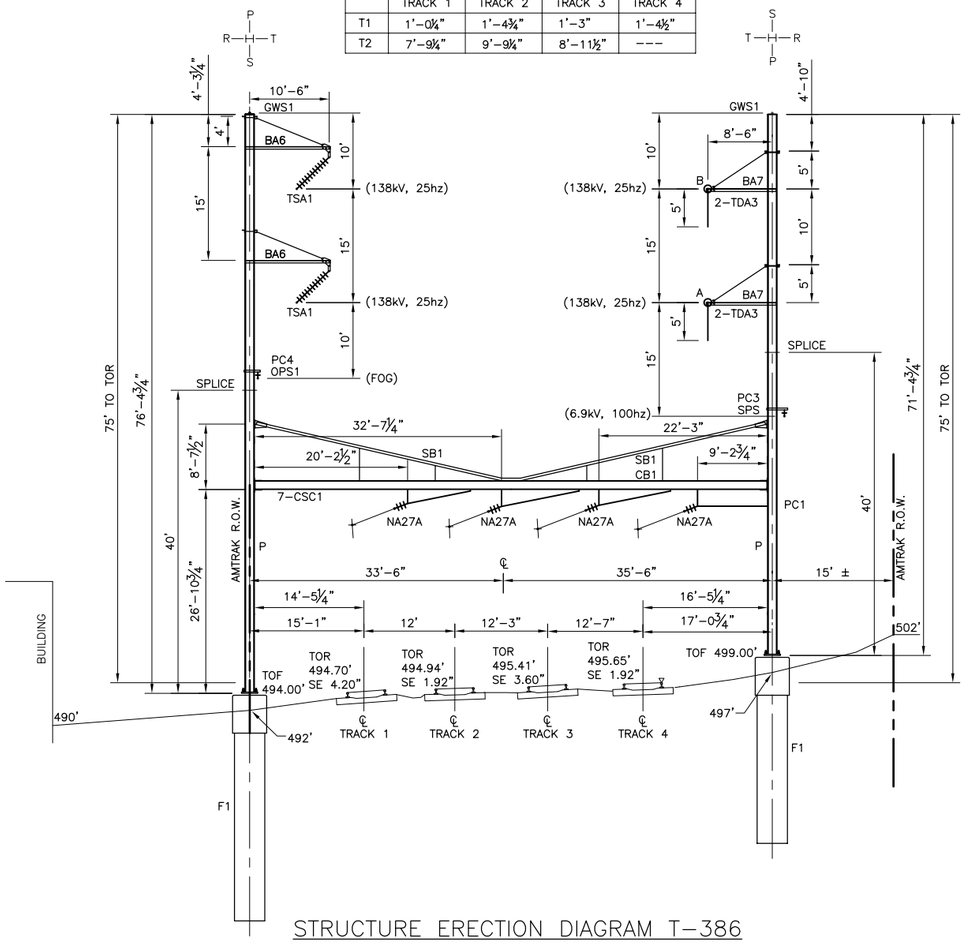
File No.:	2011–059–ET–1268.DWG
Ref. No.:	2011–059
Sheet No:	180 OF 565

ET–1268

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3/14/2016
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–11⅛"	23'–5¼"	23'–0"	22'–7½"
CW	21'–9¾"	21'–3¼"	20'–6½"	20'–3"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–0¼"	1'–4¾"	1'–3"	1'–4½"
T2	7'–9¼"	9'–9¾"	8'–11½"	---



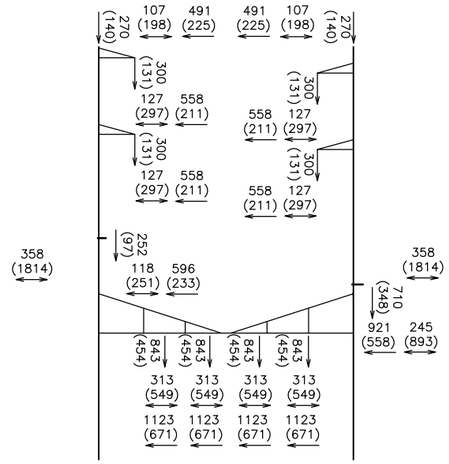
STRUCTURE ERECTION DIAGRAM T–386

923+65

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA6	TRANSMISSION BRACKET	S–5204	2
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. REAL ESTATE DEED CONTAINS LANGUAGE THAT ALLOWS FOR POLE REPLACEMENT.

100% DESIGN SUBMISSION

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Engineering

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

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–386

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

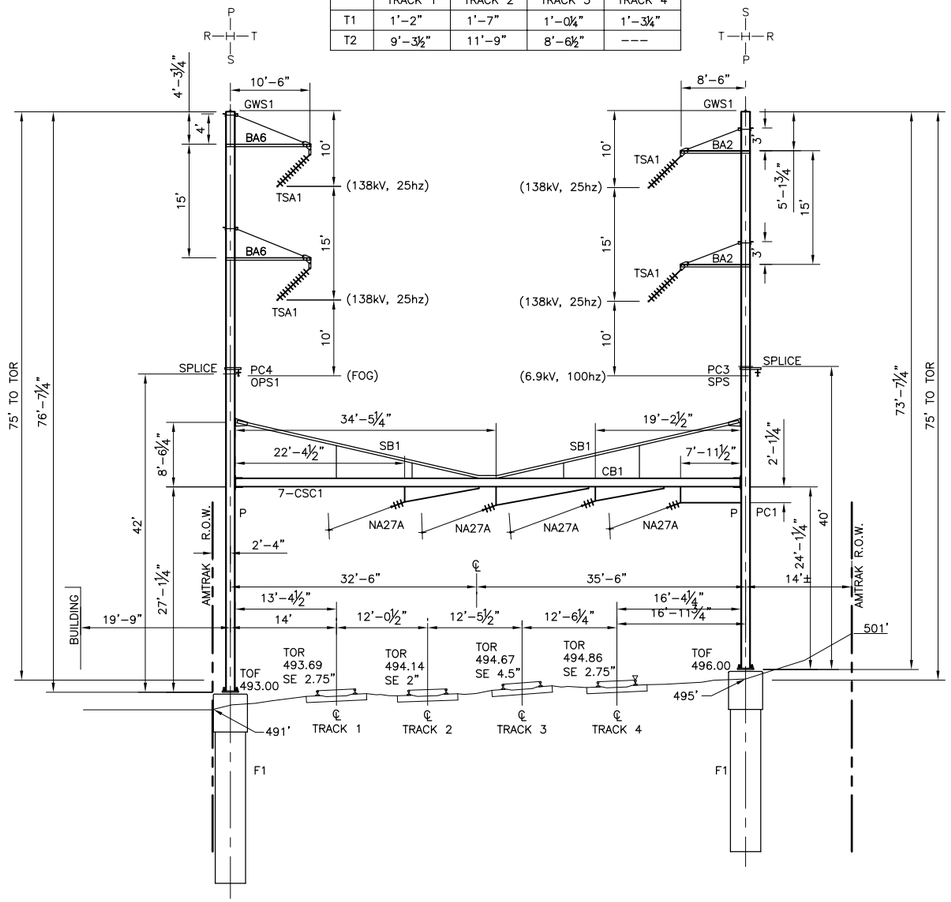
File No.:	2011–059–ET–1269.DWG
Ref. No.:	2011–059
Sheet No:	181 OF 565

ET–1269

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'-0¼"	23'-7¼"	23'-2½"	22'-9¼"
CW	20'-11¾"	20'-7¾"	19'-8½"	19'-11½"

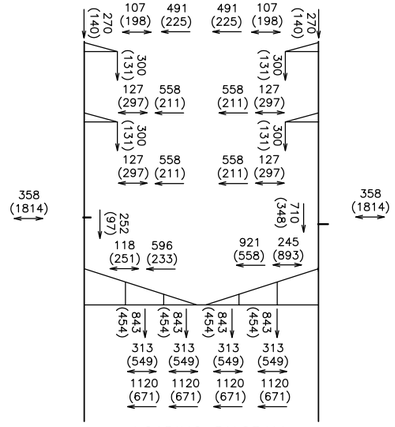
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'-2"	1'-7"	1'-0¼"	1'-3¼"
T2	9'-3½"	11'-9"	8'-6½"	---



STRUCTURE ERECTION DIAGRAM T-385

921+66
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC1	SLIDING CLAMP	S-5214	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA2	TRANSMISSION BRACKET	S-5201	2
BA6	TRANSMISSION BRACKET	S-5204	2
CSC1	SLIDING BRACKET	S-5214	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. REAL ESTATE DEED CONTAINS LANGUAGE THAT ALLOWS FOR POLE REPLACEMENT.

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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T-385

File No.:	2011-059-ET-1270.DWG
Ref. No.:	2011-059
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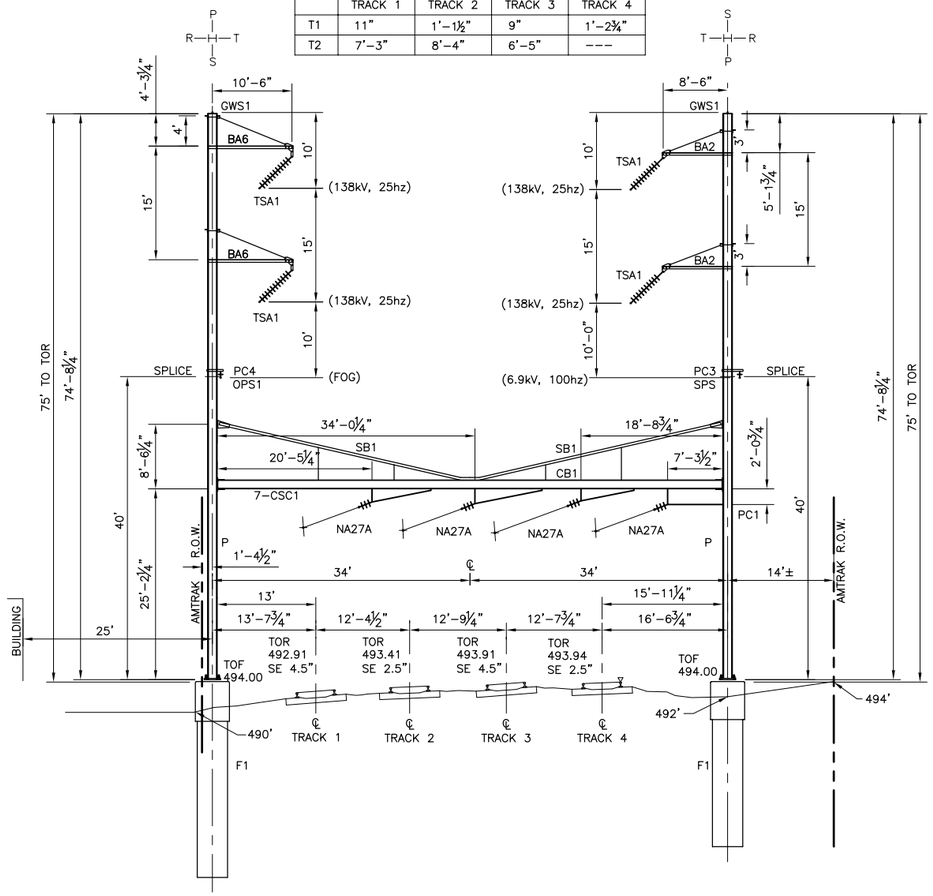
ET-1270

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

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–1½"	23'–4¾"	23'–2½"	22'–9¼"
CW	21'–5"	20'–6½"	19'–8¾"	19'–11"

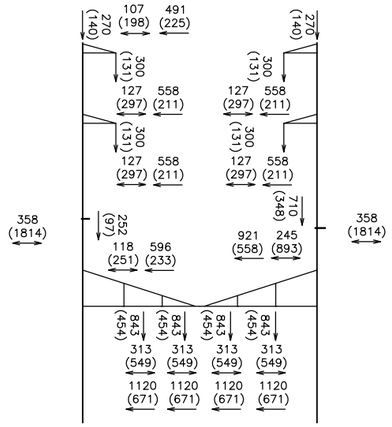
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	11"	1'–1½"	9"	1'–2¾"
T2	7'–3"	8'–4"	6'–5"	---



STRUCTURE ERECTION DIAGRAM T–384

919+65
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	2
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. REAL ESTATE DEED CONTAINS LANGUAGE THAT ALLOWS FOR POLE REPLACEMENT.

100% DESIGN SUBMISSION

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30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH
Baker
AECOM

PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–384

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

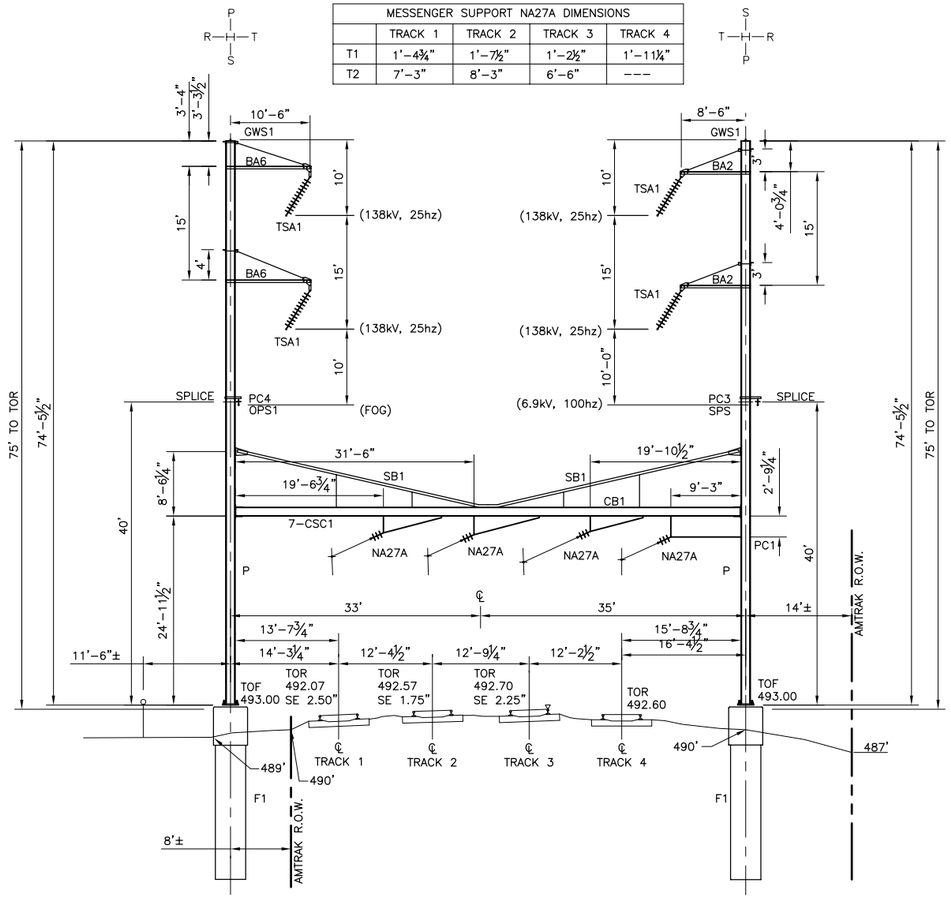
File No.:	2011–059–ET–1271.DWG
Ref. No.:	2011–059
Sheet No:	183 OF 565

ET–1271

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–1¾"	22'–4½"	22'–8¼"	22'–7¾"
CW	20'–9½"	20'–4¼"	19'–5"	20'–5¼"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–4¾"	1'–7½"	1'–2½"	1'–11¼"
T2	7'–3"	8'–3"	6'–6"	---



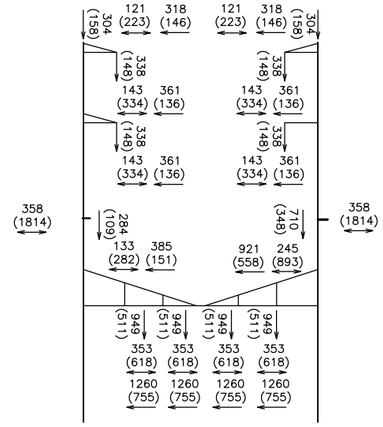
STRUCTURE ERECTION DIAGRAM T–383

917+66

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	2
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–383

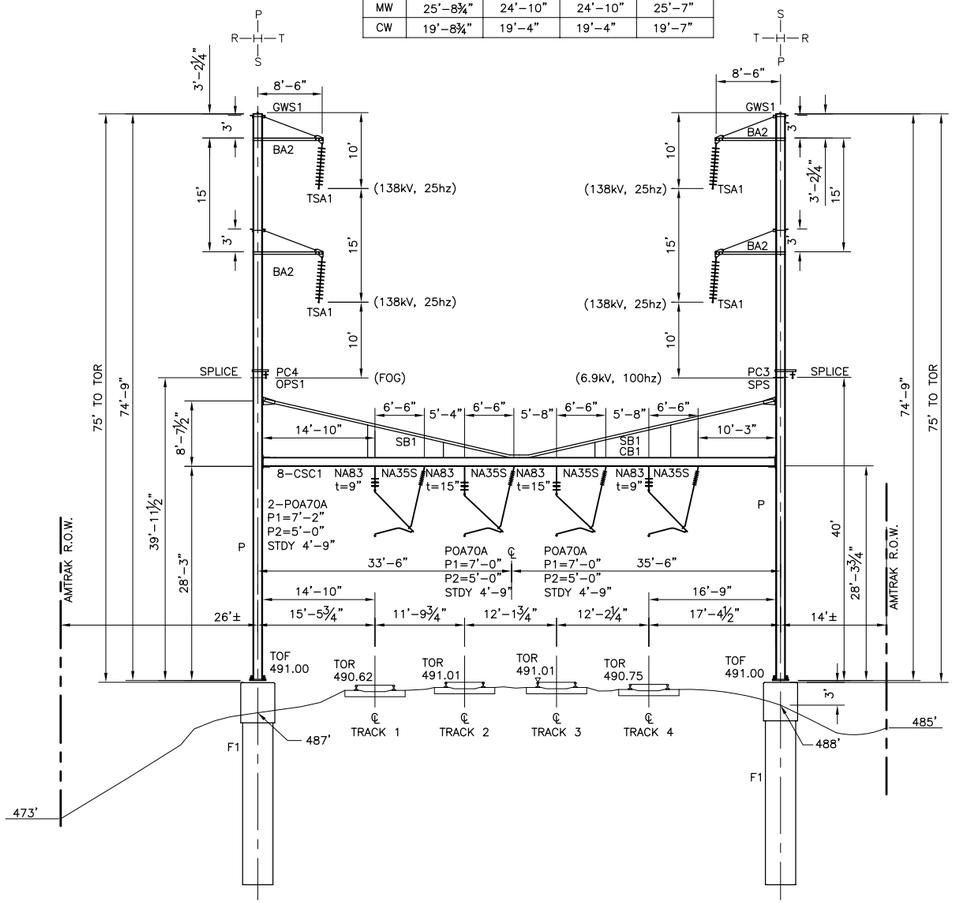
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File No.:	2011–059–ET–1272.DWG
Ref. No.:	2011–059
Sheet No:	184 OF 565

ET–1272

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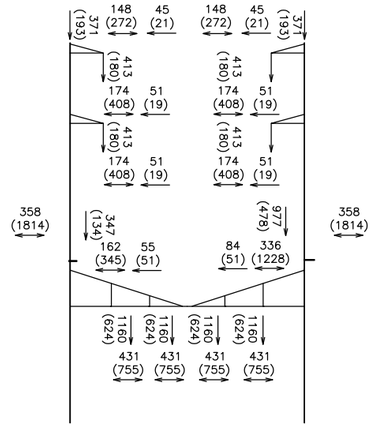
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'-8¾"	24'-10"	24'-10"	25'-7"
CW	19'-8¾"	19'-4"	19'-4"	19'-7"



STRUCTURE ERECTION DIAGRAM T-382

915+17
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA2	TRANSMISSION BRACKET	S-5201	4
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-382

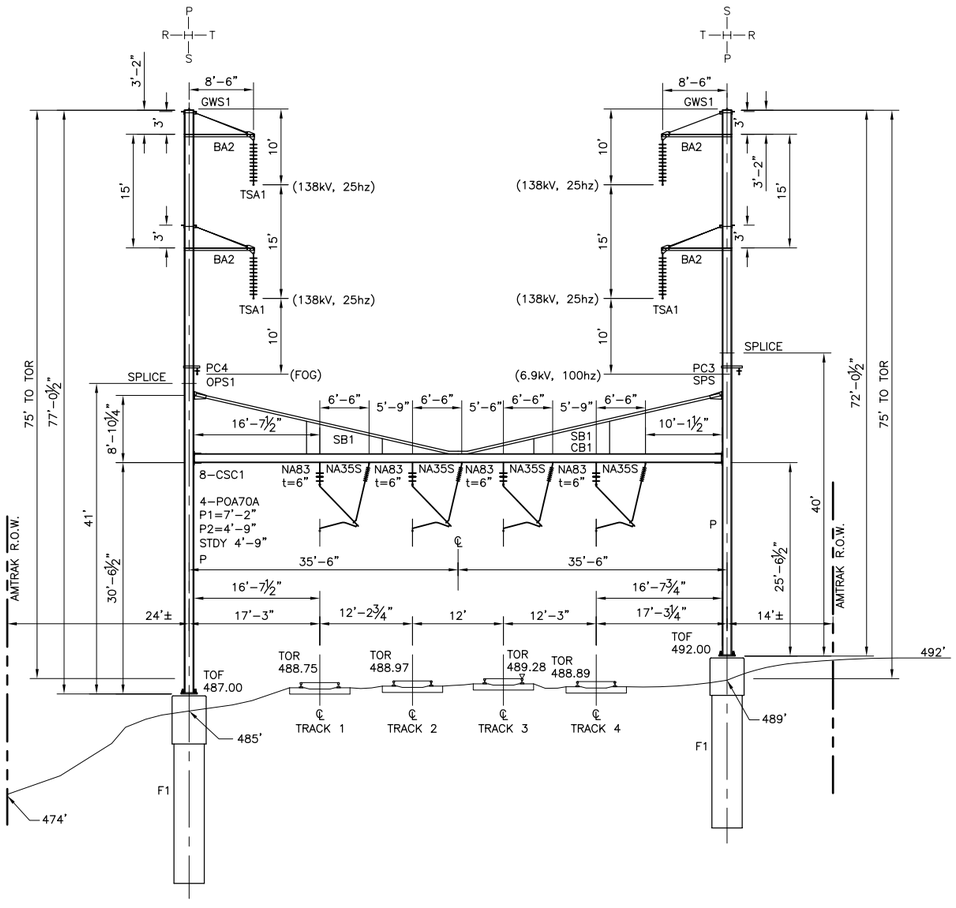
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File No.:	2011-059-ET-1273.DWG
Ref. No.:	2011-059
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ET-1273

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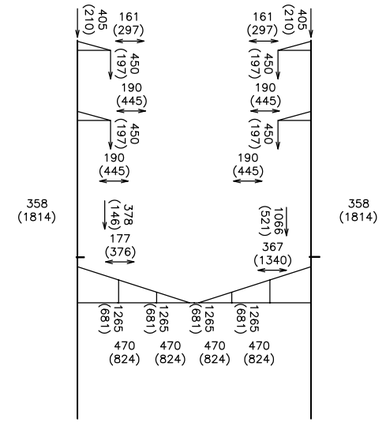
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1½"	25'–10¾"	25'–7"	25'–11¾"
CW	20'– ½"	19'–9¾"	19'–6"	19'–10¾"



STRUCTURE ERECTION DIAGRAM T–381

912+17
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–381

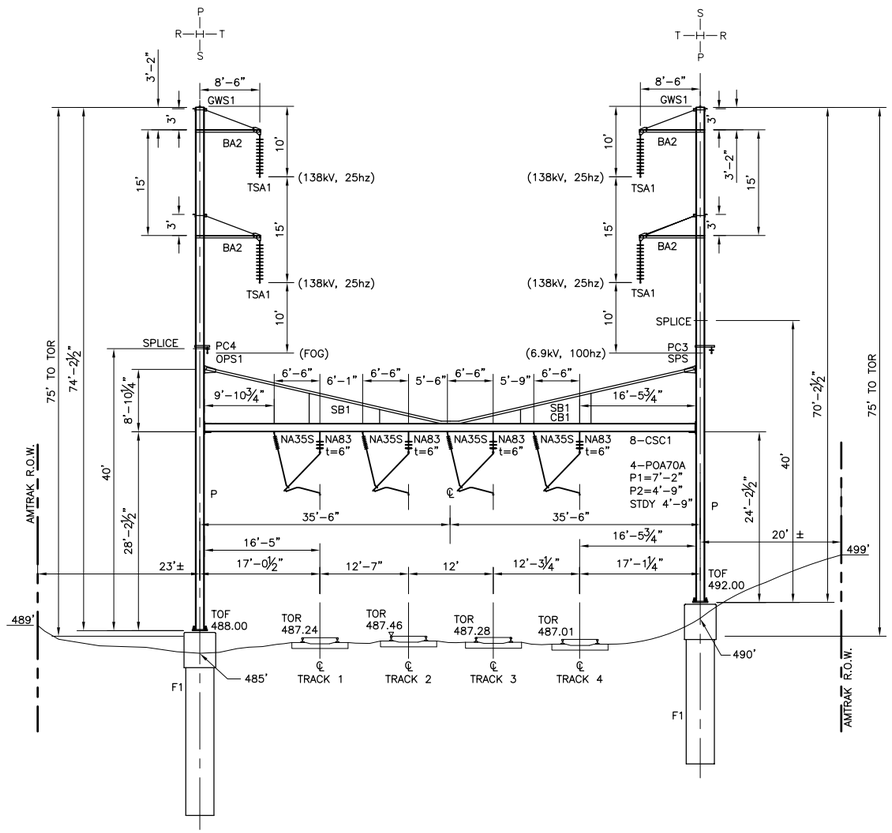
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File No.:	2011–059–ET–1274.DWG
Ref. No.:	2011–059
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ET–1274

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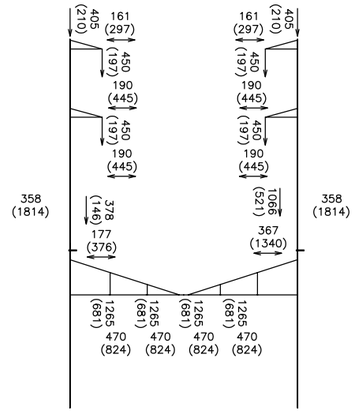
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–3¾"	26'–1"	26'–3¾"	26'–6½"
CW	20'–3¾"	20'–1"	20'–3¾"	20'–6½"



STRUCTURE ERECTION DIAGRAM T–380

909+17
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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OFFICE OF
Chief Engineer
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
STRUCTURAL ERECTION DIAGRAM
T–380

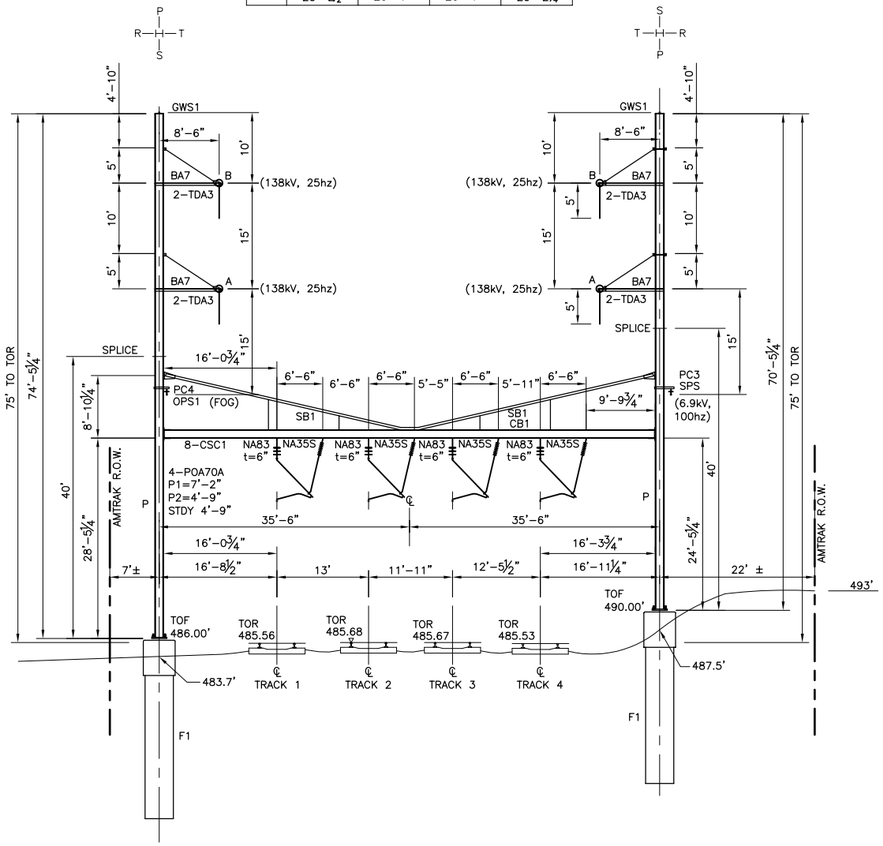
File No.:	2011–059–ET–1275.DWG
Ref. No.:	2011–059
Sheet No:	187 OF 565

ET–1275

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

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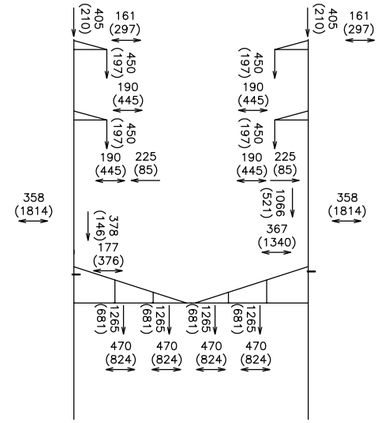
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-2½"	26'-1"	26'-1"	26'-2¾"
CW	20'-2½"	20'-1"	20'-1"	20'-2¾"



STRUCTURE ERECTION DIAGRAM T-379

906+17
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

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

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA7	TRANSMISSION BRACKET -SINGLE	S-5201	4
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PAOLI TO BRYN MAWR TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-379

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