Northeast
Utilities System

Dooley Substation
Addition of 115 kV Circuit Breaker
(Transient Stability Analyses)

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Transmission Services
4/06/06

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1 Executive Summary

Dooley 30K substation is a substation located in the town of Middletown, Connecticut and feeds 7200 customers in the towns of Durham and Middlefield. Dooley 30K is a 115-13.2kV distribution substation, with two 47 MVA transformers.

Proposed Schedule -Dooley 30K
In-Service Date – June 30, 2006 –Addition of 115kV circuit breaker

The transmission scope includes the installation of the 115kV portion of Dooley substation 30K. This would include an additional 115kV bus tie breaker and associated switches to accommodate a second transformer. In addition, the following scope of work will be included in this project:

- Replacement of CCVT's on both the 1050 and 1766 Transmission lines
- New bus protection, CCVT, and metering associated with the new bus section and new breaker
- New SCADA installation to accommodate Dooley 30K.
- All line relaying, breaker failure relays, reclosing relays, and metering associated with the 1050 line and the new breaker

Comments and changes to the report

**** Note: SSG commented about contingency 3NC, a 3-phase fault on line 1050 at Dooley causing Middletown Unit 2 and 3 to lose synchronism. Based on Dooley being a non-BPS substation, the SSG requested that a fault simulation be executed on line 1050 with the fastest protection scheme in service, which happens to be high speed clearing, 5 cycles.***

In conclusion, after running this simulation (3NC-fault on the 1050 line at Dooley-clearing both Dooley and Middletown in 5 cycles) with the fastest protection scheme in service, the units at Middletown 2 and 3 were stable. These results were what I expected.

2 Study Approach

The following fault scenarios are simulated assuming that the proposed project is in service:

Generation is turned on in the study area and the megawatt transfers are modeled to impose stress on the local transmission system interfaces.

This study was prepared in accordance with the NEPOOL Planning Procedure PP5-3: Guidelines for Conducting and Evaluating Proposed Plan Application Analyses.

2.1 Study Criteria

The transmission system transient stability responses are monitored to ensure conformance to the "Reliability Standards for the New England Power Pool", PP-3, dated Feb. 1, 2005. Mainly, that the New England bulk power system shall remain stable during and following the most severe contingencies (i.e. design contingencies).

The Reliability Standards also address extreme contingencies; the extreme contingency is considered more severe relative to a design contingency, but lower in probability of occurrence. The transmission bulk power system performance, in response to an extreme contingency, is intended to be a gauge of the system's robustness or a measure of the extent of the disturbance. The Reliability Standards lists a number attributes that characterize a contingency as extreme; for this study a three phase bolted fault with a failed circuit breaker contingency is simulated and considered an extreme contingency.

For this study design and extreme contingencies are considered below, as interpreted from NPCC Document A-2,"Basic Criteria for Design and Operation of Interconnected Power Systems, dated May 6, 2004.

Design Contingencies (DC):

1.) A permanent three phase fault on any generator, transmission circuit, transformer or bus section with normal fault clearing (fastest protection group out of service).
2.) A permanent phase to ground fault on any generator, transmission circuit, transformer or bus section with delayed fault clearing (breaker failure, fastest protection group out of service).

Extreme Contingencies (EC):

1.) Loss of all lines emanating from a substation.
2.) A permanent three phase fault on any generator, transmission circuit, transformer or bus section with delayed fault clearing (breaker failure, cleared by the fastest protection group).

Both design and extreme, should meet the *NEPOOL Damping Criteria*; which states:
"Acceptable damping with time domain analysis requires running a transient stability simulation for sufficient time (up to 30 seconds) that only a single mode of oscillation remains. A 50 % reduction in the magnitude of the oscillation must then be observed over four periods of the oscillation. A sufficient number of system quantities including rotor angle, voltage, and interface transfers should be analyzed to ensure that adequate system damping is observed." [NEPOOL Stability Task Force submittal, Aug. 18, 1999].

- For a design contingency, the impedance trajectory entry into New Brunswick Power's GCX relay characteristic, installed at the Keswick Substation on the 345 kV Section 3001/396 (Keswick to Orrington), is considered **unacceptable**.

The following is extracted from a NEPOOL Stability Task Force submittal dated May 17, 2000 and applied for this study;

For a design contingency, the following system responses are considered **unacceptable**:

- Transiently unstable, with wide spread system collapse.
- Transiently stable, with undamped or sustained power system oscillations.
- Loss of source exceeding 1200 MW.

For an extreme contingency, the following system responses are considered **unacceptable**:

- Transiently unstable, with wide spread system collapse.
- Transiently stable, with undamped or sustained power system oscillations.
- Loss of source greater than 2200 MW.

For extreme contingencies, the following response can be considered **acceptable**

A loss of source above 1400 MW and up to 2200 MW may be acceptable depending upon the likelihood of occurrence and other factors.

Case and Contingency Descriptions

2.2 Contingency Description

The following contingencies were studied and analyzed for the breaker addition.

Table 1: Normal Contingencies and Extreme Contingencies

List of Contingencies

Contingency type	***Fault type***	***Location***	***Elements Switched***	***Switching times***
1aNC	BPS test	Dooley 115kV	West Side, Middletown	35 .00
1bNC	BPS test	West Side115kV	Dooley, Berlin	35.00
1cNC	BPS test	Middletown 115kV	Dooley, Portland, P&W, Haddam	35.00
2NC	3 Phase	West Side115kV	West Side	5.00
		1766 line	Dooley	35.0
3NC	3 Phase	Dooley 115kV	Dooley	5.00
		1050 line	Middletown	35.00
3aNC	3 Phase	Dooley 115kV	Dooley	5.00
		1050 line	Middletown (fastest clearing time)	5.00
4NC	3 Phase	Berlin 115kV	Berlin	5.00
		1765 line	West side	35.00
5NC	3 Phase	Middletown 115kV	Middletown	5.00
		1050 line	Dooley	35.00
6EC	3 Phase	Dooley 115kV	-Middletown 115kV end opens 12T & 11T	5.00
		1050 line	-1T opens at West side	35.00
		Dooley 115kV		
		2T sticks		
7EC	3 Phase	Dooley 115kV	-West Side	5.00
		1766 line	-Middletown 12T and 11T	17.25
		Dooley 115kV		
		2T sticks		
		T.T to Middletown		

Contingency type	***Fault type***	***Location***	***Elements Switched***	***Switching times***
8EC	3 Phase	West Side115kV 1766 line West Side115kV 1T sticks T.T to Berlin	-Dooley 2T -Berlin 13T &14T	5.00 17.25
9EC	3 Phase	West Side115kV 1765 line West Side115kV 1T sticks T.T. to Berlin	-Berlin 13T & 14T -Dooley 2T	5.00 17.25
10EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 12T sticks 12T sticks B.F.	-Dooley 2T -Middletown 11T -Middletown 4T and 8T	5.00 5.00 15.00
11EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 11T sticks Loss of Middletown 3 part of fault clearing	-Dooley 2T -Middletown 12T -Middletown 10T	5.00 5.00 15.00
12EC	3 Phase	Middletown 115KV 1050 line Dooley 115kV 2T sticks No T.T. to West Side	-Middletown 11T &12T -West Side 1T	5.00 64.0

Discussion of Stability Results (Light Load case)

The stability analyses displayed stable post project system performance. Table 2 below provides summaries of normal and extreme contingency results.

Table 2: Results of Normal and Extreme Contingencies for *LL* case

Contingency type	*Fault type*	*Location*	*Elements Switched*	*Stable*	GCX entry	Total loss of Source (MW)
1aNC	BPS test	Dooley 115kV	West Side, Middletown	yes	no	0
1bNC	BPS test	West Side115kV	Dooley, Berlin	yes	no	0
1cNC	BPS test	Middletown 115kV	Dooley, Portland, P&W, Haddamyes	no		875 (Mis units &Middletown 2,3)
2NC	3 Phase	West Side115kV 1766 line	West Side Dooley	yes	no	0
3aNC	3 Phase	Dooley 115kV 1050 line	Dooley Middletown	yes	no	0
3NC	3 Phase	Dooley 115kV 1050 line	Dooley Middletown	yes	no	353 (Middletown 2,3)
4NC	3 Phase	Berlin 115kV 1765 line	Berlin West side	yes	no	0
5NC	3 Phase	Middletown 115kV 1050 line	Middletown Dooley	yes	no	0
6EC	3 Phase	Dooley 115kV 1050 line Dooley 115kV 2T sticks	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0
7EC	3 Phase	Dooley 115kV 1766 line	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0

		Dooley 115kV 2T sticks					
Contingency type	***Fault type***	***Location***	***Elements Switched***	Stable		GCX entry	Total loss of Source (MW)
8EC	3 Phase	West Side115kV 1766 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
9EC	3 Phase	West Side115kV 1765 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
10EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 12T sticks	-11T opens at Middletown 115kV -4T, 8T opens at Middletown -Dooley 2T end opens	yes		no	0
11EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 11T sticks Loss of Middletown 3	-12T opens at Middletown 115kV -10T opens at Middletown -Dooley 2T end opens	yes		no	236 (Middletown 3)
12EC	3 Phase	Middletown 115KV 1050 line Dooley 115kV 2T sticks	-11T & 12T opens at Middletown 115kV -1T opens at West side	yes		no	0

Description loss of source (LL case)

1) 1cNC - BPS test at Middletown.

Unit	**MW**
Middletown 2	117
Middletown 3	236
Mis GT1	166
Mis GT2	166
Mis ST	190

```
A)MACHINE 3  AT BUS 73556 TRIPPED BY OVERSPEED RELAY AT TIME =   0.7750 SECS.
  MACHINE 3  AT BUS  73556 [MIDDTN#322.000] TRIPPED AT TIME = 0.7750

B)MACHINE 2  AT BUS 73555 TRIPPED BY OVERSPEED RELAY AT TIME =   0.8708 SECS.
  MACHINE 2  AT BUS  73555 [MIDDTN#213.800] TRIPPED AT TIME = 0.8708
```

Triggers Bucksport SPS

```
C)CIRCUIT 1  FROM  70210 [BUCKSPOR    115.00] TO  70108 [DETROIT     115.00]
      TRIPPED AT TIME =  2.296
  CIRCUIT 1  FROM  70210 [BUCKSPOR    115.00] TO  70109 [BELFAST     115.00]
      TRIPPED AT TIME =  2.296

  AT TIME = 2.2959 BRANCH FROM BUS70210 TO BUS70108 CKT # 1 IS TRIPPED ON MVA FLOW.

  AT TIME = 2.2959 BRANCH FROM BUS70210 TO BUS70109 CKT # 1 IS TRIPPED ON MVA FLOW.

  LINE TRIP TIME =     2.4667 GEN TRIP TIME =     2.4626
  MACHINE 1  AT BUS  70060 [MIS GT1 18.000] TRIPPED AT TIME = 2.4667

  MACHINE 1  AT BUS  70061 [MIS GT2 18.000] TRIPPED AT TIME = 2.4667

  MACHINE 1  AT BUS  70062 [MIS ST  18.000] TRIPPED AT TIME = 2.4667
```

2) 11EC-3Phase fault Dooley 115kV 1050 line, 11T sticks (Loss of Middletown 3 for EC11 is part of the fault clearing scheme)

Unit	**MW**
Middletown 3	236

Discussion of Stability Results (Light Load case) Max gen-in Conn

The stability analyses displayed stable post project system performance. Table 2 below provides summaries of normal and extreme contingency results.

Table 2: Results of Normal and Extreme Contingencies for *LL* case

Contingency type	***Fault type***	***Location***	***Elements Switched***	***Stable***	GCX entry	Total loss of Source (MW)
1aNC	BPS test	Dooley 115kV	West Side, Middletown	yes	no	0
1bNC	BPS test	West Side115kV	Dooley, Berlin	yes	no	0
1cNC	BPS test	Middletown 115kV	Dooley, Portland, P&W, Haddamyes	no		875 (MIS units) (Middletown 2,3)
2NC	3 Phase	West Side115kV 1766 line	West Side Dooley	yes	no	0
3NC	3 Phase	Dooley 115kV 1050 line	Dooley Middletown	yes	no	0
4NC	3 Phase	Berlin 115kV 1765 line	Berlin West side	yes	no	0
5NC	3 Phase	Middletown 115kV 1050 line	Middletown Dooley	yes	no	0
6EC	3 Phase	Dooley 115kV 1050 line Dooley 115kV 2T sticks	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0
7EC	3 Phase	Dooley 115kV 1766 line	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0

		Dooley 115kV 2T sticks					
Contingency type	***Fault type***	***Location***	***Elements Switched***	Stable		GCX entry	Total loss of Source (MW)
8EC	3 Phase	West Side115kV 1766 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
9EC	3 Phase	West Side115kV 1765 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
10EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 12T sticks	-11T opens at Middletown 115kV -4T, 8T opens at Middletown -Dooley 2T end opens	yes		no	0
11EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 11T sticks Loss of Middletown 3	-12T opens at Middletown 115kV -10T opens at Middletown -Dooley 2T end opens	yes		no	236 (Middletown 3)
12EC	3 Phase	Middletown 115KV 1050 line Dooley 115kV 2T sticks	-11T & 12T opens at Middletown 115kV -1T opens at West side	yes		no	0

Description loss of source (LL case) Max gen-in Conn.

1) 1cNC - BPS test at Middletown.

Unit	**MW**
Middletown 2	117
Middletown 3	236
Mis GT1	166
Mis GT2	166
Mis ST	190

```
A)MACHINE 3  AT BUS 73556 TRIPPED BY OVERSPEED RELAY AT TIME =   0.7750 SECS.
  MACHINE 3  AT BUS  73556 [MIDDTN#322.000] TRIPPED AT TIME = 0.7750

B)MACHINE 2  AT BUS 73555 TRIPPED BY OVERSPEED RELAY AT TIME =   0.8708 SECS.
  MACHINE 2  AT BUS  73555 [MIDDTN#213.800] TRIPPED AT TIME = 0.8708
```

Triggers Bucksport SPS

```
C)CIRCUIT 1  FROM  70210 [BUCKSPOR    115.00] TO  70108 [DETROIT     115.00]
      TRIPPED AT TIME =  2.296
  CIRCUIT 1  FROM  70210 [BUCKSPOR    115.00] TO  70109 [BELFAST     115.00]
      TRIPPED AT TIME =  2.296

  AT TIME = 2.2959 BRANCH FROM BUS70210 TO BUS70108 CKT # 1 IS TRIPPED ON MVA FLOW.

  AT TIME = 2.2959 BRANCH FROM BUS70210 TO BUS70109 CKT # 1 IS TRIPPED ON MVA FLOW.

  LINE TRIP TIME =     2.4667 GEN TRIP TIME =     2.4626
  MACHINE 1  AT BUS  70060 [MIS GT1 18.000] TRIPPED AT TIME = 2.4667

  MACHINE 1  AT BUS  70061 [MIS GT2 18.000] TRIPPED AT TIME = 2.4667

  MACHINE 1  AT BUS  70062 [MIS ST  18.000] TRIPPED AT TIME = 2.4667
```

2) 11EC-3Phase fault Dooley 115kV 1050 line, 11T sticks (Loss of Middletown 3 for EC11 is part of the fault clearing scheme)

Unit	MW
Middletown 3	236

Discussion of Stability Results (Peak Load case)

The stability analyses displayed stable post project system performance. Table 2 below provides summaries of normal and extreme contingency results.

Table 2: Results of Normal and Extreme Contingencies for *PL* case

Contingency type	*Fault type*	*Location*	*Elements Switched*	*Stable*	GCX entry	Total loss of Source (MW)
1aNC	BPS test	Dooley 115kV	West Side, Middletown	yes	no	0
1bNC	BPS test	West Side115kV	Dooley, Berlin	yes	no	0
1cNC	BPS test	Middletown 115kV	Dooley, Portland, P&W, Haddamyes	no		353 (Middletown 2,3)
2NC	3 Phase	West Side115kV 1766 line	West Side Dooley	yes	no	0
3NC	3 Phase	Dooley 115kV 1050 line	Dooley Middletown	yes	no	0
4NC	3 Phase	Berlin 115kV 1765 line	Berlin West side	yes	no	0
5NC	3 Phase	Middletown 115kV 1050 line	Middletown Dooley	yes	no	0
6EC	3 Phase	Dooley 115kV 1050 line Dooley 115kV 2T sticks	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0
7EC	3 Phase	Dooley 115kV 1766 line	-Middletown 115kV end opens 12T & 11T -1T opens at West side	yes	no	0

		Dooley 115kV 2T sticks					
Contingency type	***Fault type***	***Location***	***Elements Switched***	Stable		GCX entry	Total loss of Source (MW)
8EC	3 Phase	West Side115kV 1766 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
9EC	3 Phase	West Side115kV 1765 line West Side115kV 1T sticks	-Berlin end opens at 13T & 14T -2T opens at Dooley	yes		no	0
10EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 12T sticks	-11T opens at Middletown 115kV -4T, 8T opens at Middletown -Dooley 2T end opens	yes		no	0
11EC	3 Phase	Dooley 115kV 1050 line Middletown 115kV 11T sticks Loss of Middletown 3	-12T opens at Middletown 115kV -10T opens at Middletown -Dooley 2T end opens	yes		no	236 (Middletown 3)
12EC	3 Phase	Middletown 115KV 1050 line Dooley 115kV 2T sticks	-11T & 12T opens at Middletown 115kV -1T opens at West side	yes		no	0

Description loss of source (PL case)

1) 1cNC-BPS test at Middletown.

Unit	**MW**
Middletown 2	117
Middletown 3	236

```
A)MACHINE 3  AT BUS 73556 TRIPPED BY OVERSPEED RELAY AT TIME =   0.7792 SECS.
  MACHINE 3  AT BUS  73556 [MIDDTN#322.000] TRIPPED AT TIME = 0.7792

B)MACHINE 2  AT BUS 73555 TRIPPED BY OVERSPEED RELAY AT TIME =   0.8792 SECS.
  MACHINE 2  AT BUS  73555 [MIDDTN#213.800] TRIPPED AT TIME = 0.8792
```

2) 11EC-3Phase fault Dooley 115kV 1050 line, 11T sticks (Loss of Middletown 3 for EC11 is part of the fault clearing scheme)

Unit	**MW**
Middletown 3	236

Conclusion:

Normal, extreme and BPS testing met all criteria set by NPCC, NEPOOL, and NU. Based on the stability analysis results meeting all the criteria, the addition of Dooley 30K breaker would not have a significant adverse effect on the reliability or operating characteristics of the Northeast Utilities facilities, the transmission facilities of another Transmission owner, or the system of Market Participant. Overall this project enhances the transmission system performance and reliability for the distribution system.

Figure 1- Dooley Substation local One Line-Pre-Project

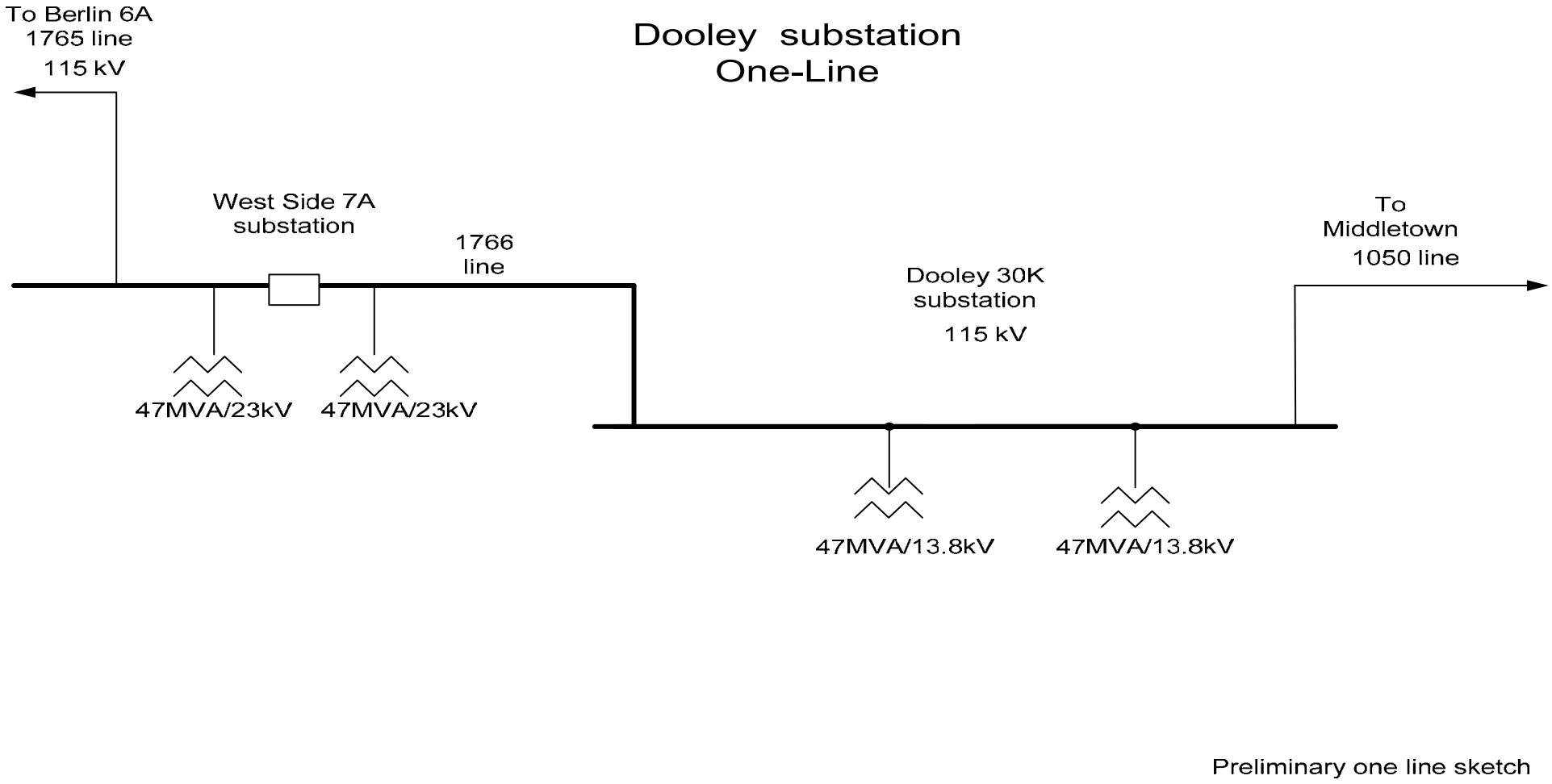


Figure 2- Dooley Substation local One-Line- Post Project

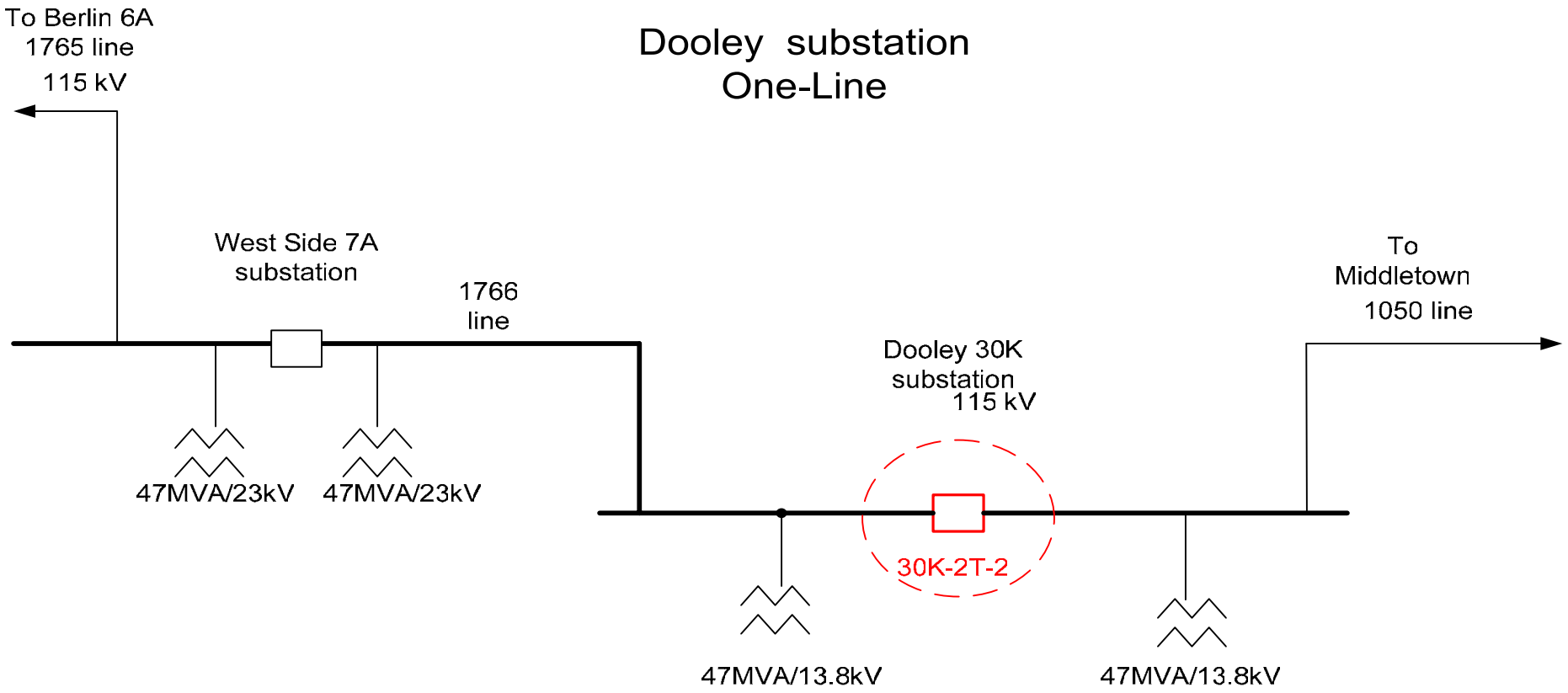
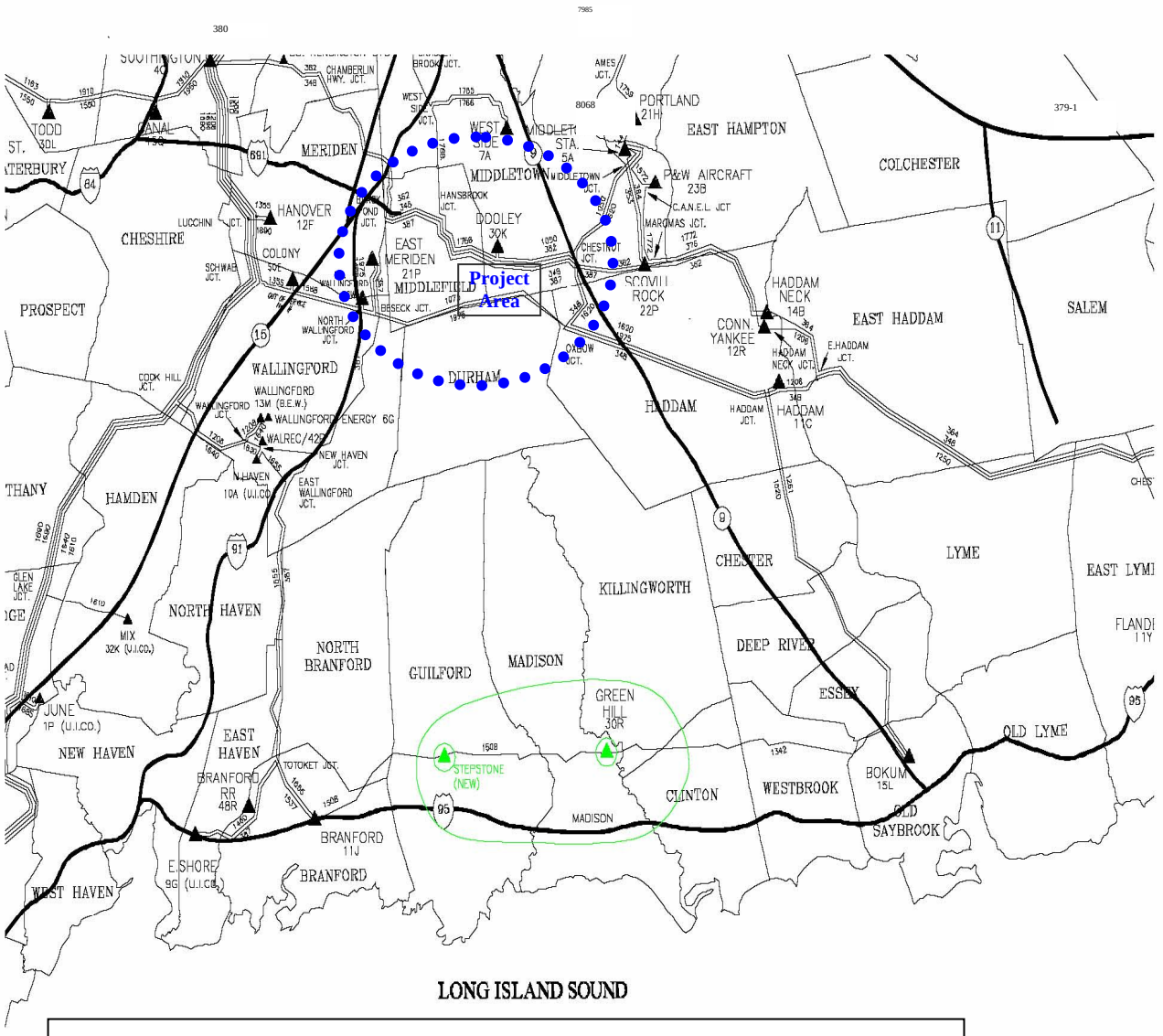


Figure 3- Geographical Location



Dooley Substation

Figure 4A- Dooley substation configuration

Dooley 30K-Nomenclature Diagram- Currently in service

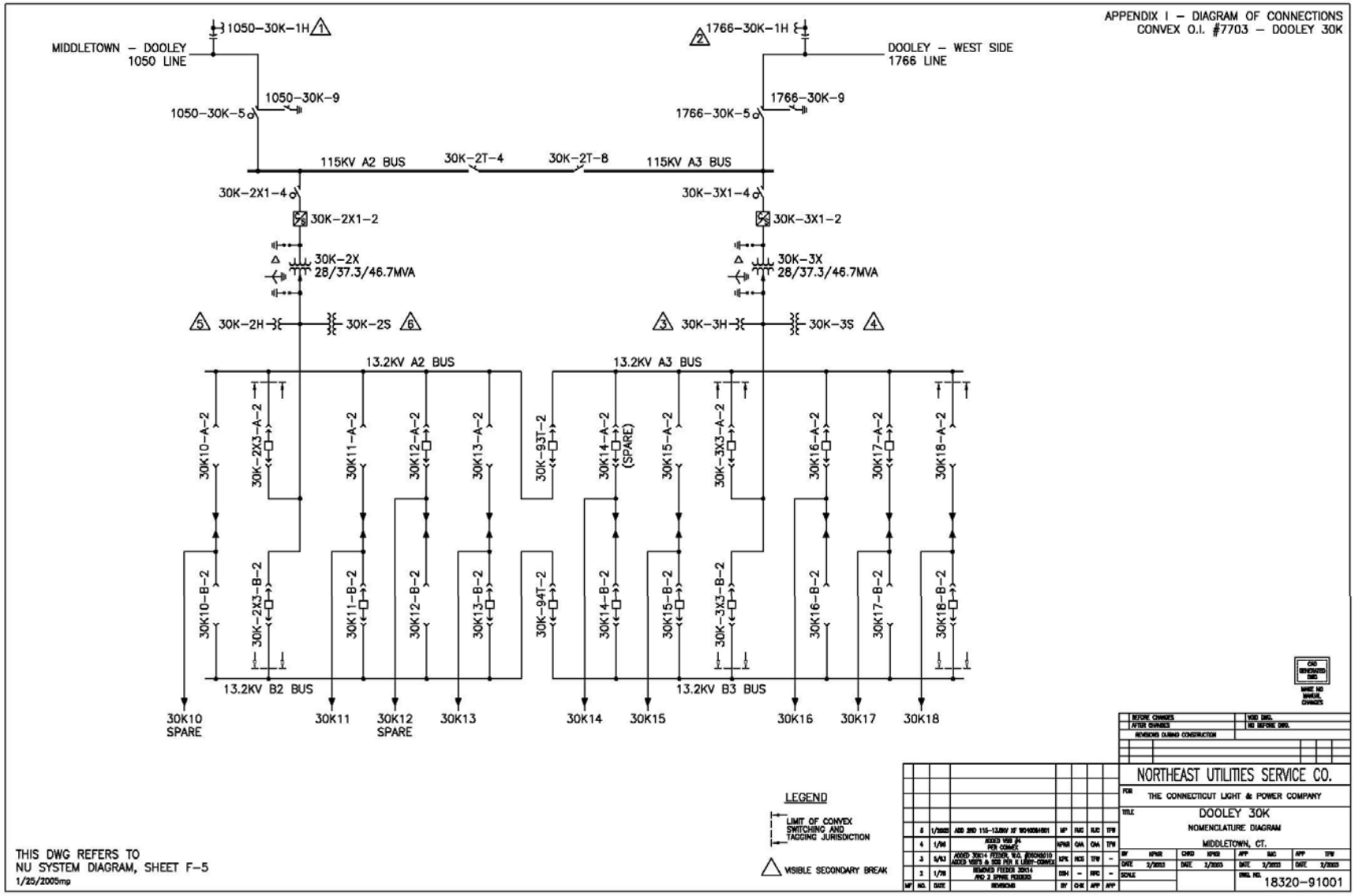


Figure 4B- Dooley substation configuration

Dooley 30K-Nomenclature Diagram- Currently needed **(L portion)**

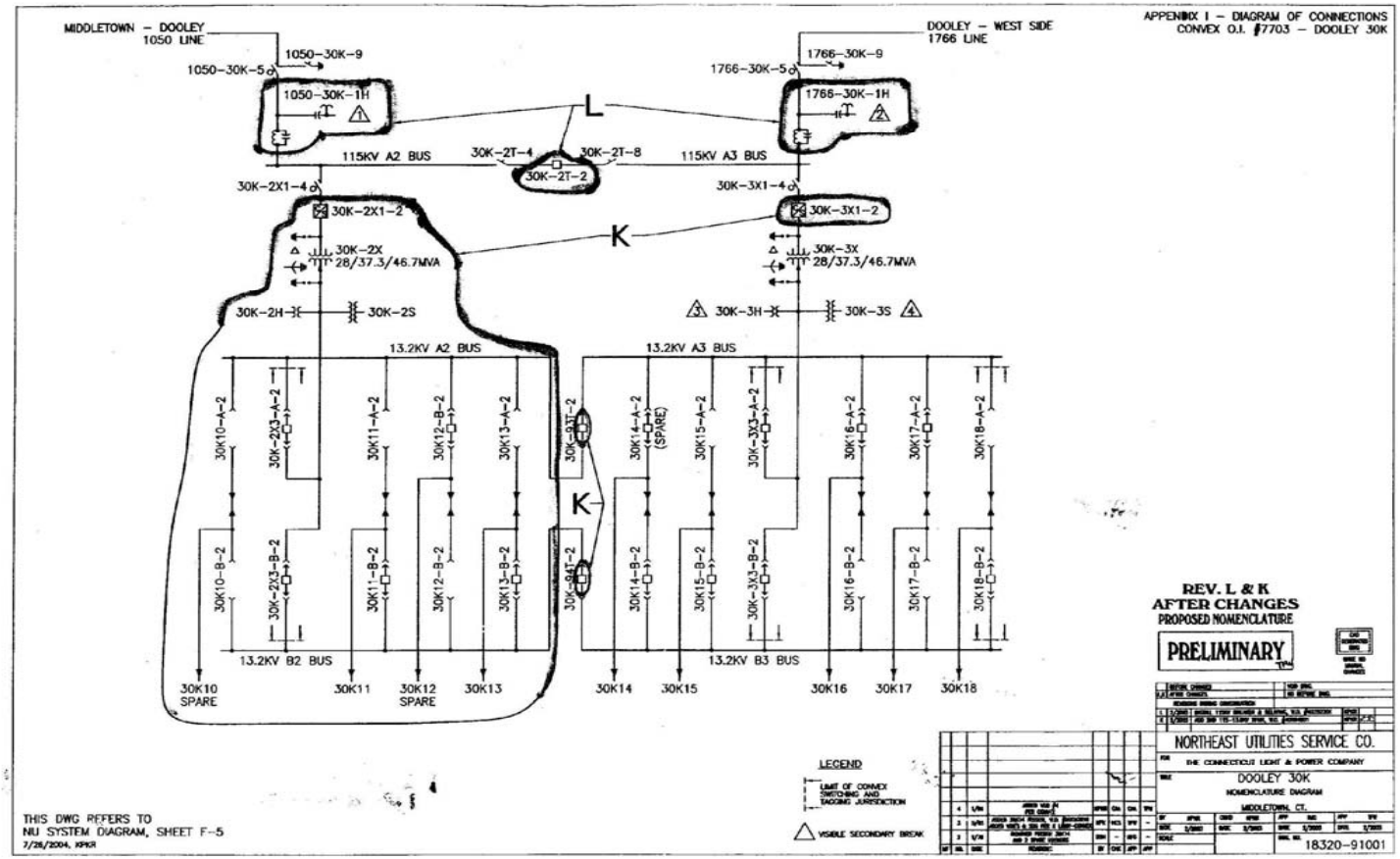


Figure 5

115kV
Light load One-line

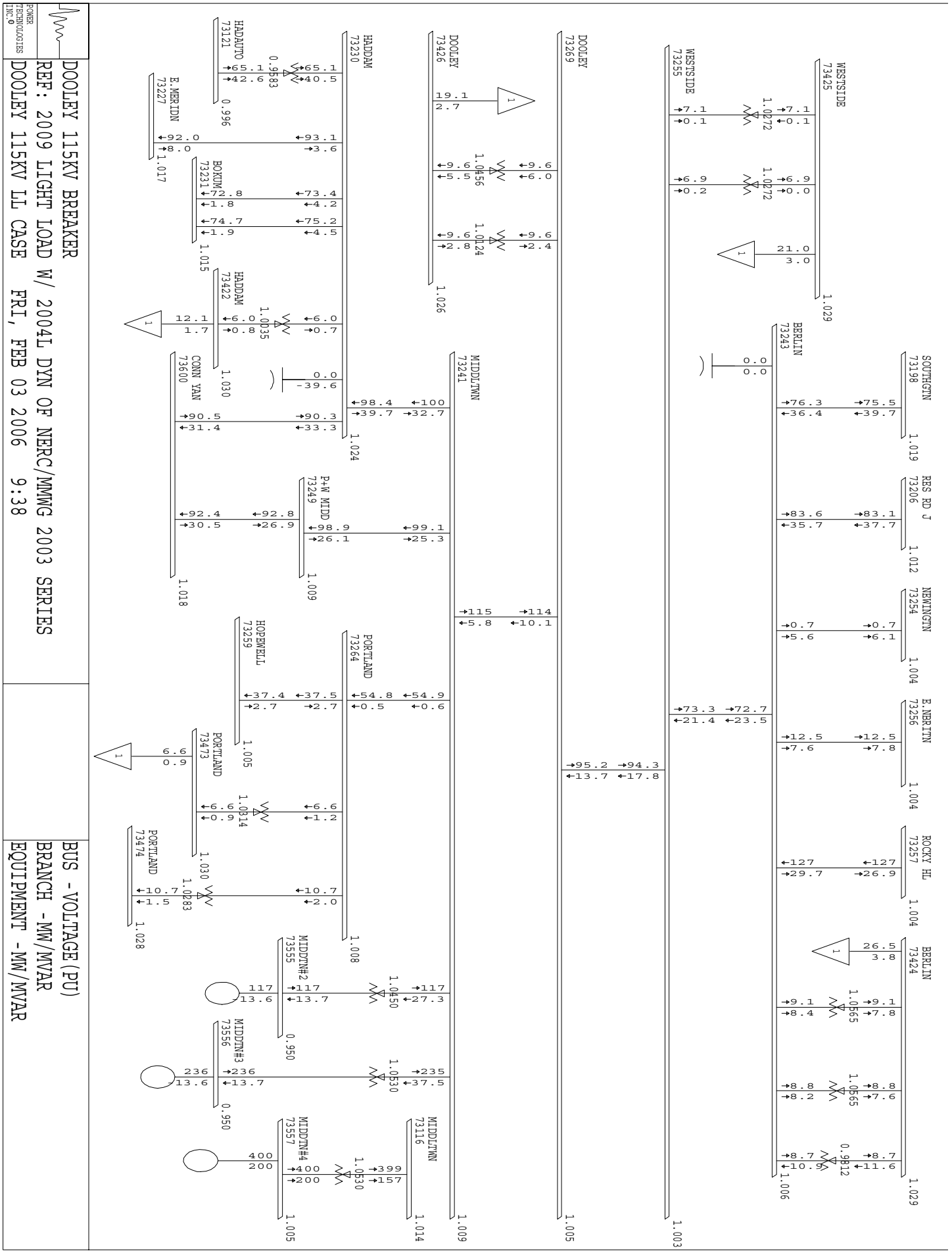

DOOLEY 115KV BREAKER
REF: 2009 LIGHT LOAD W/ 2004L DYN OF NERC/MMWG 2003 SERIES
DOOLEY 115KV LL CASE FRI, FEB 03 2006 9:38
POWER TECHNOLOGIES INC
BUS -VOLTAGE(PU)
BRANCH -MW/MVAR
EQUIPMENT -MW/MVAR
WESTSIDE 73425
SOUTHGTN 73198
BERLIN 73243
RES RD J 73206
NEWINGTN 73254
E.NBRITN 73256
ROCKY HL 73257
BERLIN 73424
WESTSIDE 73255
DOOLEY 73269
DOOLEY 73426
MIDDLTWN 73241
HADDAM 73230
HADAUTO 73121
E.MERIDN 73227
BOKUM 73231
HADDAM 73422
CONN YAN 73600
P+W MIDD 73249
HOPEWELL 73259
PORTLAND 73264
PORTLAND 73473
PORTLAND 73474
MIDDTN#2 73555
MIDDTN#3 73556
MIDDLTWN 73116
MIDDTN#4 73557

Figure 5A

115kV
Light load One-line
Max gen-Conn.

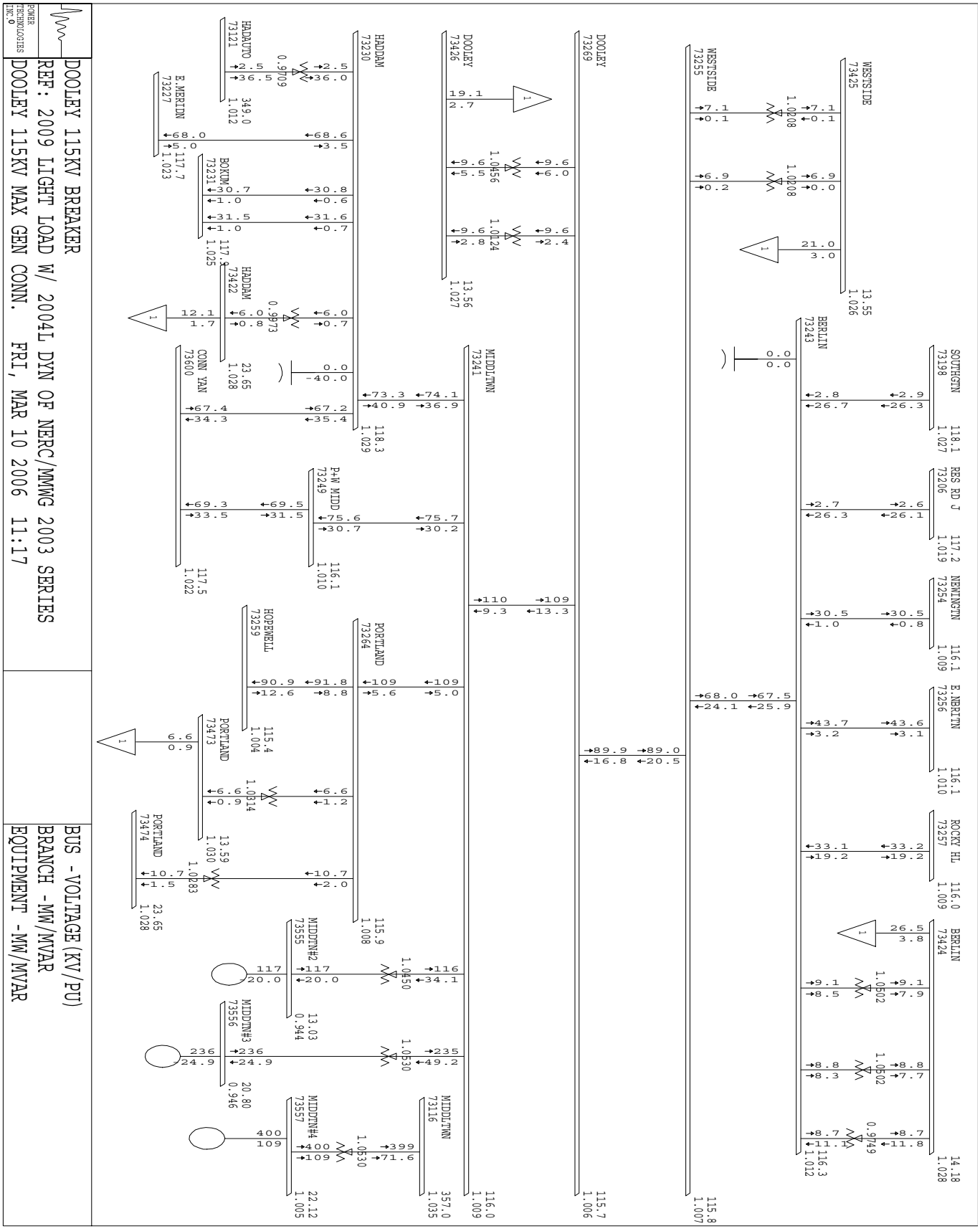

DOOLEY 115KV BREAKER
REF: 2009 LIGHT LOAD W/ 2004L DYN OF NERC/MMWG 2003 SERIES
DOOLEY 115KV MAX GEN CONN. FRI, MAR 10 2006 11:17
POWER TECHNOLOGIES INC
BUS - VOLTAGE(KV/PU)
BRANCH -MW/MVAR
EQUIPMENT -MW/MVAR
WESTSIDE 73425
SOUTHGTN 73198
BERLIN 73243
RBS RD J 73206
NEWINGTN 73254
E.NBRITN 73256
ROCKY HL 73257
BERLIN 73424
WESTSIDE 73255
DOOLEY 73426
DOOLEY 73269
MIDDLTWN 73241
HADDAM 73230
HADAUTO 73121
E.MERIDN 73227
BOKUM 73231
HADDAM 73422
CONN YAN 73600
P+W MIDD 73249
HOPEWELL 73259
PORTLAND 73264
PORTLAND 73473
PORTLAND 73474
MIDDTWN#2 73555
MIDDTWN#3 73556
MIDDTWN#4 73557
MIDDLTWN 73116

Figure 6

115kV
Peak Load One-line

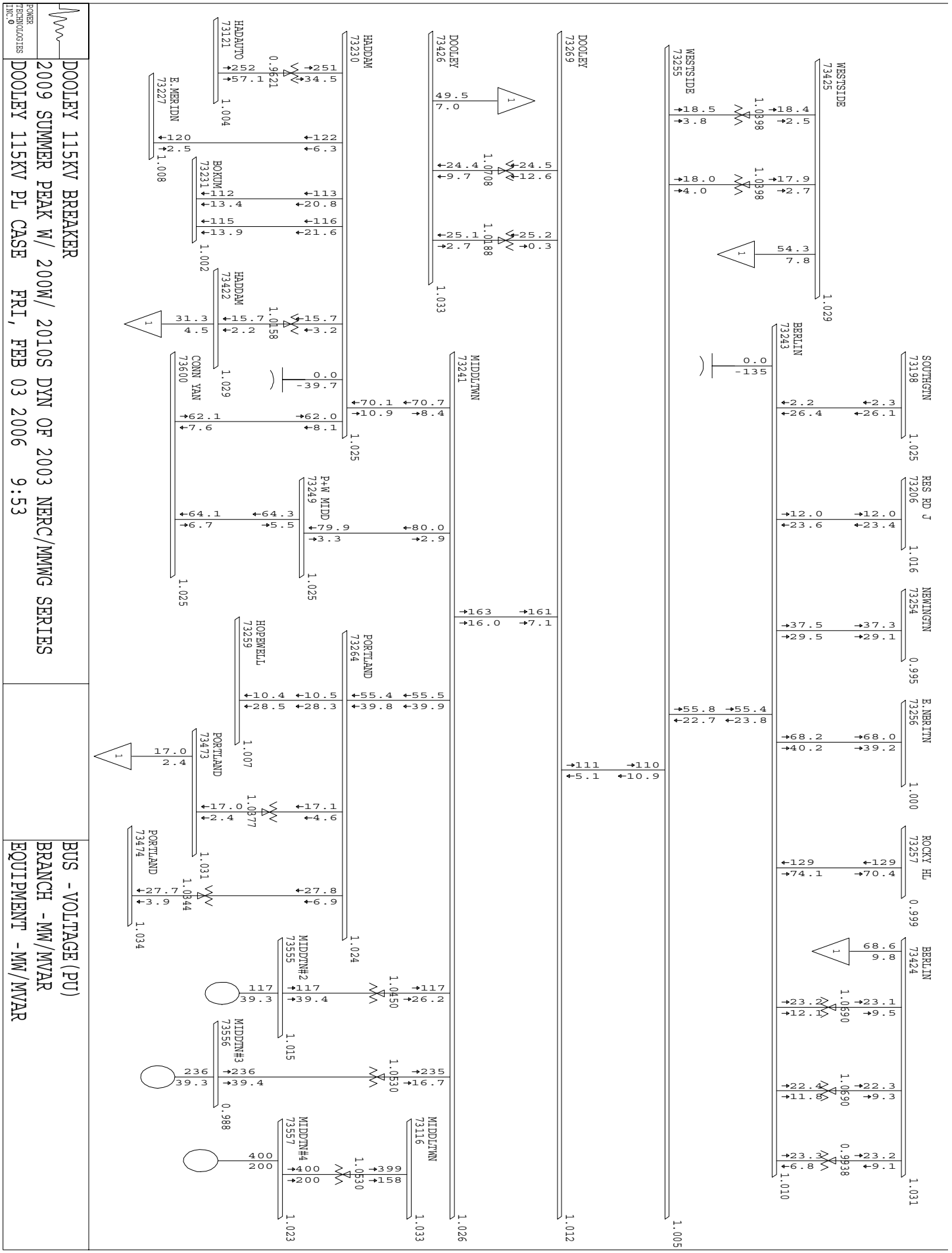
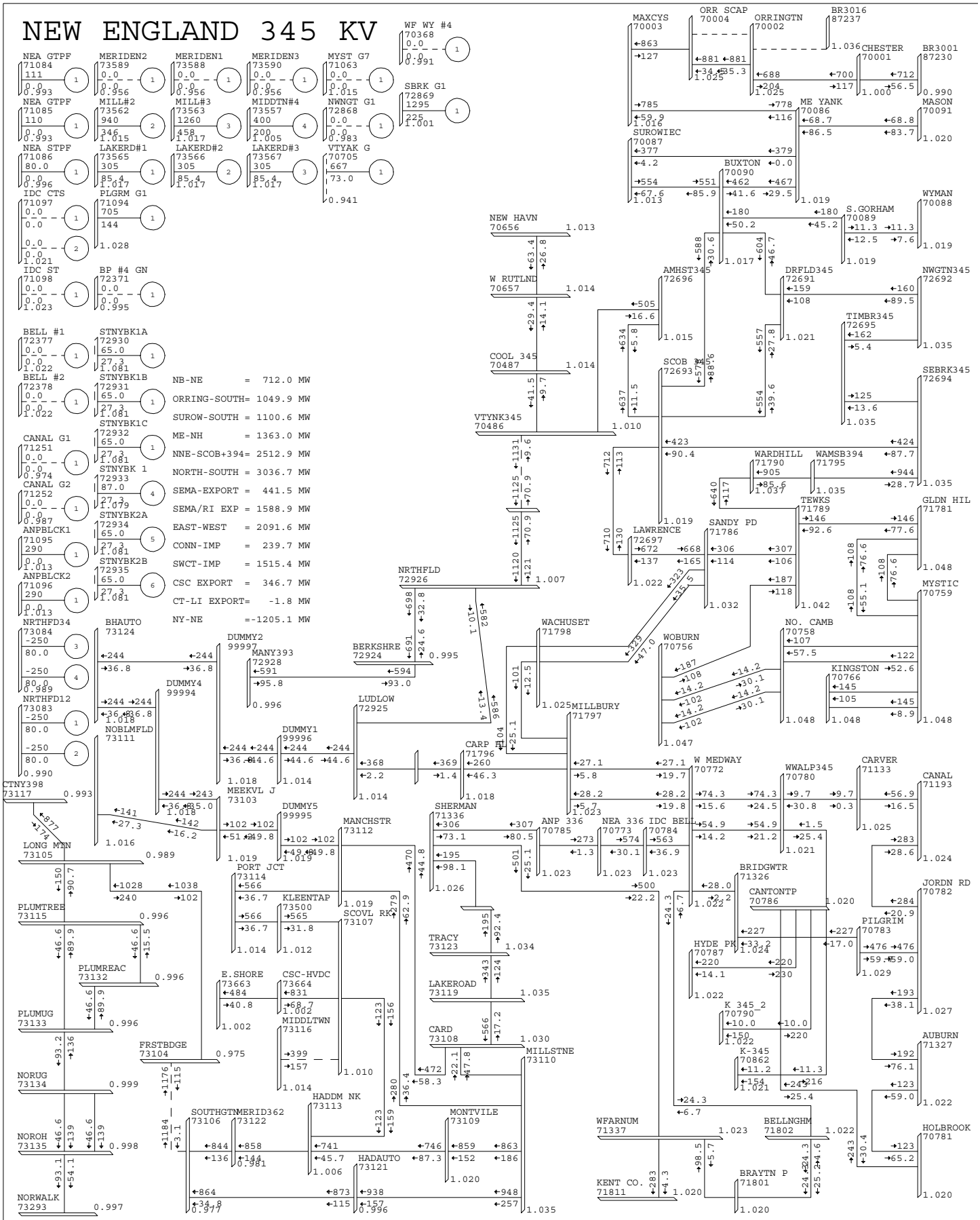

DOOLEY 115KV BREAKER
2009 SUMMER PEAK W/ 200W/ 2010S DYN OF 2003 NERC/MMWG SERIES
DOOLEY 115KV PL CASE FRI, FEB 03 2006 9:53
BUS -VOLTAGE(PU)
BRANCH -MW/MVAR
EQUIPMENT -MW/MVAR
POWER TECHNOLOGIES INC 0
WESTSIDE 73425
SOUTHGTN 73198
BERLIN 73243
RES RD J 73206
NEWINGTN 73254
E.NBRITN 73256
ROCKY HL 73257
BERLIN 73424
WESTSIDE 73255
DOOLEY 73269
DOOLEY 73426
HADDAM 73230
HADAUTO 73121
E.MERIDN 73227
BOKUM 73231
HADDAM 73422
CONN YAN 73600
MIDDLTWN 73241
P+W MIDD 73249
HOPEWELL 73259
PORTLAND 73264
PORTLAND 73473
PORTLAND 73474
MIDDTN#2 73555
MIDDTN#3 73556
MIDDTN#4 73557
MIDDLTWN 73116

Figure 7

345kV
Light Load One-line



DOOLEY 115KV BREAKER
REF: 2009 LIGHT LOAD W/ 2004L DYN OF NERC/MMWG 2003 SERIES
DOOLEY---- 345KV LL CASE FRI, FEB 03 2006 9:56

95 % RATEA
0.950 UV 1.050 OV
KV: ≤115 , ≤138 , ≤345

Figure 7A

345kV
Light Load One-line
Max gen-Conn.

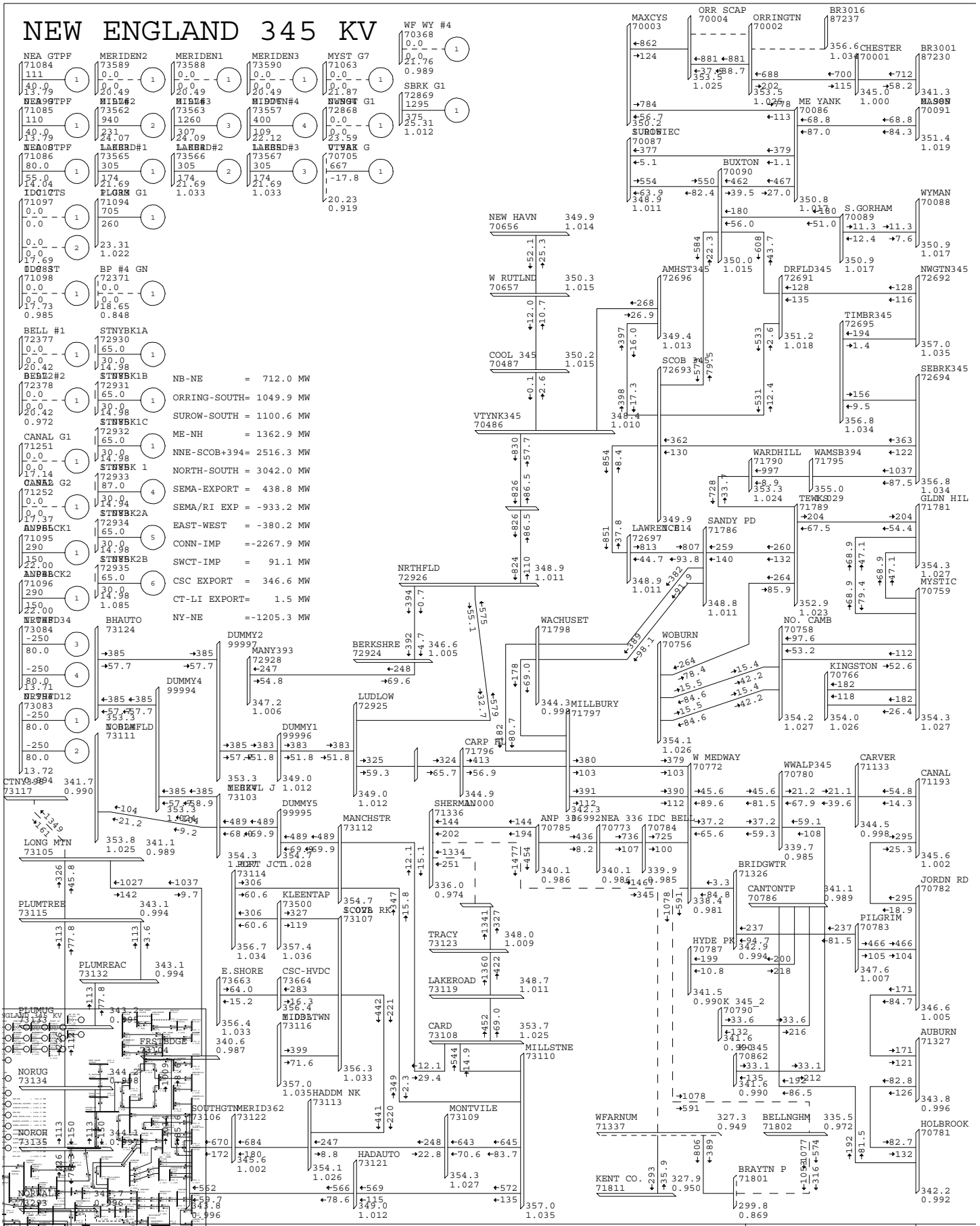
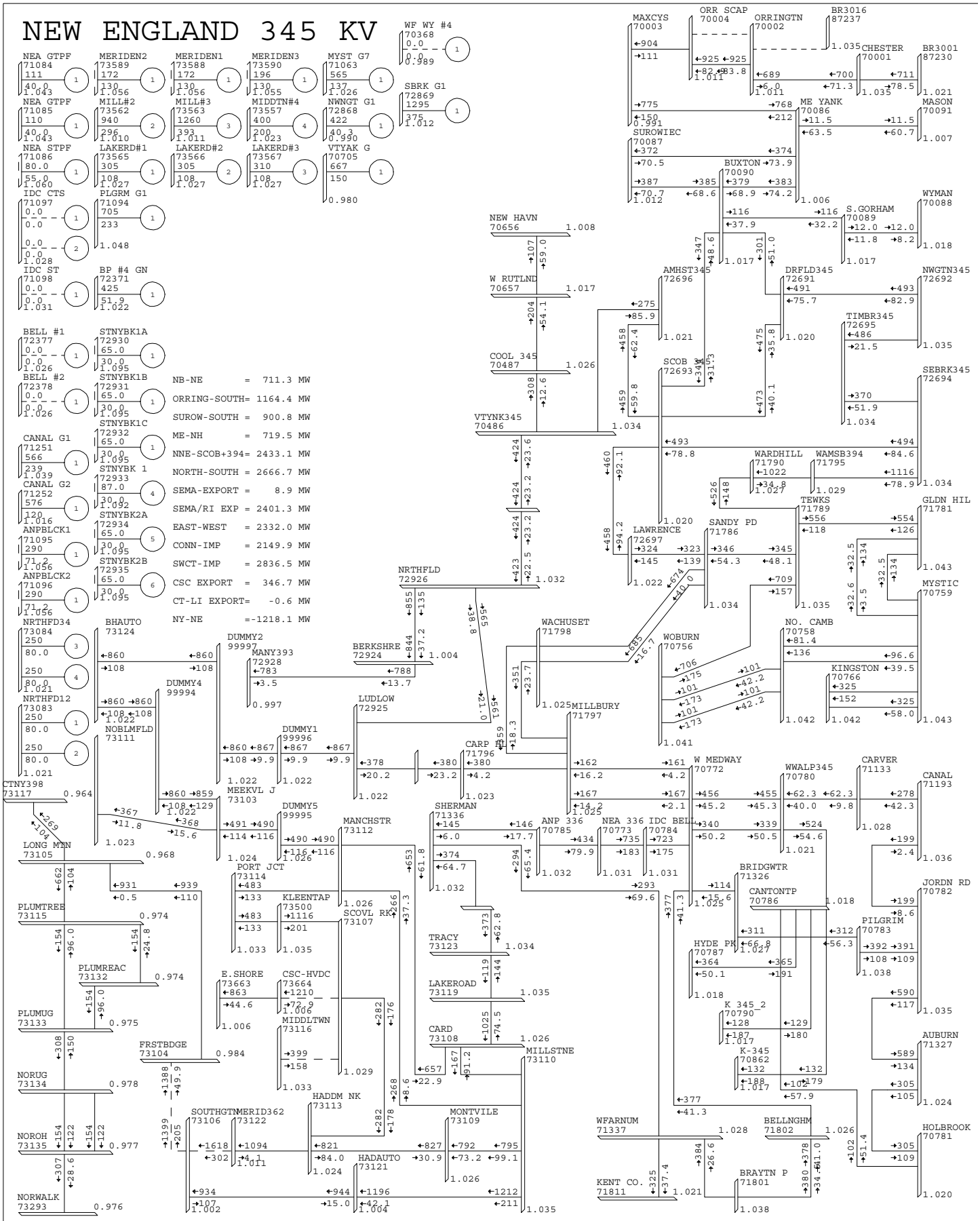

NEW ENGLAND 345 KV
NB-NE = 712.0 MW
ORRING-SOUTH= 1049.9 MW
SUROW-SOUTH = 1100.6 MW
ME-NH = 1362.9 MW
NNE-SCOB+394= 2516.3 MW
NORTH-SOUTH = 3042.0 MW
SEMA-EXPORT = 438.8 MW
SEMA/RI EXP = -933.2 MW
EAST-WEST = -380.2 MW
CONN-IMP =-2267.9 MW
SWCT-IMP = 91.1 MW
CSC EXPORT = 346.6 MW
CT-LI EXPORT= 1.5 MW
NY-NE =-1205.3 MW
DOOLEY 115KV BREAKER
REF: 2009 LIGHT LOAD W/ 2004L DYN OF NERC/MMWG 2003 SERIES
345KV LIGHT LOAD MAX GEN CONN. FRI, MAR 10 2006 11:57
95 % RATEA
0.950 UV 1.050 OV
KV: ≤115 , ≤138 , ≤345

Figure 8

345kV
Peak Load One-line



POWER TECHNOLOGIES INC.®	DOOLEY 115KV BREAKER 2009 SUMMER PEAK W/ 200W/ 2010S DYN OF 2003 NERC/MMWG SERIES DOOLEY---------345KV PL CASE FRI, FEB 03 2006 10:00	95 % RATEA 0.950 UV 1.050 OV KV: ≤115 , ≤138 , ≤345