NIXON PEABODY LLP
ATTORNEYS AT LAW

One Citizens Plaza
Suite 500
Providence, RI 02903
(401) 454-1000

Peter V. Lacouture
Direct Dial: (401) 454-1011
Fax: (866) 947-1235
E-Mail: placouture@nixonpeabody.com

March 6, 2009

VIA HAND DELIVERY

Ms. Luly Massaro, Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

Re: In Re: The Narragansett Electric Company d/b/a National Grid (Advisory Opinion to EFSB regarding need and cost-justification for proposed Rhode Island Reliability Project)
Docket No. 4029

Dear Luly:

I am enclosing an original and 9 copies of National Grid's Response to the Division's First Set of Data Requests for filing in the above-reference matter. Although the Division's requests were numbered R-I-1, et seq., we have renumbered them DPUC 1-1, et seq. to make them consistent with the Division's second set of data requests.

Please time stamp and return a copy of this letter and Response with our messenger. Thank you.

Sincerely,

Peter V. Lacouture

PVL/lco
Enclosures

cc: Leo Wold, Esq.
Mr. Andrew C. Dzykewicz
Mr. Jared Rhodes
Mr. Gregory Booth
Mr. Richard Hahn
Eric J. Krathwohl, Esq.

12425073.1

Kevin Flynn, Esq.
Erica P. Bigelow, Esq.
William J. Conley, Jr., Esq. (via Electronic Mail)
Timothy A. Williamson, Esq. (via Electronic Mail)
Richard Nadeau, Esq. (via Electronic Mail)
Peter D. Ruggiero, Esq. (via Electronic Mail)
Anthony A. Cipriano, Esq. (via Electronic Mail)
Ed Alves, Jr., Esq. (via Electronic Mail)
Christopher Colardo, Esq. (via Electronic Mail)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-1:

The Rhode Island Reliability Project ("Project") proposes that there will be approximately 224 new structures associated with the T-172 115 kV line, and approximately 226 new steel structures associated with the S-171 115 kV line, and both of these lines will be re-conductored. For each of these lines provide the following information:

a. When the line was originally installed
b. The depreciated life of each line
c. What the remaining life of each line is based on the remaining un-depreciated value
d. The remaining life of each line utilizing the Iowa Curve Methodology
e. The book value of each line, original cost and accumulated depreciation
f. The budgeted annual maintenance cost associated with each line
g. The proposed replacement date for each line based purely on maintenance, assuming the lines were not re-conductored or relocated as proposed under the Project.

RESPONSE:

a. The S-171 line was installed in the mid 1950s and the T-172 line was installed in the early 1960s.
b. For accounting purposes, the lives of poles and fixtures (355 Account) are assumed to be 40 years and the lives of conductor and accessories (356 Account) are assumed to be 45 years. The S-171 and T-172 lines are considered as one group of transmission line assets for National Grid plant accounting purposes. Further, information on depreciated life is available only on a specific component basis, depending on its installation date, and not for the lines as a whole. This is because asset components have been replaced on a continuing basis during the period since the original construction of the lines due to deterioration, the need for capacity

(Response prepared by or under
the supervision of Scott H. Ryder, P.E., Mark Eddy,
James McGrath and Eric Gemborys)

upgrades and damage repairs. Accordingly, we would not be able to provide a meaningful "depreciated life" for each line.

c. To use the remaining un-depreciated value to approximate the remaining life of the S-171 and T-172 group of transmission line assets, the following formula would be applied (assumes the transmission lines are comprised of 50% 355 Account assets with 45 year book life and 50% 356 Account assets with 40 year book life):

Remaining life = Net book value/Original cost x (40 years + 45 years)/2
= $5,857,185/$8,829,715 x (40 years + 45 years)/2
= 28 years

d. Narragansett Electric Company utilizes an "S2" mortality curve for Utility Account 355 and an "S1.5" curve for Utility Account 356. Please see Attachment 1 which indicates remaining depreciable life for each vintage year according to these mortality curves.

e. The book value of the S-171 and T-172 group of transmission line assets as of February, 2009 is $5,857,185, the original cost was $8,829,715 and the accumulated depreciation is $2,972,530.

f. In their present configuration, the S-171 and T-172 transmission lines occupy approximately 2/3 of the cleared width of the right-of-way (ROW). Following the proposed reconstruction of the S-171 and T-172 lines and the proposed installation of the new 345 kV line on the ROW from West Farnum to Kent County, the S-171 and T-172 transmission lines will occupy approximately 1/3 of the ROW cleared width, which will remain essentially unchanged from its current cleared width. The annualized cost of ROW vegetation management in $2009 for the full ROW width is approximately $95,000, and would be expected to remain unchanged. About 2/3 of this cost, or $63,000, could be considered applicable to the S-171 and T-172 lines, or $31,500/year to each line, as they exist in their current configurations. Following reconstruction, about 1/3 of the $95,000 total ROW vegetation management cost, or $32,000, could be considered applicable to the S-171 and T-172 lines, or about $16,000/year to each line.

Other maintenance costs include wood pole inspections, visual line inspections by foot patrol and helicopter, and infra-red inspections. S-171 and T-172 wood pole inspections and treatment would typically occur on a 10 year cycle with the annualized cost being approximately $9,000 total or $4,500/year per line. This component of maintenance will be essentially eliminated following Project completion, since wood poles would be replaced with steel poles. Based on National Grid transmission system wide costs, visual and infra-red inspections of the S-171 and T-172 lines are typically estimated at $6,000/year total or $3,000/year per line, and this would remain unchanged.

g. In the 47 to 54 year period since the original installation of the S-171 and T-172 group of transmission line assets in the 1950s and early 1960s, almost all individual line components have been replaced. Conductor and some structure components were replaced on approximately one half of the S-171 and T-172 lines in the 1980s, while conductor and some structure components were replaced on the remaining approximately one half of the S-171 and T-172 lines in the 1990s. Additionally, several structures near the ends of their useful service lives would be replaced over the next few years were it not for the proposed reconstruction of the S-171 and T-172 lines. Since transmission lines undergo continuous repair, maintenance and upgrade, it is rarely necessary to replace an entire set of transmission line assets at once for asset condition reasons only. As noted in c. above, this continuous process of component replacements results in an approximation of remaining life of 28 years based on un-depreciated value, even though it has been 47 to 54 years since the original facilities were installed.

Only the 1.1 mile segments of the S-171 and T-172 lines between Hartford Avenue Substation and the Johnston taps would be reconductored with higher capacity conductor as part of the proposed reconstruction.

Attachment 1 to National Grid response to
DPUC Data Request 1-1

Curve ASL S2
Account 355

description	vintage	remaining_life
NECO 101/106 355	1923	0.85
NECO 101/106 355	1929	1.95
NECO 101/106 355	1943	5.02
NECO 101/106 355	1949	6.58
NECO 101/106 355	1950	6.86
NECO 101/106 355	1953	7.74
NECO 101/106 355	1956	8.68
NECO 101/106 355	1959	9.70
NECO 101/106 355	1963	11.18
NECO 101/106 355	1964	11.57
NECO 101/106 355	1965	11.98
NECO 101/106 355	1966	12.40
NECO 101/106 355	1967	12.83
NECO 101/106 355	1968	13.27
NECO 101/106 355	1969	13.73
NECO 101/106 355	1970	14.20
NECO 101/106 355	1971	14.68
NECO 101/106 355	1972	15.18
NECO 101/106 355	1973	15.69
NECO 101/106 355	1974	16.22
NECO 101/106 355	1975	16.77
NECO 101/106 355	1976	17.33
NECO 101/106 355	1977	17.91
NECO 101/106 355	1978	18.51
NECO 101/106 355	1979	19.13
NECO 101/106 355	1980	19.77
NECO 101/106 355	1981	20.42
NECO 101/106 355	1982	21.10
NECO 101/106 355	1983	21.79
NECO 101/106 355	1984	22.51
NECO 101/106 355	1985	23.24
NECO 101/106 355	1986	24.00
NECO 101/106 355	1987	24.77
NECO 101/106 355	1988	25.57
NECO 101/106 355	1989	26.39
NECO 101/106 355	1990	27.22
NECO 101/106 355	1991	28.08
NECO 101/106 355	1992	28.95
NECO 101/106 355	1993	29.84
NECO 101/106 355	1994	30.74
NECO 101/106 355	1995	31.67
NECO 101/106 355	1996	32.60
NECO 101/106 355	1997	33.55
NECO 101/106 355	1998	34.51

NECO 101/106 355	1999	35.48
NECO 101/106 355	2000	36.46
NECO 101/106 355	2001	37.44
NECO 101/106 355	2002	38.43
NECO 101/106 355	2003	39.42
NECO 101/106 355	2004	40.42
NECO 101/106 355	2005	41.42
NECO 101/106 355	2006	42.42
NECO 101/106 355	2007	43.42
NECO 101/106 355	2008	44.42

Curve ASL S1.5
Account 356

NECO 101/106 356	1923	0.00
NECO 101/106 356	1929	0.25
NECO 101/106 356	1943	3.71
NECO 101/106 356	1949	5.25
NECO 101/106 356	1950	5.52
NECO 101/106 356	1953	6.34
NECO 101/106 356	1955	6.91
NECO 101/106 356	1959	8.12
NECO 101/106 356	1962	9.09
NECO 101/106 356	1963	9.43
NECO 101/106 356	1964	9.78
NECO 101/106 356	1965	10.13
NECO 101/106 356	1966	10.50
NECO 101/106 356	1967	10.88
NECO 101/106 356	1968	11.26
NECO 101/106 356	1969	11.66
NECO 101/106 356	1970	12.06
NECO 101/106 356	1971	12.48
NECO 101/106 356	1972	12.91
NECO 101/106 356	1973	13.36
NECO 101/106 356	1974	13.81
NECO 101/106 356	1975	14.28
NECO 101/106 356	1976	14.77
NECO 101/106 356	1977	15.26
NECO 101/106 356	1978	15.78
NECO 101/106 356	1979	16.31
NECO 101/106 356	1980	16.85
NECO 101/106 356	1981	17.41
NECO 101/106 356	1982	17.99
NECO 101/106 356	1983	18.59
NECO 101/106 356	1984	19.21
NECO 101/106 356	1985	19.84
NECO 101/106 356	1986	20.49
NECO 101/106 356	1987	21.16
NECO 101/106 356	1988	21.85
NECO 101/106 356	1989	22.57

NECO 101/106 356	1990	23.30
NECO 101/106 356	1991	24.05
NECO 101/106 356	1992	24.82
NECO 101/106 356	1993	25.61
NECO 101/106 356	1994	26.42
NECO 101/106 356	1995	27.25
NECO 101/106 356	1996	28.09
NECO 101/106 356	1997	28.96
NECO 101/106 356	1998	29.84
NECO 101/106 356	1999	30.74
NECO 101/106 356	2000	31.66
NECO 101/106 356	2001	32.59
NECO 101/106 356	2002	33.54
NECO 101/106 356	2003	34.49
NECO 101/106 356	2004	35.46
NECO 101/106 356	2005	36.44
NECO 101/106 356	2006	37.43
NECO 101/106 356	2007	38.42
NECO 101/106 356	2008	39.42

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company d/b/a National Grid (Advisory Opinion to EFSB regarding need and cost-justification for proposed Rhode Island Reliability Project)	: : : :	Docket No. 4029

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-2:

The Project proposes a new 345 kV line utilizing two 954 kcmil ACSR "rail" bundled conductor construction. Please provide the normal capacity of this line in both megawatts and amperes, and provide the ambient and conductor temperature basis or other bases for this capacity. Also, provide the emergency capacity rating for the line and the basis for the emergency capacity in terms of thermal conductor rating.

RESPONSE:

The 2-954 kcmil ACSR Rail bundled conductor is rated as follows:

Amps

Summer (100 ºF)				Winter (50 ºF)			
NORM	LTE	STE	DAL	NORM	LTE	STE	DAL
2598	3209	3556	4764	3203	3670	4159	5720

MVA

Summer (100 ºF)				Winter (50 ºF)			
NORM	LTE	STE	DAL	NORM	LTE	STE	DAL
1552	1918	2125	2847	1914	2193	2485	3418

NORM stands for normal (continuous rating)
LTE stands for long term emergency (12 hour rating in the summer, 4 hour rating in the winter)
STE stands for short term emergency (15 minute rating)
DAL stands for drastic action limit (5 minute rating)

The normal limit is based on a conductor temperature of 105 ºC
The emergency limits are based on a conductor temperature of 140 ºC

Note: National Grid rates transmission equipment in terms of Amps or MVA, not in MW.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-3:

With the relocation and reconstruction of the T-172 and S-171 lines on the existing right-of-way, will there be any additional right-of-way impact or right-of-way required associated with guying outside of the existing right-of-way? Also, will there be any additional danger tree right-of-way required that may impact trees of property owners?

RESPONSE:

All new S-171 and T-172 structures will be self-supporting steel except for four new guyed wood pole structures in the vicinity of Hartford Avenue Substation. The guy anchors for these structures will be located within the limits of the existing right-of-way (ROW). Accordingly, there will be no additional ROW required or impacts outside of the existing ROW.

National Grid does not anticipate the need for additional rights for removal of danger trees. Should any specific danger trees outside of the ROW be identified that could present a risk to the relocated lines, National Grid would attempt to work with individual property owners to obtain permission for trimming or removal.

(Response prepared by or under
the supervision of Scott H. Ryder, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-4:

The H-17 and the G-185N 115 kV lines are proposed for reconstruction utilizing H-frame wood pole design. The Rhode Island Reliability Project Environmental Report, Volume 1 explains that these lines are being constructed utilizing H-Frame wood pole design in order to meet the new National Electrical Safety Code strength requirements, and the loading criterion. Explain in detail why these lines are not being constructed with single steel pole design in a similar fashion as the T-172 and S-171 line reconstructions. Also, explain if these lines could be constructed utilizing the same single steel pole davit arm structure design, particularly since it appears that the conductor size is proposed to be the same as the T-172 and S-171 lines.

RESPONSE:

The wood H-frame design proposed for the H-17 line relocation and G-185N line reconductoring utilizes structures that are shorter and less costly than steel pole structures. Additionally, the wood H-frame structures are typically direct-buried, which eliminates the need for reinforced concrete foundations. The vertically configured steel pole design proposed for S-171 and T-172 transmission lines is more compact in that it takes up less width on the right-of-way (ROW). Use of this design results in creation of a slot on the ROW from West Farnum to Kent County for the new 345 kV line to occupy. It does so, however, at a higher initial installed cost and with taller, more visible structures than would result with a wood H-frame design. The H-17 and G-185N transmission lines are located on ROWs that are less space constrained. Accordingly, the wood H-frame design was selected due to lower initial cost and reduced visibility.

The H-17 line relocation and the G-185N line reconductoring could be constructed using the same single steel pole davit arm structure design as that proposed for the S-171 and T-172 line reconstructions. However, the wood H-frame design is capable of supporting the same size conductor proposed for the S-171 and T-172 transmission lines at a lower installed cost and with shorter, less visible structures.

(Response prepared by or under
the supervision of Scott H. Ryder, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-5:

What dollars have been generally included in the National Grid transmission maintenance cost on an annual basis for T-172, S-171, H-17, B-23, and G-185? What annual maintenance cost reduction will be reflected as a result of these lines being reconstructed?

RESPONSE:

As noted in the response to DPUC 1-1, annual maintenance costs that could be assigned to the S-171 and T-172 lines will likely decrease following the proposed reconstruction to accommodate the new 345 kV line from West Farnum to Kent County. Vegetation management cost assignable to the S-171 and T-172 lines would decrease since these lines would take up less space on the right of way (ROW), and wood pole inspection costs would be essentially eliminated in the 20.2 mile section of the lines that is reconstructed with steel poles.

Annual maintenance costs assignable to the short segments of the 115 kV B-23 and H-17 lines to be relocated are typically less than $1,000 each. Since they occupy portions of ROWs that would be maintained anyway to accommodate other circuits occupying the corridors, there would be minimal assignable vegetation management costs. Assignable costs for wood pole and other inspections would be less than $1,000.

Annual maintenance costs assignable to the G-185N line, currently in the range of $1,000 to $5,000, would remain unchanged following the proposed reconductoring.

(Response prepared by or under
the supervision of Scott H. Ryder, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-6:

Has National Grid evaluated the future congestion issues that may exist if the Project is not constructed, other than the load flow contingency analysis?

RESPONSE:

There are no known congestion issues in this area through the time period of the in-service date of the RI Reliability Project; however, if generators were to be sited in the area in the future, then congestion could become an issue of concern. The Project would serve to help mitigate possible future transmission congestion by creating more transmission capacity.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-7:

Does the construction of the transmission projects proposed in the Project result in an increased ability to move additional generation and low cost generation into Rhode Island? Does this Project provide the ability for customers, most particularly large industrial customers, to purchase low cost generation from other suppliers and effectively move that low cost generation without adverse congestion issues? Has National Grid considered this in its evaluation of this Project?

RESPONSE:

The Rhode Island Reliability Project increases the transmission system's capacity and capability and therefore increases the ability to move additional generation into the area. Additionally, the Project increases the ability of customers to purchase power from suppliers outside of the area and move that power into the area without congestion. The Project also provides future flexibility, expandability, and strong bulk transmission access and support to this heavily-loaded area. These aspects were very important in the selection of the proposed Project. This is demonstrated by the fact that the 115 kV underground cable alternative (from Franklin Square Substation to Sockanosset Substation) was not selected due, in part, to the fact that it did not accomplish the benefits mentioned in this paragraph.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-8:

Has National Grid or the ISO evaluated the cost effect on the transmission wheeling rates to customers in Rhode Island as a result of construction of the proposed Project?

RESPONSE:

The Rhode Island Reliability Project is part of a larger regional transmission plan known as the NEEWS Project. NEEWS is a joint undertaking of National Grid and Northeast Utilities aimed at addressing bulk transmission reliability and security issues in the three-state area of Rhode Island, Massachusetts and Connecticut. National Grid did evaluate the effect that its portion of the NEEWS Project, which amounts to approximately $634 million, would have on regional and local transmission rates for The Narragansett Electric Company's customers.

With all of National Grid's components of NEEWS fully in-service in 2013, the total estimated incremental cost to The Narragansett Electric Company customers would be approximately $0.00090 per kWh, or $0.47 per month to an average 500 kWh residential customer bill.

The Rhode Island Reliability Project as presented to the RIEFSB and the RIPUC has an estimated cost of approximately $270M, representing 42.59% of National Grid's total share of NEEWS. Therefore, the estimated incremental cost to The Narragansett Electric Company customers resulting from the Rhode Island Reliability Project would be approximately $0.00038 per kWh, or $0.20 per month to an average 500 kWh residential customer bill.

(Response prepared by or under
the supervision of Pamela A. Viapiano)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-9:

What is the present transmission wheeling rate being charged to customers who wheel their power into Rhode Island? What will be the incremental impact of the Project on the transmission wheeling rate for customers in Rhode Island?

RESPONSE:

Effective January 1, 2009, the average transmission costs to The Narragansett Electric Company customers is $.01466 per kWh**,** which equates to $7.64 per month to an average 500 kWh residential customer bill. The $0.20 total estimated incremental impact of the Rhode Island Reliability Project, as indicated in response to DPUC 1-9 above, reflects an increase in monthly transmission costs of approximately 3%.

(Response prepared by or under
the supervision of Pamela A. Viapiano)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-10:

To the extent that National Grid and the ISO have not evaluated the incremental impact of the Project on transmission wheeling cost, please provide the formulas utilized by the ISO for the calculation of transmission wheeling and, utilizing the proposed cost estimate for this project, provide the best estimate of National Grid for what the additional incremental cost associated with the implementation of the Project will be on transmission wheeling customers in terms of cost per kW and cost per kWh.

RESPONSE:

Please see the response to DPUC 1-8.

(Response prepared by or under
the supervision of Pamela A. Viapiano)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-11:

On page 3-2 of the Rhode Island Reliability Project Environmental Report, Volume 1, it has been stated that the equipment loading capabilities have been determined using maximum allowable equipment temperatures as criteria. Provide what the detailed temperature criteria are that have been utilized for the overhead conductors, and clearly state whether the criteria were evaluated on a normal or emergency loading basis.

RESPONSE:

The temperature criteria for overhead conductors can be based on two factors; the conductor type and the sag clearance.

For lines that are ACSR (aluminum conductor steel reinforced) the Normal conductor temperature used is 105 ºC and the emergency conductor temperature used is 140 ºC.

For lines that are ACSS (aluminum conductor steel supported) the Normal conductor temperature used is 200 ºC and the emergency conductor temperature used is also 200 ºC.

For lines that are ACAR (aluminum conductor alloy reinforced) the Normal conductor temperature used is 95 ºC and the emergency conductor temperature used is 110 ºC.

For lines that are AL (aluminum) the Normal conductor temperature used is typically 95º C and the emergency conductor temperature used is typically 100 ºC.

If operating temperatures less than the conductor temperatures listed above would cause the transmission line to sag to a point that would violate minimum clearance criteria, the transmission line would be de-rated and limited to a lower conductor operating temperature.

For normal conditions, with no contingencies, the normal criteria were used for the analysis. For contingency conditions, the emergency criteria were used in the analysis.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-12:

On page 3-6 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 3-1 *Most Severe Planning Criteria Violations in Rhode Island*, outlines five dispatch stress criteria, and indicates that mitigation without the Project would require the shedding of between 100 MW of load up to a maximum 500 MW of load that must be shed after the first contingency, but prior to the second contingency. Explain in detail how the ICF International Report ("Report") is consistent with this table, specifically referring to page 50 in which it outlines that an additional 1000 MW of reduction are required in Connecticut and an additional 1000 MW are required in Rhode Island if the Project is not constructed, and further goes on to indicate that there is a need for 40% to 70% reduction in peak load by 2013, which seems completely inconsistent with the indication that there would be over 500 MW of load that must be shed after the first contingency as indicated on Table 3-1.

RESPONSE:

The 100 MW to over 500 MW of load that must be shed after the first contingency, but prior to the second contingency (specified on page 3-6 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 3-1 *Most Severe Planning Criteria Violations in Rhode Island*) refers to load that would have to be shed in a specifically targeted area. The targeted area includes only the load that is served by Rhode Island substations that are geographically located south of the Hartford Avenue substation. This represents the load that must be shed to address the most severe dispatch and contingency conditions, such as voltage collapse resulting in blackouts. The targeted load shedding does not, however, address all criteria violations observed in the Needs Analysis. As mentioned on page 3-5 of the Rhode Island Reliability Project Environmental Report, Volume 1, there are many other dispatch and contingency conditions that result in "lesser" criteria violations that are not included in Table 3-1.

In contrast, the demand reduction specified in the ICF International Report refers to the amount of demand reduction that would provide the same level of reliability as the proposed Rhode Island Reliability Project. Therefore, ICF attempted to implement demand reduction that would address all criteria violations, similar to the Rhode Island Reliability Project. This reflects a higher amount of demand response (spread over many area substations) than that which is

(Response prepared by or under the supervision
of Mark A. Stevens, P.E. and Kenneth K. Collison)

required to relieve only the most severe conditions. The Report is therefore consistent with the findings of the Needs Analysis.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-13:

Appendix F of the Report has concluded that non-transmission alternatives cannot reach a sufficient level to either defer or eliminate the reliability project in Rhode Island. What level of megawatts of non-transmission alternatives are necessary in order to defer the Project in Rhode Island for ten (10) years? What level would need to be sustainable to eliminate the need for the Project in Rhode Island for twenty (20) years, assuming that the non-transmission alternatives, both in terms of distributed generation and other demand side management projects, were reliable and sustainable?

RESPONSE:

The analysis described in the ICF International Report was performed for 2013 only. ICF did not find a feasible or realistic non-transmission alternative to the Project in that year. The study showed that the demand reduction required in 2013 to meet the planning criteria for the New England transmission system will be in excess of 40 percent to 70 percent of the peak demand in Rhode Island. ICF did not conduct a similar study to determine the level of megawatts of non-transmission alternatives necessary to defer the Project in Rhode Island for ten (10) years, or to eliminate the need for the Project in Rhode Island for twenty (20) years. However, ICF believes that the level of megawatts required over a ten year to twenty year period would be even higher than the amount that would be needed in 2013 to eliminate the need for the Project.

(Response prepared by or under the supervision
of Mark A. Stevens, P.E. and Kenneth K. Collison)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-14:

In Appendix F the Report discusses the projection of additional non-transmission capability of some 492 MW, made up of 31 MW of CHP, 196 MW of new renewable generation, and 265 MW of non-dispatchable DSM. How is this 492 MW of new potential load reduction capability inconsistent with matching up with the approximately 500 MW of load that must be shed under Table 3-1 of the report under the worst of all conditions?

RESPONSE:

Please see the response to DPUC 1-12.

(Response prepared by or under the supervision
of Mark A. Stevens, P.E. and Kenneth K. Collison)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-15:

On page 3-6 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 3-1 indicates for the first two dispatch stress criteria what appears to be a three contingency situation. Please explain how the first two planning criteria are different than three contingency criteria on the basis that the statement says that critical 115 kV RI generator out of service in both of the first two assessments, then goes on to discuss a first contingency of the 332 line being out and on the second contingency either the S-171S or the T-172S lines being out. Based on the ISO's criteria and customary industry practices are these two planning criteria not, in fact, describing a three contingency situation since there are three components that are outaged? To the extent this is not National Grid's belief, please provide a detailed description as to why this is not a three contingency situation.

RESPONSE:

Placing the critical 115 kV generator out-of-service is not considered a contingency for this analysis, but rather a dispatch stress. This is consistent with the ISO-NE criteria in that the generator is critical to the area, and therefore the analysis should be carried out without the generator in-service in order to create a stressed generation dispatch. This can be found on page 4 of the ISO-NE Planning Procedure 3, and is quoted here for convenience: "With due allowance for generator maintenance and forced outages, design studies will assume power flow conditions with applicable transfers, load, and resource conditions that reasonably stress the system." If the system were to be planned assuming that all of the area generators will be in-service, the consequences would be that if one generator was out of service then the system would not be able to meet the required reliability criteria. In other words, the system would then be dependent on all area generators being in-service in order to meet the required reliability criteria. Assuming all area generators to be in-service does not constitute a stress to the transmission system as prescribed by ISO-NE Planning Procedure 3.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-16:

On page 3-6 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 3-1 is it the most severe planning violation and National Grid's contention that 500 MW must be shed if critical 115 kV RI generator is out of service and the 332 line is out, thus constituting two outages or two contingency failures must exist simultaneously? Also, please indicate what the critical 115 kV RI generator that would be out is intended to represent, and is it, in fact, intended to be the RISE unit outage of 550 MW discussed in the Report in Appendix F.

RESPONSE:

The critical 115 kV generator is the FPLE RISE generator. Again, placing this generator out-of-service is not considered a contingency for this analysis, but rather a dispatch stress. (Please see the response to DPUC 1-15.)

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-17:

Based on what appears to be an inconsistency between the Rhode Island Reliability Project Environmental Report, Volume 1, Table 3-1 load shedding level and the ICF Report in Appendix F, state what National Grid's position is in regard to the specific amount of load shedding that must transpire in the event of the most severe planning criteria contingencies. If that level is in excess of those stated on Table 3-1, would it be incorrect to state that distributed generation, CHP and DSM added to the system of an additional 500 MW would offset the most severe planning criteria violations as outlined in Table 3-1? If this statement is incorrect, so state and explain why the statement is incorrect.

RESPONSE:

Please see the response to DPUC 1-12.

(Response prepared by or under the supervision
of Mark A. Stevens, P.E. and Kenneth K. Collison)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-18:

To the extent that National Grid is proposing the utilization of wood pole structures, including H-frame wood pole structures, in some of the reconstruction, please state if National Grid gave economic consideration to the utilization of single steel pole structures or steel pole in lieu of wood pole H-Frame for reliability, maintenance, and long-term economic life in its design analysis and economic analysis of the most cost-effective construction methods.

RESPONSE:

The wood H-frame structures would employ steel cross-arms, so only the wood poles would be left requiring inspection every 10 years and replacement on an approximately 50 year cycle, compared to steel poles on reinforced concrete foundations which could reasonably be expected to last 100 years or more. Other maintenance costs such as regular visual inspections, infra-red inspections and vegetation management would be the same for wood or steel structures. The present value of the costs of wood pole inspections in years 10, 20, 30 and 40, and replacement of wood poles in year 50 would be significantly less than the difference in upfront costs between the wood H-frame and steel pole designs.

(Response prepared by or under
the supervision of Scott H. Ryder, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-19:

Page 5-2, paragraph 5.2.2 of the Rhode Island Reliability Project Environmental Report, Volume 1, outlines why the underground alternative does not perform well under second contingency conditions. Did National Grid consider, as part of the performance of the underground alternatives how much additional DSM, CHP, and distributed generation would offset the deficiency in performance under the second contingency system conditions?

RESPONSE:

National Grid did not consider, as part of the performance of the 115 kV underground alternative (from Franklin Square Substation to Sockanosset Substation), how much additional DSM, CHP, and distributed generation would offset the deficiency in performance under the second contingency system conditions. As described in the prefiled testimony of Mark Stevens, many additional transmission upgrades would be required in order to eliminate the contingency violations and make this alternative a viable longer term solution (considering that DSM, CHP and distributed generation are spread across the area, a significant amount of these resources would be required in order to eliminate the need for the additional transmission upgrades). Even with all of the additional transmission upgrades that would be required to make the underground alternative viable, this alternative would still not provide the future capacity, flexibility, or expandability that the proposed Project does, and it would not provide the strong bulk transmission access and support that is needed for this heavily loaded area. For these reasons, this alternative was not further pursued, and a supplement of DSM, CHP and distributed generation was not considered.

(Response prepared by or under
the supervision of Mark A. Stevens, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-20:

The Rhode Island Reliability Project Environmental Report discusses line designs and construction methods, including using H-frame structures and double-circuit davit arm structures, and elected to select single steel pole construction for the 345 kV line and two of the 115 kV lines. Was this same type of evaluation performed on the G-185N line and the H-17 line? If so, why were the results different?

RESPONSE:

Since adequate space exists on the rights-of-way occupied by the G-185N and H-17 lines, it was determined that there was no justification for use of a more compact, taller and more costly design such as single steel poles on concrete foundations. (Please see the response to DPUC 1-4.)

(Response prepared by or under
the supervision of Scott H. Ryder, P.E.)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-21:

On page 5-11 of the Rhode Island Reliability Project Environmental Report, Volume 1, paragraph 5.6.2, National Grid describes that it evaluated two types of underground cable technology, including HPFF and solid dielectric cable.

a. Has National Grid installed, operated, and/or maintained any 345 kV underground cable system utilizing either HPFF or solid dielectric cable? If so, which, when, and where?
b. The Rhode Island Reliability Project Environmental Report indicates that 345 kV has a successful experience record dating back to the 1960s for HPFF type cable systems, however, it does not provide any historical reference for any solid dielectric cables used at 345 kV. Does National Grid have such information, and has it evaluated such information?
c. Provide examples of where National Grid is aware that it or other utilities have successfully operated significant lengths of 345 kV solid dielectric cross linked polyethylene underground cables extending the number of miles that would be necessary as an alternative to the reliability project, as outlined in the Rhode Island Reliability Project Environmental Report.

RESPONSE:

a. Yes, National Grid has installed, operated, and maintained 345 kV transmission cables as follows:

- E105 and F106 cables between Manchester St Substation (Providence, RI) and Hartford Ave Substation (Johnston, RI), a distance of 6.8 miles. These are 345 kV High Pressure Fluid Filled Pipe Type Cables. The cables were installed in 1994. The cables are constructed for 345 kV operation, but are presently operating at 115 kV.

In addition to these circuits, National Grid has a short installation of 345 kV HPFF cable outside of Syracuse NY. National Grid, through its Keyspan subsidiary, operates several 345 kV HPFF and solid dielectric cables on Long Island, NY for the Long Island Power Authority. National Grid (UK) has several 400 kV solid dielectric installations in the greater London area.

(Response prepared by or under
the supervision of David M. Campilii, P.E.)

b. National Grid does not have extensive reliability information for solid dielectric XLPE cables operating at 345 kV. National Grid does have anecdotal information at this voltage. Solid dielectric transmission cables have been available commercially at 345 kV since the early to mid 1980's. Some early installations experienced difficulty with splice failures.

The International Electrotechnical Commission (IEC) and the Association of Edison Illuminating Companies (AEIC), two agencies that develop and maintain standards and specifications for cables of this voltage, have both instituted strict requirements for this type of cable. Manufacturers have to qualify a cable "system", consisting of the cable itself, as well as any cable splices and terminations. The qualification procedure involves rigorous electrical, thermal, and mechanical testing. These tests are intended to demonstrate the compatibility between the cables and the cable accessories (splices and terminations) over the design life of the cable.

Recent installations that we are aware of have been relatively trouble free, but there is limited long term reliability history available for this type of cable.

c. National Grid is aware of several installations of 345 kV and higher voltage solid dielectric transmission cables in the multi-mile range. These include:

- Tokyo "Shin-Keiyo to Shin-Toyosu" cable, consisting of 25 miles of 500 kV XLPE cable, energized in 2000.

- Northeast Utilities "Middletown to Norwalk" cable, consisting of 23 miles of double circuit 345 kV XLPE cable in Connecticut. This system was energized in December, 2008.

- Copenhagen "Metro Power Project", consisting of 13 miles of 420 kV XLPE cable energized in 1997, and 7 miles of 420 kV XLPE cable energized in 1999.

- National Grid's (UK) "Elstree to St Johns Wood" cable, consisting of 13 miles of 400 kV XLPE cable in London. This system was energized in 2007.

- Long Island Power Authority "East Garden City to Ruland Road" cable, consisting of 13 miles of 345 kV XLPE cable. This circuit was energized in 2007.

- National Grid (UK) "Barking to West Ham" cable, consisting of 4 miles of 400 kV XLPE cable in London. The first circuit of this system was energized in 2008, with a second circuit expected to be energized in late 2009.

- Long Island Power Authority "Duffy Ave Converter Station to Newbridge Rd Substation" cable (associated with the Neptune HVDC interconnection to New Jersey), consisting of 2 miles of 345 kV XLPE cable. This circuit was energized in 2007.

- Northeast Utilities "Bethel to Norwalk" cable, consisting of approximately 2 miles of double circuit 345 kV XLPE cables. This cable system was energized in 2006.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-22:

On page 5-15 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 5-2, National Grid has provided a cost estimate associated with a 345 kV underground alternative. Provide the detailed breakdown associated with each of the project segment cost estimates including, but not limited to, the 345 cable material cost, the proposed trenching cost, and the proposed duct bank cost. Also, outline the additional terminal structure cost and equipment cost, and the specific components that make up these costs, as summarized in Table 5-2.

RESPONSE:

See the attached spreadsheet (Attachment 1) which provides details of the underground transmission cable estimate. The estimate for the installed cable system, as shown in the spreadsheet, is $311.5 Million. The spreadsheet also details $1.5 million of spare parts for the cable system. AFUDC was calculated separately to be $23.4 Million. These three costs add up to the $336.4 Million estimate for the underground transmission cable, as shown in Table 5-2 of the ER.

The costs for interconnecting the underground alternative were evaluated for both terminal substations (West Farnum Substation and Kent County Substation). A comparison of costs between the preferred overhead interconnection and the underground alternative are displayed in Table 5-4 of the ER. Based on preliminary study, it was determined that there would be little or no incremental cost to interconnect the underground alternative at Kent County Substation as compared to the connection costs for the proposed overhead alternative. There would be approximately $8.3 million of additional costs at West Farnum Substation associated with the 345 kV underground alternative. These are primarily related to the addition of a 300 MVAR shunt reactor, with associated foundations, bus work, and relaying changes. Incremental costs for the interconnection of the underground alternative at West Farnum Substation are detailed in Attachment 2.

(Response prepared by or under the supervision
of David M. Campilii, P.E. and Todd G. Kopoyan, P.E.)

UNDERGROUND TRANSMISSION: CABLE IN DUCT - ESTIMATE

Date: August 13, 2008

By: JPC, DMC
File: NEEWS RI 345 Estimate.xls

Description 1: **NEEWS RI Reliability_345kV_Estimate**
Description 2: **One set 345 kV XLPE 3000 kcmil cu, w/spare conduits**
Description 3: **W Farnum to Kent County**

CIRCUIT PARAMETERS			
Number of three phase circuits:	1		
Length:	23.5	Miles	124,080 Feet
Number of ducts:	6		
Duct Size(nominal):	8	Inch	
State where construction will occur	RI		
Classification	TRAN		

DESIGN TRENCH		
Trench Width (inch):	48	inches
Trench depth (inch):	60	inches
Concrete Envelope Thickness (inch)	30	inches
Percent of Route on Paved Surface	100	%
Percent of Route requiring Sidewalk & Curb Repairs	0	%
Percent of Route in Dense Urban Environment	25	%
Percent of Route requiring Fluidized Thermal Backfill	0	%
Percent of Route requiring Rock Removal	10	%
Percent of Route w/ Work Restrictions (i.e. Night Wrk)	0	%

ENGINEERING CALCULATIONS		
Avg. spacing of geotechnical boring	500	Feet
Geotechnical Borings	248	Borings
Avg. spacing of geothermal borings	500	Feet
Geothermal Borings	248	Borings

EXCAVATION AND REPAVING PARAMETERS		
Length in Rock	12,408	Feet
Cut Paving	124,080	Feet
Paving Removal Factor	0.44	Sq Yd/Ft
Excavation Factor	0.74	Cu Yd/Ft
Over - Excavation Factor	5	%
Concrete Factor	0.29	Cu Yd/Ft
Backfill Factor	0.39	Cu Yd/Ft
Temporary Paving Factor	0.44	Sq Yd/Ft
Full Depth Patch Width (1 ft cutbacks)	6	Feet
Grind & Overlay Width (Final Restoration)	30	Feet
Non Paved Area Restoration - Width	0	Feet
Jersey Barrier Protection Req'd - Length	20000	Feet
Trench Shoring Req'd - Length	31020	Feet
Curb Repairs Req'd - Length	0	Feet
Sidewalk Repairs Req'd - Length	0	Feet
Length of Rte w/ Work Restrictions (i.e. Night Work)	0	Feet
Police and Flagmen (Trenching only):	2,000	Days

EXCAVATION QUANTITIES	
55,147	Sq Yds Pavement Removed
9,651	Cu Yds Rock removed
86,856	Cu Yds Soil Removed
38,152	Cu Yds Concrete
50,666	Cu Yds Backfill
0	Cu Yds Fluidized Thermal Backfill
55,147	Sq Yds Temporary Paving
82,720	Sq Yds Full Depth Permanent Patch
413,600	Sq Yds Mill and overlay
0	Sq Yds Non-Paved Area Restoration

CONDUIT AND MANHOLES		
Length of PVC Conduit	744,480	Feet
Length of Temperature Monitoring, Comm & Ground Cont. Conduits	124,080	Feet
Average Manhole Spacing	1500	Feet
Manholes	82	
Communication Handholes	41	

CABLE AND SPLICES			
Cable - Feet		382,200	Feet
Reels		249	
Pulls		249	
Joints - Single Phase		246	
Control/Communication Cables	2	248,160	Feet
Neutral/drain cables	1	124,080	Feet
Temperature Probes		25	
Police and Flagmen (Cable Work only)		659	Days

TERMINAL EQUIPMENT	
Cathodic Protection System	0
Potheads - GIS	0
Potheads - Air	6
Riser Pedestals	6
Pothead Stands	6
Pothead Shields	6
Terminal Locations - Bonding locations	2

UNDERGROUND TRANSMISSION: CABLE IN DUCT - ESTIMATE

NEEWS RI Reliability_345kV_Estimate
One set 345 kV XLPE 3000 kcmil cu, w/spare conduits
W Farnum to Kent County

CIVIL CONSTRUCTION	MATERIAL UNIT COST	QUANTITY	MATERIAL	CONTRACTOR UNIT COST	QUANTITY	LABOR	TOTAL M&L
MOBILIZATION/STAGING (TOT)				$200,000	1	$200,000	$200,000
SAWCUTTING				$5	124080	$620,400	$620,400
PAVEMENT REMOVAL (SQ FT)				$10	55147	$551,470	$551,470
EXCAVATE - NORMAL (CU YD)				$90	86,856	$7,817,040	$7,817,040
EXCAVATE - ROCK (CU YD)				$450	9651	$4,342,950	$4,342,950
SHEETING AND SHORING (FT)	$15.00	31020	$465,300	$23	31020	$697,950	$1,163,250
CONCRETE ENCASEMENT (CU YD)	$150.00	38,152	$5,722,800	$30	38152	$1,144,560	$6,867,360
BACKFILL (CU YD)	$37.50	50,666	$1,899,975	$38	50,666	$1,899,975	$3,799,950
FLUIDIZED THERMAL BACKFILL (CU YD)	$127.50	0	$0	$38	0	$0	$0
TEMPORARY PAVING (SQ YD)	$7.50	55,147	$413,603	$30	55147	$1,654,410	$2,068,013
FULL DEPTH PATCH (SQ YD)	$30.00	82,720	$2,481,600	$30	82720	$2,481,600	$4,963,200
GRIND & OVERLAY (SQ YD)	$67.50	413,600	$27,918,000	$68	413600	$27,918,000	$55,836,000
SIDEWALK REPAIR (SQ FT)	$22.50	0	$0	$23	0	$0	$0
CURB REPAIRS (FT)	$22.50	0	$0	$8	0	$0	$0
NON PAVED AREA RESTORATION (CU YD)	$5.00	0	$0	$5	0	$0	$0
INSTALL SPARE MANHOLES	$30,000.00	$82.00	$2,460,000	$37,500	82	$3,075,000	$5,535,000
River Crossings - Woonasq, Woon Reserv, Pawtuxet			$0	$2,000,000	3	$6,000,000	$6,000,000
River Crossings - Med - Pocassett, Dry Brook, Cedar Swamp			$0	$1,500,000	3	$4,500,000	$4,500,000
Stream Crossings - Various			$0	$1,000,000	5	$5,000,000	$5,000,000
RR Crossings			$0	$500,000	2	$1,000,000	$1,000,000
PVC CONDUIT (FT)	$7.25	744480	$5,397,480	$23	744480	$16,750,800	$22,148,280
MANHOLES (EACH)	$30,000.00	82	$2,460,000	$37,500	82	$3,075,000	$5,535,000
COMMUNICATION CONDUIT (FT) with innerduct	$5.75	124,080	$713,460	$11	124,080	$1,395,900	$2,109,360
COMMUNICATION INNERDUCT (FT)	$5.00	0	$0	$11	0	$0	$0
COMM HANDHOLES (EACH)	$6,000.00	41	$246,000	$6,000	41	$246,000	$492,000
2" GROUND CONTINUITY CONDUIT (FT)	$1.25	124,080	$155,100	$11	124,080	$1,395,900	$1,551,000
2" TEMPERATURE MONITORING CONDUIT	$1.25	124,080	$155,100	$12	124,080	$1,488,960	$1,644,060
JERSEY BARRIER PROTECTION - PER FOOT				$5	20000	$100,000	$100,000
WORK RESTRICTION ADDER (PER FT)				$30	0	$0	$0
POLICE & FLAGMEN (Duct and Manhole installation -Per Day)				$1,000	2000	$2,000,000	$2,000,000
CONDUIT SYSTEM DIRECT COST			$50,488,418			$95,355,915	$145,844,333

Cost per foot $1,175

CABLE CONSTRUCTION	MATERIAL UNIT COST	QUANTITY	MATERIAL	CONTRACTOR UNIT COST	QUANTITY	LABOR	TOTAL M&L
CABLE (MATL:FT, LABOR:#REELS)	$184.00	382200	$70,324,800	$500	249	$124,500	$70,449,300
CABLE TEMP STORAGE				$0	1	$0	$0
CABLE INSTALLATION (PULL)				$36,200	249	$9,013,800	$9,013,800
JACKET INTEGRITY TEST (PER CABLE)				$3,750	249	$933,750	$933,750
SPLICES - SINGLE PHASE	$25,446.00	246	$6,259,716	$29,600	246	$7,281,600	$13,541,316
NEUTRAL/DRAIN CABLES	$12.00	124080	$1,488,960	$5	124080	$558,360	$2,047,320
BONDING / GROUNDING ACCESSORIES PER MH	$7,160.00	82	$587,120	$5,500	82	$451,000	$1,038,120
CABLE CLAMPS (EA)	$300.00	328	$98,400	$120	328	$39,360	$137,760
COMMUNICATION / RELAY SYSTEM:							
COMMUNICATION CABLES (FT)	$5.00	248160	$1,240,800	$6	248160	$1,488,960	$2,729,760
COMMUNICATION SPLICES (EA)	$6,000.00	41	$246,000	$4,500	41	$184,500	$430,500
TEMPERATURE MONITORING SYSTEM							
TEMPERATURE MONITORING CABLE (FIBER OPTIC) (FT)	$2.25	248,160	$558,360	$6	248160	$1,488,960	$2,047,320
THERMOCOUPLES (EA)	$150.00	164	$24,600	$2,250	164	$369,000	$393,600
TEST STATIONS (EA)	$750.00	82	$61,500	$1,500	82	$123,000	$184,500
TEMPERATURE PROBES (EA)	$750.00	25	$18,750	$1,500	25	$37,500	$56,250
POLICE & FLAGMEN (Cable installation - Per Day)				$1,000	659	$659,000	$659,000
CABLE INSTALLATION DIRECT COSTS			$80,909,006			$22,753,290	$103,662,296

Cost per foot $835

TERMINAL CONSTRUCTION	MATERIAL UNIT COST	QUANTITY	MATERIAL	CONTRACTOR UNIT COST	QUANTITY	LABOR	TOTAL M&L
CATH PROT SYSTEM & BONDING (TOT)	$15,000.00	0	$0	$5,000	0	$0	$0
BONDING ACCESSORIES PER TERMINAL LOCATION	$5,000.00	2	$10,000	$1,000	2	$2,000	$12,000
CABLE CLAMPS (EA)	$300.00	12	$3,600	$120	12	$1,440	$5,040
POTHEADS - GIS (EACH)	$5,000.00	0	$0	$2,000	0	$0	$0
POTHEADS - AIR (EACH)	$44,060.00	6	$264,360	$32,410	6	$194,460	$458,820
RISER PEDESTALS - EACH	$1,000.00	6	$6,000	$1,000	6	$6,000	$12,000
POTHEAD STANDS (TOT)	$0.00	6	$0	$0	6	$0	$0
POTHEAD SHIELDS (EACH)	$1,000.00	6	$6,000	$500	6	$3,000	$9,000
MONITORING/CONTROL SYSTEM	$0.00	0	$0	$0	0	$0	$0
HI-POT TESTING (# CKT)				$5,000	1	$5,000	$5,000
TERMINALS DIRECT COST			$289,960			$211,900	$501,860

UNDERGROUND TRANSMISSION: CABLE IN DUCT - ESTIMATE

Date: August 13, 2008

By: JPC, DMC
File: NEEWS RI 345 Estimate.xls

NEEWS RI Reliability_345kV_Estimate
One set 345 kV XLPE 3000 kcmil cu, w/spare conduits
W Farnum to Kent County

ENGINEERING, DESIGN & SUPERVISION	NGRID			OUTSIDE CONTRACTOR			TOTAL
	LABOR UNIT COST	QUANTITY	INTERNAL LABOR	LABOR UNIT COST	QUANTITY	EXTERNAL LABOR	M&L
PRELIMINARY ENGINEERING (NGRID:DAYS - CONTRACTOR:LOT)	$400.00	400	$160,000	$300,000.00	1	$300,000	$460,000
DETAILED ENGINEERING (NGRID:DAYS - CONTRACTOR:LOT)	$400.00	1200	$480,000	$800,000.00	1	$800,000	$1,280,000
OTHER ENGINEERING CONSULTANTS			$0		1	$0	$0
SURVEYING & MAPPING (FT)				$3.00	124,080	$372,240	$372,240
GEOTECHNICAL INVESTIGATION (PER BORING)				$2,500.00	248	$620,000	$620,000
GEOTHERMAL INVESTIGATION (PER BORING)				$1,500.00	248	$372,000	$372,000
ENVIRONMENTAL PERMITTING (NGRID:DAYS - CONTRACTOR:LOT	$400.00	400	$160,000	$500,000.00	1	$500,000	$660,000
LEGAL - LICENSING (DAYS)	$600.00	100	$60,000			$0	$60,000
REAL ESTATE (DAYS)	$400.00	300	$120,000				$120,000
PURCHASING & BID PROCESS (NGRID:DAYS - CONTRACTOR:LOT	$400.00	120	$48,000				$48,000
OVERSIGHT & SUPERVISION (DAYS)	$400.00	2000	$800,000				$800,000
ENGINEERING, DESIGN & SUPERVISION TOTAL DIRECT COSTS			$1,828,000			$2,964,240	$4,792,240

% Direct M&L Costs 2

SUMMARY

				MATERIAL	LABOR	TOTAL
CONDUIT SYSTEM DIRECT COST				$50,488,418	$95,355,915	$145,844,333
CABLE INSTALLATION DIRECT COSTS				$80,909,006	$22,753,290	$103,662,296
TERMINALS DIRECT COST				$289,960	$211,900	$501,860
DIRECT MATERIAL & LABOR				$131,687,384	$118,321,105	$250,008,489
STORES HANDLING (INVOICES+ MISC)	$500	0		$0		$0
TOTAL DIRECT COST				$131,687,384	$118,321,105	$250,008,489
SALES TAX		7	%	$9,218,117		$9,218,117
ENGINEERING, DESIGN & SUPERVISION COSTS					$4,792,240	$4,792,240
CONTINGENCY	15 % MAT'L	20	% LABOR	$21,135,825	$24,622,669	$45,758,494
OVERHEADS (APPLIED TO NGRID INTERNAL LABOR ONLY)		70	%		$1,535,520	$1,535,520
TRANSPORTATION (APPLIED TO NGRID OVERSIGHT & SUPV)		26.5	%		$212,000	$212,000
TOTAL CAPITAL				**$162,041,326**	**$149,483,534**	**$311,524,860**

$ MIL / MILE: 13.26

SPARE MATERIAL	MATERIAL UNIT COST	QUANTITY	MATERIAL
CABLE			
CABLE (MATL:FT)	$220.00	5000	$1,100,000
SPLICES - SINGLE PHASE	$38,300.00	6	$229,800
BONDING / GROUNDING ACCESSORIES PER MH	$8,000.00	3	$24,000
CABLE CLAMPS (EA)	$300.00	6	$1,800
COMMUNICATION / RELAY SYSTEM:			
COMMUNICATION CABLES (FT)	$5.00	0	$0
COMMUNICATION SPLICES (EA)	$6,000.00	0	$0
TEMPERATURE MONITORING SYSTEM			
TEMPERATURE MONITORING CABLE (FIBER OPTIC) (FT)	$2.25	0	$0
TERMINALS			
POTHEADS - GIS (EACH)	$5,000.00	0	$0
POTHEADS - AIR (EACH)	$44,060.00	3	$132,180
SPARE MATERIAL COSTS			$1,487,780

ESTIMATE OF: West Farnum Reactor

PROJECT #: study **DATE:** developed 8/13/2008

FOR: Narragansett Electric Company **BY:** T.G. Kopoyan

SCOPE:

PLANT ADDITION:

	MATERIAL	LABOR	OTHER	TOTAL	MH
Total Material and Construction Labor	7,068,000	612,000	22,000	7,702,000	4,368
Engineering, Design and Supervision	0	61,000	0	61,000	522
Preliminary Engineering	0	0	30,000	30,000	0
General and Administrative Costs	0	0	233,800	233,800	0
AFUDC	0	0	248,900	248,900	0
TOTAL PLANT ADDITION	7,068,000	673,000	534,700	8,275,700	4,890
Cost of Removal				60	0
Retirement				0	
Salvage				0	
O & M				60	0
TOTAL SPENDING FOR PROJECT	7,068,000	673,000	534,700	8,275,820	4,890

NOTES:

1. A construction start date of 04/01/10 , an in-service date of 05/31/12 .
   a completion date of 09/01/12 .

DISTRIBUTION:

PROJECT ESTIMATE-MATERIAL & CONSTRUCTION LABOR - INSTALLATION

SHEET: 1 C

DESCRIPTION: West Farnum Reactor
ENGINEER: T.G. Kopoyan
CO. #: 49 PDS#: XXX
AREA #: XX

PROJ. #: study
WO #: 0
MATL OH % : 30%

EST. DATE: developed 8/13/2008
REV. DATE: XX/XX/XX
VERSION: XXXXX

FILENAME: XXXXXX
CONSTRUCTION START: 04/01/10
CONSTRUCTION CMPLT: 05/31/12
NEED DATE: XXX

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			MATERIAL							CONSTRUCTION LABOR			COMPANY EQUIPMENT		EQUIPMENT		TOTAL
PLANT UNIT CODE	ACTIVITY	DESCRIPTION	MAT	UOM		INST	COST	OVER-	TOTAL	LABOR	DIRECT	OVERHEAD			RENTAL	CONTRACTOR	ESTIMATED
			SRC	TYPE	UOM	QTY	$	HEADS	COST	HOURS	$	$	HOURS	$	$	$	COST ($)
353 . 01 . 00	TC4400	FOUNDATION-CONCR	E	QNTY	CY	110	44,726	0	44,726	1,540	107,800	107,800		0			260,326
353 . 03 . 00	TC4400	GROUND SYSTEM	E	EACH	EA		8,560	0	8,560	80	5,600	5,600		0			19,760
353 . 04 . 00	TC4400	STRUCTURAL METAL	E	WGHT	LB	21,000	56,175	0	56,175	210	14,700	14,700		0			85,575
353 . 05 . 00	TC4400	Reactor	E	EACH	EA	1	5,831,500	0	5,831,500		0	0		0			5,831,500
353 . 06 . 00	TC4400	Reactor Installation	E	EACH	EA			0	0	400	28,000	28,000	400	20,000			76,000
353 . 09 . 00	TC4400	CONDUIT	E	LENG	FT		1,070	0	1,070	40	2,800	2,800		0			6,670
353 . 10 . 00	TC4400	CONDUCTOR	E	LENG	FT		10,700	0	10,700	360	25,200	25,200		0			61,100
353 . 11 . 00	TC4400	Arrestors	E	EACH	EA	3	12,840	0	12,840	36	2,550	2,550		0			17,940
353 . 12 . 00	TC4400	INSULATOR, BUS SUPPORT	E	EACH	EA	9	8,667	0	8,667	54	3,800	3,800		0			16,267
353 . 61 . 00	TC4400	~~GUY ANCHOR~~	E	EACH	EA	0		0	0		0	0		0			0
353 . 64 . 00	TC4400	~~STORAGE BATTERY~~	E	EACH	EA	0		0	0		0	0		0			0
353 . 67 . 00	TC4400	~~SWITCHBOARD~~	E	EACH	EA	0		0	0		0	0		0			0
353 . 68 . 00	TC4400	SWITCHBOARD EQUIPMENT	E	EACH	EA	diff relay etc	10,700	0	10,700		0	0		0			10,700
353 . 68 . 00	TC4440	RELAY TEST	E	EACH	EA			0	0	48	3,350	3,350		0			6,700
353 . 68 . 00	TC4430	COMMUNICATION TEST	E	EACH	EA			0	0	20	1,400	1,400		0			2,800
353 . 68 . 00	TC4435	~~METER TEST~~	E	EACH	EA	0		0	0		0	0		0			0
353 . 97 . 00	TC4400	LANDSCAPING and grading	E	AREA	LT		160,500	0	160,500		0	0		0			160,500
353 . . 00	TC4400	WAVE TRAP & TUNER	E	AREA	LT	0		0	0		0	0		0			0
. .	TC4401	ESTIMATING	I					0	0		0	0		0			0
. .	TC4405	SUPERVISORY ACCOUNT	I					0	0	200	14,000	14,000		0			28,000
. .	TC4410	SAFETY SUPERVISION / RED TAG	I					0	0	600	42,000	42,000		0			84,000
. .	TC4411	WEATHER	I					0	0	40	2,800	2,800		0			5,600
. .	TC4423	Field Accounting	I					0	0	24	1,700	1,700		0			3,400
. .	TC4425	Security	I					0	0	24	1,700	1,700		0			3,400
. .	TC4428	Mobilize / Demobilize	I					0	0	24	1,700	1,700		0			3,400
. .	TC4445	Police Details / Protection	I					0	0		0	0		0			0
. .	TC4450	QA/QC	I					0	0	24	1,700	1,700		0			3,400
. .	TC4455	Switching / Grounding	I					0	0	24	1,700	1,700		0			3,400
. .	TC4457	Material Handling	I					0	0	24	1,700	1,700		0			3,400
. .	TC4460	Storage	I					0	0		0	0		0			0
. .	TC4463	Temporary Enclosure	I					0	0		0	0		0			0
. .	TC4465	Construction Power	I					0	0		0	0		0			0
. .	TC4470	Dewatering	I					0	0	24	1,700	1,700		0			3,400
. .	TC4480	Tree Trimming	I					0	0		0	0		0			0
. .	TC4485	Building Construction	I					0	0		0	0		0			0
		SUBTOTAL					6,145,438	0	6,145,438	3,796	265,900	265,900	400	20,000	0	0	6,697,238
		CONTINGENCY					922,562	0	922,562	572	40,100	40,100	40	2,000	0	0	1,004,762
		TOTAL MATERIAL AND LABOR					7,068,000	0	7,068,000	4,368	306,000	306,000	440	22,000	0	0	7,702,000
		OPERATION AND MAINTENANCE							0		0	0		0			0

>MAT'L = COLUMNS 8 & 9 7,068,000
>LABOR = COLUMNS 12 & 13 612,000
>OTHER = COLUMNS 15 & 16 & 17 22,000

TOTAL MATERIAL & CONST. LABOR 7,702,000

PREPARED BY T.G. Kopoyan
CONST. MANAGER
COORD & SCHED.
PROJ. ENGINEER

PROJECT ESTIMATE - ENGINEERING FILENAME: XXXXXX

PROJECT DESCRIPTION: West Farnum Reactor

PROJECT ENGINEER: T.G. Kopoyan ESTIMATE DATE: developed 8/13/2008 NEED DATE: XXX
CO. #: 49 REVISION DATE: XX/XX/XX CMPL DATE: 05/31/12
AREA #: XX PROJECT #: study
PDS #: XXX WORK ORDER #: 0

ENGINEERING DEPT.	1	2	3	4	5	6	7	8
	APPROV	ACTIVITY	WORK UNIT (OWU)	LABOR HOURS	LABOR $	OVERHEAD %	OVERHEAD $	TOTAL $
SUBSTATION ENGINEERING		TC4100	3530	80	5000	140	7000	12000
					0	0	0	0
CIVIL		TC4120	3530	24	1200	150	1800	3000
MECHANICAL		TC4120	6850		0	0	0	0
DESIGN - ELECTRICAL		TC4195	3540	120	5400	140	7560	12960
DESIGN - MECHANICAL		TC4196	3540		0	0	0	0
DESIGN - STRUCTURAL		TC4196	3540	100	4500	140	6300	10800
DESIGN - ADMINISTRATION		TC4190	3540		0	0	0	0
TELECOMMUNICATIONS		TC4130	3551		0	0	0	0
METERING		TC4135	3557		0	0	0	0
ELECTRICAL LABORATORY		TC4115	3560		0	0	0	0
MATERIAL EXPEDITING		TC4150	3604		0	0	0	0
RELAY & CONTROL		TC4140	3552	40	2000	140	2800	4800
INTEGRATION		TC4100	3510		0	0	0	0
TRANSMISSION LINE		TC2100	3535	24	1200	115	1380	2580
CORPORATE LEGAL		TC4110	1810		0	0	0	0
RETAIL ENGINEERING		TC4100	3500		0	0	0	0
REAL ESTATE		TC2010	3536	60	3000	115	3450	6450
					0	0	0	0
DISTRICT - FIELD					0	0	0	0
					0	0		
ENGINEERING-CONSULTANT		TC4100	3530		0	0		0
ENGINEERING-CONSULTANT		TC4100	3530		0	0		0
ENGINEERING-CONSULTANT		TC4100	3530		0	0		0
ENGINEERING-CONSULTANT		TC4100	3530		0	0		0
					0			
SUBTOTAL				448	22300		30290	52590
CONTINGENCY				74	3700		4710	8410
TOTAL ENGINEERING,DESIGN, AND SUPERVISION			0	522	26000		35000	61000
ENGINEERING - COST OF REMOVAL					30	0	30	60
ENGINEERING - O&M					30	0	30	60

NOTES:

FOR ESTIMATE COVER SHEET AND PROJECT SHEET "SUMMARY OF ENGINEERING ESTIMATE"
LABOR = TOTAL COLUMNS 5 & 7 = 61000

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re The Narragansett Electric Company	:	
d/b/a National Grid (Advisory Opinion	:	Docket No. 4029
to EFSB regarding need and cost-justification	:	
for proposed Rhode Island Reliability Project)	:	

National Grid's Response
to the Division's First Set of Data Requests

REQUEST DPUC 1-23:

On page 4-18 of the Rhode Island Reliability Project Environmental Report, Volume 1, Table 4-2, National Grid has provided a cost estimate for the proposed project costs associated with construction and reconstruction of overhead transmission lines. Provide the detailed breakdown associated with each project segment cost estimate including, but not limited to, structure costs, conductor costs, right-of-way costs, and other costs associated with construction, staging, and switching for the proposed solution and alternatives which were considered.

RESPONSE:

Estimates attached to or referenced in this response should be considered to have accuracy levels of +/-25%. The five (5) attached estimates (Attachments 1 through 5) contain the requested detail for 3 of the 8 transmission line estimates in the updated version of Table 4-2 as follows:

- New 359 345 kV Transmission Line (Attachment 1)
- Relocate and Reconstruct S-171 and T-172 115 kV Transmission Lines (comprised of the following attached estimates):
    - S-171 West Farnum – Kent County 115 kV Line (Attachment 2)
    - T-172 West Farnum – Kent County 115 kV Line (Attachment 3)
    - T-172/S-171 Hartford Ave. – (Johnston) Tap Reconductor (Attachment 4)
- Reconductor G-185N 115 kV Transmission Line (Attachment 5)

A less detailed method was used to develop estimates for the smaller scope line relocation projects. The method was based on application of historical costs/mile for similar projects with project specific adjustments made for increased mobilization costs as a percentage of total for small projects, extensive swamp mat use for wetland locations, higher labor costs due to likely weekend work requirements, etc. The results were as follows:

- 332 line relocation – This project is comprised of 0.3 miles of single steel pole line on reinforced concrete foundations, similar to the proposed 359 line, which is estimated at

(Response prepared by or under
the supervision of Scott H. Ryder, P.E..)

appproximately $2,900K/mile. Then, 0.3 miles x $2,900K/mile x 1.5 (small job mobilization factor) = $1,350K +/-.

- 315 line relocation – This project involves the installation of a 3-pole self-supporting steel structure on reinforced concrete foundations in a wetland location, the installation of one span of conductor, and the removal of two spans of conductor and an existing steel pole structure in a wetland location. Extensive swamp mat installations in addition to the small job mobilization factor result in the $750K estimated cost which is significantly higher than would result from directly pro-rating typical per mile costs for this type of construction.
- H-17 line relocation – This project is comprised of 0.3 miles of 115 kV wood pole H-frame line with steel cross-arms. The small job mobilization factor combined with the likelihood of wetland swamp mat construction results in the $750K estimate.
- B-23 line relocation – The design of this 0.2 mile segment of line relocation continues to evolve. The current $250K estimate is based on wood pole construction with relatively small 336.4 kcmil ACSR conductor. As more design information becomes available, the estimated cost of this work could increase by a factor of 2.
- G-185S/L-190 line relocations – Two spans of each of these lines would need to be relocated to facilitate line termination at new positions in the Kent County Substation. The estimate of $500K represents about 1/3 of the cost of a mile of new 115 kV single pole line construction plus a small job mobilization factor.

The alternative considered for the proposed 345 kV 359 line from West Farnum to Kent County on existing reconfigured right-of-way (ROW) was a new 345 kV overhead line using direct buried steel H-frame structures on an existing, National Grid owned but undeveloped ROW between Sherman Road Substation and Kent County Substation, a distance of approximately 44.5 miles. An estimate was prepared based on the estimated per mile cost of a new 345 kV line proposed between West Farnum Substation and the RI/CT state line. See attached Attachment 6. The estimated per mile cost for the Kent County to Sherman Road alternative 345 kV line was then developed as follows:

• Per mile estimate based on 341 line (assumes 88’ average width of clearing and improvement of existing access road for 75% of ROW length)	$ 2,615K
• Additional cost per mile for 170’ width clearing	160
• Additional cost per mile for new access roads for full ROW length	115
• Cost escalation associated with estimated 4 year delay in completion due to the anticipated contentious permitting process associated with opening up a previously undeveloped transmission corridor	750
• Additional costs per mile for permitting, legal, community relations and survey work associated with opening up a previously undeveloped transmission corridor	135
• Present value of 40 years of new ROW vegetation management costs	15
Total estimated per mile cost of the alternative 345 kV line	$ 3,790K
Total estimated transmission line cost of alternative 44.5 mi. line	**$168,650K**

This amount would be compared against the preferred West Farnum to Kent County 345 kV line cost which is summarized as follows:

• New 359 345 kV transmission line	$ 61,900K
• Relocate and reconstruct S-171 and T-172 115 kV transmission lines	115,600
• Relocate 332 345 kV transmission line	1,350
• Relocate H-17 115 kV transmission line	750
Total estimated transmission line cost of preferred 21.4 mile line	**$179,600K**

While total estimated transmission line costs for the alternative 345 kV line would appear to be on the order of $11M (about 6%) less than the preferred 345 kV line, they should be considered essentially equivalent given the +/- 25% accuracy of the estimates. Further, the environmental and social impacts of developing a new transmission corridor would be much greater than use of an existing developed corridor as proposed. The alternative 345 kV line would require the clearing of approximately 800 acres of forested land, much of which is wetland and other areas of high ecological value, and would require the construction of a new access road network to facilitate construction of the transmission line. This would result in more extensive ground disturbance and potential wetland impacts than would result with the preferred 345 kV line as proposed along an existing developed ROW. Lastly, due to the potential multi-year delay that could result from a contentious permitting process associated with opening up a previously undeveloped transmission corridor, the alternative 345 kV line could not, in all likelihood, be delivered in time to meet the transmission reliability needs of the area.

Accordingly, National Grid concluded that it was strongly preferable to utilize the existing developed corridor so as to minimize impacts to the natural and social environments as required by EFSB criteria, and to deliver the necessary transmission reliability improvements in a timely manner.

Project Estimate Summary - Construction

Funding Project:	**C23967**
Work Order:	**9000076207**
Company:	**Narragansett Electric Company**
Project Title:	**359 W.Farnum - Kent County 345 kV Line**

PROJECT SCOPE

POWER Project # 113516

Install:
Construct new 345 kV line - 21 Miles in length.
Twin Bundle 954 kcm ACSR Rail Conductor.
1 - 3/8" EHS Steel Shield Wire and 1 OPGW.
All structures to be weathering steel, self supporting.
Anchor bolt/caisson foundations for all structures.

Remove:

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$3,825,360		$3,825,360	$3,825,360	34776
Wire Work	$3,779,820		$3,779,820	$3,779,820	29880
Foundation Work					
Misc Support Services	$10,575,331		$10,575,331	$10,575,331	
TLS Staff	$465,750		$465,750	$465,750	3240
CONSTRUCTION SUBTOTAL	$18,646,261		$18,646,261	$18,646,261	67896
Foundation Material		$9,247,150	$9,247,150	$9,247,150	
Line Material		$18,267,204	$18,267,204	$18,267,204	
Engineering	$7,174,850		$7,174,850	$7,174,850	
Overhead			$8,515,520	$8,515,520	
ENG. AND PROC. SUBTOTAL	$7,174,850	$27,514,354	$43,204,724	$43,204,724	
TOTAL	$25,821,111	$27,514,354	$61,850,985	$61,850,985	67,896
VARIANCE					
ROUNDED ESTIMATE (2008)			**$61,900,000**	**$61,900,000**	
ESCALATION (Through 2013)			**$13,580,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 10 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 24 week structure framing schedule.
10. Assumes 30 week wire stringing schedule.
11. Includes Construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (954 ACSR Rail) assumed at $4.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 3 RR crossings.
25. Assumes 3 road crossings per mile (10 days total).
26. Swamp mats required at 100 structures.
27. 1/4 access requires matting - 3/4 requires road improvements
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons.
29. Line consists of 20 angles, 20 DE, and 200 tangents (240 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
(4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)
Access Road Improvements approx. $70,000/mile

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C23967**
Work Order:	**9000076207**
Company:	**Narragansett Electric Company**
Project Title:	**359 W.Farnum - Kent County 345 kV Line**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

			Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
TLS or Contractor Labor and Equipment Costs	Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$56,100			100%		
		Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$56,100			100%		
		Site Prep and Clean Up	4	1440	5760	5760	$110	$633,600	1	$633,600	$633,600			100%		
		Set Frame Suspension	6	8	48	9600	$110	$5,280	200	$1,056,000	$1,056,000			100%		
		Set Frame Angle	6	10	60	1200	$110	$6,600	20	$132,000	$132,000			100%		
		Set Frame DE	6	12	72	1440	$110	$7,920	20	$158,400	$158,400			100%		
		Temp Line Rework (assumed # of temp. line work)	6	30	180	1800	$110	$19,800	10	$198,000	$198,000			100%		
		Structure / Material Delivery Crew	4	6	24	5760	$110	$2,640	240	$633,600	$633,600			100%		
		Pole Stepping Crew	3	3	9	2160	$110	$990	240	$237,600	$237,600			100%		
		Material Receiving Crew	3	500	1500	1500	$110	$165,000	1	$165,000	$165,000			100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Structure Work				**30240**				**$3,326,400**	**$3,326,400**					
		CONTINGENCY 15%				**4536**				**$498,960**	**$498,960**					
		VARIANCE														
		TOTAL - Structure Work				**34776**				**$3,825,360**	**$3,825,360**					
	Wire Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up	2	1800	3600	3600	$110	$396,000	1	$396,000	$396,000			100%		
		Install 6-954 kcm ACSR "Falcon" (per mile)	18	40	720	15120	$110	$79,200	21	$1,663,200	$1,663,200			100%		
		Install 1-3/8" EHS (per mile)	18	10	180	3780	$110	$19,800	21	$415,800	$415,800			100%		
		Install 1-OPGW (per mile)	18	10	180	3780	$110	$19,800	21	$415,800	$415,800			100%		
		Misc. Wire Work	12	30	360	3600	$110	$39,600	10	$396,000	$396,000			100%		
														100%		
		SUBTOTAL - Wire Work				**29880**				**$3,286,800**	**$3,286,800**					
		CONTINGENCY 15%								**$493,020**	**$493,020**					
		VARIANCE														
		TOTAL - Wire Work				**29880**				**$3,779,820**	**$3,779,820**					
	Foundation Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up												100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Foundation Work														
		CONTINGENCY 15%														
		VARIANCE														
		TOTAL - Foundation Work														
	Support Services	Swamp Matting Structure Work Pad - Each						$1,500	100	$150,000	$150,000			100%		
		Swamp Matting per foot (access - 1/4 segment length - per ft)						$60	27,720	$1,663,200	$1,663,200			100%		
		Swamp Mat per foot (2nd & 3rd layers - 20% of item above per ft)						$60	5,544	$332,640	$332,640			100%		
		Access Road Improvements (3/4 segment length - per mile)						$70,000	15.8	$1,102,500	$1,102,500			100%		
		Stone Aprons						$10,000	50	$500,000	$500,000			100%		
		Structure Ground Testing - Per Structure						$400	240	$96,000	$96,000			100%		
		Railroad Flagman - Each per day						$10,000	10	$100,000	$100,000			100%		
		Police Detail - Each per day - (3 xings per mile x 4 cops)						$500	252	$126,000	$126,000			100%		
		Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	40	$80,000	$80,000			100%		
		Office Trailer (cost base $100 per week)						$100	54	$5,400	$5,400			100%		
		Storage Yard (cost base $4000 per yard per month)						$4,000	14	$56,000	$56,000			100%		
		R/W Clearing per acre						$16,000	21	$336,000	$336,000			100%		
		R/W Mowing per mile						$25,000	21	$525,000	$525,000			100%		
		Line Switching per Day (assume 1 per mile)						$1,500	20	$30,000	$30,000			100%		
		Line Truck (cost base $1500/week for 54 weeks - 8 trucks)						$1,500	432	$648,000	$648,000			100%		
		Crane (cost base $7,500/week for 54 weeks - 4 cranes)						$7,500	216	$1,620,000	$1,620,000			100%		
		Utility Truck (cost base $800/week for 54 weeks - 6 trucks)						$800	324	$259,200	$259,200			100%		
		Tensioner (cost base $1000/week for 30 weeks)						$1,000	30	$30,000	$30,000			100%		
		Drum Puller (cost base $1000/week for 30 weeks)						$1,000	30	$30,000	$30,000			100%		
		Helicopter (wire stringing - $40,000 per week)						$40,000	21	$840,000	$840,000			100%		
		ROW Security/Landscaping/Restoration						$561,000	1	$561,000	$561,000			100%		
		Environmental Controls - ROW ($5000/mi)						$5,000	21.0	$105,000	$105,000			100%		
		SUBTOTAL - Misc.Support Services								**$9,195,940**	**$9,195,940**					
		CONTINGENCY 15%								**$1,379,391**	**$1,379,391**					
		VARIANCE														
		TOTAL - Misc.Support Services								**$10,575,331**	**$10,575,331**					
	TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	3240	3240	3240	$125	$405,000	1	$405,000	$405,000			100%		
		Field Construction Coordinator (hours per person)					$100							100%		
		TLS Support Staff (hours per person)					$75							100%		
														100%		
														100%		
														100%		
		SUBTOTAL - TLS Supervision				3240				**$405,000**	**$405,000**					
		CONTINGENCY 15%								**$60,750**	**$60,750**					
		VARIANCE														
		TOTAL - TLS Supervision				3240				**$465,750**	**$465,750**					
		CONSTRUCTION TOTAL								**$18,646,261**	**$18,646,261**					
		VARIANCE														

ENGINEERING AND PROCUREMENT

								Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Material Costs	Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)						$1,000	6,440	$6,440,000	$6,440,000			100%		
		Foundations - Rock Socket Core (10% of poles @ 12 CY ea)						$5,000	288	$1,440,000	$1,440,000			100%		
		Foundations - HFrame- Select Backfill (2 cu. yd. per pole)						$200						100%		
		Foundations - HFrame- Culvert Installation						$3,500						100%		
		Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)						$5,000						100%		
		Excavated Material Removal						$30.00	3,220	$96,600	$96,600			100%		
		Excavated Material Regrade/Seed						$20.00	3,220	$64,400	$64,400			100%		
		MSR Stock Material												100%		
		Sales Tax												100%		
		Stores Handling												100%		
		SUBTOTAL - Foundation Material								**$8,041,000**	**$8,041,000**					
		CONTINGENCY 15%								**$1,206,150**	**$1,206,150**					
		VARIANCE														
		TOTAL - Material								**$9,247,150**	**$9,247,150**					
	Line Material	**WOOD POLES (PO COST AND QTY)**														
		Wood Poles (misc line relocations)						$2,000	30	$60,000	$60,000			100%		
		STEEL POLES (PO COST AND QTY)														
		Steel Pole Tangent - Single (total number of structures)						$30,000	200	$6,000,000	$6,000,000			100%		
		Steel Pole Tangent - Hframe (total number of structures)						$32,000						100%		
		Steel Pole Angle - Single (total number of structures)						$80,000	20	$1,600,000	$1,600,000			100%		
		Steel Pole Angle - Hframe (total number of structures)						$88,000						100%		
		Steel Pole DE - Single (total number of structures)						$90,000	20	$1,800,000	$1,800,000			100%		
		Steel Pole DE - Hframe (total number of structures)						$100,000						100%		
														100%		
														100%		
														100%		
		EQUIPMENT (PO COST AND QTY)														
		Grounding (total number of structures)						$2,000	240	$480,000	$480,000			100%		
		Shield Hardware (total number of structures)						$400	480	$192,000	$192,000			100%		
														100%		
		Conductor Hardware - Susp (total qty required + 10%)						$1,200	792	$950,400	$950,400			100%		
		Conductor Hardware - DE (total qty required + 10%)						$1,500	132	$198,000	$198,000			100%		
		CONDUCTOR (PER FOOT)														
		954 ACSR "Rail" (total ft required + 5%)						$4.50	698,544	$3,143,448	$3,143,448			100%		
		3/8" EHS Steel Shieldwire (total ft required + 5%)						$1.00	116,424	$116,424	$116,424			100%		
		OPGW (total ft required + 5%)						$2.50	116,424	$291,060	$291,060			100%		
		WORK UNITS														
		Insulators														
		Guys														
		Anchors														
		STOCK MATERIAL AND FEES														
		MSR Stock Material												100%		
		Sales Tax							7%	$1,038,193	$1,038,193			100%		
		MSR and Wood Pole Stores Handling							25%	$15,000	$15,000			100%		
		SUBTOTAL - Line Material								**$15,884,525**	**$15,884,525**					
		CONTINGENCY 15%								**$2,382,679**	**$2,382,679**					
		VARIANCE														
		TOTAL - Material								**$18,267,204**	**$18,267,204**					
	Engineering Costs	**Consultant Environmental Review, Permitting, Licensing**												100%		
		Consultant Environmental Monitoring												100%		
		Consultant Surveying/Geotech								$807,000	$807,000			100%		
		TLE Engineering Support								$20,000	$20,000			100%		
		Consultant Preliminary Engineering								$182,000	$182,000			100%		
		Consultant Detailed Design								$182,000	$182,000			100%		
		Consultants - (Other)												100%		
		Project Management - Phase 1 - Consultant								$60,000	$60,000			100%		
		Project Management - Phase 1 - National Grid												100%		
		Construction Management/Inspection								$614,000	$614,000			100%		
		Phases II and III (Program Management Activities)								$1,805,000	$1,805,000			100%		
		Community Relations												100%		
		SUBTOTAL - Engineering								**$6,239,000**	**$6,239,000**					
		CONTINGENCY 15%								**$935,850**	**$935,850**					
		VARIANCE														
		TOTAL - Engineering								**$7,174,850**	**$7,174,850**					
	Overheads	Capital Overhead							3%	$1,391,360	$1,391,360			100%		
		Supervision & Admin (Billable Projects)												100%		
		AFUDC (Calculated Separately)						$6,013,440		$6,013,440	$6,013,440			100%		
		SUBTOTAL - Overhead								**$7,404,800**	**$7,404,800**					
		CONTINGENCY 15%								**$1,110,720**	**$1,110,720**					
		VARIANCE														
		TOTAL - Overhead								**$8,515,520**	**$8,515,520**					
		ENGINEERING AND PROCUREMENT TOTAL								**$43,204,724**	**$43,204,724**					
		VARIANCE														

Totals	Totals	**Estimate Grand Total**	**$61,850,985**	**$61,850,985**	
		Rounded Estimate Grand Total	**$61,900,000**	**$61,900,000**	
		Variance			
		Project Cost to Date			

Project Estimate Summary - Construction

Funding Project:	**C23969**
Work Order:	**9000076208**
Company:	**Narragansett Electric Company**
Project Title:	**S171 W.Farnum - Kent County 115 kV Line**

PROJECT SCOPE

POWER Project # 113517

Install:
Rebuild Existing 115 kV line on offset centerline - 21 Miles in length.
Single 1590 kcm ACSR Falcon Conductor per phase.
1 OPGW.
All Structures to be weathering steel, self supporting.
Anchor bolt/caisson foundations for all structures.

Remove:
Existing 115 kV wood pole H-Frame structures (Approx. 240).
Existing conductors (single 795 kcm AAC or single 1590 kcm ACSR per phase).
Existing Shield wire(s).

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$6,982,800		$6,982,800	$4,887,960	63480
Wire Work	$3,149,850		$3,149,850	$1,889,910	24900
Foundation Work					
Misc Support Services	$10,721,841		$10,721,841	$10,721,841	
TLS Staff	$517,500		$517,500	$517,500	3600
CONSTRUCTION SUBTOTAL	$21,371,991		$21,371,991	$18,017,211	91980
Foundation Material		$8,422,025	$8,422,025	$8,422,025	
Line Material		$11,682,623	$11,682,623	$10,578,623	
Engineering	$3,811,468		$3,811,468	$3,811,468	
Overhead			$7,178,430	$7,178,430	
ENG. AND PROC. SUBTOTAL	$3,811,468	$20,104,648	$31,094,546	$29,990,546	
TOTAL	$25,183,459	$20,104,648	$52,466,537	$48,007,757	91,980
VARIANCE					
ROUNDED ESTIMATE			**$52,520,000**	**$48,050,000**	
ESCALATION (Through 2013)			**$10,380,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 10 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 40 week structure framing and removals schedule.
10. Assumes 20 week wire stringing schedule.
11. Includes construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (1590 ACSR Falcon) assumed at $4.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 3 RR crossings.
25. Assumes 3 road crossings per mile (10 days total).
26. Swamp mats required at 100 structures.
27. 1/4 access requires matting - 3/4 requires road improvements
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons
29. Line consists of 20 angles, 20 DE, and 200 tangents (240 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
    (4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)
    Access Road Improvements approx. $70,000/mile

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C23969**
Work Order:	**9000076208**
Company:	**Narragansett Electric Company**
Project Title:	**S171 W.Farnum - Kent County 115 kV Line**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

			Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
TLS or Contractor Labor and Equipment Costs	Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Site Prep and Clean Up	4	2400	9600	9600	$110	$1,056,000	1	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
		Set Frame Suspension	6	8	48	9600	$110	$5,280	200	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
		Set Frame Angle	6	10	60	1200	$110	$6,600	20	$132,000	$92,400	$26,400	$13,200	70%	20%	10%
		Set Frame DE	6	12	72	1440	$110	$7,920	20	$158,400	$110,880	$31,680	$15,840	70%	20%	10%
		Temp Line Rework (assumed # of temp. line work)	6	30	180	1800	$110	$19,800	10	$198,000	$138,600	$39,600	$19,800	70%	20%	10%
		Structure / Material Delivery Crew	4	6	24	5760	$110	$2,640	240	$633,600	$443,520	$126,720	$63,360	70%	20%	10%
		Pole Stepping Crew	3	3	9	2160	$110	$990	240	$237,600	$166,320	$47,520	$23,760	70%	20%	10%
		Material Receiving Crew	3	500	1500	1500	$110	$165,000	1	$165,000	$115,500	$33,000	$16,500	70%	20%	10%
		Remove Suspension (structure + wire)	6	8	48	9600	$110	$5,280	200	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
		Remove Angle (structure + wire)	6	8	48	960	$110	$5,280	20	$105,600	$73,920	$21,120	$10,560	70%	20%	10%
		Remove DE (structure + wire)	6	8	48	960	$110	$5,280	20	$105,600	$73,920	$21,120	$10,560	70%	20%	10%
		Dispose of Wood Poles	4	4	16	9600	$110	$1,760	600	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
														70%	20%	10%
		SUBTOTAL - Structure Work				**55200**				**$6,072,000**	**$4,250,400**	**$1,214,400**	**$607,200**			
		CONTINGENCY 15%				**8280**				**$910,800**	**$637,560**	**$182,160**	**$91,080**			
		VARIANCE														
		TOTAL - Structure Work				**63480**				**$6,982,800**	**$4,887,960**	**$1,396,560**	**$698,280**			
	Wire Work	Mobilization												60%	35%	5%
		Demobilization												60%	35%	5%
		Site Prep and Clean Up	2	1200	2400	2400	$110	$264,000	1	$264,000	$158,400	$92,400	$13,200	60%	35%	5%
		Install 3-1590 kcm ACSR "Falcon" (per mile)	18	40	720	15120	$110	$79,200	21	$1,663,200	$997,920	$582,120	$83,160	60%	35%	5%
		Install 1-3/8" EHS (per mile)	18	10	180		$110	$19,800						60%	35%	5%
		Install 1-OPGW (per mile)	18	10	180	3780	$110	$19,800	21	$415,800	$249,480	$145,530	$20,790	60%	35%	5%
		Misc. Wire Work	12	30	360	3600	$110	$39,600	10	$396,000	$237,600	$138,600	$19,800	60%	35%	5%
														60%	35%	5%
		SUBTOTAL - Wire Work				**24900**				**$2,739,000**	**$1,643,400**	**$958,650**	**$136,950**			
		CONTINGENCY 15%								**$410,850**	**$246,510**	**$143,798**	**$20,543**			
		VARIANCE														
		TOTAL - Wire Work				**24900**				**$3,149,850**	**$1,889,910**	**$1,102,448**	**$157,493**			
	Foundation Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up												100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Foundation Work														
		CONTINGENCY 15%														
		VARIANCE														
		TOTAL - Foundation Work														
	Support Services	Swamp Matting Structure Work Pad - Each						$1,500	100	$150,000	$150,000			100%		
		Swamp Matting per foot (1/4 of access requires matting)						$60	27,720	$1,663,200	$1,663,200			100%		
		Swamp Mat per foot (2nd & 3rd layers - 20% of item above)						$60	5,544	$332,640	$332,640			100%		
		Access Road Improvements (3/4 segment length)						$70,000	15.8	$1,102,500	$1,102,500			100%		
		Stone Aprons						$10,000	50	$500,000	$500,000			100%		
		Structure Ground Testing - Per Structure						$400	240	$96,000	$96,000			100%		
		Railroad Flagman - Each per day						$10,000	10	$100,000	$100,000			100%		
		Police Detail - Each per day - (3 xings per mile x 4 cops)						$500	252	$126,000	$126,000			100%		
		Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	42	$84,000	$84,000			100%		
		Office Trailer (cost base $100 per week)						$100	60	$6,000	$6,000			100%		
		Storage Yard (cost base $4000 per yard per month)						$4,000	15	$60,000	$60,000			100%		
		R/W Clearing per acre						$6,000	20	$120,000	$120,000			100%		
		R/W Mowing per mile						$25,000	21	$525,000	$525,000			100%		
		Line Switching per Day						$1,500	20	$30,000	$30,000			100%		
		Line Truck (cost base $1500/week for 60 weeks - 8 trucks)						$1,500	480	$720,000	$720,000			100%		
		Crane (cost base $7,500/week for 60 weeks - 4 cranes)						$7,500	240	$1,800,000	$1,800,000			100%		
		Utility Truck (cost base $800/week for 60 weeks - 6 trucks)						$800	360	$288,000	$288,000			100%		
		Tensioner (cost base $1000/week for 20 weeks)						$1,000	20	$20,000	$20,000			100%		
		Drum Puller (cost base $1000/week for 20 weeks)						$1,000	20	$20,000	$20,000			100%		
		Helicopter (wire stringing - $40,000 per week)						$40,000	20	$800,000	$800,000			100%		
		ROW Security/Landscaping/Restoration						$675,000	1	$675,000	$675,000			100%		
		Environmental Controls - ROW ($5000/mi)						$5,000	21	$105,000	$105,000			100%		
		SUBTOTAL - Misc.Support Services								**$9,323,340**	**$9,323,340**					
		CONTINGENCY 15%								**$1,398,501**	**$1,398,501**					
		VARIANCE														
		TOTAL - Misc.Support Services								**$10,721,841**	**$10,721,841**					
	TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	3600	3600	3600	$125	$450,000	1	$450,000	$450,000			100%		
		Field Construction Coordinator (hours per person)					$100							100%		
		TLS Support Staff (hours per person)					$75							100%		
														100%		
														100%		
														100%		
		SUBTOTAL - TLS Supervision				3600				**$450,000**	**$450,000**					
		CONTINGENCY 15%								**$67,500**	**$67,500**					
		VARIANCE														
		TOTAL - TLS Supervision				3600				**$517,500**	**$517,500**					
		CONSTRUCTION TOTAL								**$21,371,991**	**$18,017,211**	**$2,499,008**	**$855,773**			
		VARIANCE														

ENGINEERING AND PROCUREMENT

			Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Material Costs	Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)	$1,000	5,740	$5,740,000	$5,740,000			100%		
		Foundations - Rock Socket Core (10% of poles @ 12 CY ea)	$5,000	288	$1,440,000	$1,440,000			100%		
		Foundations - HFrame- Select Backfill (2 cu. yd. per pole)	$200						100%		
		Foundations - HFrame- Culvert Installation	$3,500						100%		
		Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)	$5,000						100%		
		Excavated Material Removal	$30	2,870	$86,100	$86,100			100%		
		Excavated Material Regrade/Seed	$20	2,870	$57,400	$57,400			100%		
		MSR Stock Material							100%		
		Sales Tax							100%		
		Stores Handling							100%		
		SUBTOTAL - Foundation Material			**$7,323,500**	**$7,323,500**					
		CONTINGENCY 15%			**$1,098,525**	**$1,098,525**					
		VARIANCE									
		TOTAL - Material			**$8,422,025**	**$8,422,025**					
	Line Material	**WOOD POLES (PO COST AND QTY)**									
		Wood Poles (misc line relocations)	$2,000	45	$90,000	$90,000			100%		
		STEEL POLES (PO COST AND QTY)									
		Steel Pole Tangent - Single (total number of structures)	$16,000	200	$3,200,000	$3,200,000			100%		
		Steel Pole Tangent - Hframe (total number of structures)							100%		
		Steel Pole Angle - Single (total number of structures)	$22,000	20	$440,000	$440,000			100%		
		Steel Pole Angle - Hframe (total number of structures)							100%		
		Steel Pole DE - Single (total number of structures)	$50,000	20	$1,000,000	$1,000,000			100%		
		Steel Pole DE - Hframe (total number of structures)							100%		
									100%		
		Dispose Existing Structure/Wire (per structure)	$4,000	240	$960,000		$960,000			100%	
									100%		
		EQUIPMENT (PO COST AND QTY)									
		Grounding (total number of structures)	$2,000	240	$480,000	$480,000			100%		
		Shield Hardware (total number of structures)	$400	240	$96,000	$96,000			100%		
		Switch Structure Materials	$100,000	8	$800,000	$800,000			100%		
		Conductor Hardware - Susp (total qty required + 15%)	$600	828	$496,800	$496,800			100%		
		Conductor Hardware - DE (total qty required + 15%)	$800	138	$110,400	$110,400			100%		
		CONDUCTOR (PER FOOT)									
		1590 ACSR "Falcon" (total ft required + 5%)	$4.50	349,272	$1,571,724	$1,571,724			100%		
		3/8" EHS Steel Shieldwire (total ft required + 5%)	$1.00						100%		
		OPGW (total ft required + 5%)	$2.50	116,424	$291,060	$291,060			100%		
		WORK UNITS									
		Insulators									
		Guys									
		Anchors									
		STOCK MATERIAL AND FEES									
		MSR Stock Material							100%		
		Sales Tax		7.0%	$600,319	$600,319			100%		
		MSR and Wood Pole Stores Handling		25%	$22,500	$22,500			100%		
		SUBTOTAL - Line Material			**$10,158,803**	**$9,198,803**	**$960,000**				
		CONTINGENCY 15%			**$1,523,820**	**$1,379,820**	**$144,000**				
		VARIANCE									
		TOTAL - Material			**$11,682,623**	**$10,578,623**	**$1,104,000**				
Engineering Costs		**Consultant Environmental Review, Permitting, Licensing**							100%		
		Consultant Environmental Monitoring							100%		
		Consultant Surveying/Geotech			$2,600	$2,600			100%		
		TLE Engineering Support			$20,000	$20,000			100%		
		Consultant Preliminary Engineering			$93,000	$93,000			100%		
		Consultant Detailed Design			$93,000	$93,000			100%		
		Consultants - (Other)							100%		
		Project Management - Phase 1 - Consultant			$31,000	$31,000			100%		
		Project Management - Phase 1 - National Grid							100%		
		Construction Management/Inspection			$610,000	$610,000			100%		
		Phases II and III (Program Management Activities)			$1,100,000	$1,100,000			100%		
		Community Relations							100%		
		SUBTOTAL - Engineering			**$3,314,320**	**$3,314,320**					
		CONTINGENCY 15%			**$497,148**	**$497,148**					
		VARIANCE									
		TOTAL - Engineering			**$3,811,468**	**$3,811,468**					
Overheads		Capital Overhead		3%	$1,065,113	$1,065,113			100%		
		Supervision & Admin (Billable Projects)							100%		
		AFUDC (Calculated Separately)	$5,177,000		$5,177,000	$5,177,000			100%		
		SUBTOTAL - Overhead			**$6,242,113**	**$6,242,113**					
		CONTINGENCY 15%			**$936,317**	**$936,317**					
		VARIANCE									
		TOTAL - Overhead			**$7,178,430**	**$7,178,430**					
		ENGINEERING AND PROCUREMENT TOTAL			**$31,094,546**	**$29,990,546**	**$1,104,000**				
		VARIANCE									

Totals	Totals	**Estimate Grand Total**	**$52,466,537**	**$48,007,757**	**$3,603,008**	**$855,773**
		Rounded Estimate Grand Total	**$52,520,000**	**$48,050,000**	**$3,610,000**	**$860,000**
		Variance				
		Project Cost to Date				

5/6/2008
5:03 PM

Project Estimate Summary - Construction

Funding Project:	**C24479**
Work Order:	**9000076209**
Company:	**Narragansett Electric Company**
Project Title:	**T172 W.Farnum - Kent County 115 kV Line**

PROJECT SCOPE

POWER Project # 113517

Install:
Rebuild new 115 kV line on offset centerline - 21 Miles in length.
Relocate approx. 3 miles of existing, paralleling distribution to underbuild on new structures.
Single 1590 kcm ACSR Falcon Conductor per phase.
1 - 3/8" EHS Shield Wire.
All structures to be weathering steel, self supporting.

Remove:
Existing 115 kV wood pole H-Frame structures (Approx. 240 total).
Existing conductors (single 795 kcm AAC or single 1590 kcm ACSR per phase).
Existing Shield wire(s).
Existing wood pole distribution structures (Approx 60 total).

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$8,045,400		$8,045,400	$5,631,780	73140
Wire Work	$3,605,250		$3,605,250	$2,163,150	28500
Foundation Work					
Misc Support Services	$11,247,391		$11,247,391	$11,247,391	
TLS Staff	$503,125		$503,125	$503,125	3500
CONSTRUCTION SUBTOTAL	$23,401,166		$23,401,166	$19,545,446	105140
Foundation Material		$10,072,275	$10,072,275	$10,072,275	
Line Material		$12,823,966	$12,823,966	$11,719,966	
Engineering	$4,476,168		$4,476,168	$4,476,168	
Overhead			$8,340,196	$8,340,196	
ENG. AND PROC. SUBTOTAL	$4,476,168	$22,896,241	$35,712,605	$34,608,605	
TOTAL	$27,877,334	$22,896,241	$59,113,771	$54,154,051	105,140
VARIANCE					
ROUNDED ESTIMATE			**$59,170,000**	**$54,200,000**	
ESCALATION (Through 2013)			**$11,710,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 10 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 45 week structure framing and removals schedule.
10. Assumes 25 week wire stringing schedule.
11. Includes construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (1590 ACSR Falcon) assumed at $4.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 3 RR crossings (10 days total).
25. Assumes 3 road crossings per mile.
26. Swamp mats required at 100 structures.
27. 1/2 access requires matting - 1/2 requires road improvements
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons.
29. Line consists of 20 angles, 20 DE, and 200 tangents (240 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
    (4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)
    Access Road Improvements approx. $70,000/mile

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C24479**
Work Order:	**9000076209**
Company:	**Narragansett Electric Company**
Project Title:	**T172 W.Farnum - Kent County 115 kV Line**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

			Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
TLS or Contractor Labor and Equipment Costs	Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Site Prep and Clean Up	4	2700	10800	10800	$110	$1,188,000	1	$1,188,000	$831,600	$237,600	$118,800	70%	20%	10%
		Set Frame Suspension	6	8	48	9600	$110	$5,280	200	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
		Set Frame Angle	6	10	60	1200	$110	$6,600	20	$132,000	$92,400	$26,400	$13,200	70%	20%	10%
		Set Frame DE	6	12	72	1440	$110	$7,920	20	$158,400	$110,880	$31,680	$15,840	70%	20%	10%
		Temp Line Rework (assumed # of temp. line work)	6	30	180	1800	$110	$19,800	10	$198,000	$138,600	$39,600	$19,800	70%	20%	10%
		Structure / Material Delivery Crew	4	6	24	5760	$110	$2,640	240	$633,600	$443,520	$126,720	$63,360	70%	20%	10%
		Pole Stepping Crew	3	3	9	2160	$110	$990	240	$237,600	$166,320	$47,520	$23,760	70%	20%	10%
		Material Receiving Crew	3	500	1500	1500	$110	$165,000	1	$165,000	$115,500	$33,000	$16,500	70%	20%	10%
		Remove Suspension (structure + wire)	6	8	48	10560	$110	$5,280	220	$1,161,600	$813,120	$232,320	$116,160	70%	20%	10%
		Remove Angle (structure + wire)	6	8	48	1920	$110	$5,280	40	$211,200	$147,840	$42,240	$21,120	70%	20%	10%
		Remove DE (structure + wire)	6	8	48	1920	$110	$5,280	40	$211,200	$147,840	$42,240	$21,120	70%	20%	10%
		Dispose of Wood Poles	4	4	16	9600	$110	$1,760	600	$1,056,000	$739,200	$211,200	$105,600	70%	20%	10%
		Distribution Underbuild Work	6	12	72	4320	$110	$7,920	60	$475,200	$332,640	$95,040	$47,520	70%	20%	10%
		SUBTOTAL - Structure Work				**63600**				**$6,996,000**	**$4,897,200**	**$1,399,200**	**$699,600**			
		CONTINGENCY 15%				**9540**				**$1,049,400**	**$734,580**	**$209,880**	**$104,940**			
		VARIANCE														
		TOTAL - Structure Work				**73140**				**$8,045,400**	**$5,631,780**	**$1,609,080**	**$804,540**			
	Wire Work	Mobilization												60%	35%	5%
		Demobilization												60%	35%	5%
		Site Prep and Clean Up	2	1800	3600	3600	$110	$396,000	1	$396,000	$237,600	$138,600	$19,800	60%	35%	5%
		Install 3-1590 kcm ACSR "Falcon" (per mile)	18	40	720	15120	$110	$79,200	21	$1,663,200	$997,920	$582,120	$83,160	60%	35%	5%
		Install 1-3/8" EHS (per mile)	18	10	180	3780	$110	$19,800	21	$415,800	$249,480	$145,530	$20,790	60%	35%	5%
		Install 1-OPGW (per mile)	18	10	180		$110	$19,800						60%	35%	5%
		Misc. Wire Work	12	30	360	3600	$110	$39,600	10	$396,000	$237,600	$138,600	$19,800	60%	35%	5%
		Install Distribution Underbuild (per mile)	12	40	480	2400	$110	$52,800	5	$264,000	$158,400	$92,400	$13,200	60%	35%	5%
		SUBTOTAL - Wire Work				**28500**				**$3,135,000**	**$1,881,000**	**$1,097,250**	**$156,750**			
		CONTINGENCY 15%								**$470,250**	**$282,150**	**$164,588**	**$23,513**			
		VARIANCE														
		TOTAL - Wire Work				**28500**				**$3,605,250**	**$2,163,150**	**$1,261,838**	**$180,263**			
	Foundation Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up												100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Foundation Work														
		CONTINGENCY 15%														
		VARIANCE														
		TOTAL - Foundation Work														
	Support Services	Swamp Matting Structure Work Pad - Each						$1,500	100	$150,000	$150,000			100%		
		Swamp Matting per foot (1/4 access requires matting)						$60	27,720	$1,663,200	$1,663,200			100%		
		Swamp Mat per foot (2nd & 3rd layers - 20% of item above)						$60	5,544	$332,640	$332,640			100%		
		Access Road Improvements (3/4 segment length)						$70,000	15.8	$1,102,500	$1,102,500			100%		
		Stone Aprons						$10,000	50	$500,000	$500,000			100%		
		Structure Ground Testing - Per Structure						$400	240	$96,000	$96,000			100%		
		Railroad Flagman - Each per day						$10,000	10	$100,000	$100,000			100%		
		Police Detail - Each per day - (3 xings per mile x 4 cops)						$500	252	$126,000	$126,000			100%		
		Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	30	$60,000	$60,000			100%		
		Office Trailer (cost base $100 per week)						$100	70	$7,000	$7,000			100%		
		Storage Yard (cost base $4000 per yard per month)						$4,000	18	$72,000	$72,000			100%		
		R/W Clearing per acre						$6,000	20	$120,000	$120,000			100%		
		R/W Mowing per mile						$25,000	19	$475,000	$475,000			100%		
		Line Switching per Day						$1,500	20	$30,000	$30,000			100%		
		Line Truck (cost base $1500/week for 70 weeks - 8 trucks)						$1,500	560	$840,000	$840,000			100%		
		Crane (cost base $7,500/week for 70 weeks - 4 cranes)						$7,500	280	$2,100,000	$2,100,000			100%		
		Utility Truck (cost base $800/week for 70 weeks - 6 trucks)						$800	420	$336,000	$336,000			100%		
		Tensioner (cost base $1000/week for 25 weeks)						$1,000	25	$25,000	$25,000			100%		
		Drum Puller (cost base $1000/week for 25 weeks)						$1,000	25	$25,000	$25,000			100%		
		Helicopter (wire stringing - $40,000 per week)						$40,000	21	$840,000	$840,000			100%		
		ROW Security/Landscaping/Restoration						$675,000	1	$675,000	$675,000			100%		
		Environmental Controls - ROW ($5000/mi)						$5,000	21	$105,000	$105,000			100%		
		SUBTOTAL - Misc.Support Services								**$9,780,340**	**$9,780,340**					
		CONTINGENCY 15%								**$1,467,051**	**$1,467,051**					
		VARIANCE														
		TOTAL - Misc.Support Services								**$11,247,391**	**$11,247,391**					
	TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	3500	3500	3500	$125	$437,500	1	$437,500	$437,500			100%		
		Field Construction Coordinator (hours per person)					$100							100%		
		TLS Support Staff (hours per person)					$75							100%		
														100%		
														100%		
														100%		
		SUBTOTAL - TLS Supervision				3500				**$437,500**	**$437,500**					
		CONTINGENCY 15%								**$65,625**	**$65,625**					
		VARIANCE														
		TOTAL - TLS Supervision				3500				**$503,125**	**$503,125**					
		CONSTRUCTION TOTAL								**$23,401,166**	**$19,545,446**	**$2,870,918**	**$984,803**			
		VARIANCE														

ENGINEERING AND PROCUREMENT

			Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Material Costs	Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)	$1,000	7,140	$7,140,000	$7,140,000			100%		
		Foundations - Rock Socket Core (10% of poles @ 12 CY ea)	$5,000	288	$1,440,000	$1,440,000			100%		
		Foundations - HFrame- Select Backfill (2 cu. yd. per pole)	$200						100%		
		Foundations - HFrame- Culvert Installation	$3,500						100%		
		Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)	$5,000						100%		
		Excavated Material Removal	$30	3,570	$107,100	$107,100			100%		
		Excavated Material Regrade/Seed	$20	3,570	$71,400	$71,400			100%		
		MSR Stock Material							100%		
		Sales Tax							100%		
		Stores Handling							100%		
		SUBTOTAL - Foundation Material			**$8,758,500**	**$8,758,500**					
		CONTINGENCY 15%			**$1,313,775**	**$1,313,775**					
		VARIANCE									
		TOTAL - Material			**$10,072,275**	**$10,072,275**					
	Line Material	**WOOD POLES (PO COST AND QTY)**									
		Wood Poles (misc line relocations)	$2,000	45	$90,000	$90,000			100%		
		STEEL POLES (PO COST AND QTY)									
		Steel Pole Tangent - Single (total number of structures)	$18,000	200	$3,600,000	$3,600,000			100%		
		Steel Pole Tangent - Hframe (total number of structures)							100%		
		Steel Pole Angle - Single (total number of structures)	$24,000	20	$480,000	$480,000			100%		
		Steel Pole Angle - Hframe (total number of structures)							100%		
		Steel Pole DE - Single (total number of structures)	$60,000	20	$1,200,000	$1,200,000			100%		
		Steel Pole DE - Hframe (total number of structures)							100%		
									100%		
		Dispose Existing Structure/Wire (per structure)	$4,000	240	$960,000		$960,000			100%	
									100%		
		EQUIPMENT (PO COST AND QTY)									
		Grounding (total number of structures)	$2,000	240	$480,000	$480,000			100%		
		Shield Hardware (total number of structures)	$400	240	$96,000	$96,000			100%		
		Switch Structure Materials	$100,000	8	$800,000	$800,000			100%		
		Conductor Hardware - Susp (total qty required + 10%)	$600	828	$496,800	$496,800			100%		
		Conductor Hardware - DE (total qty required + 10%)	$800	138	$110,400	$110,400			100%		
		Distribution Hardware - DE	$500	200	$100,000	$100,000			100%		
		CONDUCTOR (PER FOOT)									
		1590 ACSR "Falcon" (total ft required (w/dist) + 5%)	$4.50	415,800	$1,871,100	$1,871,100			100%		
		3/8" EHS Steel Shieldwire (total ft required + 5%)	$1.00	116,424	$116,424	$116,424			100%		
		OPGW (total ft required + 5%)	$2.50								
		WORK UNITS									
		Insulators									
		Guys									
		Anchors									
		STOCK MATERIAL AND FEES									
		MSR Stock Material							100%		
		Sales Tax		7.0%	$728,051	$728,051			100%		
		MSR and Wood Pole Stores Handling		25%	$22,500	$22,500			100%		
		SUBTOTAL - Line Material			**$11,151,275**	**$10,191,275**	**$960,000**				
		CONTINGENCY 15%			**$1,672,691**	**$1,528,691**	**$144,000**				
		VARIANCE									
		TOTAL - Material			**$12,823,966**	**$11,719,966**	**$1,104,000**				
Engineering Costs		**Consultant Environmental Review, Permitting, Licensing**							100%		
		Consultant Environmental Monitoring							100%		
		Consultant Surveying/Geotech			$2,600	$2,600			100%		
		TLE Engineering Support			$25,000	$25,000			100%		
		Consultant Preliminary Engineering			$115,000	$115,000			100%		
		Consultant Detailed Design			$115,000	$115,000			100%		
		Consultants - (Other)							100%		
		Project Management - Phase 1 - Consultant			$37,000	$37,000			100%		
		Project Management - Phase 1 - National Grid							100%		
		Construction Management/Inspection			$705,000	$705,000			100%		
		Phases II and III (Program Management Activities)			$1,290,000	$1,290,000			100%		
		Community Relations							100%		
		SUBTOTAL - Engineering			$3,892,320	$3,892,320					
		CONTINGENCY 15%			**$583,848**	**$583,848**					
		VARIANCE									
		TOTAL - Engineering			**$4,476,168**	**$4,476,168**					
Overheads		Capital Overhead		3%	$1,195,144	$1,195,144			100%		
		Supervision & Admin (Billable Projects)							100%		
		AFUDC (Calculated Separately)	$6,057,200		$6,057,200	$6,057,200			100%		
		SUBTOTAL - Overhead			**$7,252,344**	**$7,252,344**					
		CONTINGENCY 15%			**$1,087,852**	**$1,087,852**					
		VARIANCE									
		TOTAL - Overhead			**$8,340,196**	**$8,340,196**					
		ENGINEERING AND PROCUREMENT TOTAL			**$35,712,605**	**$34,608,605**	**$1,104,000**				
		VARIANCE									

Totals	Totals	**Estimate Grand Total**	**$59,113,771**	**$54,154,051**	**$3,974,918**	**$984,803**
		Rounded Estimate Grand Total	**$59,170,000**	**$54,200,000**	**$3,980,000**	**$990,000**
		Variance				
		Project Cost to Date				

Project Estimate Summary - Construction

Funding Project:	**C23974 / C24483**
Work Order:	**9000076216 / 9000076220**
Company:	**Narragansett Electric Company**
Project Title:	**T172/S171 Hartford Ave. Tap Reconductor**

PROJECT SCOPE

POWER Project # 113523

Install:
Reuse 8 existing 115 kV wood pole structures. (4 DE structures per circuit - 8 total).
New insulator attachment assemblies (8 DE structures).
New 1590 kcm ACSS Falcon conductor along T172 and S171 taps into Hartford Ave S/S.
Install 4 new switch structures at Hartford Ave Tap.

Remove:
Existing 1590 kcm Falcon ACSR and insulator assemblies.

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$258,060		$258,060	$180,642	2346
Wire Work	$212,520		$212,520	$127,512	1680
Foundation Work					
Misc Support Services	$709,711		$709,711	$709,711	
TLS Staff	$34,500		$34,500	$34,500	240
CONSTRUCTION SUBTOTAL	$1,214,791		$1,214,791	$1,052,365	4266
Foundation Material		$874,920	$874,920	$874,920	
Line Material		$645,537	$645,537	$627,137	
Engineering	$678,385		$678,385	$678,385	
Overhead			$542,724	$542,724	
ENG. AND PROC. SUBTOTAL	$678,385	$1,520,457	$2,741,567	$2,723,167	
TOTAL	$1,893,176	$1,520,457	$3,956,358	$3,775,532	4,266
VARIANCE					
ROUNDED ESTIMATE			**$3,990,000**	**$3,800,000**	
ESCALATION (Through 2013)			**$850,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor - labor/misc tools).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 0 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 2 week structure framing schedule.
10. Assumes 2 week wire stringing schedule.
11. Includes Construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (1590 ACSS Falcon) assumed at $5.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 0 RR crossings.
25. Assumes 1 road crossing per mile.
26. Swamp mats required at 0 structures.
27. 1/4 access requires matting - 3/4 requires road improvements.
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons
29. Line consists of 0 angles, 4 DE, and 0 tangents (4 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
(4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)
Access Road Improvements approx. $70,000/mile.

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C23974 / C24483**
Work Order:	**9000076216 / 9000076220**
Company:	**Narragansett Electric Company**
Project Title:	**T172/S171 Hartford Ave. Tap Reconductor**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

			Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
TLS or Contractor Labor and Equipment Costs	Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
		Site Prep and Clean Up	4	120	480	480	$110	$52,800	1	$52,800	$36,960	$10,560	$5,280	70%	20%	10%
		Set Frame Suspension	6	8	48		$110	$5,280						70%	20%	10%
		Set Frame Angle	6	10	60		$110	$6,600						70%	20%	10%
		Set Frame DE	6	12	72	288	$110	$7,920	4	$31,680	$22,176	$6,336	$3,168	70%	20%	10%
		Temp Line Rework (assumed # of temp. line work)	6	30	180		$110	$19,800						70%	20%	10%
		Structure / Material Delivery Crew	4	6	24	96	$110	$2,640	4	$10,560	$7,392	$2,112	$1,056	70%	20%	10%
		Pole Stepping Crew	3	3	9	36	$110	$990	4	$3,960	$2,772	$792	$396	70%	20%	10%
		Material Receiving Crew	3	40	120	120	$110	$13,200	1	$13,200	$9,240	$2,640	$1,320	70%	20%	10%
		Remove Suspension (structure + wire)	6	4	24		$110	$2,640						70%	20%	10%
		Remove Angle (structure + wire)	6	8	48		$110	$5,280						70%	20%	10%
		Remove DE (structure + wire)	6	8	48		$110	$5,280						70%	20%	10%
														70%	20%	10%
														70%	20%	10%
		SUBTOTAL - Structure Work				**2040**				**$224,400**	**$157,080**	**$44,880**	**$22,440**			
		CONTINGENCY 15%				**306**				**$33,660**	**$23,562**	**$6,732**	**$3,366**			
		VARIANCE														
		TOTAL - Structure Work				**2346**				**$258,060**	**$180,642**	**$51,612**	**$25,806**			
	Wire Work	Mobilization												60%	35%	5%
		Demobilization												60%	35%	5%
		Site Prep and Clean Up	2	120	240	240	$110	$26,400	1	$26,400	$15,840	$9,240	$1,320	60%	35%	5%
		Install 3-1590 kcm ACSS "Falcon" (per mile)	18	40	720	1440	$110	$79,200	2	$158,400	$95,040	$55,440	$7,920	60%	35%	5%
		Install 1-3/8" EHS (per mile)	18	10	180		$110	$19,800						60%	35%	5%
		Install 1-OPGW (per mile)	18	10	180		$110	$19,800						60%	35%	5%
		Misc. Wire Work	12	30	360		$110	$39,600						60%	35%	5%
														60%	35%	5%
		SUBTOTAL - Wire Work				**1680**				**$184,800**	**$110,880**	**$64,680**	**$9,240**			
		CONTINGENCY 15%								**$27,720**	**$16,632**	**$9,702**	**$1,386**			
		VARIANCE														
		TOTAL - Wire Work				**1680**				**$212,520**	**$127,512**	**$74,382**	**$10,626**			
	Foundation Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up												100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Foundation Work														
		CONTINGENCY 15%														
		VARIANCE														
		TOTAL - Foundation Work														
	Support Services	Swamp Matting Structure Work Pad - Each						$1,500						100%		
		Swamp Matting per foot (access - 1/4 segment length - per ft)						$60	1,320	$79,200	$79,200			100%		
		Swamp Mat per foot (2nd & 3rd layers - 20% of item above per ft)						$60	264	$15,840	$15,840			100%		
		Access Road Improvements (3/4 segment length - per mile)						$70,000	0.8	$52,500	$52,500			100%		
		Stone Aprons						$10,000						100%		
		Structure Ground Testing - Per Structure						$400						100%		
		Railroad Flagman - Each per day						$10,000						100%		
		Police Detail - Each per day - (1 xings per mile x 4 cops)						$500	8	$4,000	$4,000			100%		
		Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	2	$4,000	$4,000			100%		
		Office Trailer (cost base $100 per week)						$100	4	$400	$400			100%		
		Storage Yard (cost base $4000 per yard per month)						$4,000	1	$4,000	$4,000			100%		
		R/W Clearing per acre						$16,000	0.5	$8,000	$8,000			100%		
		R/W Mowing per mile						$25,000	1.0	$25,000	$25,000			100%		
		Line Switching per Day (assume 1 per mile)						$1,500	2	$3,000	$3,000			100%		
		Line Truck (cost base $1500/week for 4 weeks - 8 trucks)						$1,500	32	$48,000	$48,000			100%		
		Crane (cost base $7,500/week for 4 weeks - 4 cranes)						$7,500	16	$120,000	$120,000			100%		
		Utility Truck (cost base $800/week for 4 weeks - 6 trucks)						$800	24	$19,200	$19,200			100%		
		Tensioner (cost base $1000/week for 2 weeks)						$1,000	2	$2,000	$2,000			100%		
		Drum Puller (cost base $1000/week for 2 weeks)						$1,000	2	$2,000	$2,000			100%		
		Helicopter (wire stringing - $40,000 per week)						$40,000						100%		
		ROW Security/Landscaping/Restoration						$225,000	1	$225,000	$225,000			100%		
		Environmental Controls - ROW ($5000/mi)						$5,000	1.0	$5,000	$5,000			100%		
		SUBTOTAL - Misc.Support Services								**$617,140**	**$617,140**					
		CONTINGENCY 15%								**$92,571**	**$92,571**					
		VARIANCE														
		TOTAL - Misc.Support Services								**$709,711**	**$709,711**					
	TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	240	240	240	$125	$30,000	1	$30,000	$30,000			100%		
		Field Construction Coordinator (hours per person)					$100							100%		
		TLS Support Staff (hours per person)					$75							100%		
														100%		
														100%		
														100%		
		SUBTOTAL - TLS Supervision				**240**				**$30,000**	**$30,000**					
		CONTINGENCY 15%								**$4,500**	**$4,500**					
		VARIANCE														
		TOTAL - TLS Supervision				**240**				**$34,500**	**$34,500**					
		CONSTRUCTION TOTAL								**$1,214,791**	**$1,052,365**	**$125,994**	**$36,432**			
		VARIANCE														

ENGINEERING AND PROCUREMENT

			Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Material Costs	Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)	$1,000	672	$672,000	$672,000			100%		
		Foundations - Rock Socket Core (10% of poles @ 12 CY ea)	$5,000	14	$72,000	$72,000			100%		
		Foundations - HFrame- Select Backfill (2 cu. yd. per pole)	$200						100%		
		Foundations - HFrame- Culvert Installation	$3,500						100%		
		Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)	$5,000						100%		
		Excavated Material Removal	$30.00	336	$10,080	$10,080			100%		
		Excavated Material Regrade/Seed	$20.00	336	$6,720	$6,720			100%		
		MSR Stock Material							100%		
		Sales Tax							100%		
		Stores Handling							100%		
		SUBTOTAL - Foundation Material			**$760,800**	**$760,800**					
		CONTINGENCY 15%			**$114,120**	**$114,120**					
		VARIANCE									
		TOTAL - Material			**$874,920**	**$874,920**					
	Line Material	**WOOD POLES (PO COST AND QTY)**									
		Wood Poles (misc line relocations)	$2,000	3	$6,000	$6,000			100%		
		STEEL POLES (PO COST AND QTY)									
		Steel Pole Tangent - Single (total number of structures)	$16,000						100%		
		Steel Pole Tangent - Hframe (total number of structures)							100%		
		Steel Pole Angle - Single (total number of structures)	$22,000						100%		
		Steel Pole Angle - Hframe (total number of structures)							100%		
		Steel Pole DE - Single (total number of structures)							100%		
		Steel Pole DE - Hframe Switch Str (total number of structures)	$70,000	4	$280,000	$280,000			100%		
									100%		
		Dispose Existing Structure/Wire (per structure)	$4,000	4	$16,000		$16,000			100%	
									100%		
		EQUIPMENT (PO COST AND QTY)									
		Grounding (total number of structures)	$2,000	4	$8,000	$8,000			100%		
		Shield Hardware (total number of structures)	$400	8	$3,200	$3,200			100%		
									100%		
		Conductor Hardware - Susp (total qty required + 10%)	$600	10	$5,940	$5,940			100%		
		Conductor Hardware - DE (total qty required + 10%)	$800	26	$21,120	$21,120			100%		
		CONDUCTOR (PER FOOT)									
		1590 ACSS "Falcon" (total ft required + 5%)	$5.50	33,264	$182,952	$182,952			100%		
		3/8" EHS Steel Shieldwire (total ft required + 5%)	$1.00						100%		
		OPGW (total ft required + 5%)	$2.50						100%		
		WORK UNITS									
		Insulators									
		Guys									
		Anchors									
		STOCK MATERIAL AND FEES									
		MSR Stock Material							100%		
		Sales Tax		7.0%	$36,625	$36,625			100%		
		MSR and Wood Pole Stores Handling		25%	$1,500	$1,500			100%		
		SUBTOTAL - Line Material			**$561,337**	**$545,337**	**$16,000**				
		CONTINGENCY 15%			**$84,201**	**$81,801**	**$2,400**				
		VARIANCE									
		TOTAL - Material			**$645,537**	**$627,137**	**$18,400**				
Engineering Costs		**Consultant Environmental Review, Permitting, Licensing**							100%		
		Consultant Environmental Monitoring							100%		
		Consultant Surveying/Geotech			**$6,000**	$6,000			100%		
		TLE Engineering Support			**$20,000**	$20,000			100%		
		Consultant Preliminary Engineering			**$50,000**	$50,000			100%		
		Consultant Detailed Design			**$50,000**	$50,000			100%		
		Consultants - (Other)							100%		
		Project Management - Phase 1 - Consultant			**$17,000**	$17,000			100%		
		Project Management - Phase 1 - National Grid							100%		
		Construction Management/Inspection			**$80,000**	$80,000			100%		
		Phases II and III (Program Management Activities)			**$124,000**	$124,000			100%		
		Community Relations							100%		
		SUBTOTAL - Engineering			**$589,900**	**$589,900**					
		CONTINGENCY 15%			**$88,485**	**$88,485**					
		VARIANCE									
		TOTAL - Engineering			**$678,385**	**$678,385**					
Overheads		Capital Overhead		3.0%	$84,334	$84,334			100%		
		Supervision & Admin (Billable Projects)							100%		
		AFUDC (Calculated Separately)	$387,600		$387,600	$387,600			100%		
		SUBTOTAL - Overhead			**$471,934**	**$471,934**					
		CONTINGENCY 15%			**$70,790**	**$70,790**					
		VARIANCE									
		TOTAL - Overhead			**$542,724**	**$542,724**					
		ENGINEERING AND PROCUREMENT TOTAL			**$2,741,567**	**$2,723,167**	**$18,400**				
		VARIANCE									

Totals	Totals	**Estimate Grand Total**	**$3,956,358**	**$3,775,532**	**$144,394**	**$36,432**
		Rounded Estimate Grand Total	**$3,990,000**	**$3,800,000**	**$150,000**	**$40,000**
		Variance				
		Project Cost to Date				

5/6/2008
5:25 PM

Project Estimate Summary - Construction

Funding Project:	**C24160**
Work Order:	**9000076224**
Company:	**Narragansett Electric Company**
Project Title:	**G185 West Farnum - Drumrock 115 kV Rebuild**

PROJECT SCOPE

POWER Project # 113519

Install:
Rebuild existing 115 kV transmission line in place with direct bury/guyed wood and self supporting steel pole structures.
Replace 4 existing self supporting steel pole structures with similar steel pole structures on caisson foundations. Replace 7 existing wood pole structures with new wood pole structures. Install 1.0 mile of 1590 kcm
ACSR Falcon conductor (one per phase), 1 OPGW, and 1 3/8" EHS Steel Shield.

Remove:
4 self supporting steel pole structures. 7 wood pole structures. 1.0 mile of 795 kcm AAC.

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$609,224		$609,224	$426,457	5538
Wire Work	$250,470		$250,470	$150,282	1980
Foundation Work					
Misc Support Services	$861,626		$861,626	$861,626	
TLS Staff	$69,000		$69,000	$69,000	480
CONSTRUCTION SUBTOTAL	$1,790,320		$1,790,320	$1,507,365	7998
Foundation Material		$253,230	$253,230	$253,230	
Line Material		$567,622	$567,622	$517,022	
Engineering	$722,128		$722,128	$722,128	
Overhead			$453,254	$453,254	
ENG. AND PROC. SUBTOTAL	$722,128	$820,852	$1,996,234	$1,945,634	
TOTAL	$2,512,448	$820,852	$3,786,554	$3,452,999	7,998
VARIANCE					
ROUNDED ESTIMATE			**$3,850,000**	**$3,500,000**	
ESCALATION (Through 2013)			**$880,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor - labor/misc tools).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 2 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 5 week structure framing schedule.
10. Assumes 2 week wire stringing schedule.
11. Includes Construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (1590 ACSR Falcon) assumed at $4.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 1 RR crossings (3 days total).
25. Assumes 3 road crossings per mile.
26. Swamp mats required at 5 structures.
27. 1/4 access requires matting - 3/4 requires road improvements.
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons.
29. Line consists of 0 angles, 4 DE, and 7 tangents (11 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
    (4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)
    Access Road Improvements approx. $70,000/mile.

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C24160**
Work Order:	**9000076224**
Company:	**Narragansett Electric Company**
Project Title:	**G185 West Farnum - Drumrock 115 kV Rebuild**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

TLS or Contractor Labor and Equipment Costs

		Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
	Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$39,270	$11,220	$5,610	70%	20%	10%
	Site Prep and Clean Up	4	300	1200	1200	$110	$132,000	1	$132,000	$92,400	$26,400	$13,200	70%	20%	10%
	Set Frame Suspension	6	8	48	336	$110	$5,280	7	$36,960	$25,872	$7,392	$3,696	70%	20%	10%
	Set Frame Angle	6	10	60		$110	$6,600						70%	20%	10%
	Set Frame DE	6	12	72	288	$110	$7,920	4	$31,680	$22,176	$6,336	$3,168	70%	20%	10%
	Temp Line Rework (assumed # of temp. line work)	6	30	180	360	$110	$19,800	2	$39,600	$27,720	$7,920	$3,960	70%	20%	10%
	Structure / Material Delivery Crew	4	6	24	264	$110	$2,640	11	$29,040	$20,328	$5,808	$2,904	70%	20%	10%
	Pole Stepping Crew	3	3	9	36	$110	$990	4	$3,960	$2,772	$792	$396	70%	20%	10%
	Material Receiving Crew	3	200	600	600	$110	$66,000	1	$66,000	$46,200	$13,200	$6,600	70%	20%	10%
	Remove Suspension (structure + wire)	6	4	24	168	$110	$2,640	7	$18,480	$12,936	$3,696	$1,848	70%	20%	10%
	Remove Angle (structure + wire)	6	8	48		$110	$5,280						70%	20%	10%
	Remove DE (structure + wire)	6	8	48	192	$110	$5,280	4	$21,120	$14,784	$4,224	$2,112	70%	20%	10%
	Dispose Existing Structure/Wire (per structure)	4	8	32	352	$110	$3,520	11	$38,720	$27,104	$7,744	$3,872	70%	20%	10%
													70%	20%	10%
	SUBTOTAL - Structure Work				**4816**				**$529,760**	**$370,832**	**$105,952**	**$52,976**			
	CONTINGENCY 15%				**722**				**$79,464**	**$55,625**	**$15,893**	**$7,946**			
	VARIANCE														
	TOTAL - Structure Work				**5538**				**$609,224**	**$426,457**	**$121,845**	**$60,922**			
Wire Work	Mobilization												60%	35%	5%
	Demobilization												60%	35%	5%
	Site Prep and Clean Up	1	180	180	180	$110	$19,800	1	$19,800	$11,880	$6,930	$990	60%	35%	5%
	Install 3-1590 kcm ACSR "Falcon" (per mile)	18	40	720	720	$110	$79,200	1	$79,200	$47,520	$27,720	$3,960	60%	35%	5%
	Install 1-3/8" EHS (per mile)	18	10	180	180	$110	$19,800	1	$19,800	$11,880	$6,930	$990	60%	35%	5%
	Install 1-OPGW (per mile)	18	10	180	180	$110	$19,800	1	$19,800	$11,880	$6,930	$990	60%	35%	5%
	Misc. Wire Work	12	30	360	720	$110	$39,600	2	$79,200	$47,520	$27,720	$3,960	60%	35%	5%
													60%	35%	5%
	SUBTOTAL - Wire Work				**1980**				**$217,800**	**$130,680**	**$76,230**	**$10,890**			
	CONTINGENCY 15%								**$32,670**	**$19,602**	**$11,435**	**$1,634**			
	VARIANCE														
	TOTAL - Wire Work				**1980**				**$250,470**	**$150,282**	**$87,665**	**$12,524**			
Foundation Work	Mobilization												100%		
	Demobilization												100%		
	Site Prep and Clean Up												100%		
													100%		
													100%		
													100%		
													100%		
													100%		
	SUBTOTAL - Foundation Work														
	CONTINGENCY 15%														
	VARIANCE														
	TOTAL - Foundation Work														
Support Services	Swamp Matting Structure Work Pad - Each						$1,500	5	$7,500	$7,500			100%		
	Swamp Matting per foot (access - 1/4 segment length - per ft)						$60	1,320	$79,200	$79,200			100%		
	Swamp Mat per foot (2nd & 3rd layers - 20% of item above per ft)						$60	264	$15,840	$15,840			100%		
	Access Road Improvements (3/4 segment length - per mile)						$70,000	0.8	$52,500	$52,500			100%		
	Stone Aprons						$10,000	6	$60,000	$60,000			100%		
	Structure Ground Testing - Per Structure						$400	12	$4,800	$4,800			100%		
	Railroad Flagman - Each per day						$10,000	3	$30,000	$30,000			100%		
	Police Detail - Each per day - (3 xings per mile x 4 cops)						$500	12	$6,000	$6,000			100%		
	Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	2	$4,000	$4,000			100%		
	Office Trailer (cost base $100 per week)						$100	8	$800	$800			100%		
	Storage Yard (cost base $4000 per yard per month)						$4,000	2	$8,000	$8,000			100%		
	R/W Clearing per acre						$16,000						100%		
	R/W Mowing per mile						$25,000	1	$25,000	$25,000			100%		
	Line Switching per Day (assume 1 per mile)						$1,500	4	$6,000	$6,000			100%		
	Line Truck (cost base $1500/week for 7 weeks - 8 trucks)						$1,500	56	$84,000	$84,000			100%		
	Crane (cost base $7,500/week for 7 weeks - 4 cranes)						$7,500	28	$210,000	$210,000			100%		
	Utility Truck (cost base $800/week for 7 weeks - 6 trucks)						$800	42	$33,600	$33,600			100%		
	Tensioner (cost base $1000/week for 2 weeks)						$1,000	2	$2,000	$2,000			100%		
	Drum Puller (cost base $1000/week for 2 weeks)						$1,000	2	$2,000	$2,000			100%		
	Helicopter (wire stringing - $40,000 per week)						$40,000						100%		
	ROW Security/Landscaping/Restoration						$113,000	1	$113,000	$113,000			100%		
	Environmental Controls - ROW ($5000/mi)						$5,000	1.0	$5,000	$5,000			100%		
	SUBTOTAL - Misc.Support Services								**$749,240**	**$749,240**					
	CONTINGENCY 15%								**$112,386**	**$112,386**					
	VARIANCE														
	TOTAL - Misc.Support Services								**$861,626**	**$861,626**					
TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	480	480	480	$125	$60,000	1	$60,000	$60,000			100%		
	Field Construction Coordinator (hours per person)					$100							100%		
	TLS Support Staff (hours per person)					$75							100%		
													100%		
													100%		
													100%		
	SUBTOTAL - TLS Supervision				**480**				**$60,000**	**$60,000**					
	CONTINGENCY 15%								**$9,000**	**$9,000**					
	VARIANCE														
	TOTAL - TLS Supervision				**480**				**$69,000**	**$69,000**					
	CONSTRUCTION TOTAL								**$1,790,320**	**$1,507,365**	**$209,509**	**$73,446**			
	VARIANCE														

ENGINEERING AND PROCUREMENT

Material Costs

		Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)	$1,000	84	$84,000	$84,000			100%		
	Foundations - Rock Socket Core (10% of poles @ 12 CY ea)	$5,000	12	$60,000	$60,000			100%		
	Foundations - HFrame- Select Backfill (2 cu. yd. per pole)	$200	28	$5,600	$5,600			100%		
	Foundations - HFrame- Culvert Installation	$3,500	14	$49,000	$49,000			100%		
	Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)	$5,000	4	$19,500	$19,500			100%		
	Excavated Material Removal	$30.00	42	$1,260	$1,260			100%		
	Excavated Material Regrade/Seed	$20.00	42	$840	$840			100%		
	MSR Stock Material							100%		
	Sales Tax							100%		
	Stores Handling							100%		
	SUBTOTAL - Foundation Material			**$220,200**	**$220,200**					
	CONTINGENCY 15%			**$33,030**	**$33,030**					
	VARIANCE									
	TOTAL - Material			**$253,230**	**$253,230**					
Line Material	**WOOD POLES (PO COST AND QTY)**									
	Wood Poles (misc line relocations)	$2,000	20	$40,000	$40,000			100%		
	STEEL POLES (PO COST AND QTY)									
	Steel Pole Tangent - Single (total number of structures)	$16,000						100%		
	Steel Pole Tangent - Hframe (total number of structures)							100%		
	Steel Pole Angle - Single (total number of structures)	$22,000						100%		
	Steel Pole Angle - Hframe (total number of structures)							100%		
	Steel Pole DE - Single (total number of structures)	$50,000	4	$200,000	$200,000			100%		
	Steel Pole DE - Hframe (total number of structures)							100%		
								100%		
	Dispose Existing Structure/Wire (per structure)	$4,000	11	$44,000		$44,000			100%	
								100%		
	EQUIPMENT (PO COST AND QTY)									
	Grounding (total number of structures)	$2,000	11	$22,000	$22,000			100%		
	Shield Hardware (total number of structures)	$400	22	$8,800	$8,800			100%		
	Counterpoise (total length - ft)	$1.50						100%		
	Conductor Hardware - Susp (total qty required + 10%)	$600	36	$21,780	$21,780			100%		
	Conductor Hardware - DE (total qty required + 10%)	$800	26	$21,120	$21,120			100%		
	CONDUCTOR (PER FOOT)									
	1590 ACSR "Falcon" (total ft required + 5%)	$4.50	16,632	$74,844	$74,844			100%		
	3/8" EHS Steel Shieldwire (total ft required + 5%)	$1.00	5,544	$5,544	$5,544			100%		
	OPGW (total ft required + 5%)	$2.50	5,544	$13,860	$13,860			100%		
	WORK UNITS									
	Insulators									
	Guys									
	Anchors									
	STOCK MATERIAL AND FEES									
	MSR Stock Material							100%		
	Sales Tax		7.0%	$31,636	$31,636			100%		
	MSR and Wood Pole Stores Handling		25%	$10,000	$10,000			100%		
	SUBTOTAL - Line Material			**$493,584**	**$449,584**	**$44,000**				
	CONTINGENCY 15%			**$74,038**	**$67,438**	**$6,600**				
	VARIANCE									
	TOTAL - Material			**$567,622**	**$517,022**	**$50,600**				
Engineering Costs	**Consultant Environmental Review, Permitting, Licensing**							100%		
	Consultant Environmental Monitoring							100%		
	Consultant Surveying/Geotech			$18,375	$18,375			100%		
	TLE Engineering Support			$20,000	$20,000			100%		
	Consultant Preliminary Engineering			$60,000	$60,000			100%		
	Consultant Detailed Design			$60,000	$60,000			100%		
	Consultants - (Other)							100%		
	Project Management - Phase 1 - Consultant			$21,000	$21,000			100%		
	Project Management - Phase 1 - National Grid							100%		
	Construction Management/Inspection			$120,000	$120,000			100%		
	Phases II and III (Program Management Activities)			$70,000	$70,000			100%		
	Community Relations							100%		
	SUBTOTAL - Engineering			**$627,938**	**$627,938**					
	CONTINGENCY 15%			**$94,191**	**$94,191**					
	VARIANCE									
	TOTAL - Engineering			**$722,128**	**$722,128**					
Overheads	Capital Overhead		3%	$78,254	$78,254			100%		
	Supervision & Admin (Billable Projects)							100%		
	AFUDC (Calculated Separately)	$315,880		$315,880	$315,880			100%		
	SUBTOTAL - Overhead			**$394,134**	**$394,134**					
	CONTINGENCY 15%			**$59,120**	**$59,120**					
	VARIANCE									
	TOTAL - Overhead			**$453,254**	**$453,254**					
	ENGINEERING AND PROCUREMENT TOTAL			**$1,996,234**	**$1,945,634**	**$50,600**				
	VARIANCE									

Totals	**Estimate Grand Total**	**$3,786,554**	**$3,452,999**	**$260,109**	**$73,446**
Totals	**Rounded Estimate Grand Total**	**$3,850,000**	**$3,500,000**	**$270,000**	**$80,000**
	Variance				
	Project Cost to Date				

5/6/2008
5:14 PM

Project Estimate Summary - Construction

Funding Project:	**C24799**
Work Order:	**9000076210**
Company:	**Narragansett Electric Company**
Project Title:	**341 W.Farnum - RI/CT S.L. 345 kV Line**

PROJECT SCOPE

POWER Project # 113521

Install:
Construct new 345 kV line - 18 Miles in length.
Twin Bundle 1590 kcm ACSR Falcon Conductor.
1 - 3/8" EHS Shield Wire and 1 OPGW.
All angle and DE structures to be weathering steel, self supporting. Tangents are H-Frame weathering steel direct embed.
Anchor bolt/caisson foundations for all structures.

Remove:

ESTIMATE

Work Segment	Labor	Material	Project Totals	Capital Portion	Manhours
Structure Work	$2,661,813		$2,661,813	$2,661,813	24198
Wire Work	$3,339,600		$3,339,600	$3,339,600	26400
Foundation Work					
Misc Support Services	$12,152,763		$12,152,763	$12,152,763	
TLS Staff	$414,000		$414,000	$414,000	2880
CONSTRUCTION SUBTOTAL	$18,568,176		$18,568,176	$18,568,176	53478
Foundation Material		$4,929,504	$4,929,504	$4,929,504	
Line Material		$13,231,312	$13,231,312	$13,231,312	
Engineering	$4,555,150		$4,555,150	$4,555,150	
Overhead			$5,003,716	$5,003,716	
ENG. AND PROC. SUBTOTAL	$4,555,150	$18,160,816	$27,719,682	$27,719,682	
TOTAL	$23,123,326	$18,160,816	$46,287,858	$46,287,858	53,478
VARIANCE					
ROUNDED ESTIMATE			**$46,300,000**	**$46,300,000**	
ESCALATION (Through 2013)			**$11,760,000**		

ESTIMATE ASSUMPTIONS

1. Assumes independent construction contractor not affiliated with National Grid USA.
2. $110 average rate (union contractor).
3. Accounting split for Structure Labor & Equipment varies per task.
4. Line work assumes varying size crews.
5. Foundation caisson work assumed @ $1000/cy (labor + materials).
6. Assumes no construction inefficiencies due to extended line outage unavailability.
7. Assumes 10 miscellaneous line reroutings required during construction.
8. Assumes 60 hour work week.
9. Assumes 20 week structure framing schedule.
10. Assumes 21 week wire stringing schedule.
11. Includes Construction management costs.
12. Does not include cathodic protection required for gas pipelines.
13. Steel assumed at $2.00/lbs.
14. Conductor (1590 ACSR Falcon) assumed at $4.50/ft
15. Shield Wire (3/8" EHS) assumed @ $1.00/ft.
16. Optical Ground Wire (OPGW) assumed @ $2.50/ft.
17. Line truck assumed cost of $1500/wk.
18. Utility truck assumed cost of $800/wk.
19. Crane assumed cost of $7500/wk.
20. Cable Tensioner assumed cost of $1000/wk.
21. Drum puller assumed cost of $1000/wk.
22. Office trailer assumed cost of $100/wk.
23. Storage yard assumed cost of $4000/mo.
24. Assumes 3 RR crossings (10 days total).
25. Assumes 3 road crossings per mile.
26. Swamp mats required at 75 structures.
27. 1/4 access requires matting - 3/4 requires road improvements
28. 8ft dia. X 30ft deep and 6ft dia. X 20ft deep caissons.
29. Line consists of 19 angles, 8 DE, and 115 tangents (142 total).
30. Construction inspection assumed at $35,000 per month.
31. Access road (4 men - 60hr week - 1 mi/wk + equip + mat'l)
(4men x $110 x 60hr) + (1000 cy x $30/cy) + (1 dozer x $5k/wk)

Access Road Improvements approx. $70,000/mile

APPROVALS

Approval of the Construction Labor and Equipment portion of this estimate will be indicated by signing below

Date : _____

Ed Natale
Transmission Line Services

Date: _____

Kate Darwin
Transmission Line Services

Approval of this estimate in full will be indicated by signing below

Date : _____

Jeremy Cote
Transmission Line Engineering

Date : _____

Rich Dupre
Transmission Line Engineering

Project Estimate

Funding Project:	**C24799**
Work Order:	**9000076210**
Company:	**Narragansett Electric Company**
Project Title:	**341 W.Farnum - RI/CT S.L. 345 kV Line**

Total Contingency = 15%

Accounting Totals

CONSTRUCTION

			Men	Hr / Man	Tot MH/ Unit	Total MH	Cost / hour	Unit Cost	Units	Total	Capital	Removal	O&M	Accounting Split		
TLS or Contractor Labor and Equipment Costs	Structure Work	Mobilization	17	30	510	510	$110	$56,100	1	$56,100	$56,100			100%		
		Demobilization	17	30	510	510	$110	$56,100	1	$56,100	$56,100			100%		
		Site Prep and Clean Up	4	1200	4800	4800	$110	$528,000	1	$528,000	$528,000			100%		
		Set Frame Suspension	6	8	48	5520	$110	$5,280	115	$607,200	$607,200			100%		
		Set Frame Angle	6	10	60	1140	$110	$6,600	19	$125,400	$125,400			100%		
		Set Frame DE	6	12	72	576	$110	$7,920	8	$63,360	$63,360			100%		
		Temp Line Rework (assumed # of temp. line work)	6	30	180	1800	$110	$19,800	10	$198,000	$198,000			100%		
		Structure / Material Delivery Crew	4	6	24	3408	$110	$2,640	142	$374,880	$374,880			100%		
		Pole Stepping Crew	3	3	9	1278	$110	$990	142	$140,580	$140,580			100%		
		Material Receiving Crew	3	500	1500	1500	$110	$165,000	1	$165,000	$165,000			100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Structure Work				**21042**				**$2,314,620**	**$2,314,620**					
		CONTINGENCY 15%				**3156**				**$347,193**	**$347,193**					
		VARIANCE														
		TOTAL - Structure Work				**24198**				**$2,661,813**	**$2,661,813**					
	Wire Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up	2	1680	3360	3360	$110	$369,600	1	$369,600	$369,600			100%		
		Install 6-1590 kcm ACSR "Falcon" (per mile)	18	40	720	12960	$110	$79,200	18	$1,425,600	$1,425,600			100%		
		Install 1-3/8" EHS (per mile)	18	10	180	3240	$110	$19,800	18	$356,400	$356,400			100%		
		Install 1-OPGW (per mile)	18	10	180	3240	$110	$19,800	18	$356,400	$356,400			100%		
		Misc. Wire Work	12	30	360	3600	$110	$39,600	10	$396,000	$396,000			100%		
														100%		
		SUBTOTAL - Wire Work				**26400**				**$2,904,000**	**$2,904,000**					
		CONTINGENCY 15%								**$435,600**	**$435,600**					
		VARIANCE														
		TOTAL - Wire Work				**26400**				**$3,339,600**	**$3,339,600**					
	Foundation Work	Mobilization												100%		
		Demobilization												100%		
		Site Prep and Clean Up												100%		
														100%		
														100%		
														100%		
														100%		
														100%		
		SUBTOTAL - Foundation Work														
		CONTINGENCY 15%														
		VARIANCE														
		TOTAL - Foundation Work														
	Support Services	Swamp Matting Structure Work Pad - Each						$1,500	75	$112,500	$112,500			100%		
		Swamp Matting per foot (access - 1/4 segment length - per ft)						$60	23,760	$1,425,600	$1,425,600			100%		
		Swamp Mat per foot (2nd & 3rd layers - 20% of item above per ft)						$60	4,752	$285,120	$285,120			100%		
		Access Road Improvements (3/4 segment length - per mile)						$70,000	13.5	$945,000	$945,000			100%		
		Stone Aprons						$10,000	50	$500,000	$500,000			100%		
		Structure Ground Testing - Per Structure						$400	142	$56,800	$56,800			100%		
		Railroad Flagman - Each per day						$10,000	10	$100,000	$100,000			100%		
		Police Detail - Each per day - (3 xings per mile x 4 cops)						$500	216	$108,000	$108,000			100%		
		Highway Crossing Signing - (assume 2 state roads per mile)						$2,000	36	$72,000	$72,000			100%		
		Office Trailer (cost base $100 per week)						$100	48	$4,800	$4,800			100%		
		Storage Yard (cost base $4000 per yard per month)						$4,000	12	$48,000	$48,000			100%		
		R/W Clearing per acre						$16,000	200	$3,200,000	$3,200,000			100%		
		R/W Mowing per mile						$25,000	18	$450,000	$450,000			100%		
		Line Switching per Day (assume 1 per mile)						$1,500	20	$30,000	$30,000			100%		
		Line Truck (cost base $1500/week for 41 weeks - 8 trucks)						$1,500	328	$492,000	$492,000			100%		
		Crane (cost base $7,500/week for 41 weeks - 4 cranes)						$7,500	164	$1,230,000	$1,230,000			100%		
		Utility Truck (cost base $800/week for 41 weeks - 6 trucks)						$800	246	$196,800	$196,800			100%		
		Tensioner (cost base $1000/week for 21 weeks)						$1,000	21	$21,000	$21,000			100%		
		Drum Puller (cost base $1000/week for 21 weeks)						$1,000	21	$21,000	$21,000			100%		
		Helicopter (wire stringing - $40,000 per week)						$40,000	21	$840,000	$840,000			100%		
		ROW Security/Landscaping/Restoration						$339,000	1	$339,000	$339,000			100%		
		Environmental Controls - ROW ($5000/mi)						$5,000	18	$90,000	$90,000			100%		
		SUBTOTAL - Misc.Support Services								**$10,567,620**	**$10,567,620**					
		CONTINGENCY 15%								**$1,585,143**	**$1,585,143**					
		VARIANCE														
		TOTAL - Misc.Support Services								**$12,152,763**	**$12,152,763**					
	TLS Staff	TLS Construction Management ($125/hr - w/truck)	1	2880	2880	2880	$125	$360,000	1	$360,000	$360,000			100%		
		Field Construction Coordinator (hours per person)					$100							100%		
		TLS Support Staff (hours per person)					$75							100%		
														100%		
														100%		
														100%		
		SUBTOTAL - TLS Supervision				**2880**				**$360,000**	**$360,000**					
		CONTINGENCY 15%								**$54,000**	**$54,000**					
		VARIANCE														
		TOTAL - TLS Supervision				**2880**				**$414,000**	**$414,000**					
		CONSTRUCTION TOTAL								**$18,568,176**	**$18,568,176**					
		VARIANCE														

ENGINEERING AND PROCUREMENT

			Unit Cost	Units	Total	Captial	Removal	O&M	Accounting Split		
Material Costs	Foundation	Foundations - Concrete (total req'd for subproject - cu. yd.)	$1,000	2,541	$2,541,000	$2,541,000			100%		
		Foundations - Rock Socket Core (10% of poles @ 12 CY ea)	$5,000	97	$486,000	$486,000			100%		
		Foundations - HFrame- Select Backfill (2 cu. yd. per pole)	$200	460	$92,000	$92,000			100%		
		Foundations - HFrame- Culvert Installation	$3,500	230	$805,000	$805,000			100%		
		Foundations - H-Frame Rock Core (20% of poles @ 1.3 CY ea)	$5,000	60	$299,000	$299,000			100%		
		Excavated Material Removal	$30.00	1,271	$38,115	$38,115			100%		
		Excavated Material Regrade/Seed	$20.00	1,271	$25,410	$25,410			100%		
		MSR Stock Material							100%		
		Sales Tax							100%		
		Stores Handling							100%		
		SUBTOTAL - Foundation Material			**$4,286,525**	**$4,286,525**					
		CONTINGENCY 15%			**$642,979**	**$642,979**					
		VARIANCE									
		TOTAL - Material			**$4,929,504**	**$4,929,504**					
	Line Material	**WOOD POLES (PO COST AND QTY)**									
		Wood Poles (misc line relocations)	$2,000	60	$120,000	$120,000			100%		
		STEEL POLES (PO COST AND QTY)									
		Steel Pole Tangent - Single (total number of structures)	$30,000						100%		
		Steel Pole Tangent - Hframe (total number of structures)	$35,200	115	$4,048,000	$4,048,000			100%		
		Steel Pole Angle - Single (total number of structures)	$80,000						100%		
		Steel Pole Angle - Hframe (total number of structures)	$88,000	19	$1,672,000	$1,672,000			100%		
		Steel Pole DE - Single (total number of structures)	$90,000						100%		
		Steel Pole DE - Hframe (total number of structures)	$100,000	8	$800,000	$800,000			100%		
									100%		
									100%		
									100%		
		EQUIPMENT (PO COST AND QTY)									
		Grounding (total number of structures)	$2,000	142	$284,000	$284,000			100%		
		Shield Hardware (total number of structures)	$400	284	$113,600	$113,600			100%		
		Counterpoise (total length - ft)	$1.50						100%		
		Conductor Hardware - Susp (total qty required + 10%)	$1,200	470	$564,000	$564,000			100%		
		Conductor Hardware - DE (total qty required + 10%)	$1,500	53	$79,500	$79,500			100%		
		CONDUCTOR (PER FOOT)									
		1590 ACSR "Falcon" (total ft required + 5%)	$4.50	598,752	$2,694,384	$2,694,384			100%		
		3/8" EHS Steel Shieldwire (total ft required + 5%)	$1.00	99,792	$99,792	$99,792			100%		
		OPGW (total ft required + 5%)	$2.50	99,792	$249,480	$249,480			100%		
		WORK UNITS									
		Insulators									
		Guys									
		Anchors									
		STOCK MATERIAL AND FEES									
		MSR Stock Material							100%		
		Sales Tax		7.0%	$750,733	$750,733			100%		
		MSR and Wood Pole Stores Handling		25%	$30,000	$30,000			100%		
		SUBTOTAL - Line Material			**$11,505,489**	**$11,505,489**					
		CONTINGENCY 15%			**$1,725,823**	**$1,725,823**					
		VARIANCE									
		TOTAL - Material			**$13,231,312**	**$13,231,312**					
Engineering Costs		**Consultant Environmental Review, Permitting, Licensing**							100%		
		Consultant Environmental Monitoring							100%		
		Consultant Surveying/Geotech			$275,000	$275,000			100%		
		TLE Engineering Support			$20,000	$20,000			100%		
		Consultant Preliminary Engineering			$122,000	$122,000			100%		
		Consultant Detailed Design			$122,000	$122,000			100%		
		Consultants - (Other)							100%		
		Project Management - Phase 1 - Consultant			$41,000	$41,000			100%		
		Project Management - Phase 1 - National Grid							100%		
		Construction Management/Inspection			$520,000	$520,000			100%		
		Phases II and III (Program Management Activities)			$1,230,000	$1,230,000			100%		
		Community Relations							100%		
		SUBTOTAL - Engineering			**$3,961,000**	**$3,961,000**					
		CONTINGENCY 15%			**$594,150**	**$594,150**					
		VARIANCE									
		TOTAL - Engineering			**$4,555,150**	**$4,555,150**					
Overheads		Capital Overhead		3%	$1,076,978	$1,076,978			100%		
		Supervision & Admin (Billable Projects)							100%		
		AFUDC (Calculated Separately)	$3,274,080		$3,274,080	$3,274,080			100%		
		SUBTOTAL - Overhead			**$4,351,058**	**$4,351,058**					
		CONTINGENCY 15%			**$652,659**	**$652,659**					
		VARIANCE									
		TOTAL - Overhead			**$5,003,716**	**$5,003,716**					
		ENGINEERING AND PROCUREMENT TOTAL			**$27,719,682**	**$27,719,682**					
		VARIANCE									

Totals	Totals	**Estimate Grand Total**	**$46,287,858**	**$46,287,858**	
		Rounded Estimate Grand Total	**$46,300,000**	**$46,300,000**	
		Variance			
		Project Cost to Date			

5/6/2008
5:21 PM