SUBSTATION ENGINEERING COMPANY

Western New York Public Policy Transmission Need

Technical Review Report

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This report summarizes the independent consultant evaluation of transmission solution for Western New York Public Policy Need.

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1. Introduction

This report documents the technical evaluation of the ten proposals for the Western NY Public Policy Transmission Need (Western NY PPTN) that the New York Independent System Operator, Inc. (NYISO) determined, in its May 31, 2016 Viability and Sufficiency Assessment Report, would be able to satisfy the public policy transmission need criteria. The ten proposals evaluated are :

- North America Transmission (NAT) – Proposal #1 (T006)
- North America Transmission (NAT) – Proposal #2 (T007)
- North America Transmission (NAT) – Proposal #3 (T008)
- North America Transmission (NAT) – Proposal #4 (T009)
- National Grid (NGRID)_– Moderate Power Transfer Solution (T011)
- National Grid (NGRID) – High Power Transfer Solution (T012)
- New York Power Authority (NYPA)/ New York State Electric and Gas (NYSEG) – Western NY Energy Link (T013)
- NextEra Energy Transmission New York – Empire State Line #1 (T014)
- NextEra Energy Transmission New York – Empire State Line #2 (T015)
- Exelon Transmission Company – Niagara Area Transmission Expansion (T017)

The evaluation included review of the initial proposals received as well as answers to the Requests For Information (RFIs) issued to the Developers in January and March 2017.

This evaluation focused on the following areas:

- Site review and “walk down” of proposed sites and routes to evaluate their constructability and identify potential issues with the proposed design, siting and routing.
- Review of the environmental and permitting requirements for the project as proposed by Developers and identify gaps and issues. The environmental reviews were completed predominately using “desktop” analysis supplemented with occasional field review.
- Evaluate completeness and reasonableness of the proposed project schedules, including identification of potential issues associated with delay in obtaining permits for and construction of the proposed project.
- Evaluate cost estimates and develop independent cost estimates.
- Review, identify and estimate real estate requirements.
- Review proposals and identify risks to licensing and construction of the project on a timely basis.
- Determine expandability of proposed project.
- Assess the Developer’s plans for site control.
- Evaluate the Developer’s operating plan.

The review team's evaluation did not include further review of Developers' qualifications or credentials beyond the initial screening completed prior to the submittal of proposals.

2. Executive Summary

This technical review focused primarily on schedule, cost, identifiable risks, the ability to expand on the project in the future, site control plan and availability of Rights of Way (ROW), and the operating plan provided by each Developer. Below is a brief summary of our findings. Please see the remainder of the report for further detail.

2.1. Schedule

Each Developer's schedule for permitting and construction of its project was reviewed based on the review team's collective experience with transmission projects sited by the New York State Public Service Commission (NYPSC) under Article VII of the New York Public Service Law and constructed in New York State. A review of recent Article VII project timelines was completed to identify comparable schedules. A summary of the expected durations for each Developer's proposed scope is shown on the table below:

Proposal	Developer Proposed Total Duration	Estimated Duration	Minimum Duration
T006 NAT Proposal #1	41 Months	43 Months	40 months
T007 NAT Proposal #2	48 Months	63 Months	59 months
T008 NAT Proposal #3	51 Months	69 Months	65 months
T009 NAT Proposal #3	53 Months	75 Months	71 months
T011 NGRID Moderate Power Transfer	51 Months	57 Months	57 months
T012 NGRID High Power Transfer	51 Months	60 Months	60 months
T013 NYPA/NYSEG	53 Months	55 Months	44 months
T014 NextEra w/ phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T015 NextEra w/ no phase shifter	42 Months	49 (53 Months for alternative with new ROW	40 months (49 months for alternative with new ROW)
T017 Exelon	75 Months	82 Months	66 months

"Estimated Duration" is calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods the review team used the greater of the duration shown by the Developer or what the review team believes to be the minimum. The review team also assumed that the Environmental Management & Construction Plan ("EM&CP") preparation is completed and ready for submission when the Article VII certificate is received. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. If the "Estimated Duration" is shown to be shorter than that proposed by the Developer, that does not lead to the conclusion that the Developer should or could accelerate its schedule but rather is intended to highlight schedules that the review team believes to be deficient.

The "Minimum Duration" is calculated using what the review team considered to be the minimum duration for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. This is an absolute best case and is shown for comparative purposes.

2.2. Cost

In evaluating the construction cost of each proposal, Kenny Construction ("Kenny") prepared independent estimates for each proposal. Kenny reviewed the Developers' proposals with the costs redacted. GEI Consultants, Inc. estimated the environmental licensing and permitting costs. An independent real estate agent estimated the cost of obtaining ROW. The results are shown below:

Project	Independent Estimate
T006 NAT Proposal #1	$157,487,990
T007 NAT Proposal #2	$278,030,710
T008 NAT Proposal #3	$355,917,057
T009 NAT Proposal #4	$487,143,285
T011 NGRID Moderate Power Transfer	$177,016,086
T012 NGRID High Power Transfer	$433,188,925
T013 NYPA/NYSEG	$231,685,063
T014 NextEra w/ phase shifter	$180,706,286
T014 NextEra w/ phase shifter Alternate ROW	$218,693,080
T015 NextEra w/ no phase shifter	$159,289,397
T015 NextEra w/ no phase shifter Alternate ROW	$197,276,192
T017 Exelon	$299,083,008

The review team conducted an analysis to place the proposals on a common basis by adjusting the cost estimates to 2017 costs, and identify reasons for the most significant variances.

2.3. Risk

2.3.1. The review team completed a review of the potential risks associated with the proposals focusing on the most significant drivers to the project risks including:

- Article VII review approval process and potential environmental issues
- Procurement of major equipment
- Construction
- Site Control and procurement of real estate
- Operational Plan

2.3.2. The proposals share many risks in common such as potential delays in preparation and approval of regulatory licenses and permits.

2.3.3. The most significant risk to the projects is the acquisition of significant new real estate for the transmission line ROWs, and most notably, the corridor between Stolle Road and Gardenville. That corridor traverses many commercial and residential properties and requires the acquisition of homes. Those projects affected include NAT -T007, NAT -T008, NAT -T009 and Exelon –T017.

2.4. Expandability

The review identified several items that may be considered common to all proposals:

- New line segments could be designed for double circuit capability. The Developers have not proposed such a design.
- The transmission lines could be constructed with higher ampacity conductor or re-conductored in the future.
- The western New York system could be expanded in the future with modifications proposed by Developers in addition to the one ultimately selected by the NYISO. For example, National Grid's solution could be further expanded by a number of the new lines and modifications proposed by the other Developers.

2.5. Site Control and Real Estate

2.5.1. In all proposals, the following is common for the property rights acquisition process:

- Use existing ROW as much as practical.
- Where additional ROWs must be acquired, it will be accomplished through arm's length negotiation with property owners.
- If negotiations are unsuccessful, the property will be acquired through eminent domain.
- All Developers have completed preliminary routing of their proposed lines.

2.5.2. The non-incumbent Developers all claim two common rights to assist in obtaining property:

- They cite the recent 12/17/15 NYPSC order (Case 12-T-0502) related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. The Order stated on page 60: *"Incumbent utilities should offer competitors the same terms they offer Transco; there should be no bias shown to Transco."*
  Further on page 60 the NYPSC Order states:
  "Commission expects the utility company owner to bargain in good faith to reach an agreement with the developer of the transmission solution as to property access and compensation as it would for other linear project developers that seek to co-locate on utility property."
- If negotiations with private land owners are unsuccessful they believe, under New York State Law, Developers may have eminent domain authority after certification of a route by the NYPSC.

2.6. Operational Plan

2.6.1. The review team conducted a review of the Developers' operations and maintenance plans associated with the proposals. The review team did not identify any major flaw with any Developer's plans and the plans are essentially the same.

2.6.2. For the non-incumbent entity proposals, the following is common :

- The Developers stated that all O&M activities will comply with required NERC regulations.
- Developer owned facilities will be part of the NYISO Bulk Power System with real-time reporting of operating data to the NYISO.

2.6.3. The non-incumbent Developers proposed the following arrangements for Control Center services:

- North American Transmission proposes to use Cross Texas Transmission, an affiliate of NAT, to provide control center services.
- NextEra also proposes to use an out-of-state affiliate control center.
- Exelon plans to contract with an incumbent utility or third party for control center services.

3. Discussion of Proposals

Brief descriptions of the proposed projects are provided below.

3.1. T006 –North American Transmission –Proposal #1

NAT proposal T006 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New (third) 345-115 kV transformer at Stolle Road

Additional system upgrades that Developer identified to support proposal T006 include:

- Gardenville to Stolle Road 230 kV terminal upgrades
- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades

3.2. T007 –North American Transmission –Proposal #2

NAT proposal T007 builds on T006 by adding a new 345 kV line between Stolle Road and Gardenville and a new 345-230kV transformer at Gardenville and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV

Additional possible system upgrades that Developer identified to support proposal T007 include:

- Gardenville to Stolle Road 230 kV terminal upgrades
- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.3. T008 –North American Transmission –Proposal #3

NAT proposal T008 builds on T007 by adding a second 345kV line between Dysinger and Stolle Road and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV
- Second new Dysinger-Stolle Road 345 kV line #2

Additional possible system upgrades that Developer identified to support proposal T008 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road - 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.4. T009 –North American Transmission –Proposal #4

NAT proposal T009 builds on T008 by adding a new Niagara to Dysinger 345kV line and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV (connecting to the NYSEG 230 kV yard)
- Second new Dysinger-Stolle Road 345 kV line #2
- New Niagara-Dysinger 345 kV line

Additional possible system upgrades that Developer identified to support proposal T009 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.5. T011 –National Grid - Moderate Power Transfer Solution

National Grid's "Moderate Power Transfer Solution" proposal T011 includes the following major work items:

- Reconductor 115 kV lines (~62 miles) including:
  - Niagara/Packard-Gardenville 115 kV (180, 181, 182) reconductor ("Minimal Solution")
  - Niagara-Packard (191, 192) reconductoring
  - Packard-Huntley (130, 133) partial reconductoring
  - Niagara-Lockport (103, 104) partial reconductoring
  - Tower separation of 61/64 230 kV lines
  - Replacement of thermally limiting equipment at Packard, Huntley, Lockport, Robinson Rd, Erie St. and Niagara stations

3.6. T012 –National Grid – High Power Transfer Solution

National Grid's "High Power Transfer Solution" proposal T012 includes the following major work items:

- New Niagara-Gardenville 230 kV line (connecting to the National Grid 230kV yard)
- New Park Club Lane 115 kV switching station (connects to Packard, Stolle Road, Gardenville)
- Reconductor 115 kV lines (~76 miles worth) including:
  - Niagara/Packard-Gardenville 115 kV (180, 181, 182) reconductor ("Full solution")
  - Niagara-Packard (191, 192) reconductoring
  - Packard-Huntley (130, 133) partial reconductoring
  - Niagara-Lockport (103, 104) partial reconductoring
  - Tower separation of 61/64 230 kV lines
  - Replacement of thermally-limiting equipment at Packard, Huntley, Lockport, Robinson Road, Erie St. and Niagara stations

3.7. T013 –NYPA/NYSEG - Western NY Energy Link

NYPA/NYSEG proposal T013 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines)
- New Dysinger-Stolle Road 345 kV line
- Reconductoring Stolle Road-Gardenville 230 kV line
- Protection relay upgrade at Gardenville for the reconductored Stolle-Gardenville 230 kV line
- Two new 345-230 kV transformers at Stolle Road

- Tower separation of 230 kV Line Nos. 61/64 at Niagara
- New 230-115 kV transformer at South Perry
- New 115 kV Phase Angle Regulator (PAR) at South Perry substation (on South Perry – Meyer 115 kV line)

3.8. T014 –NextEra – Empire State Line #1

NextEra proposal T014 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines, and cuts out the 345 kV line loop to Somerset 345 kV)
- New East Stolle Switchyard (near Stolle Road substation)
- New Dysinger-East Stolle 345 kV line with 700 MVA PAR at Dysinger end and a shunt reactor at East Stolle

Additional possible system upgrades that Developer identified to support proposal T014 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV - Reconductor approximately 12 miles of line
- Roll Road - to Stolle Road 115 kV Line #928 – Replace terminal equipment at Stolle Road to increase the line rating.
- Add 100 MVAR shunt reactor at Rochester

3.9. T015 –NextEra – Empire State Line #2

NextEra proposal T015 is the same as T014 except that it does not have the 700 MVA PAR. Proposal T015 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines)
- New East Stolle Switchyard (near Stolle Road substation)
- New Dysinger-East Stolle 345 kV line and a shunt reactor at East Stolle Road

Additional possible system upgrades that Developer identified to support proposal T015 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV - Reconductor approximately 12 miles of line
- Roll Road - to Stolle Road 115 kV Line #928 – Replace terminal equipment at Stolle Road to increase the line rating.
- Add 100MVAR shunt reactor at Rochester

3.10. T017 –Exelon - Niagara Area Transmission Expansion

Exelon proposal T017 includes the following major work items:

- New Niagara-Stolle Road 345 kV line
- New Gardenville-Stolle Road 230 kV line
- Reconductoring 115 kV lines (~33.1 miles worth) including:
    - Packard –Huntley (130, 133) (approximately 19.6 miles of line reconductoring)
    - Packard-Niagara Falls Blvd(181) (approximately 3.7 miles of line reconductoring)
    - Watch Road-Huntley (133) (approximately 9.8 miles of line reconductoring)

4. Evaluation

4.1. Schedule

The NYISO OATT section 31.4.8.1.7 states the following: "The potential issues associated with delay in constructing the proposed regulated Public Policy Transmission Project consistent with the major milestone schedule and the schedule for obtaining any permits and other certifications as required to timely meet the need."

The review team completed a review of the schedules submitted with the proposals. All show proposed start dates that are not achievable at this point, so the team focused on task durations instead of the dates. The review teams evaluation was based on the team's collective experience with transmission line and substation projects in New York State, and comparison of each schedule to actual Article VII projects completed.

The main drivers to the project schedule durations considered were:

- Article VII approval process including preliminary and final engineering
- Procurement of major equipment
- Real Estate acquisition
- Construction requirements.

The review team's conclusion for minimum durations for the Article VII process is:

	Scope of the Proposed Transmission Project		
Task	Re-conductor/minor rebuild on existing ROW	Rebuild on Existing ROW	Widen or New ROW
Prepare and submit Article VII application (minimum)	3 mo.	3-6 mo.	8 mo.
PSC issue certificate (minimum)	12 mo.	12 mo.	18-24 mo.
DPS review and approve EM&CP (assumes drafted during Article VII proceedings)	3 mo.	6 mo.	9 mo.
Total: Best Case Submit application -Start Construction	**15 mo.**	**18 mo.**	**27-33 mo.**

The project durations discussed in this evaluation assume that preparation of the Article VII application will begin at the time the project is awarded to the selected Developer and that any preliminary work required has already been completed by the Developer prior to that date. The review team also assumed that the EM&CP preparation will be completed and ready for submission when the Article VII certificate is received.

The review team's estimated duration for each project was calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods, the review team used the greater of the duration shown by the Developer or what the review team believed to be the minimum. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. Therefore, if the review team's estimate of the minimum duration for an activity was shorter than that proposed by the

Developer, the review team did not accelerate the Developer's schedule. The analysis is intended to highlight scheduled tasks that the review team believes to be deficient.

In general, all of the Developers' schedules should show more break down of the construction phases to help ensure they understand all the requirements. The selected Developer should submit a more detailed construction milestone schedule for inclusion in the Development Agreement with the NYISO. Summarized below are the review team's findings for each Developer.

4.1.1. North American Transmission

4.1.1.1. NAT Proposal T006

- Includes 6 months for Preliminary Engineering and Article VII preparation. Based on the review team's experience, the Developer should allocate 8 months.
- Overall Article VII review process schedule is adequate.
- Engineering is not shown on the schedule but it is reasonable to expect that the preliminary engineering will progress in parallel with Article VII application preparation and that final engineering will be progressed during Article VII review and approval and preparation of EM&CP. Those time frames appear reasonable.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW. This can occur between the award of the project to the start of construction which is 26 months.
- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows nine months between Article VII review approval and start of substation construction. The proposed construction period is approximately 19 months. Therefore, there is adequate time to procure equipment, but the Developer needs to add equipment procurement on their schedule.
- Overall construction schedule appears adequate.
- The Developer's proposed project duration is 41 months. The review team estimates that a total of 43 months should be allocated for licensing and construction of this project.

4.1.1.2. NAT Proposal T007

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including new Stolle Road to Gardenville 345kV line, a 12 month period appears appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final

engineering will progress during the Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.

- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW. This can occur between the award of the project to the start of construction which is 35 months.
- Additional Real Estate ROW is required. There appears to be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The overall construction schedule is not adequate. Considering the additional Stolle Road to Gardenville 345kV Circuit, 13 miles in length, and the additional work requiring a 345-230kV transformer in the Gardenville Substation, the team estimates that an additional five months will be required to complete construction. Based on historical work in this region and with the impacted utilities, there is no evidence to support the likelihood for concurrent parallel path construction for the added work scope. Similar Article VII projects include Lockport to Mortimer and Rochester Transmission Project (RTP). The length of the proposed T007 proposal requires work through two potentially severe winter cycles and two summer cycles where outages will be difficult to obtain.
- The proposed project duration is 48 months. The review team estimates that a total of 63 months should be allocated for this project.

4.1.1.3. NAT Proposal T008

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including a new Stolle Road to Gardenville 345kV line and second Stolle Road to Dysinger 345kV line, it appears that that a 12 month period at minimum is appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Non-Article VII permits can/should be done earlier.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final

engineering will progress during Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.

- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW. This can occur between the award of the project to the start of construction which is 35 months.
- Additional Real Estate ROW is required. The review team assumes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- Overall Construction schedule is not adequate. Considering the scope addition of a second 345kV line from the proposed Dysinger Switchyard to the existing Stolle Road 345kV Substation, which will require new structures and foundations, as well as the expansion of the Dysinger Switchyard, the review team estimates a total duration of 30 months for construction. Exposure to as many as three winter and summer cycles in the region should be expected to impact outage availability, work day lengths, and create long periods of less than optimal construction performance. This is based on historical experience on Article VII projects performed in western New York. Examples include RTP, Auburn Transmission and Lockport to Mortimer.
- The Developer's proposed project duration is 51 months. The review team estimates a total of 69 months should be allocated for this project.

4.1.1.4. NAT Proposal T009

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including a new Niagara to Dysinger 345kV line, a 12 month period at minimum appears appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final engineering will progress during Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.

- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW. This can occur between the award of the project to the start of construction which is 35 months.
- Additional Real Estate ROW is required. The review team assumes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the addition of a new 345kV transmission line from the Niagara Substation to the proposed Dysinger Switchyard and the requirement to expand the Dysinger Yard to seven positions, the review team estimates that 36 months will be required to complete the construction efforts for all items included in the scope. The scope of this proposal includes numerous components across wide geographical/service area. The risk/potential for outage restraints, and weather restraints, material issues, and schedule constraints is exacerbated. Example projects include Auburn Transmission, RTP and Lockport to Mortimer.
- The Developer's proposed project duration is 53 months. The review team estimates that a total of 75 months should be allocated for this project.

4.1.2. National Grid

4.1.2.1. Moderate Power Transfer T011

- National Grid has provided a very detailed and well thought out schedule. The review team estimates that additional time should be allocated for the Article VII application review and EM&CP process. National Grid has allocated 9 months. The review team estimates approximately 15 months should be allocated recognizing that previous National Grid projects have taken at least that much time. The review team agrees with construction durations and other aspects of the Developer's schedule.
- The Developer's proposed project duration is 51 months. The review team estimates that 57 months should be allocated for this project.

4.1.2.2. High Power Transfer T012

- National Grid has provided a very detailed and well thought out schedule. The review team estimates that additional time should be allocated for the Article VII application review and EM&CP process. National Grid has allocated 9 months. The review team estimates that approximately 18 months should be allocated since there will be a new Niagara to Gardenville 230kV line in this scope. The review team agrees with construction durations and other aspects of the Developer's schedule.
- The Developer's proposed project duration is 51 months. The review team estimates that 60 months should be allocated for this project

4.1.3. NYPA/NYSEG Proposal T013

- The review team believes that the NYPA/NYSEG proposal allows sufficient time to put the project in service. The proposed schedule shows a six month duration to prepare the Article VII application. Based on past history, the team expects this to take about eight months. The Developer has allocated sufficient durations for all other major activities and its overall schedule duration is adequate. However, the schedule is at a very high level at this stage and should be further detailed.
- The Developer's proposed project duration is 53 months. The review team estimates that 55 months should be allocated for this project.

4.1.4. NextEra

4.1.4.1. Proposal T014 w/phase shifter

- NextEra has proposed 12 months for Article Vll application preparation and 23 months for the overall Article VII approval process. The review team believes this is more than adequate if the existing NYSEG ROW is utilized.
- If the Developer procures new ROW for the 345kV line, then the proposed 12 month Article VII preparation period is appropriate. However, the overall Article VII approval process schedule is not adequate. Based on past Article VII projects and considering the new ROW, the review team recommends a minimum of 27 months.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW for the primary proposal. This can occur between the award of the project to the start of construction which is 26 months.
- Procurement of major equipment including the phase shifting transformer which has a 16 month lead time can be accomplished in parallel with other activities.

- If the additional Real Estate ROW alternative is required, the review team estimates a minimum of 14 months to accomplish this, and believes it can be done in parallel with other activities, but would need to begin earlier than shown on its schedule. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the scope which includes new transmission line construction and considerable substation enhancements and construction, and based on historical project experience, NextEra has not allowed sufficient time for construction of 20 miles of new 345kV transmission line, substation construction and all other components as described in its proposal. The schedule targets a November to May time frame for construction. While this may be beneficial to avoid additional environmental concerns, it places all of the construction in the most unpredictable weather of the calendar year. Based on the review team's experience, 14 – 16 months is a reasonable duration for construction.
- The Developer's proposed project duration is 42 months assuming it is able to utilize NYSEG's existing ROW. The review team estimates that 49 months should be allocated for this project. If NextEra is required to purchase new additional ROW, the review team estimates that 53 months should be allocated to this project.

4.1.4.2. Proposal T015 w/o phase shifter

- NextEra has proposed 12 months for Article Vll application preparation and 23 months for the overall Article VII approval process. The review team believes this is more than adequate if the existing NYSEG ROW is utilized.
- If the Developer procures new ROW for the 345kV line, then the proposed 12 month Article VII preparation period is appropriate. However, the overall Article VII approval process schedule is not adequate. Based on past Article VII projects and considering the new ROW, the review team recommends a minimum of 27 months.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW for the primary proposal. This can occur between the award of the project to the start of construction which is 26 months.
- Procurement of major equipment can be accomplished in parallel with other activities.
- If the additional Real Estate ROW alternative is required, the review team estimates a minimum of 14 months to accomplish this, and believes it can be done in parallel with other activities, but would need to begin earlier than shown on its schedule. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the scope which include new transmission line construction and considerable substation enhancements

and construction, and based on historical project experience, NextEra has not allowed sufficient time for construction of 20 miles of new 345kV transmission line, substation construction and all other components as described in its proposal. The schedule targets a November to May time frame for construction. While this may be beneficial to avoid additional environmental concerns, it places all of the construction in the most unpredictable weather of the calendar year. Based on the review team's experience, 14 – 16 months is a reasonable duration for construction.

- The Developer's proposed project duration is 42 months assuming it is able to utilize NYSEG's existing ROW. The review team estimates that 49 months should be allocated for this project. If NextEra is required to purchase new additional ROW, review team estimates that 53 months should be allocated to this project.

4.1.5. Exelon Proposal T017

- Exelon's schedule shows the overall Article VII approval process to be 20 months. Based on comparable Article VII projects and the need to obtain new ROW for the Stolle Road to Gardenville 230kV line, the review team estimates that a minimum of 27 months is required for the licensing process. However, Exelon appears to have included what would appear to be more than adequate time for Article VII preparation and its overall schedule is more than sufficient.
- Adequate time is available to negotiatiate with the incumbent utility for use of ROW. This can occur between the award of the project to the start of construction which is 35 months.
- Additional Real Estate ROW is required. The review team believes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The Developer's schedule is very high level at this stage and should be further detailed.
- Exelon's proposed project duration is 75 months. The review team estimates that a total of 82 months should be allocated for this project.

Based on the review, the team estimates the following total project durations:

Proposal	Developer Proposed Total Duration	Estimated Duration (Note #1)	Minimum Duration (Note #2)
T006 NAT Proposal #1	41 Months	43 Months	40 months
T007 NAT Proposal #2	48 Months	63 Months	59 months
T008 NAT Proposal #3	51 Months	69 Months	65 months
T009 NAT Proposal #4	53 Months	75 Months	71 months
T011 NGRID Moderate Power Transfer	51 Months	57 Months	57 months
T012 NGRID High Power Transfer	51 Months	60 Months	60 months
T013 NYPA/NYSEG	53 Months	55 Months	44 months
T014 NextEra w/ phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T015 NextEra w/ no phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T017 Exelon	75 Months	82 Months	66 months

Note #1

"Estimated Duration" is calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods, the review team used the greater of the duration shown by the Developer or what the review team believes to be the minimum. The review team also assumed that the EM&CP preparation is completed and ready for submission when the Article VII certificate is received. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. If the "Estimated Duration" is shown to be shorter than that proposed by the Developer, that does not lead to the conclusion that the Developer should or could accelerate its schedule but rather is intended to highlight schedules that the review team believes to be deficient.

Note #2

The "Minimum Duration" is calculated using what the review team considered to be the minimum duration for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. This is absolute best case and is shown for comparison purposes.

4.2. Cost

Concerning the cost of proposed transmission projects, the NYISO OATT section 31.4.8.1.1 states the following: "The capital cost estimates for the proposed regulated Public Policy Transmission Project, including the accuracy of the proposed estimates. For this evaluation, the Developer shall provide the ISO with credible capital cost estimates for its proposed project, with itemized supporting work sheets that identify all material and labor cost assumptions, and related drawings to the extent applicable and available. The work sheets should include an estimated quantification of cost variance, providing an assumed plus/minus range around the capital cost estimate. The estimate shall include all components that are needed to meet the Public Policy Transmission Need. To the extent information is available, the Developer should itemize: material and labor cost by equipment, engineering and design work, permitting, site acquisition, procurement and construction work, and commissioning needed for the proposed project, all in accordance with Good Utility Practice. For each of these cost categories, the Developer should specify the nature and estimated cost of all major project components and estimate the cost of the work to be done at each substation and/or on each feeder to physically and electrically connect each facility to the existing system. The work sheets should itemize to the extent applicable and available all equipment for: (i) the proposed project, (ii) interconnection facilities (including Attachment Facilities and Direct Assignment Facilities), and (iii) Network Upgrade Facilities, System Upgrade Facilities, System Deliverability Upgrades, Network Upgrades, and Distribution Upgrades."

In evaluating the construction cost of each proposal, independent estimates were prepared. Kenny Construction prepared independent estimates for each proposal. Kenny reviewed the Developers' proposals with the costs redacted. GEI Consultants, Inc. estimated the environmental licensing and permitting costs. An independent real estate agent estimated the cost of obtaining the new ROW and estimated value of the existing incumbent utility-owned ROW.

The estimates were prepared in accordance with the Association for the Advancement of Cost Engineering International Recommended Practice for Class 4 Accuracy. The expected accuracy range typically varies from a low of (-15% to -30%) and high of (+20% to +50%).

ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%

A summary of the results are shown below:

Project	Independent Estimate
T006 NAT Proposal #1	$157,487,990
T007 NAT Proposal #2	$278,030,710
T008 NAT Proposal #3	$355,917,057
T009 NAT Proposal #4	$487,143,285
T011 NGRID Moderate Power Transfer	$177,016,086
T012 NGRID High Power Transfer	$433,188,925
T013 NYPA/NYSEG	$231,685,063
T014 NextEra w/ phase shifter	$180,706,286
T014 NextEra w/ phase shifter Alternate ROW	$218,693,080
T015 NextEra w/ no phase shifter	$159,289,397
T015 NextEra w/ no phase shifter Alternate ROW	$197,276,192
T017 Exelon	$299,083,008

4.2.1. NAT T006

A summary of the independent cost estimate is shown below:

NAT T006		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 12,359,030
2	**TRANSMISSION LINE FOUNDATIONS**	$ 6,777,500
3	**STRUCTURES - TRANSMISSION LINE**	$ 12,081,851
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 5,187,754
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 1,328,890
6	**NEW DYSINGER SWITCHYARD**	$ 19,771,000
7	**STOLLE ROAD SUBSTATION WORKS**	$ 11,447,500
8	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,000,000
9	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 5,950,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 1,800,000
10	**ENGINEERING**	
	DESIGN ENGINEERING	$ 3,750,000
	LIDAR	$ 400,000
	GEOTECH	$ 800,000
	SURVEYING/STAKING	$ 300,000
11	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,150,000
12	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 2,308,505
	ENVIRONMENTAL MITIGATION	$ 8,202,072
	WARRANTIES / LOC'S	$ 418,284
	REAL ESTATE COSTS (NEW ROW)	$ 157,126
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 1,502,000
	LEGAL FEES	$ 2,000,000
	SALES TAX ON MATERIALS	$ 2,535,304
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 15,214,022
	SUBTOTAL:	$ 116,640,839
	CONTINGENCY (20%)	$ 23,328,168
	TOTAL (A):	**$ 139,969,006**
13	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 9,227,025
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 4,541,959
	TOTAL (B):	**$ 17,518,984**
	TOTAL PROJECT COST (A+B):	**$ 157,487,990**

4.2.2. NAT T007

A summary of the independent cost estimate is shown below:

NAT T007		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 18,262,638
2	**TRANSMISSION LINE FOUNDATIONS**	$ 21,747,379
3	**STRUCTURES - TRANSMISSION LINE**	$ 27,076,848
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 8,522,568
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 2,536,564
6	**NEW DYSINGER SWITCHYARD**	$ 19,771,000
7	**STOLLE ROAD SUBSTATION WORKS**	$ 7,548,000
8	**GARDENVILLE 345/230kV SUBSTATION WORKS**	$ 12,822,500
9	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,200,000
10	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 9,000,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 2,000,000
11	**ENGINEERING**	
	DESIGN ENGINEERING	$ 6,600,000
	LIDAR	$ 600,000
	GEOTECH	$ 1,100,000
	SURVEYING/STAKING	$ 450,000
12	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,500,000
13	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 3,120,534
	ENVIRONMENTAL MITIGATION	$ 9,884,084
	WARRANTIES / LOC'S	$ 738,968
	REAL ESTATE COSTS (NEW ROW)	$ 7,623,974
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 1,949,484
	LEGAL FEES	$ 2,500,000
	SALES TAX ON MATERIALS	$ 4,815,807
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 25,735,552
	SUBTOTAL:	$ 197,305,901
	CONTINGENCY (25%)	$ 49,326,475
	TOTAL (A):	**$ 246,632,377**
14	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 9,227,025
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 14,031,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**
	TOTAL PROJECT COST (A+B):	**$ 278,030,710**

4.2.3. NAT T008

A summary of the independent cost estimate is shown below:

NAT T008		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 22,772,195
2	**TRANSMISSION LINE FOUNDATIONS**	$ 28,417,010
3	**STRUCTURES - TRANSMISSION LINE**	$ 39,158,699
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 13,710,320
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 3,821,694
6	**NEW DYSINGER SWITCHYARD**	$ 20,868,000
7	**STOLLE ROAD SUBSTATION WORKS**	$ 14,263,000
8	**GARDENVILLE 345/230kV SUBSTATION WORKS**	$ 12,822,500
9	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,500,000
10	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 12,000,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 2,200,000
11	**ENGINEERING**	
	DESIGN ENGINEERING	$ 8,400,000
	LIDAR	$ 600,000
	GEOTECH	$ 1,100,000
	SURVEYING/STAKING	$ 450,000
12	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 2,000,000
13	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 3,608,602
	ENVIRONMENTAL MITIGATION	$ 16,814,084
	WARRANTIES / LOC'S	$ 970,163
	REAL ESTATE COSTS (NEW ROW)	$ 7,623,974
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 3,168,924
	LEGAL FEES	$ 3,000,000
	SALES TAX ON MATERIALS	$ 6,282,990
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 33,862,823
	SUBTOTAL:	$ 259,614,978
	CONTINGENCY (25%)	$ 64,903,745
	TOTAL (A):	**$ 324,518,723**
14	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 9,227,025
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 14,031,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**
	TOTAL PROJECT COST (A+B):	**$ 355,917,057**

4.2.4. NAT T009

A summary of the independent cost estimate is shown below:

NAT T009		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 48,929,055
2	**TRANSMISSION LINE FOUNDATIONS**	$ 40,444,048
3	**STRUCTURES - TRANSMISSION LINE**	$ 57,905,468
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 21,865,190
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 5,828,824
6	**NEW DYSINGER SWITCHYARD**	$ 23,229,000
7	**STOLLE ROAD SUBSTATION WORKS:**	$ 14,263,000
8	**GARDENVILLE 345/230kV SUBSTATION WORKS**	$ 12,822,500
9	**NIAGARA SUBSTATION WORK**	$ 4,246,500
10	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 2,000,000
11	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 16,200,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 2,500,000
12	**ENGINEERING**	
	DESIGN ENGINEERING	$ 10,500,000
	LIDAR	$ 800,000
	GEOTECH	$ 1,700,000
	SURVEYING/STAKING	$ 1,000,000
13	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 2,500,000
14	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 4,336,429
	ENVIRONMENTAL MITIGATION	$ 20,514,989
	WARRANTIES / LOC'S	$ 1,358,623
	REAL ESTATE COSTS (NEW ROW)	$ 7,675,534
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 4,555,924
	LEGAL FEES	$ 3,500,000
	SALES TAX ON MATERIALS	$ 8,164,882
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 47,555,995
	SUBTOTAL:	$ 364,595,961
	CONTINGENCY ON ENTIRE PROJECT (25%)	$ 91,148,990
	TOTAL (A):	$ 455,744,951
15	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 9,227,025
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 14,031,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	$ 31,398,334
	TOTAL PROJECT COST (A+B):	$ 487,143,285

4.2.5. National Grid T011

A summary of the independent cost estimate is shown below:

National Grid T011		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 28,554,443
2	**WG D2 -IDENTIFIED LINE WORK 180, 181, 182 (MINIMAL SOLUTION)**	$ 45,533,358
	WG E NEW BUS TIE BREAKER AT PACKARD STATION TO BE PLACED IN SERIES WITH EXISTING BREAKER R342	$ 880,000
	WG F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD STATION FOR LINE 181	$ 200,000
3	**WG-H IDENTIFIED LINE WORK 130, 133**	$ 7,261,318
	WG-I REPLACE THERMALLY LIMITING EQUIPMENT AT HUNTLEY STATION	$ 235,000
4	**WG-J IDENTIFIED LINE WORK 191**	$ 3,670,736
5	**WG-M IDENTIFIED LINE WORK 103, 104**	$ 486,376
	WG-N REPLACE THERMALLY LIMITING EQUIPMENT AT LOCKPORT STATION FOR LINES 101,102	$ 500,000
6	**WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64**	$ 1,570,740
	WG-P2 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$ 3,564,852
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$ 1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$ 1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$ 1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$ 500,000
7	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,500,000
8	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 7,920,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 1,700,000
9	**ENGINEERING**	
	DESIGN ENGINEERING	$ 5,000,000
	LIDAR	$ 500,000
	GEOTECH	$ 1,100,000
	SURVEYING/STAKING	$ 500,000
10	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,000,000
11	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 3,984,698
	ENVIRONMENTAL MITIGATION	$ 227
	WARRANTIES / LOC'S	$ 515,916
	REAL ESTATE COSTS (NEW ROW)	$ -
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ -
	LEGAL FEES	$ 2,000,000
	SALES TAX ON MATERIALS	$ 1,526,384
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK UP (OH&P) 15%	$ 18,690,607
	SUBTOTAL (A):	$ 143,294,655
	CONTINGENCY ON ENTIRE PROJECT (20%)	$ 28,658,931
	TOTAL (A):	$ 171,953,586
12	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ -
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 1,312,500
	SUBTOTAL (B):	$ 5,062,500
	TOTAL PROJECT COST (A+B):	$ 177,016,086

4.2.6. National Grid T012

A summary of the independent cost estimate is shown below:

National Grid T012			
	Description		Total Amount
1	CLEARING & ACCESS WORKS FOR T-LINE CONSTRUCTION	$	77,418,870
2	WG A - NEW 230kV NIAGARA TO GARDENVILLE LINE & RELOCATIONS	$	70,767,955
	WG B NEW 230kV LINE ASSOCIATED WORK AT GARDENVILLE SUBSTATION	$	1,105,500
	WG C NEW 230kV LINE - NIAGARA SUBSTATION CONNECTION	$	1,075,000
3	WG-D1 REBUILD & RE-CONDUCTOR	$	55,276,810
	WG-E NEW BUS BREAKER AT PACKARD STATION	$	880,000
	WG-F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD SUBSTATION FOR LINE 181	$	200,000
	WG-G NEW 115kV SWITCHING STATION	$	11,169,000
4	WG-H PACKARD-HUNTLEY & WALCK-HUNTLEY DOUBLE CIRCUIT LINE WORKS	$	7,261,318
	WG-I - UPGRADE AMPACITY OF LINES 130 AND 133 AT HUNTLEY SUBSTATION	$	235,000
5	WG-J - REFURBISHMENT WORKS ON LINES 191	$	3,670,736
6	WG-M - LINE WORK 103,104	$	486,376
	WG-N - LINE WORK 101, 102, 103, 104	$	500,000
7	WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64	$	1,570,740
	WG-P1 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$	5,366,640
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$	1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$	1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$	1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$	500,000
8	CONTRACTOR MOBILIZATION / DEMOBILIZATION		
	MOB / DEMOB	$	2,000,000
9	PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES		
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$	12,600,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$	2,500,000
10	ENGINEERING		
	DESIGN ENGINEERING	$	10,000,000
	LIDAR	$	800,000
	GEOTECH	$	1,800,000
	SURVEYING/STAKING	$	800,000
11	TESTING & COMMISSIONING		
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$	2,500,000
12	PERMITTING AND ADDITIONAL COSTS		
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$	5,965,150
	ENVIRONMENTAL MITIGATION	$	7,796,225
	WARRANTIES / LOC'S	$	1,277,797
	REAL ESTATE COSTS (NEW ROW)	$	172,069
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$	1,157,000
	LEGAL FEES	$	2,000,000
	SALES TAX ON MATERIALS	$	4,574,892
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$	200,000
	CONTRACTOR MARK UP (OH&P) 15%	$	44,674,062
	SUBTOTAL:	$	342,501,140
	CONTINGENCY ON ENTIRE PROJECT (25%)	$	85,625,285
	TOTAL (A):	$	428,126,425
13	SYSTEM UPGRADE FACILITIES (SUF)		
	DEVELOPER IDENTIFIED SUF	$	-
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$	3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	1,312,500
	TOTAL (B):	$	5,062,500
	TOTAL PROJECT COST (A+B):	$	433,188,925

4.2.7. NYPA/NYSEG T013

A summary of the independent cost estimate is shown below:

NYPA/NYSEG T013			
	Description	**Total Amount**	
1	**DYSINGER SWITCHING STATION**	$	21,947,000
2	**GARDENVILLE TO STOLLE ROAD 230KV TRANSMISSION LINE RECONDUCTORING**	$	14,140,200
3	**LINE SEPARATION**	$	2,292,025
4	**SOUTH PERRY SUBSTATION**	$	5,421,000
5	**STOLLE ROAD SUBSTATION**	$	36,859,022
6	**DYSINGER - STOLLE ROAD NEW 345kV TRANSMISSION LINE**	$	46,864,263
7	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**		
	MOB / DEMOB	$	1,500,000
8	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**		
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$	7,700,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$	1,800,000
9	**ENGINEERING**		
	DESIGN ENGINEERING	$	6,000,000
	LIDAR	$	500,000
	GEOTECH	$	800,000
	SURVEYING/STAKING	$	500,000
10	**TESTING & COMMISSIONING**		
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$	2,500,000
11	**PERMITTING AND ADDITIONAL COSTS**		
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$	2,366,540
	ENVIRONMENTAL MITIGATION	$	6,312,700
	WARRANTIES / LOC'S	$	693,715
	REAL ESTATE COSTS (NEW ROW)	$	497,876
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$	1,613,000
	LEGAL FEES	$	2,000,000
	SALES TAX ON MATERIALS	$	5,380,386
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$	200,000
	CONTRACTOR MARK UP (OH&P) 15%	$	25,183,159
	SUBTOTAL:	$	193,070,886
	CONTINGENCY ON ENTIRE PROJECT (20%)	$	38,614,177
	TOTAL PROJECT COST:	$	231,685,063
	Note: System Impact Study completed and no additional system upgraded facilities (SUF) beyond Developer proposal identified or anticipated.		

4.2.8. NextEra T014

A summary of the independent cost estimate is shown below:

NextEra T014		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 12,717,405
2	**TRANSMISSION LINE FOUNDATIONS**	$ 3,200,398
3	**STRUCTURES - TRANSMISSION LINE**	$ 4,688,312
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 6,137,208
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 1,382,170
6	**NEW DYSINGER SUBSTATION**	$ 37,852,000
7	**EAST STOLLE RD SUBSTATION**	$ 13,963,000
8	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 800,000
9	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 3,080,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 1,400,000
10	**ENGINEERING**	
	DESIGN ENGINEERING	$ 3,600,000
	LIDAR	$ 400,000
	GEOTECH	$ 600,000
	SURVEYING/STAKING	$ 400,000
11	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,600,000
12	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 2,312,325
	ENVIRONMENTAL MITIGATION	$ 9,472,635
	WARRANTIES / LOC'S	$ 459,515
	REAL ESTATE COSTS (NEW ROW)	$ 391,346
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 1,793,000
	LEGAL FEES	$ 2,000,000
	SALES TAX ON MATERIALS	$ 3,219,867
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 16,750,377
	SUBTOTAL:	$ 128,419,558
	CONTINGENCY (20%)	$ 25,683,912
	TOTAL (A):	**$ 154,103,470**
13	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 15,955,790
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 6,897,027
	TOTAL (B):	**$ 26,602,817**
	TOTAL PROJECT COST (A+B):	**$ 180,706,286**

4.2.8.1. NextEra T014 Alternative

A summary of the independent cost estimate is shown below:

NextEra T014 Alternative		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 13,571,466
2	**TRANSMISSION LINE FOUNDATIONS**	$ 10,001,353
3	**STRUCTURES - TRANSMISSION LINE**	$ 12,215,200
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 6,089,688
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 1,829,571
6	**NEW DYSINGER SUBSTATION**	$ 37,852,000
7	**EAST STOLLE RD SUBSTATION**	$ 13,963,000
8	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,000,000
9	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 4,900,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 1,400,000
10	**ENGINEERING**	
	DESIGN ENGINEERING	$ 4,770,000
	LIDAR	$ 500,000
	GEOTECH	$ 1,100,000
	SURVEYING/STAKING	$ 500,000
11	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,600,000
12	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 3,477,113
	ENVIRONMENTAL MITIGATION	$ 8,002,635
	WARRANTIES / LOC'S	$ 575,441
	REAL ESTATE COSTS (NEW ROW)	$ 7,993,538
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 90,000
	LEGAL FEES	$ 3,500,000
	SALES TAX ON MATERIALS	$ 4,064,839
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 20,879,377
	SUBTOTAL:	$ 160,075,220
	CONTINGENCY (20%)	$ 32,015,044
	TOTAL (A):	**$ 192,090,264**
13	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 15,955,790
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 6,897,027
	TOTAL (B):	**$ 26,602,817**
	TOTAL PROJECT COST (A+B):	**$ 218,693,080**

4.2.9. NextEra T015

A summary of the independent cost estimate is shown below:

NextEra T015		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 12,717,405
2	**TRANSMISSION LINE FOUNDATIONS**	$ 3,200,398
3	**STRUCTURES - TRANSMISSION LINE**	$ 4,688,312
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 6,137,208
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 1,382,170
6	**NEW DYSINGER SUBSTATION**	$ 25,374,000
7	**EAST STOLLE RD SUBSTATION**	$ 13,963,000
8	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 800,000
9	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 3,080,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 1,400,000
10	**ENGINEERING**	
	DESIGN ENGINEERING	$ 3,000,000
	LIDAR	$ 400,000
	GEOTECH	$ 600,000
	SURVEYING/STAKING	$ 400,000
11	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,000,000
12	**PERMITTING AND ADDITIONAL COSTS**	$ -
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 2,312,325
	ENVIRONMENTAL MITIGATION	$ 9,472,635
	WARRANTIES / LOC'S	$ 395,286
	REAL ESTATE COSTS (NEW ROW)	$ 391,346
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 1,793,000
	LEGAL FEES	$ 2,000,000
	SALES TAX ON MATERIALS	$ 1,442,611
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 14,422,454
	SUBTOTAL:	$ 110,572,150
	CONTINGENCY (20%)	$ 22,114,430
	TOTAL (A):	**$ 132,686,580**
13	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 15,955,790
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 6,897,027
	TOTAL (B):	**$ 26,602,817**
	TOTAL PROJECT COST (A+B):	**$ 159,289,397**

4.2.9.1. NextEra T015 Alternative

A summary of the independent cost estimate is shown below:

NextEra T015 Alternative			
	Description		**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$	13,571,466
2	**TRANSMISSION LINE FOUNDATIONS**	$	10,001,353
3	**STRUCTURES - TRANSMISSION LINE**	$	12,215,200
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$	6,089,688
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$	1,829,571
6	**NEW DYSINGER SUBSTATION**	$	25,374,000
7	**EAST STOLLE RD SUBSTATION**	$	13,963,000
8	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**		
	MOB / DEMOB	$	1,000,000
9	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**		
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$	4,900,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$	1,400,000
10	**ENGINEERING**		
	DESIGN ENGINEERING	$	4,170,000
	LIDAR	$	500,000
	GEOTECH	$	1,100,000
	SURVEYING/STAKING	$	500,000
11	**TESTING & COMMISSIONING**		
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$	1,000,000
12	**PERMITTING AND ADDITIONAL COSTS**		
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$	3,477,113
	ENVIRONMENTAL MITIGATION	$	8,002,635
	WARRANTIES / LOC'S	$	511,213
	REAL ESTATE COSTS (NEW ROW)	$	7,993,538
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$	90,000
	LEGAL FEES	$	3,500,000
	SALES TAX ON MATERIALS	$	2,287,583
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$	200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$	18,551,454
	SUBTOTAL:	$	142,227,813
	CONTINGENCY (20%)	$	28,445,563
	TOTAL (A):	$	**170,673,376**
13	**SYSTEM UPGRADE FACILITIES (SUF)**		
	DEVELOPER IDENTIFIED SUF	$	15,955,790
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$	3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	6,897,027
	TOTAL (B):	$	**26,602,817**
	TOTAL PROJECT COST (A+B):	$	**197,276,192**

4.2.10. Exelon T017

A summary of the independent cost estimate is shown below:

Exelon T017		
	Description	**Total Amount**
1	**CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION**	$ 40,368,420
2	**TRANSMISSION LINE FOUNDATIONS**	$ 16,694,900
3	**STRUCTURES - TRANSMISSION LINE**	$ 30,784,427
4	**CONDUCTOR, SHIELDWIRE, OPGW**	$ 15,797,866
5	**TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE**	$ 4,498,017
6	**STOLLE ROAD SUBSTATION WORKS:**	$ 3,616,500
7	**GARDENVILLE 230kV SUBSTATION WORKS**	$ 3,414,500
8	**NIAGARA SUBSTATION WORK**	$ 4,209,000
9	**CONTRACTOR MOBILIZATION / DEMOBILIZATION**	
	MOB / DEMOB	$ 1,500,000
10	**PROJECT MANAGEMENT, MATERIAL HANDLING & AMENITIES**	
	PROJECT MANAGEMENT & STAFFING (INCLUDES PM, FIELD ENGINEERS / SUPERVISION, SCHEDULER AND COST MANAGER, SHEQ STAFF, ADMIN, MATERIALS MANAGEMENT STAFF)	$ 11,200,000
	SITE ACCOMMODATION, FACILITIES, STORAGE	$ 2,000,000
11	**ENGINEERING**	
	DESIGN ENGINEERING	$ 7,200,000
	LIDAR	$ 800,000
	GEOTECH	$ 1,700,000
	SURVEYING/STAKING	$ 1,000,000
12	**TESTING & COMMISSIONING**	
	TESTING & COMMISSIONING OF T-LINE AND EQUIPMENT	$ 1,800,000
13	**PERMITTING AND ADDITIONAL COSTS**	
	ENVIRONMENTAL LICENSING & PERMITTING COSTS	$ 2,859,705
	ENVIRONMENTAL MITIGATION	$ 18,601,683
	WARRANTIES / LOC'S	$ 786,713
	REAL ESTATE COSTS (NEW ROW)	$ 7,017,412
	REAL ESTATE COSTS (INCUMBENT UTILITY ROW)	$ 2,774,000
	LEGAL FEES	$ 3,500,000
	SALES TAX ON MATERIALS	$ 3,864,884
	FEES FOR PERMITS, INCLUDING ROADWAY, RAILROAD, BUILDING OR OTHER LOCAL PERMITS	$ 200,000
	CONTRACTOR MARK-UP (OH&P) 15%	$ 27,928,204
	SUBTOTAL:	$ 214,116,230
	CONTINGENCY ON ENTIRE PROJECT (25%)	$ 53,529,058
	TOTAL (A):	**$ 267,645,288**
14	**SYSTEM UPGRADE FACILITIES (SUF)**	
	DEVELOPER IDENTIFIED SUF	$ 15,787,200
	SYSTEM IMPACT STUDY IDENTIFIED SUF: (including potential additional SUFs)	$ 7,500,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,150,520
	TOTAL (B):	**$ 31,437,720**
	TOTAL PROJECT COST (A+B):	**$ 299,083,008**

4.3. Risk

The review team completed an evaluation of the potential risks associated with the proposals. The review team has summarized the significant risks, including those previously identified by each Developer. The review team's evaluation was based on the team's collective experience with transmission line and substation projects in New York State.

The significant drivers to the project risks considered were:

- Article VII review approval process and potential environmental issues
- Procurement of major equipment
- Real Estate acquisition
- Construction

A qualitative assessment of the risks was used in determining the potential impact on the schedule and the amount of contingency to be included in each Developers' independent cost estimates. The largest risk involves the projects where significant new ROW will be required. A larger contingency was factored into those cost estimates. Also, since detailed studies have not been completed, additional contingency for unanticipated System Upgrade Facilities (SUF) such as overdutied breakers was included in the cost estimates.

4.3.1. Common Risks

Many of the risks are common to all proposals and are summarized below.

#	Risk Title	Description	Comment
1	Article VII Certificate	Article VII review approval process could take longer than estimated in schedule for a variety of reasons. (i.e., additional special studies requested by involved agencies, lack of stakeholder consensus)	Developer needs early outreach with all stakeholders and to prepare a comprehensive application. Teams experienced with Article VII process will be essential.
2	Other environmental approvals.	Federal agency and other approvals could take longer than State Article VII process. This could become more likely if cutbacks of funding to regulatory agencies affect employee staffing.	Developer needs early outreach with Federal Agencies and others, to prepare comprehensive applications and obtain approvals in parallel with Article VII process.

3	Public Opposition	If local groups or citizens oppose the project it could cause significant delays especially if opposition results in litigation.	Opposition and litigation risk is more likely with new ROW than with existing ROW. Developer needs early outreach to solicit public involvement, incorporate public concerns during planning stage before project execution, build mitigation into design, and foster community buy-in.
4	EM&CP Approval	EM&CP approval process could take longer than estimated in schedule.	Developer needs to prepare a comprehensive plan. Teams experience with DPS, DEC, Ags. & Markets and other agency requirements will be essential.
5	Environmental Study Findings	Environmental studies could find critical habitat; wetlands; agricultural lands; rare, threatened or endangered species; cultural or archeological sites: etc. that could require reroutes of lines or special conditions such as seasonal restriction on construction. Time of year when studies can be conducted could also affect project schedule.	Studies need to be scheduled and conducted early in the process to ensure design and EM&CP adequately minimizes, mitigates or avoids environmental impacts.
6	Unknown environmental conditions discovered during construction	During construction the Developer could encounter previously unidentified issues, such as contaminated soil, archeological remains, rare, threatened or endangered species, unidentified utilities, etc.	Environmental monitor will be on-site during construction. Such findings could require relocating and redesigning structures resulting in construction delays.
7	Work on Incumbent/Other	Upgrade to facilities not owned and operated by Developer are dependent on the specific design	Influence by the NYISO or PSC may be required to incentivize third party

	Utilities Facilities	requirement, willingness and schedule of the incumbent utility companies.	owners
8	Material Shortages	Material and equipment shortages and delayed shipments.	Mitigated by proper QA during engineering to insure adequate quantities ordered. Procurement with sufficient period of float between scheduled deliveries from suppliers and when material is needed for construction and proactive monitoring and expediting.
9	Need for additional System Upgrade Facilities	Completion of the detailed studies such as fault studies for the project will normally be completed during the SIS, the Facilities Study and detailed engineering.	The reinforcements proposed by the Developers may overduty and require replacement of some breakers and protection equipment on the existing system. Additional thermal overloads may be identified.

4.3.2. Developer Specific Risks

Summarized below are the review team's most significant findings for each Developer. This is not all inclusive but is intended to provide a summary of those items that are most critical.

4.3.2.1. *North American Transmission*

- **NAT Proposal T006** (Dysinger to Stolle 345 kV)

#	Risk Title	Description	Comment
1	Reliability Concern - Stolle Road Substation (Avangrid Owned) - Third Transformer	Proposal calls for the addition of a third 345 –115 kV transformer in parallel with the existing two transformers. This will expose all three transformers to outages for a single contingency.	The NYISO evaluated reliability impacts and considered the configuration in its technical analysis. Incumbent utility may request additional breakers, protective relays and associated equipment.
2	Design Concern - Stolle Road Substation (Avangrid Owned) - Third Transformer	Proposal calls for adding two 345kV breakers and related equipment to create a ring bus and a new line terminal. It also calls for the addition of a third 345 –115 kV transformer. This will be installed just west of existing transformers.	The proposed location of the new transformer will reduce access to the existing west transformer and the 345 kV yard. The transformer will also be in close proximity to the existing transformer and control house which would require fire walls. The new transformer should be relocated to the east and a fire wall installed between the new and existing east transformer. This will require expansion of fenced area. Included cost in independent estimate.

- **NAT Proposal T007** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle line. The Stolle to Gardenville 345kV line will require 179 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission-lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations.

- **NAT Proposal T008** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV and 2'nd Dysinger to Stolle line)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle line. The Stolle to Gardenville 345kV line will require 179 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission-lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations.

- **NAT Proposal T009** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV and 2'nd Dysinger to Stolle line and Niagara to Dysinger 345kV line)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle lines. The Stolle to Gardenville 345kV line will require 182 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel. 6 gaps exist on the existing ROW to be utilized for the Niagara to Dysinger line. At the NYPA cross state 345kv crossing, it appears that the existing ROW may need to be widened to accommodate the proposed horizontal configuration of the new line.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluation.

3	Crossing of the NYPA cross state 345kv lines	NAT proposed crossing over the existing 345kV with 3 pole horizontal configuration – each 195 ft. structure height on either side. In addition to the construction risks of crossing these lines, if the new line is to cross over the top of the existing lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both cross- state lines at the same time.	NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. Crossing under would help mitigate the risk. From a contingency analysis perspective, line crossingis not a defined NERC design contingency in planning studies.

4.3.2.2. *National Grid*

- **Moderate Power Transfer T011**

#	Risk Title	Description	Comment
1	No critical risks identified		

- **High Power Transfer T012**

#	Risk Title	Description	Comment
1	No Critical risks identified		

4.3.2.3. *NYPA/NYSEG*

- **Proposal T013** (Dysinger to Stolle 345kV, Reconductor Stolle -Gardenville 230kV)

#	Risk Title	Description	Comment
1	No Critical risks identified		

4.3.2.4. *NextEra*

- **Proposal T014 Base Proposal on existing ROW** (Dysinger Stolle w/phase shifter)

#	Risk Title	Description	Comment
1	No Critical risks identified		

- **Proposal T014 Alternative Proposal on new ROW (Dysinger Stolle w/phase shifter)**

#	Risk Title	Description	Comment
1	Right-of-way Acquisition (*for Alternate to build on new ROW*)	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Constructing the Dysinger to Stolle 345kV line off the existing ROW will require 252 acres of new ROW. 5 houses are located on the proposed new Dysinger to Stolle ROW. 86 parcels to be crossed by the proposed Dysinger to Stolle line contain houses within the parcel. NextEra's alternative proposal includes 9 crossings of the existing NYSEG ROW (with existing 230kV line). This has the risk of outages required during construction, potential of upper circuit falling into lower circuit taking out both lines at once throughout the life of the line(s) and could limit or impede future utilization of the existing ROW for additional circuit(s).	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation. Also utilization of existing utility owned ROW will greatly reduce risk. The risk is minimal if they build on the existing ROW as included in their base proposal.

- **Proposal T015 Base Proposal on existing ROW** (Dysinger Stolle w/o phase shifter)

#	Risk Title	Description	Comment
1	No Critical risks identified		

- **Proposal T015 Alternative Proposal on new ROW (Dysinger Stolle w/o phase shifter)**

#	Risk Title	Description	Comment
1	Right-of-way Acquisition (*for Alternate to build on new ROW*)	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Constructing the Dysinger to Stolle 345kV line off the existing ROW will require 252 acres of new ROW. 5 houses are located on the proposed new Dysinger to Stolle ROW. 86 parcels to be crossed by the proposed Dysinger to Stolle line contain houses within the parcel. NextEra's alternative proposal includes 9 crossings of the existing NYSEG ROW (with existing 230kV line). This has the risk of outages required during construction, potential of upper circuit falling into lower circuit taking out both lines at once throughout the life of the line(s) and could limit or impede future utilization of the existing ROW for additional circuit(s).	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation. Also utilization of existing Utility owned ROW will greatly reduce risk. The risk is minimal if they build on the existing ROW as included in their base proposal.

4.3.2.5. *Exelon*

- **Exelon Proposal T017** (Niagara to Stolle and New Gardenville to Stolle 230kV)

#	**Risk Title**	**Description**	**Comment**
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Many gaps exist on the existing National Grid ROW to be utilized for the Niagara to Dysinger line segment. To fill those gaps, 53 acres of new ROW will need to be acquired in	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation.

		addition to the ROW to be obtained from National Grid. Constructing the Dysinger to Stolle line segment will require .68 acres of new ROW. Construction of the new Stolle to Gardenville line will require 141 acres of new ROW. 4 houses and 1 commercial properties are located on the proposed new Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	
2	Crossing of the NYPA cross state 345kv lines	Exelon proposed crossing under the existing 345 kV with single pole delta configuration – 105 ft and 100 ft heights either side. In addition to the construction risks of crossing these lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both a cross state line and the new line at the same time.	NYPA and or other entities concerned with reliability of the Bulk system may require the incorporation of additional design measures to minimize or eliminate this risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in planning studies.
3	Re-use of existing structures	During construction the Developer could discover that structures originally planned for re-use are in worse condition than expected and require repair or replacement. Exelon is assuming that all existing structures and foundations on National Grid Line Nos. 130 & 133 can be re-used. It is highly likely that some of these structures will need to be replaced or repaired.	Thorough inspection of existing structures is advisable prior to completing final design.
4	Reliability Concern - Gardenville Substation (Avangrid Owned) -New	Exelon proposes connecting a new 230 kV transmission line into Gardenville with a new line terminal and a single 230kV circuit breaker.	While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Stolle Road and a loss of Transformer

	Line Terminal		Bank #7. Incumbent utility may request additional breakers, protective relays and associated equipment, which would increase project cost.
5	Reliability Concern - Stolle Road Substation (Avangrid Owned) -New Line Terminal	Exelon proposes connecting a new 230kV transmission line into Stolle Road with a new line terminal and a single 230kV circuit breaker.	While this may be the simplest arrangement and it matches the existing 230kV transmission line arrangements, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Gardenville, a loss of 230kV Line 67 to High Sheldon, and a loss of 230kV Line 65 to Lewiston. Incumbent utility may request additional breakers, protective relays and associated equipment, which would increase project cost.
6	Reliability Concern - Stolle Road Substation (Avangrid Owned)	Exelon proposes connecting a new 345kV transmission line into Stolle Road by adding a 345kV circuit breaker with disconnect switches to the existing bay. The line will terminate at the existing east dead end tower.	While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 345kV Line 37 to Homer City and a loss of Transformer Banks #3 and #4. Incumbent utility may request additional breakers, protective relays and associated equipment, which would increase project cost.

4.4. Expandability

The NYISO OATT section 31.4.8.1.3 prescribed the following: "The expandability of the proposed regulated Public Policy Transmission Project. The ISO will consider the impact of the proposed project on future construction. The ISO will also consider the extent to which any subsequent expansion will continue to use this proposed project within the context of system expansion."

The review team conducted an evaluation of the expansion capability of the Developers' proposals. The review centered predominately on the Developers' claims as presented in their proposals and additional information provided in response to a NYISO RFI. Below is a summary of the most significant items.

Items that may be considered that would be common to all proposals:

1. New line segments could be designed for double circuit capability. The Developers have not included such a design in their proposals.
2. Similarly the transmission lines could be constructed with higher ampacity conductor or re-conductored in the future.
3. The western New York system could be expanded in the future with the modifications as proposed by Developers other than the project ultimately selected by the NYISO. For example, National Grid's solution could be further expanded by constructing new lines and modifications as proposed by the other Developers.

Significant items specific to each Developer:

#	Developer	Transmission Line Expandability	Substation Expandability
T006 T007 T008 T009	North American Transmission	NAT's four proposals build upon each other providing potential expandability should the NYISO select one of the lower tier proposals.	Dysinger substation could be expanded to bring the 345 kV Somerset to Rochester T-line or the 230 kV Niagara to Stolle Road line with the installation of a 345-230 kV transformer.
T011 T012	National Grid	No significant expandability to NGRID's proposal beyond the common items mentioned above.	For T012, the proposed New Park Club Lane station will include a spare bay position.
T013	NYPA/NYSEG	No significant expandability to NYPA/NYSEG proposal beyond the common items mentioned above.	As proposed, the new 345 kV Dysinger station and the expansion of the 345 kV Stolle Road station will include spare bays. At both stations, the control houses will be constructed to accommodate further yard expansions without adding on to the buildings. Their initial design also includes significant build out and conversion of 230 kV and 345 kV busses to breaker and half schemes at Stolle Rd.
T014 T015	NextEra	No significant expandability to NextEra proposal beyond the common items mentioned above.	NextEra's proposed design for the 345 kV Dysinger station includes one open bay position. Their initial design also includes the termination of both cross state transmission lines into Dysinger.
T017	Exelon	No significant expandability to Exelon proposal beyond the common items	Dysinger substation could be constructed in the future to provide additional operating flexibility.

		mentioned above.	

4.5. Site Control and Real Estate

4.5.1. Site Control

The NYISO OATT section 31.4.8.1.6 states the following: "The extent to which the Developer of a proposed regulated Public Policy Transmission Project has the property rights, or ability to obtain the property rights, required to implement the project. The ISO will consider whether the Developer: (i) already possesses the rights of way necessary to implement the project; (ii) has completed a transmission routing study, which (a) identifies a specific routing plan with alternatives, (b) includes a schedule indicating the timing for obtaining siting and permitting, and (c) provides specific attention to sensitive areas (e.g., wetlands, river crossings, protected areas, and schools); or (iii) has specified a plan or approach for determining routing and acquiring property rights."

The review team conducted a review of the Developers' property rights acquisition plans associated with the proposals. The review centered on the Developers' claims as presented in their proposals and additional information provided in response to a NYISO RFI submitted to Developers in March 2017.

In all proposals, the following characteristics are common for the property rights acquisition process:

- Use existing ROW as much as practical.
- Where additional ROWs must be acquired, it will be accomplished through arm's length negotiation with property owners.
- If negotiations are unsuccessful, the property will be acquired through eminent domain.
- All Developers have completed preliminary routing of proposed line.

The non-incumbent Developers all claim two common rights to assist in obtaining property:

- They cite the recent 12/17/15 PSC order (Case 12-T-0502) related to the AC Transmission proceeding as have applicability to this project in terms of obtaining access to the incumbent utility ROW. The Order stated on page 60: *"Incumbent utilities should offer competitors the same terms they offer Transco; there should be no bias shown to Transco."* Further on page 60 the PSC Order states: *"Commission expects the utility company owner to bargain in good faith to reach an agreement with the developer of the transmission solution as to property access and compensation as it would for other linear project developers that seek to co-locate on utility property."* If negotiations with private land owners are unsuccessful, the Developer believes that under New York State Law they will have eminent domain authority after certification of a route by the NYPSC.

Below is a summary of the teams' review:

#	Developer	Property Rights Acquisition
T006 T007 T008 T009	North American Transmission	Their plan for T006 relies on use of the incumbent utility ROW with the exception of property to be acquired for the Dysinger and Stolle Road substations. Proposals T007, T008 and T009 require significant new ROW.The real estate requirements are further detailed in the Real Estate Analysis. Risk associated with obtaining the new ROW is documented in the Risk Section. NAT lays out a detailed plan for obtaining site control. 1. They would rely on affiliates of LS Power who have experience in negotiating easements and joint use agreements, which have been developed for many past generation and transmission projects. 2. The Developer states that landowner outreach will be accomplished through direct mailings, a website, advertisements, and public meetings. 3. Regarding use of incumbent utility ROW, they cite the recent PSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. 4. Regarding private property, they provide an opinion letter from Harris Beach PLLC asserting the ability of private Developers of electric transmission facilities to acquire real property, including utility-owned rights-of-way, through condemnation if necessary. They state: "North America Transmission Corporation is a transportation corporation under New York State Law. Accordingly, North America Transmission Corporation will have eminent domain authority after certification of a route by the NYPSC, in the event bilateral negotiations with landowners is not successful. Such a condemnation will be possible after a public interest finding by the NYPSC under Article VII of the PSL." NAT does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. North American Transmission Corporation, as a New York Transportation Corporation, will own the Bulk Power System assets included within its proposal, except for any real estate within the existing substations associated with the interconnections. NAT stated that they would acquire easements for the ROW.

T011 T012	National Grid	NGRID completed a routing study and states "the ROW targeted for this project is either fee-owned by, or under the control (via easement or permit)" of NGRID. There are a few minor parcels that will need to be obtained. As a New York utility, NGRID has a demonstrated history of negotiating and obtaining ROW for its transmission system. National Grid will own all assets included within its proposal.
T013	NYPA/NYSEG	Most property rights for this proposal are already owned by the Developer except for National Grid ROW required for line separation and an additional parcel to be acquired for Dysinger Switching station. As New York utilities, NYPA and NYSEG haves a demonstrated history of negotiating and obtaining ROW's for its transmission system. As proposed, NYPA will own, operate and maintain all assets for the Dysinger Switching Station, the 345 kV Dysinger to Stolle Road transmission line, and the additions at Niagara Station. NYSEG will own, operate and maintain the remaining assets within the proposal.
T014 T015	NextEra	Their preferred route would predominately use existing ROW owned by the incumbent utility with the exception of property to be acquired for the Dysinger and Stolle Road substations. They have provided an alternative plan to obtain all new ROW between Dysinger and Stolle Road should they not be able to obtain rights to the incumbent utility ROW. NextEra lays out a detailed plan for obtaining site control. 1. They would rely on affiliates of NextEra who have experience in negotiating easements for transmission projects. 2. Regarding use of incumbent utility ROW they cite the recent NYPSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to and lease of the incumbent utility ROW. 3. Regarding private property, they provide a plan to obtain through negotiations with land owners. Should negotiations fail they cite precedent that allows for Developers of electric transmission facilities to acquire real property through condemnation, if necessary.

		NextEra does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. NextEra Energy Transmission New York, Inc., as a New York Transportation Corporation, will own all assets included within its proposal, except for non-bulk transmission upgrades that will be constructed and owned by the transmission provider. NextEra states it has an option on a parcel of land (Parcel 8) as a potential location for Dysinger Substation.
T017	Exelon	Their plan utilizes existing ROW owned by incumbent utilities and significant new ROW to be obtained. The real estate requirements are further detailed in the Real Estate Analysis. Risk associated with obtaining the new ROW is documented in the Risk Section. Exelon lays out a detailed plan for obtaining site control. 1. They would have a Right of Way Project Manager directing internal and contract personnel. 2. Regarding use of incumbent utility ROW, they cite the recent PSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. 3. Regarding private property they provide a plan to obtain through negotiations with land owners. Should negotiations fail they cite precedent that allows for Developer of electric transmission facilities to acquire real property through condemnation if necessary. Exelon does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. Exelon is proposing to own and maintain the transmission lines associated with its proposal. Substation additions required as part of its proposal will be owned and maintained by the existing transmission substation owner(s). Exelon stated that they would acquire easements for the ROW.

4.5.2. Real Estate Analysis

A review of the proposed routing for the transmission lines and substations was completed to identify where new property rights would need to be acquired. Estimates for the property were derived by obtaining recent comparable sales and tax assessments in the town and county where the property is located.

A summary of the property requirements for new transmission line ROW (substation property is not shown on this table):

PROPOSAL	DEVELOPER	SEGMENT	NEW RIGHT OF WAY (ROW)			SUB-TOTAL	TOTAL ROW REQUIRED		COMMENTS
			COMMER	RESIDENTI	AGRICULT				
			AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	COST	
T006	North American Transmission (Proposal 1)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
T007	North American Transmission (Proposal 2)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	179.34	$ 7,471,224	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
T008	North American Transmission (Proposal 3)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	179.34	$ 7,471,224	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
T009	North American Transmission (Proposal 4)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	181.72	$ 7,522,784	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
		Niagara to Dysinger - 27.16	1.56		0.82	2.38			ROW GAP
T011	National Grid (Moderate Transfer)	No New Lines							
T012	National Grid (High Transfer)	Niagara to Gardenville - 36.2 miles	3.97		14.01	17.98	17.98	$ 172,069	ROW GAP
T013	NYPA and NYSEG	Dysinger to Stolle - 20.6 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
T014	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	33.71	120.66	97.51	251.88	251.88	$ 7,606,569	ROW W/ 5 HOUSES
T015	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	33.71	120.66	97.51	251.88	251.88	$ 7,606,569	ROW W/ 5 HOUSES
T017	Exelon Transmission	Niagara to Stolle - 47.12 miles	4.25	3.48	45.67	53.40	53.40	$ 408,382	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.10 miles	40.56	62.3	38.37	141.23	141.23	$ 6,609,030	ROW W/ 4 HOUSES AND 1 COMM BLDG

A summary of the estimated value for use of existing incumbent transmission ROW is shown below:

PROPOSAL	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY ROW		TOTAL INCUMBENT UTILITY ROW USES (ACRES)	AVERAGE COMs (Agricultural)/ ACRES	SUB-TOTAL ROW COST	TOTAL ROW COST
				NIAGARA MOHAK (ACRES)	NYSEG (ACRES)				
T006	North American Transmission (Proposal 1)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara		5.74	5.74	$ 3,400	$ 20,000	$ 1,502,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
T007	North American Transmission (Proposal 2)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara		5.74	5.74	$ 3,400	$ 20,000	$ 1,640,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
T008	North American Transmission (Proposal 3)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara		10.33	10.33	$ 3,400	$ 35,000	$ 2,846,000
			Erie		534.58	534.58	$ 5,000	$ 2,673,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
T009	North American Transmission (Proposal 4)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara		10.33	10.33	$ 3,400	$ 35,000	$ 4,234,000
			Erie		534.58	534.58	$ 5,000	$ 2,673,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
		Niagara to Dysinger - 27.16	Niagara	42.05	366.27	408.32	$ 3,400	$ 1,388,000	
T011	National Grid (Moderate Transfer)	No New Lines							
T012	National Grid (High Transfer)	Niagara to Gardenville - 36.2 miles	Niagara	203.82		203.82	$ 3,400	$ 693,000	$ 1,157,000
			Erie	92.85		92.85	$ 5,000	$ 464,000	
T013	NYPA and NYSEG	Dysinger to Stolle - 20.6 miles	Niagara		5.97	5.97	$ 3,400	$ 20,000	$ 1,613,000
			Erie		318.64	318.64	$ 5,000	$ 1,593,000	
T014	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara		4.59	4.59	$ 3,400	$ 16,000	$ 1,793,000
			Erie		355.48	355.48	$ 5,000	$ 1,777,000	
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara		1.20	1.20	$ 3,400	$ 4,000	$ 90,000
			Erie		17.16	17.16	$ 5,000	$ 86,000	
T015	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara		4.59	4.59	$ 3,400	$ 16,000	$ 1,793,000
			Erie		355.48	355.48	$ 5,000	$ 1,777,000	
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara		1.20	1.20	$ 3,400	$ 4,000	$ 90,000
			Erie		17.16	17.16	$ 5,000	$ 86,000	
T017	Exelon Transmission	Niagara to Stolle - 47.12 miles	Niagara	293.19	65.30	358.49	$ 3,400	$ 1,219,000	$ 2,701,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
		Stolle Rd SS to Gardenville SS - 12.10 miles	Erie		14.63	14.63	$ 5,000	$ 73,000	$ 73,000

4.6. Operational Plan

The review team conducted an evaluation of the Developers' operations and maintenance plans associated with the proposals. The review centered on the Developers' plans as presented in their proposals and additional information provided in response to a NYISO RFI submitted to Developers in March 2017.

For the non-incumbent Developers, the following is common among the proposals (The review team recognized that, while not stated in the proposals, these items are also common for the incumbent Developers):

- The Developers stated that all O&M activities will comply with required NERC regulations.
- Real time system operations will be conducted by the NYISO.

- Control center schedules will be 24-7-365.

Below is a summary of the review team's findings. The review team did not identify any major flaw with any Developers' plans. The review team believes the NYISO is best positioned to determine the suitability of non-incumbent utility providing control center services in New York.

#	Developer	Operations	Maintenance
T006 T007 T008 T009	North American Transmission	NAT states real time system monitoring and control center services will be provided under contract with an affiliate, Cross Texas Transmission (CTT). CTT primary and backup control centers are located in Austin, TX. The CTT control center has extensive experience. The NYISO should determine the suitability of this Texas affiliate to provide services in New York.	Transmission line and substation maintenance will be managed by local NAT staff. Maintenance activities will be performed by third-party contractors. NAT has experience maintaining transmission systems in other areas of the country and has provided a detailed maintenance plan.
T011 T012	National Grid	NGRID did not provide an operation and maintenance plan with its proposal. However, the review team recognizes that as a New York utility, NGRID has a demonstrated history of operating and maintaining its transmission and distribution systems.	See comment under Operations.
T013	NYPA/NYSEG	NYPA/NYSEG did not provide an operation and maintenance plan with its proposal. However, the review team recognizes that as New York utilities, they individually have demonstrated histories of operating and maintaining their transmission and distribution systems.	See comment under Operations

T014 T015	NextEra	NextEra preferred operations plan is to control its facilities via one of its existing out-of-NYS control centers. If preferred by NYISO, the Developer will build and operate a control center within New York. Alternatively, the Developer could contract with an incumbent utility for monitoring and control activities. The NYISO should determine the suitability of using an affiliate out-of-NYS control center to provide services in New York.	Transmission line and substation maintenance activities will be managed and performed by NextEra staff supplemented with third-party contractors. NextEra has experience maintaining transmission systems in other areas of the country and provided a detailed maintenance plan.
T017	Exelon	Exelon plans to contract with an incumbent utility or a third-party control center for monitoring and control activities.	Similarly, Exelon plans on contracting with an incumbent utility or third-party contractor for maintenance activities.

4.7. Field Reviews

Field review of proposed transmission line routes and substations was completed by the review team. The results of those field reviews are documented in a report supplemented with checklists and maps marked with comments and observations. This work was used to develop the project estimates and identify potential issues and risks with the proposed design, siting and routing.

4.8. Work Plans

- All selected Developers have a history of managing successful transmission and substation projects. In response to RFI's on work plans, there was variation in the degree of self-performance; all respondents will manage internal and external resources.
- It was not possible to evaluate external team members at this stage, as they are expected to be selected competitively after award from among leading engineering, geo-technical, environmental and construction firms.
- Generally, all Developers included work plan activities in their estimates and schedules.
- They all indicated they will contract for a portion of the engineering and self-perform the remainder. Exelon plans to outsource most engineering.
- All are expected to contract for site work and construction.
- National Grid plans to self-perform above grade/structures and electrical construction (including protection and control).

- All are expected to contract geo-tech and surveying and self-perform real estate acquisition and public outreach.

4.9. Technical Discussions and Investigations

A summary of the technical investigations of significant issues, concerns and design verification is shown below:

4.9.1. North America Transmission – Proposal #1 (T006) Stolle Road Transformer

4.9.1.1. NAT's proposal calls for the addition of a third 345 – 115 kV transformer in parallel with the existing two transformers at Stolle Rd. This will expose all three transformers to outages for a single contingency. The NYISO evaluated reliability impacts and considered the configuration in its technical analysis.

4.9.1.2. Proposal calls for adding two 345kV breakers and related equipment to create a ring bus and a new line terminal with the addition of a third 345 – 115 kV transformer. This equipment will be installed just west of existing transformers. The proposed location of the new transformer will reduce access to the existing west transformer and the 345 kV yard. The transformer will also be in close proximity to the existing transformer and control house which would require fire walls. The new transformer should be relocated to the east and a fire wall installed between the new and existing east transformer. This will require expansion of fenced area. This additional work was included in the independent estimate.

4.9.2. North America Transmission – Proposal #2(T007) Gardenville Substation

4.9.2.1. NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation. Option 1 involves the use of property located between the existing substations owned by National Grid and connects to Gardenville with a single breaker. Options 2 and 3 require purchase of additional property adjacent to industrial and residential properties and include installing a three-bay breaker-and-a-half station. These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations. Our estimate is based on Option 1. NAT proposed cost also based on Option 1.

4.9.3. North America Transmission – Proposal #3(T008)

4.9.3.1. Same as 4.9.2.1 above

4.9.4. North America Transmission – Proposal #4 (T009)

4.9.4.1. Same as 4.9.2.1 above

4.9.4.2. NAT proposed crossing over the existing 345 kV with 3 pole horizontal configuration – each 195 ft. structure height either sides. In addition to the construction risks of crossing these lines, if the new line is to cross over the top of the existing lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both cross-state lines at the same time. NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. Crossing under would help mitigate the risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in planning studies. The review team did not make any adjustments to its independent cost estimate.

4.9.4.3. Niagara Station Connection - North American Transmission's proposal called for bringing the new 345 kV transmission line to Dysinger into a new terminal structure in Bay 32. The proposed terminal structure conductor takeoff height is within a few feet of the height of the north-south strain busses in Bay 32. This makes the proposed connection impractical unless the north-south strain bus is reconfigured. Also, the proposed transmission line conductors passing over Bay 32 and Bay 33 pose a risk in that a dropped conductor or static will create a significant outage in the 345 kV yard. Since NAT's proposed arrangement was not feasible, an underground cable was included in the independent estimate.

4.9.5. National Grid – Moderate Power Transfer Solution (T011)

4.9.5.1. No major Technical Issues

4.9.6. National Grid – High Power Transfer Solution (T012)

4.9.6.1. No major Technical Issues

4.9.7. NYPA/NYSEG – Western NY Energy Link (T013)

4.9.7.1. NYPA/NYSEG proposed approximately 20 miles, of new structures for the Dysinger – Stolle Road single circuit 345 kV transmission line using engineered weathering steel poles with delta configuration I-string insulation for tangent & light angles and two or three poles for heavy angle & dead-end structures. Out of the

estimated 159 total structures, 143 structures are tangent structures. The average span length is 660 ft.

All of the structures, including tangent poles, are estimated to be installed on drilled shaft reinforced concrete foundations, with no less than 5.5 feet shaft. The review team believes NYPA/NYSEG over-designed the tangent structures by building on drilled shaft concrete foundations. Directly embedded tangent structure foundations would be more economical for the tangent structures with pole baseline moments less than 1,500-2,000 ft.-kips. (kip = 1000 Pounds-force)

4.9.8. NextEra Energy Transmission New York – Empire State Line #1 (T014)

4.9.8.1. NextEra proposed a width of 80 ft. for the alternative where they proposed an alternate to procure new ROW adjacent to NYSEG's existing ROW. The review team believes this will be inadequate and a minimum of 90 ft. is required. See 4.9.11 below for further detail.

4.9.9. NextEra Energy Transmission New York – Empire State Line #2 (T015)

4.9.9.1. The same comments stated above in section 4.9.8.1 for proposal T014 also apply to proposal T015.

4.9.10. Exelon Transmission Company – Niagara Area Transmission Expansion (T017)

4.9.10.1. Niagara Station Connection -Exelon's original proposal called for bringing the new 345kV transmission line overhead into the south terminal dead-end tower of Bay 32. The south terminal of Bay 32 is already occupied by 345kV line PA-302 which exits the station underground. Therefore, the proposed solution is not feasible. Since Exelon's proposed arrangement was not feasible, an underground cable connection was included in the independent estimate.

4.9.10.2. Exelon proposed crossing under the existing 345 kV NYPA cross state 345kV lines with single pole delta configuration – 105 ft. and 100 ft. heights on either side. In addition to the construction risks of crossing these lines there may be a concern that throughout the life of the facilities, failure of a top circuit would result in outage of both a cross state line and the new Niagara to Stolle line at the same time. NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in the power flow analysis

4.9.10.3. Exelon proposes connecting a new 230 kV line into Gardenville with a new line terminal and a single 230 kV circuit breaker. While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Stolle Road and a loss of Transformer Bank #7. Incumbent utility may object. Increased estimate contingency.

4.9.10.4. Exelon proposes connecting a new 230 kV line into Stolle Road with a new line terminal and a single 230 kV circuit breaker. While this may be the simplest arrangement and it matches the existing 230 kV transmission line arrangements, it also provides the least amount of reliability and operating flexibility. With this configuration, a failed breaker or a bus fault will cause a loss of 230 kV Line 66 to Gardenville, a loss of 230 kV Line 67 to High Sheldon, and a loss of 230 kV Line 65 to Lewiston. Incumbent utility may object. Increased estimate contingency.

4.9.10.5. Exelon proposes connecting a new 345 kV line into Stolle Road by adding a 345 kV circuit breaker with disconnect switches to the existing bay. The line will terminate at the existing east dead end tower. While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 345 kV Line 37 to Homer City and a loss of Transformer Banks #3 and #4. Incumbent utility may object. Increased estimate contingency.

4.9.10.6. Exelon Transmission proposed approximately 20 miles of new structures for the Dysinger to Stolle Road single circuit 345 kV Transmission line using engineered steel poles with delta configuration I-string insulation for tangent & light angles structures. Out of the estimated 151 total structures, 143 structures are tangent structures. The average span length is 695 ft.

All the structures, including tangent poles, are estimated to be installed on drilled shaft reinforced concrete foundations, with no less than 5.0 feet shaft. The review team believes Exelon Transmission over-designed the tangent structures by building on drilled shaft concrete foundations. Directly embedded tangent structure foundations would be more economical for the tangent structures with pole baseline moments less than 1,500-2,000 ft.-kips.

4.9.11. General Design Verifications

4.9.11.1. Transmission Line Row, Structure Type and EMF Comparison

See table below for a summary of each Developer's proposed ROW:

NY State EMF Criteria	
Max. Electric Field @ 1meter above ground @ Edge of ROW	1.6kV/m
Max. Electric Field @ 1meter above ground over public road	7.0kV/m
Max. Magnetic Field @ 1meter above ground @ Edge of ROW	200 mG

PROPOSAL	DEVELOPER	SEGMENT	LINE			EMF				COMMENTS
			Voltage (kV)	Length (miles)	Structure Configuration	ROW Width (ft.)	Edge of ROW: Max. Electric Field (kV/m)	Edge of ROW: Max. Magnetic Field (mG)	Meets NY State Requirement	
T006	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
T007	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
T008	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
T009	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
		Niagara SS to Dysinger SS	345	27.16	St. Mono Pole Delta	500	0.50	35.00	Yes	500ft. Existing Utility Corridor
T011	National Grid (Moderate Transfe	No New Lines								
T012	National Grid (High Transfer)	Niagara SS to Gardenville SS	230	36.20	St. Mono Pole Delta					EMF Study not provided, Proposed new line within the existing Utility ROW
T013	NYPA and NYSEG	Dysinger SS to Stolle Rd SS	345	20.60	St. Mono Pole Delta	500	0.33	73.52	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	230	12.00	St. Mono Pole Delta	150-500	0.97	189.30	Yes	150 to 500ft. Existing Utility Corridor, Restringing only
T014	NextEra Energy	Dysinger SS to Stolle Rd SS	345	19.93	Wood H-Pole Horz.	150	1.59	75.21	Yes	Within 500ft. Existing Utility Corridor
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS	345	21.66	St. Mono Pole Vertical	80	1.28	200.00	Yes	80ft. Proposed new ROW width meets the State EMF requirements
T015	NextEra Energy	Dysinger SS to Stolle Rd SS	345	19.93	Wood H-Pole Horz.	150	1.59	75.21	Yes	Within 500ft. Existing Utility Corridor
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS	345	21.66	St. Mono Pole Vertical	80	1.28	200.00	Yes	80ft. Proposed new ROW width meets the State EMF requirements
T017	Exelon Transmission	Niagara SS to Stolle SS	345	47.12	St. Mono Pole Delta	125				EMF Study not provided, but Noted "Exelon proposes a line design that will meet a maximum eletric field of 1.6kV/m and a max. magnetic field of 200 mG at the edge of the
		Stolle Rd SS to Gardenville SS	230	12.10	St. Mono Pole Delta	95				

The Developers' proposed ROW widths are acceptable with the exception of NextEra's alternate design. NextEra proposed a width of 80 ft. for the alternative where they proposed to procure new ROW adjacent to NYSEG's existing ROW. The review team believes this will be inadequate and a minimum of 90 ft. is required. Their distance from the conductor to ROW Edge (other side of NYSEG ROW) is only 37 ft., whereas OSHA requirement for 345 kV is 40.5 ft. (*i.e.*, electrical clearance of 20.5 ft. plus 10 ft. room for work plus 10 ft. growth).

4.9.11.2. Stolle Road 345kV Substation Arrangement Comparison

The review team compared the proposed bus arrangement for Stolle Road 345 kV substation. A summary table of the bus arrangement, number of lines, number of transformers and breakers is shown below. This comparison shows that the bus arrangements vary significantly.

Developer	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
NYPA/NYSEG T013	1	2	3	Breaker & Half *	10 (9 new)
NAT T006	1	1	2	Ring	3 (2 new)
NAT T007	2	0	2	Ring	4 (3 new)
NAT T008	3	0	3	Breaker & Half	8 (7 new)
NAT T009	3	0	3	Breaker & Half	8 (7 new)
NextEra T014 (includes PAR)	3	0	5	Ring	5 (4 new)
NextEra T015	3	0	5	Ring	5 (4 new)
Exelon	1	0	1	Straight Bus	2 (1new)

*Also includes two series breakers between transformers T4 and T6

Conclusion:

- Exelon is proposing the simplest solution with a single breaker to connect the new line from Dysinger, which of course has much less reliability and operating flexibility than the others.
- NYPA/NYSEG is proposing the most reliable and flexible system and are placing all transformers onto separate breaker positions (no parallel transformers).
- NAT has all three transformers in parallel.
- NextEra keeps the two existing transformers in parallel.

4.9.11.3. Dysinger 345 kV Substation Arrangement Comparison

The review team compared the proposed bus arrangement for Dysinger substation. A summary table of the bus arrangement, number of lines, and breakers is shown below. This comparison shows that the bus arrangements vary.

Developer	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
NYPA/NYSEG T013	5	0	5	Breaker & Half	8
NAT T006	5	0	5	Breaker & Half	8
NAT T007	5	0	5	Breaker & Half	8
NAT T008	6	0	6	Breaker & Half	9
NAT T009	7	0	7	Breaker & Half	11
NextEra T014 (includes PAR	7	0	7	Breaker & Half	11
NextEra T014	7	0	7	Breaker & Half	11
Exelon –New line by-passes Dysinger	NA	NA	NA	NA	NA

Conclusion:

- NextEra is the only Developer proposing to bring both 345kV cross state lines and both Somerset lines into Dysinger providing for additional operating flexibility.
- Exelon is not constructing a substation at Dysinger.

4.9.11.4. Environmental Discussion

All of the Developers' proposals recognize the need for environmental studies, permits and approvals from various federal and state government agencies. Standard permit requirements include transmission approval under Article VII, wetland delineation and protection, archeological studies, storm water pollution prevention requirements, stream protection, and agricultural land protection, rare, threatened and endangered species surveys and protection. The Developers acknowledge the possibility that the proposals could require modification to address additional permit conditions. At this stage in the development of the proposed projects, it is not possible to determine what those permit conditions would be. The following is a general discussion of the most significant potential environmental issues that could affect the proposals.

Except for T011, all the projects involve clearing of additional ROW for the transmission lines. There does not appear to be any environmental issues that would prevent the projects from being constructed based on the conceptual design information available for review. However, the clearing of new ROW or widening of existing ROW will somewhat proportionaly increase the environmental impacts and risks. These impacts and risks are further described below.

- Clearing of New ROWs or Expansion of Existing ROW.
  The table below contains the estimated acreage that will need to be cleared to construct the transmission lines for each proposed project. The new ROW or expanded ROW will require

archeological studies. These studies could discover archeologically sensitive areas that require actions up to and including re-routing the transmission line or structure to avoid the area. Visual assessments of the proposed line may also be required. If the line is determined to impact scenic resources or are not compatible with the community character, the line could require modifications. The project, including the substation footprint or new transmission structures, could have a permanent impact on emergent wetlands, which would require mitigation.

WNY TRANSMISSION PROJECT: Estimate of Mowing and Clearing (Acres)										
T006	T007	T008	T009	T011	T012	T013	T014	T014 Alt.	T015	T017
121	199	350	515	0	135	94	139	118	139	427

- Clearing of Forested Wetlands
  The table below contains the estimated acreage of forested wetlands that will likely be impacted by each proposed project. Forested wetlands are a very valuable ecological resource in New York and will require mitigation of impacts, including possible replacement offsite. While an estimate of these mitigation costs has been provided, there is the potential that project approval could take additional time and an alternate route could be required to avoid the wetland entirely.

WNY TRANSMISSION PROJECT: Estimate of Impacted Forested/Shrub Wetlands (Acres)										
T006	T007	T008	T009	T011	T012	T013	T014	T014 Alt.	T015	T017
39	47	96	117	0	21	30	45	38	45	106

- Clearing of Protected Species Habitat
  The project area could be determined to include habitat of threatened or endangered species, such as the Northern Long Eared Bat. If such habitat is identified, the project approval could take additional time and an alternate route could be required to avoid the habitat. Restrictions could be placed on when ROW clearing can be conducted which would further extend the project timeline.

- In–water Structures Construction (only T012 National Grid Grand Island Transmission Line)
  If T012 requires the replacement of transmission towers in the Niagara River, the project approval could take additional time. It may also require fishery resource and protected species habitat studies and protection measures such as restricted work windows, USFWS Incidental Take Permit, and open water habitat mitigation.

- Agricultural

  Early coordination with agricultural landowners and consideration of potential impacts to farmland will be needed for the proposed project. Siting and construction coordination will be needed to minimize impacts on prime agricultural lands and limit loss of crop production. Site restoration of disturbed and compacted soils will be required. Herbicide use may be restricted during construction and long-term ROW maintenance operations. Transmission line siting near Certified Organic Farms may require additional planning and consideration for compliance with organic certification. New ROWs will require additional agency coordination if the proposed route would cross properties within an Agricultural Conservation Easement Program or Land Trust.

  The table below contains the estimated acreage of agricultural land that will likely be impacted by each proposed project.

WNY TRANSMISSION PROJECT: Estimate of Impacted to Agricultural Land (Acres)									
T006	T007	T008	T009	T011	T012	T013	T014	T015	T017
16-32	19-37	19-37	53-106	0.3-0.6	50-100	17-34	30-60	30-60	69-137

  Area assumes Agricultural District lands adjacent to the project route with width of 25 ft. to 50 ft.

INDEPENDENT ESTIMATES

ATTACHMENT B1

T006 – NORTH AMERICAN TRANSMISSION

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T006 - North American Transmission

Revision: 4

SUMMARY OF COST ESTIMATE

	Description		Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	12,359,030
2	TRANSMISSION LINE FOUNDATIONS	$	6,777,500
3	STRUCTURES - TRANSMISSION LINE	$	12,081,851
4	CONDUCTOR, SHIELDWIRE, OPGW	$	5,187,754
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	1,328,890
6	NEW DYSINGER SWITCHYARD	$	19,771,000
7	STOLLE ROAD SUBSTATION WORKS	$	11,447,500
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$	32,473,291
	CONTRACTOR MARK-UP (OH&P) 15%	$	15,214,022
	SUBTOTAL:	$	116,640,839
	CONTINGENCY (20%)	$	23,328,168
	TOTAL (A):	**$**	**139,969,006**
9	SYSTEM UPGRADE FACILITIES	$	12,977,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	4,541,959
	TOTAL (B):	**$**	**17,518,984**
	TOTAL PROJECT COST (A+B):	**$**	**157,487,990**

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Revision: 4

Description of Work: A new 345kV Dysinger Switchyard located approximately 8 miles southeast of the city of Lockport, New York. The Project also includes a new ~20 mile 345kV Transmission Line from Dysinger Switchyard to Stolle Road Substation near Marilla, New York.								
Item	**Description**	**Quantity**	**Unit**	**Supply Rate**	**Labor & Equipment Rate**	**Total Unit Rate:**	**TOTAL:**	**Remarks**
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	121.0	Acre		$ 15,000	$ 15,000	**$ 1,815,000**	
1.2	Access Road	48,535.0	LF		$ 45	$ 45	**$ 2,184,075**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	48,535.0	LF		$ 4	$ 4	**$ 194,140**	
1.4	Matting	56,952.0	LF		$ 70	$ 70	**$ 3,986,640**	
1.5	Snow Removal	1.0	Sum		$ 320,000	$ 320,000	**$ 320,000**	
1.6	ROW Restoration	20.0	Mile		$ 10,000	$ 10,000	**$ 200,000**	
1.7	Work Pads	770,000.0	SF		$ 4	$ 4	**$ 2,710,400**	
1.8	Restoration for Work Pad areas	77,000.0	SF		$ 0.2	$ 0.2	**$ 11,550**	
1.9	Temporary Access Bridge	20.0	EA		$ 20,035	$ 20,035	**$ 400,700**	
1.10	Air Bridge	5.0	EA		$ 14,445	$ 14,445	**$ 72,225**	
1.11	Stabilized Construction Entrance	10.0	EA		$ 4,580	$ 4,580	**$ 45,800**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 300,000	$ 300,000	**$ 300,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 100,000	$ 100,000	**$ 100,000**	
1.14	Concrete Washout Station	10.0	EA		$ 1,850	$ 1,850	**$ 18,500**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 12,359,030**	
2. T-LINE FOUNDATIONS								
2.1	Direct Embed Foundations - 23ft deep x 6ft dia.	127.0	Structure		$ 18,000	$ 18,000	**$ 2,286,000**	Supply & Install
2.2	Direct Embed Foundations - 28ft deep x 7ft dia.	5.0	Structure		$ 20,000	$ 20,000	**$ 100,000**	Supply & Install
2.3	Direct Embed Foundations - 30ft deep x 6ft dia.	6.0	Structure		$ 20,000	$ 20,000	**$ 120,000**	Supply & Install
2.4	Drilled Piers - 38ft deep x 9ft dia.	492.4	CUY		$ 1,500	$ 1,500	**$ 738,660**	
2.5	Drilled Piers - 43ft deep x 8ft dia.	792.5	CUY		$ 1,500	$ 1,500	**$ 1,188,780**	
2.6	Drilled Piers - 71ft deep x 9ft dia.	368.0	CUY		$ 1,500	$ 1,500	**$ 552,060**	
2.7	Rock Excavation Adder	896.0	CUY		$ 2,000	$ 2,000	**$ 1,792,000**	
TOTAL - T-LINE FOUNDATIONS:							**$ 6,777,500**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Tangent Delta Single Steel Pole Tangent (0-1 deg, 100')	18.0	EA	$ 31,401	$ 18,841	$ 50,242	**$ 904,349**	
3.2	Tangent Delta Single Steel Pole Tangent (0-1 deg, 115')	109.0	EA	$ 38,376	$ 23,026	$ 61,402	**$ 6,692,774**	
3.3	Tangent Delta Single Steel Pole Tangent (0-1 deg, 130')	5.0	EA	$ 44,150	$ 26,490	$ 70,641	**$ 353,203**	
3.4	Tangent Delta Single Steel Pole Tangent (0-1 deg, 145')	1.0	EA	$ 50,029	$ 30,018	$ 80,047	**$ 80,047**	
3.5	Small Angle Delta Steel Pole (0-15 deg, 115')	5.0	EA	$ 66,881	$ 40,128	$ 107,009	**$ 535,046**	
3.6	Med Angle Vertical Steel Pole (15-60 deg, 115')	9.0	EA	$ 93,524	$ 56,115	$ 149,639	**$ 1,346,751**	
3.7	Large Angle DE Vertical Steel Pole (60-90 deg, 115')	5.0	EA	$ 111,476	$ 66,885	$ 178,361	**$ 891,806**	
3.8	Large Angle DE Vertical Steel Pole (60-90 deg, 130')	1.0	EA	$ 140,249	$ 84,149	$ 224,398	**$ 224,398**	
3.9	Large Angle DE Vertical Steel Pole (60-90 deg, 145')	1.0	EA	$ 177,172	$ 106,303	$ 283,476	**$ 283,476**	
3.10	Install Grounding	154.0	Structure		$ 5,000	$ 5,000	**$ 770,000**	
TOTAL - STRUCTURES T-LINE:							**$ 12,081,851**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	20.0	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 4,240,582**	
4.2	(1) OPGW 36 Fiber AC-33/38/571	20.0	Mile	$ 19,404	$ 27,720	$ 47,124	**$ 941,472**	
4.3	(1) 3/8" HS Steel (2nd SW where required)	1,000.0	Ft	$ 1	$ 5	$ 6	**$ 5,700**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 5,187,754**	

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	399.0	Set	$ 900	$ 720	$ 1,620	**$ 646,380**	
5.2	Angle - Polymer V-String	15.0	Set	$ 1,300	$ 1,040	$ 2,340	**$ 35,100**	
5.3	Deadend - Polymer Double Deadend including Jumper	96.0	Set	$ 1,500	$ 1,350	$ 2,850	**$ 273,600**	
5.4	OPGW Assembly - Tangent	133.0	Set	$ 200	$ 150	$ 350	**$ 46,550**	
5.5	OPGW Assembly - Angle / DE	42.0	Set	$ 250	$ 150	$ 400	**$ 16,800**	
5.6	OHSW Assembly - Angle / DE	4.0	Set	$ 250	$ 150	$ 400	**$ 1,600**	
5.7	OPGW Splice Boxes	9.0	Set	$ 1,500	$ 1,000	$ 2,500	**$ 22,500**	
5.8	OPGW Splice & Test	1.0	Sum		$ 10,800	$ 10,800	**$ 10,800**	
5.9	Spacer Dampers	1,880.0	Ea	$ 50	$ 35	$ 85	**$ 159,800**	
5.10	Vibration Dampers - Conductor	1,880.0	Ea	$ 32	$ 20	$ 52	**$ 97,760**	
5.11	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 10,000	$ 8,000	$ 18,000	**$ 18,000**	
TOTAL: T-LINE INSULATORS, FITTINGS, HARDWARE:							**$ 1,328,890**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.0	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,450.0	LF		$ 200	$ 200	**$ 490,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	16.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 112,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph	5.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 150,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,046,000	$ 1,046,000	**$ 1,046,000**	
6.8	Breakers	8.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,040,000**	
6.9	Arrestors (3 per line)	15.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 112,500**	
6.10	Line Traps	5.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 105,000**	
6.11	Two (2) 345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	Supply & Install
6.13	Low Profile Foundations	231.0	Ea		$ 5,000	$ 5,000	**$ 1,155,000**	Supply & Install
6.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
6.15	Circuit Breaker Foundations	8.0	Ea		$ 75,000	$ 75,000	**$ 600,000**	Supply & Install
6.16	Lightning Mast Foundations	15.0	Ea		$ 15,000	$ 15,000	**$ 225,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	
6.18	Control House and Pad (30' x 90')	1.0	Sum	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	Supply & Install
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	
6.20	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	Supply & Install
6.23	Protection, Telecom and Metering Equipment (Panels)	30.0	Ea		$ 30,000	$ 30,000	**$ 900,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	
6.29	Bus Support 1 Ph	93.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 279,000**	
6.30	Switch Stands	16.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 176,000**	
6.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.32	Misc. Structures	1.0	Sum	$ -	$ 52,000	$ 52,000	**$ 52,000**	
6.33	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.34	Lightning Masts	15.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 180,000**	
6.35	Arrestor Stands	15.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 52,500**	
6.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.37	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 3,400,000	$ 3,400,000	**$ 3,400,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 19,771,000**	
7. STOLLE ROAD SUBSTATION WORKS:								
7.1	Switches 3ph	4.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 28,000**	
7.2	Line Switches 3 ph w/ motor-operators	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
7.3	Instrument Transformers	1.00	Ea		$ 460,000	$ 460,000	**$ 460,000**	
7.4	Breakers	3.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,140,000**	
7.5	Arrestors (3 per line)	6.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 45,000**	
7.6	Line Traps	1.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
7.7	345 kV buses	1.00	Ea	$ 12,500	$ 17,500	$ 30,000	**$ 30,000**	Supply & Install
7.8	Low Profile Foundations	91.00	Ea		$ 5,000	$ 5,000	**$ 455,000**	Supply & Install
7.9	Circuit Breaker Foundations	3.00	Ea		$ 75,000	$ 75,000	**$ 225,000**	Supply & Install
7.10	Lightning Mast Foundations	6.0	Ea		$ 15,000	$ 15,000	**$ 90,000**	
7.11	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	Supply & Install
7.12	Protection, Telecom and Metering Equipment (Panels)	13.00	Ea		$ 30,000	$ 30,000	**$ 390,000**	Supply & Install
7.13	SCADA and Communications	1.00	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.14	Control Conduits from Cable Tray to Equipment	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.15	Cable Trench Systems for Control Cables	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	
7.16	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	
7.17	Bus Support 1 Ph	54.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 162,000**	
7.18	Switch Stands	4.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 44,000**	
7.19	Misc. Structures	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	Supply & Install
7.20	Lightning Masts	6.00	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 72,000**	Supply & Install
7.21	Arrestor Stands	3.00	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
7.22	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	
7.23	Interconnection arrangement at Stolle Rd Substation	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
7.24	345kV - 115kV 204/320/400 MVA Transformer	1.00	Ea	$ 3,900,000	$ 750,000	$ 4,650,000	**$ 4,650,000**	
7.25	Transformer Foundation with concrete moat and double steel grating	1.0	Ea		$ 150,000	$ 150,000	**$ 150,000**	
7.26	Firewall 30' long x 12' tall x 1' thick with footer	1.00	Ea		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
TOTAL - STOLLE RD SUBSTATION WORKS:							**$ 11,447,500**	
8. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
8.1	Mob / Demob	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
8.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and	17.0	Months		$ 350,000	$ 350,000	**$ 5,950,000**	
8.3	Site Accommodation, Facilities, Storage	1.0	Sum		$ 1,800,000	$ 1,800,000	**$ 1,800,000**	
	Engineering					$ -	**$ -**	
8.4	Design Engineering	1.0	Sum		$ 3,750,000	$ 3,750,000	**$ 3,750,000**	
8.5	LiDAR	1.0	Sum		$ 400,000	$ 400,000	**$ 400,000**	
8.6	Geotech	1.0	Sum		$ 800,000	$ 800,000	**$ 800,000**	
8.7	Surveying/Staking	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	
	Testing & Commissioning					$ -	**$ -**	
8.8	Testing & Commissioning of T-Line and Equipment	1.0	Sum		$ 1,150,000	$ 1,150,000	**$ 1,150,000**	
	Permitting and Additional Costs					$ -	**$ -**	
8.9	Environmental Licensing & Permitting Costs	1.0	Sum		$ 2,308,505	$ 2,308,505	**$ 2,308,505**	

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8.10	Environmental Mitigation	1.0	Sum		$ 8,202,072	$ 8,202,072	**$ 8,202,072**	
8.11	Warranties / LOC's	1.0	Sum		$ 418,284	$ 418,284	**$ 418,284**	
8.12	Real Estate Costs (New ROW)	1.0	Sum		$ 157,126	$ 157,126	**$ 157,126**	
8.13	Real Estate Costs (Incumbent Utility ROW)	1.0	Sum		$ 1,502,000	$ 1,502,000	**$ 1,502,000**	
8.14	Legal Fees	1.0	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
8.15	Allowance for Funds Used During Construction (AFUDC)	1.0	Sum			$ -	**$ -**	
8.16	Carrying Charges	1.0	Sum			$ -	**$ -**	
8.17	Sales Tax on Materials	1.0	Sum	$ 2,535,304		$ 2,535,304	**$ 2,535,304**	
8.18	Fees for permits, including roadway, railroad, building or other local permits	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 32,473,291**	
9. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so it is limited by lien conductor ratings 125/152/181 (NOR/LTE/STE).
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	**$ 75,000**	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 720,000**	
SUF 3	Roll Rd Substation							
SUF 3.1	Restoration of station stone within existing substation fence. Assume spoil materials disposed of on-site.	1.00	Ea		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
SUF 3.2	Transformer 115-34.5kV 90 MVA	1.00	Ea	$ 700,000	$ 200,000	$ 900,000	**$ 900,000**	
SUF 3.3	Switches 115kV 3Ph	1.00	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 27,000**	
SUF 3.4	Switches 35kV 3Ph	1.00	Ea	$ 6,000	$ 4,000	$ 10,000	**$ 10,000**	
SUF 3.5	Breakers 115kV 1200A	1.00	Ea	$ 150,000	$ 50,000	$ 200,000	**$ 200,000**	
SUF 3.6	Breakers 35kV 2000A	1.00	Ea	$ 75,000	$ 15,000	$ 90,000	**$ 90,000**	
SUF 3.7	CVT's 115kV	3.00	Ea	$ 10,000	$ 8,000	$ 18,000	**$ 54,000**	
SUF 3.8	Arrestors 115kV	6.00	Ea	$ 5,000	$ 700	$ 5,700	**$ 34,200**	
SUF 3.9	Arrestors 35kV (for transformer)	3.00	Ea	$ 2,500	$ 500	$ 3,000	**$ 9,000**	
SUF 3.10	Low Profile Foundations	8.00	Ea		$ 5,000	$ 5,000	**$ 40,000**	Supply & Install
SUF 3.11	Circuit Breaker Foundation 115kV	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 3.12	Circuit Breaker Foundation 35kV	1.00	Ea		$ 30,000	$ 30,000	**$ 30,000**	Supply & Install
SUF 3.13	Transformer Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 3.14	Firewall 30' long x 12' tall x 1' thick with footer	1.00	Ea		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
SUF 3.15	Control Cables	1.00	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
SUF 3.16	Protection & Telecom Equipment	3.00	Ea		$ 30,000	$ 30,000	**$ 90,000**	
SUF 3.17	SCADA and Communications	1.00	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
SUF 3.18	Low Voltage AC Distribution	1.00	Sum		$ 30,000	$ 30,000	**$ 30,000**	Supply & Install
SUF 3.19	Control Conduits	1.0	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
SUF 3.20	Grounding	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
SUF 3.21	Switch Stand 115kV (reuse 1 existing)	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 3.22	CVT Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	**$ 6,000**	

COST ESTIMATE

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 3.23	Arrestor Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	**$ 6,000**	
SUF 3.24	Misc Materials and Above / Below Ground Works	1.0	Sum		$ 120,000	$ 120,000	**$ 120,000**	Supply & Install
SUF 3.25	Engineering, T&C, PM, Indirects for SUF 3 (15%)					$ -	**$ 333,525**	Assumed 15% to cover all misc costs
SUF 4.1	Lockport to Shaw 115kV Transmsision Line 102. NAT report indicated: Remove all limitations to achieve line conductor ratings as the limit. Terminal allowance included.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	The limiting equipment is not known - scope undefined.
SUF 4.2	Engineering, T&C, PM, Indirects for SUF 4.1 (15%)					$ -	**$ 75,000**	
SUF 5	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL - SYSTEM UPGRADE FACILITIES:							**$ 12,977,025**	

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T006	
FEDERAL						Proposal 1	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$24,360	$69,050
National Park Service	National Parks	Consultation; Special Use Permit	Only applies if National Park located in project area.	Depending on impact of project request for a special use permit may require a NEPA environmental assessment.			
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$27,800	$94,000
NEPA	National Environmental Policy Act	Categorical Exclusion; EA Finding of No Impact; or EIS Record of Decision	With some exemptions, projects on federally owned lands and/or projects requiring federal permit approvals	Possible NEPA review due if federal agency coordination is required. Federal agency involved to determine if Categorical Exclusion applies. Assumes Article 7 covers NEPA requirements or if an EIS is required it is prepared under SEQRA Task.			
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)		
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Article VII Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000

NYS Public Service Commission / Department of Public Service (NYSDPS)	Part 102		Construction of a utility overhead transmission facility that will convey electric energy at 65kV or higher for a distance of one mile or longer and are not subject to Article VII of the Public Service Law.	May include coordination or studies completed under other line items including: Visual assessment, SHPO determination, OPRHP consultation, Ecological Impacts Assessment	Advantage-Disadvantage Analysis		
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$16,800	$62,000
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.			
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)			
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$13,200	$49,000

NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)		
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000

REGIONAL

Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000

LOCAL/MUNICIPAL

Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000

		Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T006 TOTAL**	**$775,560**	**$3,841,450**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing	**Expected Value**	**$2,308,505**	

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 4

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	39 acres	39 acres	16 acres	32 acres
Cost/Acre	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$2,340,000	$14,040,000	$8,048	$16,096

T006 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,348,048	**$14,056,096**	**$ 8,202,072**

*Offsite wetland mitigation area assumes clearing of NWI Forested/Shrub Wetland Approx. 3.24 miles (17107 lF) by 100' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; costing includes design and installation costs only; does not include land acquisition or long term monitoring

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 5.28 miles (27878 LF) Adjacent to Agriculture Properties by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T006)

SEGMENT: DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
	Sub Total	0.68	$ 4,376.00

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T006 - North American Transmission

Revision: 4

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NORTH AMERICAN (T006)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	North American Transmission (Proposal 1)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara	5.74	$ 1,502,000
			Erie	296.31	

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY:	NIAGARA
DEVELOPER:	NORTH AMERICAN (T006)
SEGMENT:	DYSINGER SWITCHYARD

		Total Cost
	Total Cost of Proposed Substation Site	$152,750.00

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b) Construction schedule is in accordance with the Developers proposed schedule (10 months) - we have assumed continuous working with no breaks in the schedule. Six months have been added to the construction schedule for start up and close out works and assisting in pre-construction activities (i.e. permitting activites, material procurement etc.).
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed that the Access Road included in Developer Estimate will be Type 1 Gravel Type.
f) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
g) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
h) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
i) Foundation rates include supply and installation of materials. Drilled Pier rates include supply and testing of concrete, rebar cage and the use of temp or permanent casing.
j) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section.
k) Assumes all environmental data and project details provided are accurate unless noted otherwise.
l) USFWS T&E Assumes that ¼ of the total line in ROW per segment will require field survey for T&E (5 miles).
m) NEPA-Assumes no NEPA because Art VII.
n) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of project route (10 miles).
o) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII.
p) Assumes no coordination with National Parks Service or OPRHP/State Parks.
q)USACE wetland delineation total based on Line Miles in Wetlands - NWI wetland length of 3.34 mile.
r) DEC wetland delineation total based on Line Miles in Wetlands - DEC wetland length of 1.19 miles.

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

s) Offsite wetland mitigation area costs based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.24 miles (calculated by GEI based on NWI mapper legend categories). Assumes clearing an additional 100 feet within Right of Way. Minimum costs at $60,000/acre, maximum costs at $120,000/acre for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.
t) Agricultural mitigation assumes timber matting impacts and pad impacts on adjacent agriculture land (5.28 miles) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
u)Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.).
v) No tree survey or replanting required outside regulated wetlands areas.
w) Article VII Intervenor Fund payment expected to be $100,000.
x) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
y) SUF reconductor rate is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
z) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B2

T007 – NORTH AMERICAN TRANSMISSION

SUBSTATION ENGINEERING COMPANY
8/11/2017

Revision: 4

SUMMARY OF COST ESTIMATE

	Description	Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 18,262,638
2	TRANSMISSION LINE FOUNDATIONS	$ 21,747,379
3	STRUCTURES - TRANSMISSION LINE	$ 27,076,848
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 8,522,568
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 2,536,564
6	NEW DYSINGER SWITCHYARD	$ 19,771,000
7	STOLLE ROAD SUBSTATION WORKS	$ 7,548,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$ 12,822,500
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 53,282,851
	CONTRACTOR MARK-UP (OH&P) 15%	$ 25,735,552
	SUBTOTAL:	$ 197,305,901
	CONTINGENCY (25%)	$ 49,326,475
	TOTAL (A):	**$ 246,632,376**

10	SYSTEM UPGRADE FACILITIES	$ 23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**

TOTAL PROJECT COST (A+B):	**$ 278,030,710**

COST ESTIMATE

Description of Work: Proposal 1 - A new 345kV Dysinger Switchyard located approximately 8 miles southeast of the city of Lockport, New York. The Project also includes a new ~20 mile 345kV Transmission Line from Dysinger Switchyard to Stolle Road Substation near Marilla, New York. Proposal 2 - Includes Proposal 1 Scope of Work, with the addition of a single circuit 345kV Transmission Line from the Stolle Road 345kV Substation to the existing Gardenville Substation, and a new 345/230kV Transformer at the existing Gardenville Substation. This cost estimate uses Option 1 routing (as per NAT estimate).

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	199.0	Acre		$ 15,000	$ 15,000	**$ 2,985,000**	
1.2	Access Road	98,960.0	LF		$ 45	$ 45	**$ 4,453,200**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	98,960.0	LF		$ 4	$ 4	**$ 395,840**	
1.4	Matting	74,295.0	LF		$ 70	$ 70	**$ 5,200,650**	
1.5	Snow Removal	1.0	Sum		$ 492,000	$ 492,000	**$ 492,000**	
1.6	ROW Restoration	33.0	Mile		$ 10,000	$ 10,000	**$ 330,000**	
1.7	Work Pads	832,500.0	SF		$ 4	$ 4	**$ 2,930,400**	
1.8	Restoration for Work Pad areas	83,250.0	SF		$ 0.2	$ 0.2	**$ 12,488**	
1.9	Temporary Access Bridge	30.0	EA		$ 20,035	$ 20,035	**$ 601,050**	
1.10	Air Bridge	8.0	EA		$ 14,445	$ 14,445	**$ 115,560**	
1.11	Stabilized Construction Entrance	15.0	EA		$ 4,580	$ 4,580	**$ 68,700**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 500,000	$ 500,000	**$ 500,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 150,000	$ 150,000	**$ 150,000**	
1.14	Concrete Washout Station	15.0	EA		$ 1,850	$ 1,850	**$ 27,750**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 18,262,638**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Direct Embed Foundations - 23ft deep x 6ft dia.	136.0	Structure		$ 18,000	$ 18,000	**$ 2,448,000**	Supply & Install
2.2	Direct Embed Foundations - 28ft deep x 7ft dia.	5.0	Structure		$ 20,000	$ 20,000	**$ 100,000**	Supply & Install
2.3	Direct Embed Foundations - 30ft deep x 6ft dia.	35.0	Structure		$ 20,000	$ 20,000	**$ 700,000**	Supply & Install
2.4	Direct Embed Foundations - 37ft deep x 7ft dia.	11.0	Structure		$ 22,000	$ 22,000	**$ 242,000**	Supply & Install
2.5	Drilled Pier 38ft deep x 9ft dia.	984.9	CUY		$ 1,500	$ 1,500	**$ 1,477,334**	
2.6	Drilled Pier 45ft deep x 9ft dia.	349.9	CUY		$ 1,500	$ 1,500	**$ 524,849**	
2.7	Drilled Pier 47ft deep x 8ft dia.	1,347.5	CUY		$ 1,500	$ 1,500	**$ 2,021,250**	
2.8	Drilled Pier 57ft deep x 9ft dia.	443.2	CUY		$ 1,500	$ 1,500	**$ 664,785**	
2.9	Drilled Pier 64ft deep x 8ft dia.	393.2	CUY		$ 1,500	$ 1,500	**$ 589,793**	
2.10	Drilled Pier 71ft deep x 9ft dia.	4,048.4	CUY		$ 1,500	$ 1,500	**$ 6,072,627**	
2.11	Drilled Pier 43ft deep x 8ft dia.	792.5	CUY		$ 1,500	$ 1,500	**$ 1,188,743**	
2.12	Rock Excavation Adder	2,859.0	CUY		$ 2,000	$ 2,000	**$ 5,718,000**	
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 21,747,379**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Single Steel Pole Tangent Delta - 00- 10 (Ht. 100')	18.0	ea	$ 31,401	$ 18,841	$ 50,242	**$ 904,349**	
3.2	Single Steel Pole Tangent Delta - 00- 10 (Ht. 115')	118.0	ea	$ 38,376	$ 23,026	$ 61,402	**$ 7,245,389**	
3.3	Single Steel Pole Tangent Delta - 00- 10 (Ht. 130')	29.0	ea	$ 44,150	$ 26,490	$ 70,641	**$ 2,048,579**	
3.4	Single Steel Pole Tangent Delta - 00- 10 (Ht. 145')	6.0	ea	$ 50,029	$ 30,018	$ 80,047	**$ 480,280**	
3.5	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 115')	5.0	pole	$ 66,881	$ 40,128	$ 107,009	**$ 535,046**	
3.6	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 130)	4.0	pole	$ 78,872	$ 47,323	$ 126,196	**$ 504,783**	
3.7	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 145)	2.0	pole	$ 94,927	$ 56,956	$ 151,883	**$ 303,765**	
3.8	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 115')	9.0	pole	$ 93,524	$ 56,115	$ 149,639	**$ 1,346,751**	
3.9	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 130')	7.0	pole	$ 120,604	$ 72,362	$ 192,966	**$ 1,350,760**	
3.10	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 145')	7.0	pole	$ 153,391	$ 92,034	$ 245,425	**$ 1,717,975**	
3.11	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 185')	3.0	pole	$ 187,828	$ 112,697	$ 300,525	**$ 901,575**	
3.12	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 115')	10.0	pole	$ 111,476	$ 66,885	$ 178,361	**$ 1,783,613**	
3.13	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 130')	15.0	pole	$ 140,249	$ 84,149	$ 224,398	**$ 3,365,971**	
3.14	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 145')	7.0	pole	$ 177,172	$ 106,303	$ 283,476	**$ 1,984,329**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
3.15	Large Angle DE (Ht. 195')	3.0	pole	$ 169,360	$ 101,616	$ 270,976	**$ 812,929**	
3.16	Tangent DE (Ht. 195')	3.0	pole	$ 116,824	$ 70,094	$ 186,918	**$ 560,753**	
3.17	Install Grounding	246.0	Structure		$ 5,000	$ 5,000	**$ 1,230,000**	
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 27,076,848**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	32.8	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 6,964,864**	
4.2	(1) OPGW 36 Fiber AC-33/38/571	32.8	Mile	$ 19,404	$ 27,720	$ 47,124	**$ 1,546,304**	
4.3	(1) 3/8" HS Steel (2nd SW where required)	2,000.0	Ft	$ 1	$ 5	$ 6	**$ 11,400**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 8,522,568**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	516.0	Set	$ 900	$ 720	$ 1,620	**$ 835,920**	
5.2	Angle - Polymer V-String	33.0	Set	$ 1,300	$ 1,040	$ 2,340	**$ 77,220**	
5.3	Deadend - Polymer Double Deadend including Jumper	354.0	Set	$ 1,500	$ 1,350	$ 2,850	**$ 1,008,900**	
5.4	OPGW Assembly - Tangent	172.0	Set	$ 200	$ 150	$ 350	**$ 60,200**	
5.5	OPGW Assembly - Angle / DE	148.0	Set	$ 250	$ 150	$ 400	**$ 59,200**	
5.6	OHSW Assembly - Angle / DE	8.0	Set	$ 250	$ 150	$ 400	**$ 3,200**	
5.7	OPGW Splice Boxes	15.0	Set	$ 1,500	$ 1,000	$ 2,500	**$ 37,500**	
5.8	OPGW Splice & Test	1.0	Sum		$ 18,000	$ 18,000	**$ 18,000**	
5.9	Spacer Dampers	2,952.0	Ea	$ 50	$ 35	$ 85	**$ 250,920**	
5.10	Vibration Dampers - Conductor	2,952.0	Ea	$ 32	$ 20	$ 52	**$ 153,504**	
5.11	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 20,000	$ 12,000	$ 32,000	**$ 32,000**	
TOTAL: TRANSMISSION LINE INSULATORS, FITTINGS, HARDWARE:							**$ 2,536,564**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.0	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,450.0	LF		$ 200	$ 200	**$ 490,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	16.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 112,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph	5.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 150,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,046,000	$ 1,046,000	**$ 1,046,000**	
6.8	Breakers	8.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,040,000**	
6.9	Arrestors (3 per line)	15.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 112,500**	
6.10	Line Traps	5.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 105,000**	
6.11	Two (2) 345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	Supply & Install
6.13	Low Profile Foundations	231.0	Ea		$ 5,000	$ 5,000	**$ 1,155,000**	Supply & Install
6.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
6.15	Circuit Breaker Foundations	8.0	Ea		$ 75,000	$ 75,000	**$ 600,000**	Supply & Install
6.16	Lightning Mast Foundations	15.0	Ea		$ 15,000	$ 15,000	**$ 225,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	
6.18	Control House and Pad (30' x 90')	1.0	Sum	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	Supply & Install
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	
6.20	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	Supply & Install
6.23	Protection, Telecom and Metering Equipment (Panels)	30.0	Ea		$ 30,000	$ 30,000	**$ 900,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	
6.29	Bus Support 1 Ph	93.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 279,000**	
6.30	Switch Stands	16.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 176,000**	
6.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.32	Misc. Structures	1.0	Sum	$ -	$ 52,000	$ 52,000	**$ 52,000**	
6.33	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000**	
6.34	Lightning Masts	15.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 180,000**	
6.35	Arrestor Stands	15.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 52,500**	
6.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.37	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 3,400,000	$ 3,400,000	**$ 3,400,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 19,771,000**	
7. STOLLE ROAD SUBSTATION WORKS:								
7.1	Switches 3ph	6.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 42,000**	
7.2	Line Switches 3 ph w/ motor-operators	2.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 60,000**	
7.3	Instrument Transformers	1.00	Sum		$ 544,000	$ 544,000	**$ 544,000**	
7.4	Breakers	4.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,520,000**	
7.5	Arrestors (3 per line)	6.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 45,000**	
7.6	Line Traps	2.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 42,000**	
7.7	345 kV buses	1.00	Ea	$ 12,500	$ 17,500	$ 30,000	**$ 30,000**	Supply & Install
7.8	Low Profile Foundations	110.00	Ea		$ 5,000	$ 5,000	**$ 550,000**	Supply & Install
7.9	Caisson DE Foundations	4.00	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
7.1	Circuit Breaker Foundations	4.00	Ea		$ 75,000	$ 75,000	**$ 300,000**	Supply & Install
7.11	Lightning Mast Foundations	4.0	Ea		$ 15,000	$ 15,000	**$ 60,000**	
7.12	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	Supply & Install
7.13	Protection, Telecom and Metering Equipment (Panels)	16.00	Ea		$ 30,000	$ 30,000	**$ 480,000**	Supply & Install
7.14	SCADA and Communications	1.00	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.15	Control Conduits from Cable Tray to Equipment	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.16	Cable Trench Systems for Control Cables	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	
7.17	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	
7.18	Bus Support 1 Ph	54.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 162,000**	
7.19	Switch Stands	6.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 66,000**	
7.2	Misc. Structures	1.00	Sum		$ 28,000	$ 28,000	**$ 28,000**	
7.21	Substation A-Frame Structures Standalone	1.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
7.22	Lightning Masts	4.00	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 48,000**	
7.23	Arrestor Stands	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
7.24	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
7.25	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - STOLLE RD SUBSTATION WORKS:							**$ 7,548,000**	
8. GARDENVILLE 345/230kV SUBSTATION WORKS								
8.1	Site Works including sediment controls, access roads, rough grading, final grading	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
8.2	Substation Fence	1,400.0	LF		$ 200	$ 200	**$ 280,000**	Supply & Install
8.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
8.4	Switches 3ph	1.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 7,000**	
8.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
8.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
8.7	Instrument Transformers	1.0	Sum		$ 271,000	$ 271,000	**$ 271,000**	
8.8	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8.9	Arrestors (3 per line)	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
8.10	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
8.11	230 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
8.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
8.13	Low Profile Foundations	40.0	Ea		$ 5,000	$ 5,000	**$ 200,000**	Supply & Install
8.14	Caisson DE Foundations	12.0	Ea		$ 50,000	$ 50,000	**$ 600,000**	Supply & Install
8.15	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
8.16	Lightning Mast Foundations	1.0	Ea		$ 15,000	$ 15,000	**$ 15,000**	Supply & Install
8.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
8.18	Control House and Pad (14' x 70' - 980 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
8.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
8.20	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
8.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
8.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
8.23	Protection, Telecom and Metering Equipment (Panels)	11.0	Ea		$ 30,000	$ 30,000	**$ 330,000**	Supply & Install
8.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
8.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
8.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
8.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 350,000	$ 350,000	**$ 350,000**	Supply & Install
8.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
8.29	Bus Support 1 Ph	18.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 54,000**	
8.30	Switch Stands	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.32	Misc. Structures	1.0	Sum		$ 27,000	$ 27,000	**$ 27,000**	
8.33	Substation A-Frame Structures Standalone	3.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 75,000**	
8.34	Lightning Masts	1.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 12,000**	
8.35	Arrestor Stands	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
8.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 725,000	$ 725,000	**$ 725,000**	Supply & Install
8.37	345kV - 230kV 480/540/600 MVA Transformer	1.0	Ea	$ 4,750,000	$ 750,000	$ 5,500,000	**$ 5,500,000**	
8.38	Transformer Foundation with concrete moat and double steel grating	1.0	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
TOTAL - GARDENVILLE SUBSTATION WORKS:							**$ 12,822,500**	
9. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
9.1	Mob / Demob	1.0	Sum		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
9.2	Project Management & Staffing (includes PM, Field Engineers / Supervision,	24.0	Months		$ 375,000	$ 375,000	**$ 9,000,000**	
9.3	Site Accommodation, Facilities, Storage	1.0	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
	Engineering					$ -	**$ -**	
9.4	Design Engineering	1.0	Sum		$ 6,600,000	$ 6,600,000	**$ 6,600,000**	
9.5	LiDAR	1.0	Sum		$ 600,000	$ 600,000	**$ 600,000**	
9.6	Geotech	1.0	Sum		$ 1,100,000	$ 1,100,000	**$ 1,100,000**	
9.7	Surveying/Staking	1.0	Sum		$ 450,000	$ 450,000	**$ 450,000**	
	Testing & Commissioning					$ -	**$ -**	
9.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.0	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
	Permitting and Additional Costs					$ -	**$ -**	
9.9	Environmental Licensing & Permitting Costs	1.0	Sum		$ 3,120,534	$ 3,120,534	**$ 3,120,534**	
9.10	Environmental Mitigation	1.0	Sum		$ 9,884,084	$ 9,884,084	**$ 9,884,084**	
9.11	Warranties / LOC's	1.0	Sum		$ 738,968	$ 738,968	**$ 738,968**	
9.12	Real Estate Costs (New ROW)	1.0	Sum		$ 7,623,974	$ 7,623,974	**$ 7,623,974**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
9.13	Real Estate Costs (Incumbent Utility ROW)	1.0	Sum		$ 1,949,484	$ 1,949,484	**$ 1,949,484**	
9.14	Legal Fees	1.0	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
9.15	Allowance for Funds Used During Construction (AFUDC)	1.0	Sum			$ -	**$ -**	
9.16	Carrying Charges	1.0	Sum			$ -	**$ -**	
9.17	Sales Tax on Materials	1.0	Sum	$ 4,815,807		$ 4,815,807	**$ 4,815,807**	
9.18	Fees for permits, including roadway, railroad, building or other local permits	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 53,282,851**	
10. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	$ 75,000	increased to 124/137/158 (NOR/LTE/STE)
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	$ 720,000	National Grid Niagara - Packard
SUF 3	Roll Rd Substation							
SUF 3.1	Restoration of station stone within existing substation fence. Assume spoil materials disposed of on-site.	1.00	Ea		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
SUF 3.2	Transformer 115-34.5kV 90 MVA	1.00	Ea	$ 700,000	$ 200,000	$ 900,000	**$ 900,000**	
SUF 3.3	Switches 115kV 3Ph	1.00	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 27,000**	
SUF 3.4	Switches 35kV 3Ph	1.00	Ea	$ 6,000	$ 4,000	$ 10,000	**$ 10,000**	
SUF 3.5	Breakers 115kV 1200A	1.00	Ea	$ 150,000	$ 50,000	$ 200,000	**$ 200,000**	
SUF 3.6	Breakers 35kV 2000A	1.00	Ea	$ 75,000	$ 15,000	$ 90,000	**$ 90,000**	
SUF 3.7	CVT's 115kV	3.00	Ea	$ 10,000	$ 8,000	$ 18,000	**$ 54,000**	
SUF 3.8	Arrestors 115kV	6.00	Ea	$ 5,000	$ 700	$ 5,700	**$ 34,200**	
SUF 3.9	Arrestors 35kV (for transformer)	3.00	Ea	$ 2,500	$ 500	$ 3,000	**$ 9,000**	
SUF 3.10	Low Profile Foundations	8.00	Ea		$ 5,000	$ 5,000	**$ 40,000**	Supply & Install
SUF 3.11	Circuit Breaker Foundation 115kV	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 3.12	Circuit Breaker Foundation 35kV	1.00	Ea		$ 30,000	$ 30,000	**$ 30,000**	Supply & Install
SUF 3.13	Transformer Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 3.14	Firewall 30' long x 12' tall x 1' thick with footer	1.00	Ea		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
SUF 3.15	Control Cables	1.00	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
SUF 3.16	Protection & Telecom Equipment	3.00	Ea		$ 30,000	$ 30,000	**$ 90,000**	
SUF 3.17	SCADA and Communications	1.00	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
SUF 3.18	Low Voltage AC Distribution	1.00	Sum		$ 30,000	$ 30,000	**$ 30,000**	Supply & Install
SUF 3.19	Control Conduits	1.0	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
SUF 3.20	Grounding	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
SUF 3.21	Switch Stand 115kV (reuse 1 existing)	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 3.22	CVT Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	**$ 6,000**	
SUF 3.23	Arrestor Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	**$ 6,000**	
SUF 3.24	Misc Materials and Above / Below Ground Works	1.0	Sum		$ 120,000	$ 120,000	**$ 120,000**	Supply & Install
SUF 3.25	Engineering, T&C, PM, Indirects for SUF 3 (15%)					$ -	**$ 333,525**	Assumed 15% to cover all misc costs
SUF 4.1	Lockport to Shaw 115kV Transmsision Line 102. NAT report indicated: Remove all limitations to achieve line conductor ratings as the limit. Terminal allowance included.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	The limiting equipment is not known - scope undefined.
SUF 4.2	Engineering, T&C, PM, Indirects for SUF 4.1 (15%)					$ -	**$ 75,000**	
SUF 5	Gardenville Circuit Breaker Replacement							
SUF 5.1	Circuit Breaker Foundation	12.0	Ea		$ 75,000	$ 75,000	**$ 900,000**	Supply & Install
SUF 5.2	Below Grade Conduit & Grounding	1.0	Sum		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	Supply & Install
SUF 5.3	Circuit breaker - 230kV	12.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 3,900,000**	
SUF 5.4	Switches - 230kV	24.0	Ea	$ 20,000	$ 15,000	$ 35,000	**$ 840,000**	
SUF 5.5	Control Cables	1.0	Sum		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	Supply & Install

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 5.6	Misc Above Ground Works	1.0	Sum		$ 900,000	$ 900,000	**$ 900,000**	
SUF 5.7	Engineering, T&C, PM, Indirects for SUF 5 (15%)					$ -	**$ 1,341,000**	Assumed 15% to cover all misc costs
SUF 6	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL - SYSTEM UPGRADE FACILITIES:							**$ 23,258,025**	

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T007	
FEDERAL						Proposal 2	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$26,600	$89,000
National Park Service	National Parks	Consultation; Special Use Permit	Only applies if National Park located in project area.	Depending on impact of project request for a special use permit may require a NEPA environmental assessment.			
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$43,600	$125,600
NEPA	National Environmental Policy Act	Categorical Exclusion; EA Finding of No Impact; or EIS Record of Decision	With some exemptions, projects on federally owned lands and/or projects requiring federal permit approvals	Possible NEPA review due if federal agency coordination is required. Federal agency involved to determine if Categorical Exclusion applies. Assumes Article 7 covers NEPA requirements or if an EIS is required it is prepared under SEQRA Task.			
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000

NYS Public Service Commission / Department of Public Service (NYSDPS)	Part 102		Construction of a utility overhead transmission facility that will convey electric energy at 65kV or higher for a distance of one mile or longer and are not subject to Article VII of the Public Service Law.	Report may include coordination or studies completed under other line items including: Visual assessment, SHPO determination, OPRHP consultation, Ecological Impacts Assessment Submit to the Commission for 60-day notice period: if no response for a formal investigation project can proceed, if formal investigation ordered project modification may be required	Advantage-Disadvantage Analysis		
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$20,240	$72,575
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.			
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)			
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$19,510	$67,930

NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$200,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)		
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000
REGIONAL							
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$200,000
LOCAL/MUNICIPAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000

		Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T007 TOTAL**	**$806,350**	**$4,186,505**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing	**Expected Value**	**$3,120,534.38**	

SECO SUBSTATION ENGINEERING COMPANY

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 4

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	47 acres	47 acres	18.7 acres	37.3 acres
Cost/Acre	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$2,820,000	$16,920,000	$9,406	$18,762

T007 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,829,406	**$16,938,762**	**$ 9,884,084**

*Offsite wetland mitigation area assumes Highway Alternative Route; clearing of NWI Forested/Shrub Wetland Approx. 3.88 miles (20486 LF) by 100' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; costing includes design and installation costs only; does not include land acquisition or long term monitoring
**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 6.16 miles (32525 LF) Adjacent to Agriculture Properties by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T007)

SEGMENT: DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
	Sub Total	0.68	$ 4,376.00

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T007)

SEGMENT: STOLLE TO GARDENVILLE SEGMENT

		Area (Acres)	Total Cost
	Total	167.00	$ 6,838,497.00

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

Revision: 4

COUNTY: NIAGARA & ERIE
DEVELOPER: NORTH AMERICAN (T007)
SEGMENT: DYSINGER - STOLLE - GARDENVILLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
T007	North American Transmission (Proposal 2)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara	5.74	$ 1,640,000
			Erie	296.31	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie	27.55	

REAL ESTATE ESTIMATE (HOUSES)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T007)

SEGMENT: STOLLE ROAD TO GARDENVILLE

		Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 628,349.85

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: NIAGARA
DEVELOPER: NORTH AMERICAN (T007)
SEGMENT: DYSINGER SWITCHYARD

		Total Cost
	Total Cost of Proposed Substation Site	$152,750.00

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: ERIE
DEVELOPER: NORTH AMERICAN (T007)
SEGMENT: GARDENVILLE SUBSTATION (OPTION 1)

		Total Cost
	Total Cost of Proposed Substation Site	$ 309,483.90

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b) Construction schedule is in accordance with the Developers proposed schedule (approx 12 months) - we have assumed continuous working with no breaks in the schedule. Six months added to construction schedule for PM time for start up and close out works and float.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed the Access Road included in Developer Estimate will be Type 1 Gravel Type.
f) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
g) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
h) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
i) Foundation rates include supply and installation of materials. Drilled Pier rates include supply and testing of concrete, rebar cage and the use of temp or permanent casing.
j) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section.
k)Assumes all environmental data and project details provided are accurate unless noted otherwise.
l) USFWS T&E Assumes that ¼ of the total line in ROW per proposal will require field survey for T&E (Approximately 32.6 miles).
m)NEPA-Assumes no NEPA because Art VII.
n) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of project route (Approx. 16.31 miles).
o) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII or SEQRA review. Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Highway.
p) Railroad - Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Railroad.
q) Assumes no coordination with National Parks Service or OPRHP/State Parks.
r) USACE wetland delineation total based on Line Miles in Wetlands - NWI wetland lengths of 3.91 miles (Min.) and 4.01 miles (Max.).
s) DEC wetland delineation total based on Line Miles in Wetlands - DEC wetland lengths of 2.06 miles (Min.) and 2.61 miles (Max.).
t) Offsite wetland mitigation area costs based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.88 miles using the Stolle Road to Gardenville Highway alternative (calculated by GEI based on NWI mapper legend categories). Assumes clearing an additional 100 feet within Right of Way. Minimum costs at $60,000/acre, maximum costs at $120,000/acre for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

u) Agricultural mitigation assumes timber matting impacts and pad impacts on adjacent agriculture land (6.16 miles) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-
v) No tree survey or replanting required outside regulated wetlands areas.
w) Article VII Intervenor Fund payment expected to be $100,000.
x) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.)
y) Expected value of environmental licensing and permitting cost is estimated to be 25% higher than the mean of the range based upon the addition of the new Gardenville to Stolle 345kV line.
z) NAT did not provide estimates from Options 2 and 3 (for connection to Gardenville). Our estimate only includes Option 1.
aa) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
ab) SUF reconductor rate is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
ac) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B3

T008 – NORTH AMERICAN TRANSMISSION

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T008 - North American Transmission

Revision: 4

SUMMARY OF COST ESTIMATE

	Description	Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 22,772,195
2	TRANSMISSION LINE FOUNDATIONS	$ 28,417,010
3	STRUCTURES - TRANSMISSION LINE	$ 39,158,699
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 13,710,320
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 3,821,694
6	NEW DYSINGER SWITCHYARD	$ 20,868,000
7	STOLLE ROAD SUBSTATION WORKS	$ 14,263,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$ 12,822,500
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 69,918,737
	CONTRACTOR MARK-UP (OH&P) 15%	$ 33,862,823
	SUBTOTAL:	$ 259,614,979
	CONTINGENCY (25%)	$ 64,903,745
	TOTAL (A):	**$ 324,518,723**

10	SYSTEM UPGRADE FACILITIES	$ 23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**

TOTAL PROJECT COST (A+B):	**$ 355,917,057**

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Description of Work: Proposal 1 - A new 345kV Dysinger Switchyard located approximately 8 miles southeast of the city of Lockport, New York. The Project also includes a new ~20 mile 345kV Transmission Line from Dysinger Switchyard to Stolle Road Substation near Marilla, New York. Proposal 2 - Includes Proposal 1 Scope of Work, with the addition of a single circuit 345kV Transmission Line from the Stolle Road 345kV Substation to the existing Gardenville Substation, and a new 345/230kV Transformer at the existing Gardenville Substation. This cost estimate uses Option 1 routing (as per NAT estimate). Proposal 3 includes an additional 345kV single circuit transmission line from the Dysinger Switchyard to the existing Stolle Road 345kV Substation.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR T-LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	350.00	Acre		$ 15,000	$ 15,000	**$ 5,250,000**	
1.2	Access Road	104,060.30	LF		$ 45	$ 45	**$ 4,682,713**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	104,060.30	LF		$ 4	$ 4	**$ 416,241**	
1.4	Matting	84,695.00	LF		$ 70	$ 70	**$ 5,928,650**	
1.5	Snow Removal	1.00	Sum		$ 825,000	$ 825,000	**$ 825,000**	
1.6	ROW Restoration	52.79	Mile		$ 10,000	$ 10,000	**$ 527,921**	
1.7	Work Pads	1,040,625.00	SF		$ 4	$ 4	**$ 3,663,000**	
1.8	Restoration for Work Pad areas	104,062.50	SF		$ 0.2	$ 0.2	**$ 15,609**	
1.9	Temporary Access Bridge	30.0	EA		$ 20,035	$ 20,035	**$ 601,050**	
1.10	Air Bridge	8.0	EA		$ 14,445	$ 14,445	**$ 115,560**	
1.11	Stabilized Construction Entrance	15.0	EA		$ 4,580	$ 4,580	**$ 68,700**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 500,000	$ 500,000	**$ 500,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 150,000	$ 150,000	**$ 150,000**	
1.14	Concrete Washout Station	15.0	EA		$ 1,850	$ 1,850	**$ 27,750**	
TOTAL - CLEARING & ACCESS FOR T-LINE:							**$ 22,772,195**	
2. T-LINE FOUNDATIONS								
2.1	Direct Embed Foundations - 23ft deep x 6ft dia.	263.00	Structure		$ 18,000	$ 18,000	**$ 4,734,000**	Supply & Install
2.2	Direct Embed Foundations - 28ft deep x 7ft dia.	10.00	Structure		$ 20,000	$ 20,000	**$ 200,000**	Supply & Install
2.3	Direct Embed Foundations - 30ft deep x 6ft dia.	41.00	Structure		$ 20,000	$ 20,000	**$ 820,000**	Supply & Install
2.4	Direct Embed Foundations - 37ft deep x 7ft dia.	6.00	Structure		$ 22,000	$ 22,000	**$ 132,000**	Supply & Install
2.5	Drilled Pier 38ft deep x 9ft dia.	1,477.41	CUY		$ 1,500	$ 1,500	**$ 2,216,115**	
2.6	Drilled Pier 45ft deep x 9ft dia.	349.90	CUY		$ 1,500	$ 1,500	**$ 524,849**	
2.7	Drilled Pier 47ft deep x 8ft dia.	1,347.49	CUY		$ 1,500	$ 1,500	**$ 2,021,231**	
2.8	Drilled Pier 57ft deep x 9ft dia.	443.20	CUY		$ 1,500	$ 1,500	**$ 664,800**	
2.9	Drilled Pier 64ft deep x 8ft dia.	393.19	CUY		$ 1,500	$ 1,500	**$ 589,782**	
2.10	Drilled Pier 71ft deep x 9ft dia.	4,416.45	CUY		$ 1,500	$ 1,500	**$ 6,624,676**	
2.11	Drilled Pier 43ft deep x 8ft dia.	1,585.04	CUY		$ 1,500	$ 1,500	**$ 2,377,557**	
2.12	Rock Excavation Adder	3,756.00	CUY		$ 2,000	$ 2,000	**$ 7,512,000**	
TOTAL - T-LINE FOUNDATIONS:							**$ 28,417,010**	
3. STRUCTURES - T-LINE								
3.1	Single Steel Pole Tangent Delta - 00- 10 (Ht. 100')	36.00	EA	$ 31,401	$ 18,841	$ 50,242	**$ 1,808,698**	
3.2	Single Steel Pole Tangent Delta - 00- 10 (Ht. 115')	227.00	EA	$ 38,376	$ 23,026	$ 61,402	**$ 13,938,163**	
3.3	Single Steel Pole Tangent Delta - 00- 10 (Ht. 130')	34.00	EA	$ 44,150	$ 26,490	$ 70,641	**$ 2,401,782**	
3.4	Single Steel Pole Tangent Delta - 00- 10 (Ht. 145')	7.00	EA	$ 50,029	$ 30,018	$ 80,047	**$ 560,327**	
3.5	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 115')	10.00	Pole	$ 66,881	$ 40,128	$ 107,009	**$ 1,070,093**	
3.6	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 130)	4.00	Pole	$ 78,872	$ 47,323	$ 126,196	**$ 504,783**	
3.7	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 145)	2.00	Pole	$ 94,927	$ 56,956	$ 151,883	**$ 303,765**	
3.8	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 115')	18.00	Pole	$ 93,524	$ 56,115	$ 149,639	**$ 2,693,503**	
3.9	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 130')	7.00	Pole	$ 120,604	$ 72,362	$ 192,966	**$ 1,350,760**	
3.10	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 145')	7.00	Pole	$ 153,391	$ 92,034	$ 245,425	**$ 1,717,975**	
3.11	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 185')	3.00	Pole	$ 187,828	$ 112,697	$ 300,525	**$ 901,575**	
3.12	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 115')	15.00	Pole	$ 111,476	$ 66,885	$ 178,361	**$ 2,675,419**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
3.13	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 130')	16.00	Pole	$ 140,249	$ 84,149	$ 224,398	**$ 3,590,369**	
3.14	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 145')	8.00	Pole	$ 177,172	$ 106,303	$ 283,476	**$ 2,267,804**	
3.15	Large Angle DE (Ht. 195')	3.00	Pole	$ 169,360	$ 101,616	$ 270,976	**$ 812,929**	
3.16	Tangent DE (Ht. 195')	3.00	Pole	$ 116,824	$ 70,094	$ 186,918	**$ 560,753**	
3.17	Install Grounding	400.00	Structure		$ 5,000	$ 5,000	**$ 2,000,000**	Supply & Install
TOTAL - STRUCTURES T-LINE:							**$ 39,158,699**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	52.79	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 11,205,444**	
4.2	(1) OPGW 36 Fiber AC-33/38/571	52.79	Mile	$ 19,404	$ 27,720	$ 47,124	**$ 2,487,776**	
4.3	(1) 3/8" HS Steel (2nd SW where required)	3,000.00	Ft	$ 1	$ 5	$ 6	**$ 17,100**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 13,710,320**	
5. T-LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	915.00	Set	$ 900	$ 720	$ 1,620	**$ 1,482,300**	
5.2	Angle - Polymer V-String	48.00	Set	$ 1,300	$ 1,040	$ 2,340	**$ 112,320**	
5.3	Deadend - Polymer Double Deadend including Jumper	444.00	Set	$ 1,500	$ 1,350	$ 2,850	**$ 1,265,400**	
5.4	OPGW Assembly - Tangent	305.00	Set	$ 200	$ 150	$ 350	**$ 106,750**	
5.5	OPGW Assembly - Angle / DE	180.00	Set	$ 250	$ 150	$ 400	**$ 72,000**	
5.6	OHSW Assembly - Angle / DE	12.00	Set	$ 250	$ 150	$ 400	**$ 4,800**	
5.7	OPGW Splice Boxes	23.00	Set	$ 1,500	$ 1,000	$ 2,500	**$ 57,500**	
5.8	OPGW Splice & Test	1.00	Sum		$ 27,600	$ 27,600	**$ 27,600**	
5.9	Spacer Dampers	4,752.00	Ea	$ 50	$ 35	$ 85	**$ 403,920**	
5.10	Vibration Dampers - Conductor	4,752.00	Ea	$ 32	$ 20	$ 52	**$ 247,104**	
5.11	Shieldwire / OPGW Dampers, Misc Fittings	1.00	Sum	$ 30,000	$ 12,000	$ 42,000	**$ 42,000**	
TOTAL: T-LINE INSULATORS, FITTINGS, HARDWARE:							**$ 3,821,694**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,450.00	LF		$ 200	$ 200	**$ 490,000**	Supply & Install
6.3	SSVT	1.00	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	18.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 126,000**	
6.5	Fuses 1ph	3.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph	6.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 180,000**	
6.7	Instrument Transformers	1.00	Sum		$ 1,130,000	$ 1,130,000	**$ 1,130,000**	
6.8	Breakers	9.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,420,000**	
6.9	Arrestors (3 per line)	18.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 135,000**	
6.10	Line Traps	6.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 126,000**	
6.11	Two (2) 345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.00	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	Supply & Install
6.13	Low Profile Foundations	250.00	Ea		$ 5,000	$ 5,000	**$ 1,250,000**	Supply & Install
6.14	Caisson DE Foundations	24.00	Ea		$ 50,000	$ 50,000	**$ 1,200,000**	Supply & Install
6.15	Circuit Breaker Foundations	9.00	Ea		$ 75,000	$ 75,000	**$ 675,000**	Supply & Install
6.16	Lightning Mast Foundations	15.00	Ea		$ 15,000	$ 15,000	**$ 225,000**	Supply & Install
6.17	SST Foundation	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	
6.18	Control House and Pad (30' x 90')	1.0	Sum	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	Supply & Install
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	
6.20	Control Cables	1.00	Sum	$ 110,000	$ 110,000	$ 220,000	**$ 220,000**	
6.21	125VDC Batteries	2.00	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.00	Ea		$ 25,000	$ 25,000	**$ 50,000**	Supply & Install
6.23	Protection, Telecom and Metering Equipment (Panels)	33.00	Ea		$ 30,000	$ 30,000	**$ 990,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.24	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
6.28	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	
6.29	Bus Support 1 Ph	93.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 279,000**	
6.30	Switch Stands	18.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 198,000**	
6.31	Fuse Stand	1.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.32	Misc. Structures	1.0	Sum		$ 60,000	$ 60,000	**$ 60,000**	
6.33	Substation A-Frame Structures Standalone	6.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 150,000**	
6.34	Lightning Masts	15.00	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 180,000**	
6.35	Arrestor Stands	18.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 63,000**	
6.36	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.37	Connection of Existing Lines to Dysinger Switchyard	1.00	Sum		$ 3,400,000	$ 3,400,000	**$ 3,400,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 20,868,000**	
7. STOLLE ROAD SUBSTATION WORKS:								
7.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	715.00	LF		$ 200	$ 200	**$ 143,000**	Supply & Install
7.3	Switches 3ph	14.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 98,000**	
7.4	Line Switches 3 ph w/ motor-operators	4.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 120,000**	
7.5	Instrument Transformers	1.00	Sum		$ 691,000	$ 691,000	**$ 691,000**	
7.6	Breakers	8.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,040,000**	
7.7	Arrestors (3 per line)	12.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.8	Line Traps	4.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 84,000**	
7.9	345 kV buses	2.00	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
7.10	Low Profile Foundations	183.00	Ea		$ 5,000	$ 5,000	**$ 915,000**	Supply & Install
7.11	Caisson DE Foundations	16.00	Ea		$ 50,000	$ 50,000	**$ 800,000**	Supply & Install
7.12	Circuit Breaker Foundations	8.00	Ea		$ 75,000	$ 75,000	**$ 600,000**	Supply & Install
7.13	Lightning Mast Foundations	8.00	Ea		$ 15,000	$ 15,000	**$ 120,000**	Supply & Install
7.13	Control House and Pad (25' x 50' - 1250 sq. ft)	1.00	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	Supply & Install
7.14	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
7.14	125VDC Batteries	2.00	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.15	Protection, Telecom and Metering Equipment (Panels)	27.00	Ea		$ 30,000	$ 30,000	**$ 810,000**	Supply & Install
7.16	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.16	Low Voltage AC Distribution & DC Panels & Switches	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.17	Control Conduits from Cable Tray to Equipment	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.18	Cable Trench Systems for Control Cables	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
7.19	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	
7.20	Bus Support 1 Ph	66.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 198,000**	
7.21	Switch Stands	14.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 154,000**	
7.22	Misc. Structures	1.0	Sum		$ 42,000	$ 42,000	**$ 42,000**	
7.23	Substation A-Frame Structures Standalone	4.00	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 100,000**	
7.24	Lightning Masts	8.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 96,000**	
7.25	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	
7.26	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
7.27	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - STOLLE RD SUBSTATION WORKS:							**$ 14,263,000**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8. GARDENVILLE 345/230kV SUBSTATION WORKS								
8.1	Site Works including sediment controls, access roads, rough grading, final	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
8.2	Substation Fence	1,400.0	LF		$ 200	$ 200	**$ 280,000**	Supply & Install
8.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
8.4	Switches 3ph	1.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 7,000**	Supply & Install
8.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	Supply & Install
8.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	Supply & Install
8.7	Instrument Transformers	1.0	Sum		$ 271,000	$ 271,000	**$ 271,000**	Supply & Install
8.8	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	Supply & Install
8.9	Arrestors (3 per line)	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
8.10	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
8.11	230 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
8.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
8.13	Low Profile Foundations	40.0	Ea		$ 5,000	$ 5,000	**$ 200,000**	
8.14	Caisson DE Foundations	12.0	Ea		$ 50,000	$ 50,000	**$ 600,000**	
8.15	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	
8.16	Lightning Mast Foundations	1.0	Ea		$ 15,000	$ 15,000	**$ 15,000**	
8.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	
8.18	Control House and Pad (14' x 70' - 980 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	Supply & Install
8.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	
8.20	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
8.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	Supply & Install
8.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
8.23	Protection, Telecom and Metering Equipment (Panels)	11.0	Ea		$ 30,000	$ 30,000	**$ 330,000**	Supply & Install
8.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
8.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
8.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
8.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 350,000	$ 350,000	**$ 350,000**	Supply & Install
8.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	
8.29	Bus Support 1 Ph	18.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 54,000**	
8.30	Switch Stands	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.32	Misc. Structures	1.0	Sum		$ 27,000	$ 27,000	**$ 27,000**	
8.33	Substation A-Frame Structures Standalone	3.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 75,000**	
8.34	Lightning Masts	1.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 12,000**	
8.35	Arrestor Stands	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
8.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 725,000	$ 725,000	**$ 725,000**	
8.37	345kV - 230kV 480/540/600 MVA Transformer	1.0	Ea	$ 4,750,000	$ 750,000	$ 5,500,000	**$ 5,500,000**	
8.38	Transformer Foundation with concrete moat and double steel grating	1.0	Ea		$ 150,000	$ 150,000	**$ 150,000**	
TOTAL - GARDENVILLE SUBSTATION WORKS:							**$ 12,822,500**	
9. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
9.1	Mob / Demob	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
9.2	Project Management & Staffing (includes PM, Field Engineers / Supervision,	30.00	Months		$ 400,000	$ 400,000	**$ 12,000,000**	
9.3	Site Accommodation, Facilities, Storage	1.00	Sum		$ 2,200,000	$ 2,200,000	**$ 2,200,000**	
	Engineering					$ -	**$ -**	
9.4	Design Engineering	1.00	Sum		$ 8,400,000	$ 8,400,000	**$ 8,400,000**	

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
9.5	LiDAR	1.00	Sum		$ 600,000	$ 600,000	**$ 600,000**	
9.6	Geotech	1.00	Sum		$ 1,100,000	$ 1,100,000	**$ 1,100,000**	
9.7	Surveying/Staking	1.00	Sum		$ 450,000	$ 450,000	**$ 450,000**	
	Testing & Commissioning							
9.8	Testing & Commissioning of T-Line and Equipment	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
	Permitting and Additional Costs					$ -	**$ -**	
9.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 3,608,602	$ 3,608,602	**$ 3,608,602**	
9.10	Environmental Mitigation	1.00	Sum		$ 16,814,084	$ 16,814,084	**$ 16,814,084**	
9.11	Warranties / LOC's	1.00	Sum		$ 970,163	$ 970,163	**$ 970,163**	
9.12	Real Estate Costs (New)	1.00	Sum		$ 7,623,974	$ 7,623,974	**$ 7,623,974**	
9.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 3,168,924	$ 3,168,924	**$ 3,168,924**	
9.14	Legal Fees	1.00	Sum		$ 3,000,000	$ 3,000,000	**$ 3,000,000**	
9.15	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
9.16	Carrying Charges	1.00	Sum			$ -	**$ -**	
9.17	Sales Tax on Materials	1.00	Sum	$ 6,282,990		$ 6,282,990	**$ 6,282,990**	
9.18	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 69,918,737**	
10. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	$ 500,000	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	$ 75,000	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	$ 4,800,000	Rate for reconductor is pro-rated from National
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	$ 720,000	Grid Niagara - Packard reconductor. Note that rate
SUF 3	Roll Rd Substation							
SUF 3.1	Restoration of station stone within existing substation fence. Assume spoil materials disposed of on-site.	1.00	Ea		$ 100,000	$ 100,000	$ 100,000	Supply & Install
SUF 3.2	Transformer 115-34.5kV 90 MVA	1.00	Ea	$ 700,000	$ 200,000	$ 900,000	$ 900,000	
SUF 3.3	Switches 115kV 3Ph	1.00	Ea	$ 15,000	$ 12,000	$ 27,000	$ 27,000	
SUF 3.4	Switches 35kV 3Ph	1.00	Ea	$ 6,000	$ 4,000	$ 10,000	$ 10,000	
SUF 3.5	Breakers 115kV 1200A	1.00	Ea	$ 150,000	$ 50,000	$ 200,000	$ 200,000	
SUF 3.6	Breakers 35kV 2000A	1.00	Ea	$ 75,000	$ 15,000	$ 90,000	$ 90,000	
SUF 3.7	CVT's 115kV	3.00	Ea	$ 10,000	$ 8,000	$ 18,000	$ 54,000	
SUF 3.8	Arrestors 115kV	6.00	Ea	$ 5,000	$ 700	$ 5,700	$ 34,200	
SUF 3.9	Arrestors 35kV (for transformer)	3.00	Ea	$ 2,500	$ 500	$ 3,000	$ 9,000	
SUF 3.10	Low Profile Foundations	8.00	Ea		$ 5,000	$ 5,000	$ 40,000	Supply & Install
SUF 3.11	Circuit Breaker Foundation 115kV	1.00	Ea		$ 75,000	$ 75,000	$ 75,000	Supply & Install
SUF 3.12	Circuit Breaker Foundation 35kV	1.00	Ea		$ 30,000	$ 30,000	$ 30,000	Supply & Install
SUF 3.13	Transformer Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	$ 150,000	Supply & Install
SUF 3.14	Firewall 30' long x 12' tall x 1' thick with footer	1.00	Ea		$ 100,000	$ 100,000	$ 100,000	Supply & Install
SUF 3.15	Control Cables	1.00	Sum		$ 50,000	$ 50,000	$ 50,000	Supply & Install
SUF 3.16	Protection & Telecom Equipment	3.00	Ea		$ 30,000	$ 30,000	$ 90,000	
SUF 3.17	SCADA and Communications	1.00	Sum		$ 25,000	$ 25,000	$ 25,000	Supply & Install
SUF 3.18	Low Voltage AC Distribution	1.00	Sum		$ 30,000	$ 30,000	$ 30,000	Supply & Install
SUF 3.19	Control Conduits	1.0	Sum		$ 50,000	$ 50,000	$ 50,000	Supply & Install
SUF 3.20	Grounding	1.0	Sum		$ 25,000	$ 25,000	$ 25,000	Supply & Install
SUF 3.21	Switch Stand 115kV (reuse 1 existing)	1.0	Ea	$ 1,500	$ 800	$ 2,300	$ 2,300	
SUF 3.22	CVT Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	$ 6,000	
SUF 3.23	Arrestor Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	$ 6,000	

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 3.24	Misc Materials and Above / Below Ground Works	1.0	Sum		$ 120,000	$ 120,000	$ 120,000	Supply & Install
SUF 3.25	Engineering, T&C, PM, Indirects for SUF 3 (15%)					$ -	$ 333,525	Assumed 15% to cover all misc costs
SUF 4.1	Lockport to Shaw 115kV Transmsision Line 102. NAT report indicated:	1.00	Sum		$ 500,000	$ 500,000	$ 500,000	The limiting equipment is not known - scope
SUF 4.2	Engineering, T&C, PM, Indirects for SUF 4.1 (15%)					$ -	$ 75,000	undefined.
SUF 5	Gardenville Circuit Breaker Replacement							
SUF 5.1	Circuit Breaker Foundation	12.0	Ea		$ 75,000	$ 75,000	$ 900,000	Supply & Install
SUF 5.2	Below Grade Conduit & Grounding	1.0	Sum		$ 1,200,000	$ 1,200,000	$ 1,200,000	
SUF 5.3	Circuit breaker - 230kV	12.0	Ea	$ 250,000	$ 75,000	$ 325,000	$ 3,900,000	
SUF 5.4	Switches - 230kV	24.0	Ea	$ 20,000	$ 15,000	$ 35,000	$ 840,000	
SUF 5.5	Control Cables	1.0	Sum		$ 1,200,000	$ 1,200,000	$ 1,200,000	Supply & Install
SUF 5.6	Misc Above Ground Works	1.00	Sum		$ 900,000	$ 900,000	$ 900,000	Assumed 15% to cover all misc costs
SUF 5.7	Engineering, T&C, PM, Indirects for SUF 5 (15%)					$ -	$ 1,341,000	
SUF 6	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						$ 3,750,000	Contingency for possible additional SUF upgrades
TOTAL - SYSTEM UPGRADE FACILITIES:							**$ 23,258,025**	

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T008	
FEDERAL						Proposal 3	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$41,320	$116,675
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$43,600	$125,600
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $350,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$850,000	$3,350,000

NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$25,960	$83,300
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies (not included in costing)	$19,510	$67,930
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$200,000
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T008 - North American Transmission

ENVIRONMENTAL LICENSING AND PERMITTING

Revision: 4

REGIONAL							
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$200,000
LOCAL/MUNICIPAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000

		Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T008 TOTAL**	**$1,076,790**	**$4,474,905**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing	**Expected Value**	**$3,608,601.75**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T008 - North American Transmission

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 4

WNY TRANSMISSION PROJECT - ENVIRONMENTAL MITIGATION COST ESTIMATE FOR T008

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	96 acres	96 acres	18.7 acres	37.3 acres
Cost/Acre	$50,000	$100,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$4,800,000	$28,800,000	$9,406	$18,762

T008 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$4,809,406	**$28,818,762**	**$ 16,814,084**

*Offsite wetland mitigation area assumes Highway Alternative Route; clearing of NWI Forested/Shrub Wetland Approx. 0.65 miles (3432 LF) by 100' ROW width and 3.24 miles (17107 LF) by 225' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; cost per acre Min. and Max. reduced due to area total over 50 acres; costing includes design and installation costs only; does not include land acquisition or long term monitoring

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 6.16 miles (32525 LF) Adjacent to Agriculture Properties by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T008 - North American Transmission

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: NIAGARA & ERIE

DEVELOPER: NORTH AMERICAN (T008)

SEGMENT: NIAGARA - DYSINGER - STOLLE SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	2.38	$ 51,560.00
B	**ERIE COUNTY**		
	Sub Total (A)	0.68	$ 4,376.00
	Total (A + B)	3.06	$ 55,936.00

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T008)

SEGMENT: STOLLE TO GARDENVILLE SEGMENT

		Area (Acres)	Total Cost
	Total	167.00	$ 6,838,497.00

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

Revision: 4

COUNTY: NIAGARA & ERIE
DEVELOPER: NORTH AMERICAN (T008)
SEGMENT: DYSINGER - STOLLE - GARDENVILLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
T008	North American Transmission (Proposal 3)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara	10.33	$ 2,846,000
			Erie	534.58	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie	27.55	

REAL ESTATE ESTIMATE (HOUSES)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T008)

SEGMENT: STOLLE ROAD TO GARDENVILLE

		Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 628,349.85

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: NIAGARA
DEVELOPER: NORTH AMERICAN (T008)
SEGMENT: DYSINGER SWITCHYARD

		Total Cost
	Total Cost of Proposed Substation Site	$152,750.00

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: ERIE
DEVELOPER: NORTH AMERICAN (T008)
SEGMENT: STOLLE ROAD SUBSTATION

		Total Cost
	Total Cost of Proposed Substation Site	$19,440.00

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: ERIE
DEVELOPER: NORTH AMERICAN (T008)
SEGMENT: GARDENVILLE SUBSTATION (OPTION 1)

		Total Cost	
	Total Cost of Proposed Substation Site	$	309,483.90

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b) Construction schedule is in accordance with the Developers proposed schedule (approx 15 months) - we have assumed continuous working with no breaks in the schedule. Six months have been added to the construction schedule PM time for start up and close out works and float.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed the Access Road included in Developer Estimate will be Type 1 Gravel Type.
f) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
g) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
h) The equipment types listed for Dysinger Substation have been taken from a recently completed 345kV switchyard project, using current pricing. Gardenville Transformer is assumed to be 250MVA.
i) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
j) Foundation rates include supply and installation of materials. Drilled Pier rates include supply and testing of concrete, rebar cage and the use of temp
k) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section.
l) Assumes all environmental data and project details provided are accurate unless noted otherwise.
m) Dysinger to Stolle Road Circuit 2 ROW length (19.85 miles) not included in project route total since parallels already accounted for length of Dysinger
n) USFWS T&E Assumes that ¼ of the Total Line in Right of Way will require field survey for T&E (Approx. 8.16 miles).
o) NEPA-Assumes no NEPA because Art VII.
p) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of Total Line in Right of Way (Approx. 16.31 miles).
q) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII or SEQRA review. Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Highway.
s) Railroad - Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Railroad.
t) Assumes no coordination with National Parks Service or OPRHP/State Parks
u) USACE wetland delineation total based on Line Miles in Wetlands - NWI wetland lengths of 7.58 miles (Min.) and 7.69 miles (Max.)
v) DEC wetland delineation total based on Line Miles in Wetlands - DEC wetland lengths of 3.49 miles (Min.) and 4.04 miles (Max.)

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

w) Offsite wetland mitigation area costs based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.88 miles (calculated by GEI based on NWI mapper legend categories). using the Stolle Road to Gardenville Highway alternative. Assumes clearing an additional 125 within the Dysinger to Stolle Road Right of Way (for a total of 225 feet). Minimum costs at $50,000/acre, maximum costs at $100,000/acre for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring. Minimum and maximum costs for this proposal assumes a reduced mitigation cost/acre due to size of
x) Agricultural mitigation assumes timber matting impacts and pad impacts on adjacent agriculture land (6.16 miles) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-
y) No tree survey or replanting required outside regulated wetlands areas.
z) Article VII Intervenor Fund payment expected to be $350,000.
aa) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.).
ab) Expected value of environmental licensing and permitting cost is estimated to be 30% higher than the mean of the range based upon the addition of the new Gardenville to Stolle 345kV line and a second Dysinger to Stolle line.
ac) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
ad) SUF reconductor rate is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
ae) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B4

T009 – NORTH AMERICAN TRANSMISSION

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T009 - North American Transmission

Revision: 4

SUMMARY OF COST ESTIMATE

	Description	Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 48,929,055
2	TRANSMISSION LINE FOUNDATIONS	$ 40,444,048
3	STRUCTURES - TRANSMISSION LINE	$ 57,905,468
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 21,865,190
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 5,828,824
6	NEW DYSINGER SWITCHYARD	$ 23,229,000
7	STOLLE ROAD SUBSTATION WORKS:	$ 14,263,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$ 12,822,500
9	NIAGARA SUBSTATION WORK	$ 4,246,500
10	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 87,506,380
	CONTRACTOR MARK-UP (OH&P) 15%	$ 47,555,995
	SUBTOTAL:	$ 364,595,961
	CONTINGENCY ON ENTIRE PROJECT (25%)	$ 91,148,990
	TOTAL (A):	**$ 455,744,952**
11	SYSTEM UPGRADE FACILITIES	$ 23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**
	TOTAL PROJECT COST (A+B):	**$ 487,143,285**

SECO SUBSTATION ENGINEERING COMPANY

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Description of Work: Proposal 1 - A new 345kV Dysinger Switchyard located approximately 8 miles southeast of the city of Lockport, New York. The Project also includes a new ~20 mile 345kV Transmission Line from Dysinger Switchyard to Stolle Road Substation near Marilla, New York. Proposal 2 - Includes Proposal 1 Scope of Work, with the addition of a single circuit 345kV Transmission Line from the Stolle Road 345kV Substation to the existing Gardenville Substation, and a new 345/230kV Transformer at the existing Gardenville Substation. This cost estimate uses Option 1 routing (as per NAT estimate). Proposal 3 includes an additional 345kV single circuit transmission line from the Dysinger Switchyard to the existing Stolle Road 345kV Substation. Proposal 4 includes the addition of a 27 mile 345kV Transmission Line from Niagara to Dysinger Switchyard.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR T-LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	515.0	Acre		$ 15,000	$ 15,000	**$ 7,725,000**	
1.2	Access Road	197,895.0	LF		$ 45	$ 45	**$ 8,905,275**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	197,895.0	LF		$ 4	$ 4	**$ 791,580**	
1.4	Matting	187,069.0	LF		$ 70	$ 70	**$ 13,094,830**	
1.5	Snow Removal	1.0	Sum		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	
1.6	ROW Restoration	80.0	Mile		$ 10,000	$ 10,000	**$ 800,000**	
1.7	Work Pads	3,650,000.0	SF		$ 4	$ 4	**$ 12,848,000**	
1.8	Restoration for Work Pad areas	365,000.0	SF		$ 0.2	$ 0.2	**$ 54,750**	
1.9	Temporary Access Bridge	60.0	EA		$ 20,035	$ 20,035	**$ 1,202,100**	
1.10	Air Bridge	20.0	EA		$ 14,445	$ 14,445	**$ 288,900**	
1.11	Stabilized Construction Entrance	34.0	EA		$ 4,580	$ 4,580	**$ 155,720**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 600,000	$ 600,000	**$ 600,000**	
1.14	Concrete Washout Station	34.0	EA		$ 1,850	$ 1,850	**$ 62,900**	
TOTAL - CLEARING & ACCESS FOR T-LINE:							**$ 48,929,055**	
2. T-LINE FOUNDATIONS								
2.1	Direct Embed Foundations - 23ft deep x 6ft dia.	416.0	Structure		$ 18,000	$ 18,000	**$ 7,488,000**	Supply & Install
2.2	Direct Embed Foundations - 28ft deep x 7ft dia.	15.0	Structure		$ 20,000	$ 20,000	**$ 300,000**	Supply & Install
2.3	Direct Embed Foundations - 30ft deep x 6ft dia.	63.0	Structure		$ 20,000	$ 20,000	**$ 1,260,000**	Supply & Install
2.4	Direct Embed Foundations - 37ft deep x 7ft dia.	8.0	Structure		$ 22,000	$ 22,000	**$ 176,000**	Supply & Install
2.5	Drilled Pier 38ft deep x 9ft dia.	1,477.3	CUY		$ 1,500	$ 1,500	**$ 2,216,001**	
2.6	Drilled Pier 45ft deep x 9ft dia.	699.8	CUY		$ 1,500	$ 1,500	**$ 1,049,685**	
2.7	Drilled Pier 47ft deep x 8ft dia.	2,310.0	CUY		$ 1,500	$ 1,500	**$ 3,464,967**	
2.8	Drilled Pier 57ft deep x 9ft dia.	1,772.8	CUY		$ 1,500	$ 1,500	**$ 2,659,201**	
2.9	Drilled Pier 64ft deep x 8ft dia.	393.2	CUY		$ 1,500	$ 1,500	**$ 589,782**	
2.10	Drilled Pier 71ft deep x 9ft dia.	4,416.5	CUY		$ 1,500	$ 1,500	**$ 6,624,676**	
2.11	Drilled Pier 43ft deep x 8ft dia.	2,113.4	CUY		$ 1,500	$ 1,500	**$ 3,170,076**	
2.12	Drilled Pier 48ft deep x 9ft dia.	746.4	CUY		$ 1,500	$ 1,500	**$ 1,119,660**	
2.13	Rock Excavation Adder	5,163.0	CUY		$ 2,000	$ 2,000	**$ 10,326,000**	
TOTAL - T-LINE FOUNDATIONS:							**$ 40,444,048**	
3. STRUCTURES - T-LINE								
3.1	Single Steel Pole Tangent Delta - 00- 10 (Ht. 100')	104.0	EA	$ 31,401	$ 18,841	$ 50,242	**$ 5,225,126**	
3.2	Single Steel Pole Tangent Delta - 00- 10 (Ht. 115')	312.0	EA	$ 38,376	$ 23,026	$ 61,402	**$ 19,157,299**	
3.3	Single Steel Pole Tangent Delta - 00- 10 (Ht. 130')	52.0	EA	$ 44,150	$ 26,490	$ 70,641	**$ 3,673,313**	
3.4	Single Steel Pole Tangent Delta - 00- 10 (Ht. 145')	11.0	EA	$ 50,029	$ 30,018	$ 80,047	**$ 880,514**	
3.5	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 115')	15.0	pole	$ 66,881	$ 40,128	$ 107,009	**$ 1,605,139**	
3.6	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 130)	5.0	pole	$ 78,872	$ 47,323	$ 126,196	**$ 630,979**	
3.7	Single Steel Pole Small Angle Delta - 10- 15 (Ht. 145)	3.0	pole	$ 94,927	$ 56,956	$ 151,883	**$ 455,648**	
3.8	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 115')	24.0	pole	$ 93,524	$ 56,115	$ 149,639	**$ 3,591,337**	
3.9	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 130')	11.0	pole	$ 120,604	$ 72,362	$ 192,966	**$ 2,122,623**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
3.10	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 145')	13.0	pole	$ 153,391	$ 92,034	$ 245,425	**$ 3,190,524**	
3.11	Single Steel Pole Medium Angle Vertical - 15- 60 (Ht. 185')	3.0	pole	$ 187,828	$ 112,697	$ 300,525	**$ 901,575**	
3.12	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 115')	15.0	pole	$ 111,476	$ 66,885	$ 178,361	**$ 2,675,419**	
3.13	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 130')	16.0	pole	$ 140,249	$ 84,149	$ 224,398	**$ 3,590,369**	
3.14	Single Steel Pole Large Angle DE Vertical - 60- 90 (Ht. 145')	8.0	pole	$ 177,172	$ 106,303	$ 283,476	**$ 2,267,804**	
3.15	Large Angle DE - 60- 90 (Ht. 145')	6.0	pole	$ 97,225	$ 58,335	$ 155,560	**$ 933,362**	
3.16	Large Angle DE - 60- 90 (Ht. 165')	3.0	pole	$ 105,869	$ 63,521	$ 169,390	**$ 508,170**	
3.17	Large Angle DE - 60- 90 (Ht. 195')	9.0	pole	$ 169,360	$ 101,616	$ 270,976	**$ 2,438,787**	
3.18	Tangent Dead End (Ht. 165')	3.0	pole	$ 86,818	$ 52,091	$ 138,908	**$ 416,724**	
3.19	Tangent Dead End (Ht. 195')	3.0	pole	$ 116,824	$ 70,094	$ 186,918	**$ 560,753**	
3.20	Install Grounding	616.0	Structure		$ 5,000	$ 5,000	**$ 3,080,000**	
TOTAL - STRUCTURES T-LINE:							**$ 57,905,468**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	84.2	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 17,874,078**	
4.2	(1) OPGW 36 Fiber AC-33/38/571	84.2	Mile	$ 19,404	$ 27,720	$ 47,124	**$ 3,968,312**	
4.3	(1) 3/8" HS Steel (2nd SW where required)	4,000.0	Ft	$ 1	$ 5	$ 6	**$ 22,800**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 21,865,190**	
5. T-LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	1,446.0	Set	$ 900	$ 720	$ 1,620	**$ 2,342,520**	
5.2	Angle - Polymer V-String	69.0	Set	$ 1,300	$ 1,040	$ 2,340	**$ 161,460**	
5.3	Deadend - Polymer Double Deadend including Jumper	666.0	Set	$ 1,500	$ 1,350	$ 2,850	**$ 1,898,100**	
5.4	OPGW Assembly - Tangent	502.0	Set	$ 200	$ 150	$ 350	**$ 175,700**	
5.5	OPGW Assembly - Angle / DE	222.0	Set	$ 250	$ 150	$ 400	**$ 88,800**	
5.6	OHSW Assembly - Angle / DE	16.0	Set	$ 250	$ 150	$ 400	**$ 6,400**	
5.7	OPGW Splice Boxes	34.0	Set	$ 1,500	$ 1,000	$ 2,500	**$ 85,000**	
5.8	OPGW Splice & Test	1.0	Sum		$ 40,800	$ 40,800	**$ 40,800**	
5.9	Spacer Dampers	7,212.0	Ea	$ 50	$ 35	$ 85	**$ 613,020**	
5.10	Vibration Dampers - Conductor	7,212.0	Ea	$ 32	$ 20	$ 52	**$ 375,024**	
5.11	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 30,000	$ 12,000	$ 42,000	**$ 42,000**	
TOTAL: T-LINE INSULATORS, FITTINGS, HARDWARE:							**$ 5,828,824**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.0	Sum		$1,500,000.00	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,450.0	LF		$200	$ 200	**$ 490,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	22.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 154,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph w/ motor operators	7.0	Ea	$ 15,000	$15,000.00	$ 30,000	**$ 210,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,214,000	$ 1,214,000	**$ 1,214,000**	
6.8	Breakers	11.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 4,180,000**	
6.9	Arrestors (3 per line)	21.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 157,500**	
6.10	Line Traps	7.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 147,000**	
6.11	345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	Supply & Install
6.13	Low Profile Foundations	305.0	Ea		$ 5,000	$ 5,000	**$ 1,525,000**	Supply & Install
6.14	Caisson DE Foundations	28.0	Ea		$ 50,000	$ 50,000	**$ 1,400,000**	Supply & Install
6.15	Circuit Breaker Foundations	11.0	Ea		$ 75,000	$ 75,000	**$ 825,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.16	Lightning Mast Foundations	20.0	Ea		$15,000	$ 15,000	**$ 300,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
6.18	Control House and Pad (30' x 90' - 2700 sq. ft)	1.0	Sum	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
6.19	Generator Foundation	1.0	Ea		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.20	Control Cables	1.3	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 260,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	Supply & Install
6.23	Protection, Telecom and Metering Equipment (Panels)	37.0	Ea		$ 30,000	$ 30,000	**$ 1,110,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Trench to Equipment	1.3	Sum		$ 250,000	$ 250,000	**$ 325,000**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.3	Sum		$ 750,000	$ 750,000	**$ 975,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.29	Bus Support 1 Ph	129.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 387,000**	
6.30	Switch Stands	22.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 242,000**	
6.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.32	Misc. Structures	1.0	Sum		$ 68,000	$ 68,000	**$ 68,000**	
6.33	Substation A-Frame Structures Standalone	7.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 175,000**	
6.34	Lightning Masts	20.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 240,000**	
6.35	Arrestor Stands	21.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 73,500**	Supply & Install
6.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.37	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 3,400,000	$ 3,400,000	**$ 3,400,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 23,229,000**	
7. STOLLE ROAD SUBSTATION WORKS:								
7.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	715.00	LF		$ 200	$ 200	**$ 143,000**	Supply & Install
7.3	Switches 3ph	14.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 98,000**	
7.4	Line Switches 3 ph w/ motor-operators	4.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 120,000**	
7.5	Instrument Transformers	1.00	Sum		$ 691,000	$ 691,000	**$ 691,000**	
7.6	Breakers	8.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,040,000**	
7.7	Arrestors (3 per line)	12.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.8	Line Traps	4.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 84,000**	
7.9	345 kV buses	2.00	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
7.10	Low Profile Foundations	183.00	Ea		$ 5,000	$ 5,000	**$ 915,000**	Supply & Install
7.11	Caisson DE Foundations	16.00	Ea		$ 50,000	$ 50,000	**$ 800,000**	Supply & Install
7.12	Circuit Breaker Foundations	8.00	Ea		$ 75,000	$ 75,000	**$ 600,000**	Supply & Install
7.13	Lightning Mast Foundations	8.00	Ea		$ 15,000	$ 15,000	**$ 120,000**	Supply & Install
7.14	Control House and Pad (25' x 50' - 1250 sq. ft)	1.00	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
7.15	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
7.16	125VDC Batteries	2.00	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.17	Protection, Telecom and Metering Equipment (Panels)	27.00	Ea		$ 30,000	$ 30,000	**$ 810,000**	Supply & Install
7.18	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.19	Low Voltage AC Distribution & DC Panels & Switches	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.20	Control Conduits from Cable Tray to Equipment	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.21	Cable Trench Systems for Control Cables	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
7.22	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
7.23	Bus Support 1 Ph	66.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 198,000**	
7.24	Switch Stands	14.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 154,000**	
7.25	Misc. Structures	1.0	Sum		$ 42,000	$ 42,000	**$ 42,000**	
7.26	Substation A-Frame Structures Standalone	4.00	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 100,000**	
7.27	Lightning Masts	8.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 96,000**	
7.28	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	
7.29	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
7.30	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - STOLLE RD SUBSTATION WORKS:			Ea		$ 100,000		**$ 14,263,000**	
8. GARDENVILLE 345/230kV SUBSTATION WORKS								
8.1	Site Works including sediment controls, access roads, rough grading, final grading	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
8.2	Substation Fence	1,400.0	LF		$ 200	$ 200	**$ 280,000**	Supply & Install
8.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
8.4	Switches 3ph	1.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 7,000**	
8.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
8.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
8.7	Instrument Transformers	1.0	Sum		$ 271,000	$ 271,000	**$ 271,000**	
8.8	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
8.9	Arrestors (3 per line)	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
8.10	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
8.11	230 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
8.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
8.13	Low Profile Foundations	40.0	Ea		$ 5,000	$ 5,000	**$ 200,000**	Supply & Install
8.14	Caisson DE Foundations	12.0	Ea		$ 50,000	$ 50,000	**$ 600,000**	Supply & Install
8.15	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
8.16	Lightning Mast Foundations	1.0	Ea		$ 15,000	$ 15,000	**$ 15,000**	Supply & Install
8.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
8.18	Control House and Pad (14' x 70' - 980 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
8.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
8.20	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
8.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
8.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	Supply & Install
8.23	Protection, Telecom and Metering Equipment (Panels)	11.0	Ea		$ 30,000	$ 30,000	**$ 330,000**	Supply & Install
8.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
8.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
8.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
8.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 350,000	$ 350,000	**$ 350,000**	Supply & Install
8.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
8.29	Bus Support 1 Ph	18.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 54,000**	
8.30	Switch Stands	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.31	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
8.32	Misc. Structures	1.0	Sum		$ 27,000	$ 27,000	**$ 27,000**	
8.33	Substation A-Frame Structures Standalone	3.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 75,000**	
8.34	Lightning Masts	1.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 12,000**	
8.35	Arrestor Stands	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
8.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 725,000	$ 725,000	**$ 725,000**	Supply & Install
8.37	345kV - 230kV 480/540/600 MVA Transformer	1.0	Ea	$ 4,750,000	$ 750,000	$ 5,500,000	**$ 5,500,000**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8.38	Transformer Foundation with concrete moat and double steel grating	1.0	Ea		$ 150,000	$ 150,000	**$ 150,000**	
TOTAL - GARDENVILLE SUBSTATION WORKS:							**$ 12,822,500**	
9. NIAGARA SUBSTATION WORK								
9.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	0.6	Sum		$ 1,000,000	$ 1,000,000	**$ 600,000**	Supply & Install
9.2	Substation Fence	320.0	LF		$ 200	$ 200	**$ 64,000**	Supply & Install
9.3	Switches 3ph	2.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 14,000**	
9.4	Line Switches 3 ph w/ motor operators	1.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
9.5	Instrument Transformers	1.0	Sum		$ 163,000	$ 163,000	**$ 163,000**	
9.6	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
9.7	Arrestors (3 per line)	6.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 45,000**	
9.8	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
9.9	345 kV buses	0.5	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 30,000**	
9.10	Low Profile Foundations	37.0	Ea		$ 5,000	$ 5,000	**$ 185,000**	Supply & Install
9.11	Caisson DE Foundations	4.0	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
9.12	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
9.13	Control Cables	1.0	Sum	$50,000	$ 50,000	$ 100,000	**$ 100,000**	
9.14	Protection, Telecom and Metering Equipment (Panels)	3.0	Ea		$ 30,000	$ 30,000	**$ 90,000**	Supply & Install
9.15	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
9.16	Control Conduits from Cable Trench to Equipment	1.0	Sum		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
9.17	Cable Trench Systems for Control Cables	1.0	Sum		$ 350,000	$ 350,000	**$ 350,000**	Supply & Install
9.18	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
9.19	Underground Riser Structures	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
9.20	Bus Support 1 Ph	6.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 18,000**	
9.21	Switch Stands	2.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 22,000**	
9.22	Misc. Structures	1.0	Ea		$ 8,000	$ 8,000	**$ 8,000**	
9.23	Substation A-Frame Structures Standalone	1.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
9.24	Arrestor Stands	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
9.25	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
9.26	345kV underground cable with terminations. (680 Circuit Ft.)	1.0	Ea		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	Supply & Install
TOTAL - NIAGARA SUBSTATION WORKS:							**$ 4,246,500**	
10. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
10.1	Mob / Demob	1.0	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
10.2	Project Management & Staffing (includes PM, Field Engineers / Supervision,	36.0	Months		$ 450,000	$ 450,000	**$ 16,200,000**	
10.3	Site Accommodation, Facilities, Storage	1.0	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
	Engineering					$ -	**$ -**	
10.4	Design Engineering	1.0	Sum		$ 10,500,000	$ 10,500,000	**$ 10,500,000**	
10.5	LiDAR	1.0	Sum		$ 800,000	$ 800,000	**$ 800,000**	
10.6	Geotech	1.0	Sum		$ 1,700,000	$ 1,700,000	**$ 1,700,000**	
10.7	Surveying/Staking	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Testing & Commissioning							
10.8	Testing & Commissioning of T-Line and Equipment	1.0	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
	Permitting and Additional Costs					$ -	**$ -**	
10.9	Environmental Licensing & Permitting Costs	1.0	Sum		$ 4,336,429	$ 4,336,429	**$ 4,336,429**	
10.10	Environmental Mitigation	1.0	Sum		$ 20,514,989	$ 20,514,989	**$ 20,514,989**	

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
10.11	Warranties / LOC's	1.0	Sum		$ 1,358,623	$ 1,358,623	**$ 1,358,623**	
10.12	Real Estate Costs (New)	1.0	Sum		$ 7,675,534	$ 7,675,534	**$ 7,675,534**	
10.13	Real Estate Costs (Incumbent Utility ROW)	1.0	Sum		$ 4,555,924	$ 4,555,924	**$ 4,555,924**	
10.14	Legal Fees	1.0	Sum		$ 3,500,000	$ 3,500,000	**$ 3,500,000**	
10.15	Sales Tax on Materials	1.0	Sum	$ 8,164,882		$ 8,164,882	**$ 8,164,882**	
10.16	Fees for permits, including roadway, railroad, building or other local permits	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 87,506,380**	
11. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	$ 500,000	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	$ 75,000	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	$ 4,800,000	Rate for reconductor is pro-rated from
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	$ 720,000	National Grid Niagara - Packard
SUF 3	Roll Rd Substation							
SUF 3.1	Restoration of station stone within existing substation fence. Assume spoil	1.00	Ea		$ 100,000	$ 100,000	$ 100,000	Supply & Install
SUF 3.2	Transformer 115-34.5kV 90 MVA	1.00	Ea	$ 700,000	$ 200,000	$ 900,000	$ 900,000	
SUF 3.3	Switches 115kV 3Ph	1.00	Ea	$ 15,000	$ 12,000	$ 27,000	$ 27,000	
SUF 3.4	Switches 35kV 3Ph	1.00	Ea	$ 6,000	$ 4,000	$ 10,000	$ 10,000	
SUF 3.5	Breakers 115kV 1200A	1.00	Ea	$ 150,000	$ 50,000	$ 200,000	$ 200,000	
SUF 3.6	Breakers 35kV 2000A	1.00	Ea	$ 75,000	$ 15,000	$ 90,000	$ 90,000	
SUF 3.7	CVT's 115kV	3.00	Ea	$ 10,000	$ 8,000	$ 18,000	$ 54,000	
SUF 3.8	Arrestors 115kV	6.00	Ea	$ 5,000	$ 700	$ 5,700	$ 34,200	
SUF 3.9	Arrestors 35kV (for transformer)	3.00	Ea	$ 2,500	$ 500	$ 3,000	$ 9,000	
SUF 3.10	Low Profile Foundations	8.00	Ea		$ 5,000	$ 5,000	$ 40,000	Supply & Install
SUF 3.11	Circuit Breaker Foundation 115kV	1.00	Ea		$ 75,000	$ 75,000	$ 75,000	Supply & Install
SUF 3.12	Circuit Breaker Foundation 35kV	1.00	Ea		$ 30,000	$ 30,000	$ 30,000	Supply & Install
SUF 3.13	Transformer Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	$ 150,000	Supply & Install
SUF 3.14	Firewall 30' long x 12' tall x 1' thick with footer	1.00	Ea		$ 100,000	$ 100,000	$ 100,000	Supply & Install
SUF 3.15	Control Cables	1.00	Sum		$ 50,000	$ 50,000	$ 50,000	Supply & Install
SUF 3.16	Protection & Telecom Equipment	3.00	Ea		$ 30,000	$ 30,000	$ 90,000	Supply & Install
SUF 3.17	SCADA and Communications	1.00	Sum		$ 25,000	$ 25,000	$ 25,000	Supply & Install
SUF 3.18	Low Voltage AC Distribution	1.00	Sum		$ 30,000	$ 30,000	$ 30,000	Supply & Install
SUF 3.19	Control Conduits	1.0	Sum		$ 50,000	$ 50,000	$ 50,000	Supply & Install
SUF 3.20	Grounding	1.0	Sum		$ 25,000	$ 25,000	$ 25,000	Supply & Install
SUF 3.21	Switch Stand 115kV (reuse 1 existing)	1.0	Ea	$ 1,500	$ 800	$ 2,300	$ 2,300	
SUF 3.22	CVT Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	$ 6,000	
SUF 3.23	Arrestor Stand	3.0	Ea	$ 1,000	$ 1,000	$ 2,000	$ 6,000	
SUF 3.24	Misc Materials and Above / Below Ground Works	1.0	Sum		$ 120,000	$ 120,000	$ 120,000	Supply & Install
SUF 3.25	Engineering, T&C, PM, Indirects for SUF 3 (15%)					$ -	$ 333,525	Assumed 15% to cover all misc costs
SUF 4.1	Lockport to Shaw 115kV Transmsision Line 102. NAT report indicated: Remove all limitations to achieve line conductor ratings as the limit. Terminal allowance included.	1.00	Sum		$ 500,000	$ 500,000	$ 500,000	The limiting equipment is not known - scope undefined.
SUF 4.2	Engineering, T&C, PM, Indirects for SUF 4.1 (15%)					$ -	$ 75,000	
SUF 5	Gardenville Circuit Breaker Replacement							
SUF 5.1	Circuit Breaker Foundation	12.0	Ea		$ 75,000	$ 75,000	$ 900,000	Supply & Install
SUF 5.2	Below Grade Conduit & Grounding	1.0	Sum		$ 1,200,000	$ 1,200,000	$ 1,200,000	Supply & Install
SUF 5.3	Circuit breaker - 230kV	12.0	Ea	$ 250,000	$ 75,000	$ 325,000	$ 3,900,000	

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 5.4	Switches - 230kV	24.0	Ea	$ 20,000	$ 15,000	$ 35,000	$ 840,000	
SUF 5.5	Control Cables	1.0	Sum		$ 1,200,000	$ 1,200,000	$ 1,200,000	Supply & Install
SUF 5.6	Misc Above Ground Works	1.00	Sum		$ 900,000	$ 900,000	$ 900,000	Supply & Install
SUF 5.7	Engineering, T&C, PM, Indirects for SUF 5 (15%)						$ 1,341,000	Assumed 15% to cover all misc costs
SUF 6	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						$ 3,750,000	Contingency for possible additional SUF upgrades
TOTAL - SYSTEM UPGRADE FACILITIES:							**$ 23,258,025**	

ENVIRONMENTAL LICENSING AND PERMITTING

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T009	
FEDERAL						Proposal 4	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$52,240	$137,075
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$77,600	$193,600
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $350,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$850,000	$3,350,000

ENVIRONMENTAL LICENSING AND PERMITTING

NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$31,160	$94,550
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)		$3,400	$15,000
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies (not included in costing)	$33,120	$108,760
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$200,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$3,800	$3,800

ENVIRONMENTAL LICENSING AND PERMITTING

NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000
REGIONAL							
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$200,000
LOCAL/MUNICIPAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000

		Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T009 TOTAL**	**$1,147,720**	**$4,634,185**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing	**Expected Value**	**$4,336,428.75**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T009 - North American Transmission

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 4

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	117 acres	117 acres	53 acres	106 acres
Cost/Acre	$50,000	$100,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$5,850,000	$35,100,000	$26,659	$53,318

T009 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$5,876,659	**$35,153,318**	**$ 20,514,989**

*Offsite wetland mitigation area assumes Highway Alternative Route; clearing of NWI Forested/Shrub Wetland Approx. 2.37 miles (12517 LF) by 100' ROW width and 3.24 miles (17107 LF) by 225' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; cost per acre Min. and Max. reduced due to area total over 50 acres; includes design and installation costs only; does not include land acquisition or long term monitoring.

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 17.58 miles (92822 LF) Adjacent to Agriculture Properties by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: NIAGARA & ERIE

DEVELOPER: NORTH AMERICAN (T009)

SEGMENT: NIAGARA - DYSINGER - STOLLE SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	2.38	$ 51,560.00

B	**ERIE COUNTY**		
	Sub Total (A)	0.68	$ 4,376.00
	Total (A + B)	3.06	$ 55,936.00

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NORTH AMERICAN (T009)

SEGMENT: STOLLE TO GARDENVILLE SEGMENT

		Area (Acres)	Total Cost
	Total	167.00	$ 6,838,497.00

Revision: 4

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NORTH AMERICAN (T009)
SEGMENT: NIAGARA-DYSINGER - STOLLE - GARDENVILLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
T009	North American Transmission (Proposal 4)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara	10.33	$ 4,234,000
			Erie	534.58	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie	27.55	
		Niagara to Dysinger - 27.16	Niagara	408.32	

REAL ESTATE ESTIMATE (HOUSES)

Revision: 4

COUNTY:	ERIE
DEVELOPER:	NORTH AMERICAN (T009)
SEGMENT:	STOLLE ROAD TO GARDENVILLE

		Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 628,349.85

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: NIAGARA
DEVELOPER: NORTH AMERICAN (T009)
SEGMENT: DYSINGER SWITCHYARD

		Total Cost
	Total Cost of Proposed Substation Site	$152,750.00

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: ERIE
DEVELOPER: NORTH AMERICAN (T009)
SEGMENT: STOLLE ROAD SUBSTATION

		Total Cost
	Total Cost of Proposed Substation Site	$19,440.00

REAL ESTATE ESTIMATE (SUBSTATIONS)

Revision: 4

COUNTY: ERIE
DEVELOPER: NORTH AMERICAN (T009)
SEGMENT: GARDENVILLE SUBSTATION (OPTION 1)

		Total Cost
	Total Cost of Proposed Substation Site	$ 309,483.90

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b)We have assumed a construction schedule of 24 months, with no breaks in the schedule. Six months have been added to the construction schedule PM time for start up and close out works and float.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed the Access Road included in Developer Estimate will be Type 1 Gravel Type.
f) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
g) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
h) Estimated quantities have been used for items in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
i) Foundation rates include supply and installation of materials. Driller Pier rates include supply and testing of concrete, rebar cage and the use of temp or permanent casing.
j) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section.
k) Dysinger to Stolle Road Circuit 2 ROW length (19.85 miles) not included in project route total since parallels already accounted for length of Dysinger to Stolle Road (19.97 miles).
l) USFWS T&E Assumes that ¼ of the Total Line in Right of Way will require field survey for T&E (Approx. 14.96 miles).
m) NEPA-Assumes no NEPA because Art VII.
o) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of Total Line in Right of Way (Approx. 29.92 miles).
p) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII or SEQRA review. Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Highway.
q) Railroad - Max costs includes additional agency coordination (greater than general fixed costing max.) for new ROW Parallel to Railroad.
r) Assumes no coordination with National Parks Service or OPRHP/State Parks
s) USACE wetland delineation total based on Line Miles in Wetlands - NWI wetland lengths of 10.31 miles (Min.) and 10.41 miles (Max.)
t) DEC wetland delineation total based on Line Miles in Wetlands - DEC wetland lengths of 4.99 miles (Min.) and 5.54 miles (Max.)

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

u) Offsite wetland mitigation area costs based on a total of approximately 5.6 miles of impacts anticipated by clearing of NWI Forested/Shrub Wetland (calculated by GEI based on NWI mapper legend categories) using the Stolle Road to Gardenville Highway alternative (0.65 miles). Assumes clearing an additional 125 feet within the 3.24 mile Dysinger to Stolle Road Right of Way (for a total of 225 feet width) and 100 feet of additional clearing in the 1.72 mile Dysinger to Niagara segment. Minimum costs at $50,000/acre, maximum costs at $100,000/acre for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring. Minimum and maximum costs for this proposal assumes a reduced mitigation cost/acre due to size of mitigation.
v) Agricultural mitigation assumes timber matting impacts and pad impacts on a total of 17.6 miles of adjacent agriculture land (22.86 miles for the Stolle to Gardenville Highway route and Dysinger to Niagara minus 5.28 of duplicate miles for the second circuit from Dysinger to Stolle Rd) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
w) No tree survey or replanting required outside regulated wetlands areas.
x) Article VII Intervenor Fund payment expected to be $350,000.
y) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.).
z) Did not calculate for any real estate acquisition cost of public or private lands or fees associated for property rights for railroad crossings, town road crossings etc.
aa) Expected value of environmental licensing and permitting cost is estimated to be 50% higher than the mean of the range based upon the addition of the new Gardenville to Stolle 345kV line, a second Dysinger to Stolle line and a new Niagara to Dysinger 345kV line.
ab) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
ac) SUF reconductor rate is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
ad) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B5

T011 – NATIONAL GRID

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T011 - National Grid Moderate Power Transfer Solution

Revision: 4

SUMMARY OF COST ESTIMATE

Segment	Description	Total Amount
	CLEARING & ACCESS WORKS FOR T-LINE CONSTRUCTION	$ 28,554,443
1	WG D2 -IDENTIFIED LINE WORK 180, 181, 182 (MINIMAL SOLUTION)	$ 45,533,358
	WG E NEW BUS TIE BREAKER AT PACKARD STATION TO BE PLACED IN SERIES WITH EXISTING BREAKER R342	$ 880,000
	WG F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD STATION FOR LINE 181	$ 200,000
2	WG-H IDENTIFIED LINE WORK 130, 133	$ 7,261,318
	WG-I REPLACE THERMALLY LIMITING EQUIPMENT AT HUNTLEY STATION	$ 235,000
3	WG-J IDENTIFIED LINE WORK 191	$ 3,670,736
4	WG-M IDENTIFIED LINE WORK 103, 104	$ 486,376
	WG-N REPLACE THERMALLY LIMITING EQUIPMENT AT LOCKPORT STATION FOR LINES 101,102	$ 500,000
5	WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64	$ 1,570,740
	WG-P2 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$ 3,564,852
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$ 1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$ 1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$ 1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$ 500,000
	MOBILIZATION, ACCESS, CIVILS, PROJECT MANAGEMENT, OVERHEADS, MISC:	$ 27,447,225
	CONTRACTOR MARK UP (OH&P) 15%	$ 18,690,607
	SUBTOTAL (A):	$ 143,294,655
	CONTINGENCY ON ENTIRE PROJECT (20%)	$ 28,658,931
	TOTAL (A):	**$ 171,953,585**

SYSTEM UPGRADE FACILITIES	$ 3,750,000
CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 1,312,500
SUBTOTAL (B):	**$ 5,062,500**

TOTAL PROJECT COST (A+B):	**$ 177,016,085**

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
Clearing & Access Works for T-Line Construction								
	Access, Matting, ROW Maintenance					$ -	$ -	
1.1	Gravel Access Road Improvement	17,000.00	LF		$ 7	$ 7	**$ 119,000**	Assumes Type 1 Gravel Road
1.2	Temporary Matting	250,000.00	LF		$ 70	$ 70	**$ 17,500,000**	
1.3	Work Pads	108,500.00	SF		$ 4	$ 4	**$ 381,920**	
1.4	Restoration for Work Pad areas	10,850.00	SF		$ 0.2	$ 0.2	**$ 1,628**	
1.5	New Access Roads	21,000.00	LF		$ 250	$ 250	**$ 5,250,000**	
1.6	Air Bridge	6.00	EA		$ 14,445	$ 14,445	**$ 86,670**	
1.7	Stabilized Construction Entrance	240.00	EA		$ 4,580	$ 4,580	**$ 1,099,200**	
1.8	Maintenance and Protection of Traffic on Public Roads	1.00	LS		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
1.9	Temporary Access Bridges	15.00	EA		$ 20,035	$ 20,035	**$ 300,525**	
1.10	Concrete Washout Station	30.00	EA		$ 1,850	$ 1,850	**$ 55,500**	
1.11	Rock Coring Allowance for Foundations (say 5ft / caisson for 60 caissons)	300.00	FT		$ 4,200	$ 4,200	**$ 1,260,000**	
1.12	Snow Removal & Maintenance	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
TOTAL CLEARING & ACCESS:							**$ 28,554,443**	
SEGMENT 1	**D2, E & F**							
WG D2 -Identified Line Work 180, 181, 182 (Minimal Solution)								
2	**Removal of Existing 115kV Line**							
	Wire Removal Work							
	Line 181/105 – Remove approximately 26.6 circuit miles, 115kV/69kV (Packard Substation to Ellicott Junction):							
2.1	Remove 13.3 circuit miles (typically 350 MCM 19 strand Copper) - Line 105	13.30	Mile		$ 15,000	$ 15,000	**$ 199,500**	
2.2	Remove13.3 circuit miles (typically 350 MCM 19 strand Copper) - Line 181	13.30	Mile		$ 15,000	$ 15,000	**$ 199,500**	
2.3	Remove 26.6 miles of existing 3/8” x 7 steel EHS shieldwire	26.60	Mile		$ 12,000	$ 12,000	**$ 319,200**	
2.4	Conductor attachment assembly at Packard Substation	1.00	Lot		$ 20,000	$ 20,000	**$ 20,000**	
	Line 180/181 – Remove approximately 7.2 circuit miles, 115kV (Ellicott Junction to Youngman Substation):					$ -		
2.5	Remove 7.2 circuit miles (typically 400 MCM 19 strand Copper) - Line 180	7.20	Mile		$ 15,000	$ 15,000	**$ 108,000**	
2.6	Remove 7.2 circuit miles (typically 350 MCM 19 strand Copper) - Line 181	7.20	Mile		$ 15,000	$ 15,000	**$ 108,000**	
2.7	Remove 14.4 miles of existing 3/8” x 7 steel EHS shieldwire	14.40	Mile		$ 12,000	$ 12,000	**$ 172,800**	
2.8	Conductor attachment assembly at Urban Switch	1.00	Lot		$ 20,000	$ 20,000	**$ 20,000**	
	Line 180/182 – Remove approximately 12.4 circuit miles, 115kV (Structure 280 at Packard to Grand Island Substation):							
2.9	Remove 12.4 circuit miles (typically 400 MCM 19 strand Copper) - Line 182	12.40	Mile		$ 15,000	$ 15,000	**$ 186,000**	
2.10	Remove 12.4 miles of existing 3/8” x 7 steel EHS shieldwire	12.40	Mile		$ 12,000	$ 12,000	**$ 148,800**	
	Line 182/92 – Remove approximately 7.2 circuit miles, 115kV/69kV (Ellicott Junction to Youngman Substation):							
2.11	Remove 7.2 circuit miles (typically 400 MCM 19 strand Copper) - Line 182	7.20	Mile		$ 15,000	$ 15,000	**$ 108,000**	
2.12	Remove 7.2 circuit miles (typically 400 MCM 19 strand Copper) - Line 92	7.20	Mile		$ 15,000	$ 15,000	**$ 108,000**	
2.13	Remove 14.4 miles of existing 3/8” x 7 steel EHS shieldwire	14.40	Mile		$ 12,000	$ 12,000	**$ 172,800**	
	Structure Removal Work							
	Line 181/105 – Remove 181 structures (Packard Substation to Ellicott Junction)							
	Remove 37 deadend structures:							
2.14	Remove 34 double circuit lattice deadend towers	34.00	Structure		$ 9,000	$ 9,000	**$ 306,000**	
2.15	Remove 3 single pole wood deadend structures	3.00	Structure		$ 5,000	$ 5,000	**$ 15,000**	
	144 suspension structures:							
2.16	Remove 11 double circuit steel suspension towers	11.00	Structure		$ 7,500	$ 7,500	**$ 82,500**	
2.17	Remove 10 double circuit suspension flex towers	10.00	Structure		$ 8,000	$ 8,000	**$ 80,000**	
2.18	Remove 6 H-Frame wood suspension structures	6.00	Structure		$ 6,000	$ 6,000	**$ 36,000**	
2.19	Remove 117 2 pole-wood suspension structures	117.00	Structure		$ 6,000	$ 6,000	**$ 702,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Line 180/181 – Remove 39 Structures (Ellicott Junction to Youngman Substation):							
	Remove 18 deadend structures:							
2.20	Remove 14 double circuit lattice deadend towers	14.00	Structure		$ 9,000	$ 9,000	**$ 126,000**	
2.21	Remove 4 double circuit single pole steel deadend structures	4.00	Structure		$ 8,000	$ 8,000	**$ 32,000**	
	Remove 21 suspension structures:							
2.22	Remove 19 double circuit flex towers suspension structures	19.00	Structure		$ 7,000	$ 7,000	**$ 133,000**	
2.23	Remove 1 H-frame suspension structure	1.00	Structure		$ 6,000	$ 6,000	**$ 6,000**	
2.24	Remove 1 double circuit single pole steel suspension structure	1.00	Structure		$ 7,000	$ 7,000	**$ 7,000**	
	Line 180/182 – Remove 65 structures (Structure 280 at Packard to Grand Island Substation):							
	Remove 53 structures – Ellicott Junction to Pack Club Lane Substation							
	Remove 20 deadend structures							
2.25	Remove 8 double circuit lattice deadend towers	8.00	Structure		$ 9,000	$ 9,000	**$ 72,000**	
2.26	Remove 1 single pole wood deadend structure	1.00	Structure		$ 5,000	$ 5,000	**$ 5,000**	
2.27	Remove 5 double circuit steel pole deadend structures	5.00	Structure		$ 9,000	$ 9,000	**$ 45,000**	
2.28	Remove 1 H-frame wood deadend structure	1.00	Structure		$ 6,000	$ 6,000	**$ 6,000**	
	Remove 38 suspension structures:							
2.29	Remove 29 double circuit suspension flex towers	29.00	Structure		$ 7,000	$ 7,000	**$ 203,000**	
2.30	Remove 1 double circuit steel suspension towers	1.00	Structure		$ 6,000	$ 6,000	**$ 6,000**	
2.31	Remove 8 2-pole wood suspension structures	8.00	Structure		$ 8,000	$ 8,000	**$ 64,000**	
	Line 182 – Remove 12 structures (Near Urban Switch):							
	Remove 4 deadend structures:							
2.32	Remove 2 double circuit lattice deadend towers	2.00	Structure		$ 16,000	$ 16,000	**$ 32,000**	
2.33	Remove 2 3-pole wood deadend structures	2.00	Structure		$ 8,000	$ 8,000	**$ 16,000**	
	Remove 8 suspension structures:							
2.34	Remove 3 double circuit steel suspension towers	3.00	Structure		$ 8,000	$ 8,000	**$ 24,000**	
2.35	Remove 3 double circuit suspension flex towers	3.00	Structure		$ 7,000	$ 7,000	**$ 21,000**	
2.36	Remove 2 H-frame suspension structures	2.00	Structure		$ 6,000	$ 6,000	**$ 12,000**	
	Line 182/92 – Remove 39 structures (Ellicott Junction to Youngman Substation):							
	Remove 18 deadend structures:							
2.37	Remove 14 double circuit lattice deadend towers	14.00	Structure		$ 9,000	$ 9,000	**$ 126,000**	
2.38	Remove 4 double circuit single pole steel deadend structures	4.00	Structure		$ 8,000	$ 8,000	**$ 32,000**	
	Remove 21 suspension structures:							
2.39	Remove 19 double circuit flex towers suspension structures	19.00	Structure		$ 7,000	$ 7,000	**$ 133,000**	
2.40	Remove 1 H-frame suspension structure	1.00	Structure		$ 6,000	$ 6,000	**$ 6,000**	
2.41	Remove 1 double circuit single pole steel suspension structure	1.00	Structure		$ 8,000	$ 8,000	**$ 8,000**	
2.42	Remove (2) Crossing Rail Road (3) Crossing Niagara River 300 ft. (3) offshore after Niagara River Crossing	8.00	Structure		$ 10,000	$ 10,000	**$ 80,000**	
	Proposed Rebuild of 115kV Lines							
2.43	Install Davit Arm Steel 1P suspension DCSS 115kV Structure Type P	63.00	Structure	$ 9,000.00	$ 8,100	$ 17,100	**$ 1,077,300**	
2.44	Install DE DCSS 115kV Structure Type Q	32.00	Structure	$ 29,700.00	$ 26,730	$ 56,430	**$ 1,805,760**	
2.45	Install Davit Arm Wood Restrained Suspension 115kV Structure Type R	165.00	Structure	$ 3,500.00	$ 26,000	$ 29,500	**$ 4,867,500**	
2.46	Install Davit Arm Steel DE 115kV Structure Type S	57.00	Structure	$ 18,000.00	$ 16,200	$ 34,200	**$ 1,949,400**	
2.47	Install 6' Dia x 23' deep reinforced concrete foundation caisson (cylindrical) Structure Type S (35 Nos)	1,100.00	CY		$ 1,500	$ 1,500	**$ 1,650,000**	
2.48	Direct Embedment foundation 36" Dia x 14' Deep Structure Type R (165 Nos)	165.00	Structure		$ 22,000	$ 22,000	**$ 3,630,000**	
2.49	Direct Embedment foundation 36" Dia x 20' Deep Structure Type P (63 Nos)	63.00	Structure		$ 25,000	$ 25,000	**$ 1,575,000**	
2.50	Install 6' Dia x 31' deep reinforced concrete foundation caisson (cylindrical) Structure Type Q (24 Nos)	980.00	CY		$ 1,500	$ 1,500	**$ 1,470,000**	
2.51	Install 8' Dia x 38' deep reinforced concrete foundation caisson (cylindrical) Structure Type S/Q Angle DE (30 Nos)	2,100.00	CY		$ 1,500	$ 1,500	**$ 3,150,000**	
	Install Wire Work							
	Line 181 – Install approximately 13.3 circuit miles, 115kV (Packard Substation to Ellicott Junction)							
2.52	Install 13.3 circuit miles of 1590 kcmil ACSR “FALCON” conductor	13.30	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 1,790,712**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
2.53	Install 13.3 miles of 3/8" x 7 strand EHS steel shieldwire	13.30	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 316,008**	
2.54	Conductor attachment assembly at Packard Substation	1.00	Lot		$ 20,000	$ 20,000	**$ 20,000**	
	Line 182 – Install approximately 3.6 circuit miles, 115kV (Ellicott Junction to Youngman Substation)							
	Install 3.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor:							
2.55	Install 3.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor-Line 182	3.60	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 484,704**	
2.56	Install 3.6 miles of 3/8" x 7 strand EHS steel shieldwire	3.60	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 85,536**	
2.57	Conductor attachment assembly at Park Club Lane Substation	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 182/180 – Install approximately 6.2 circuit miles, 115kV (Structure 280 at Packard to Grand Island Substation)							
2.58	Install 12.4 circuit miles of 1590 kcmil ACSR "FALCON" conductor							
2.59	Install 6.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor-Line 182	6.20	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 834,768**	
2.60	Install 6.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor-Line 180	6.20	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 834,768**	
2.61	Install 12.4 miles of 3/8" x 7 strand EHS steel shieldwire	12.40	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 294,624**	
2.62	Conductor attachment assembly at Park Club Lane Substation	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 180/181 – Install approximately 3.6 circuit miles, 115kV (Ellicott Junction to Youngman Substation)							
	Install 7.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor:							
2.63	Install 3.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor- Line 181	3.20	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 430,848**	
2.64	Install 3.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor- Line 182	3.20	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 430,848**	
2.65	Install 7.2 miles of 3/8" x 7 strand EHS steel shieldwire	7.20	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 171,072**	
2.66	Conductor attachment assembly at American Standard Tap	1.00	Lot		$ 10,000	$ 10,000	**$ 10,000**	Supply & Install
2.67	OGW Overhead Ground Wire 5/8" Dia (3/8" x 7 Strand EHS Shieldwire)	36.50	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 867,240**	
2.68	Install 11 temporarily DE structures to support Line 180 or Line 182.	11.00	Structure		$ 25,000	$ 25,000	**$ 275,000**	Supply & Install
	Insulator & Hardware Work							
2.69	Tangent - Porcelain String (10 Discs Assembly)	66.00	Set	$ 900.00	$ 720	$ 1,620	**$ 106,920**	
2.70	Angle & Deadend Porcelain String (10 Disc Assembly)	120.00	Set	$ 1,300.00	$ 1,040	$ 2,340	**$ 280,800**	
2.71	Jumper Post Porcelain String (Assembly)	66.00	Set	$ 500.00	$ 400	$ 900	**$ 59,400**	
2.72	Allowances for Group M and W with no details	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
	River Crossing 1.2 Miles extra allowance							
2.73	Install River Crossing Structures (2 Structures)	100,000.00	Lbs.	$ 1.80	$ 2	$ 4	**$ 354,000**	
2.74	Install off shore structures (3 Structures)	60,000.00	Lbs.	$ 1.80	$ 2	$ 4	**$ 212,400**	
2.75	Install on land structures (1 Structure)	50,000.00	Lbs.	$ 1.80	$ 2	$ 4	**$ 177,000**	
2.76	Rental of 2 barges with 150 Ton Cranes each for 180 days	12.00	Months		$ 110,000	$ 110,000	**$ 1,320,000**	Supply & Install
2.77	Safety Plan and Coast Guard	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
2.78	Mobilization/Demobilization of Barges and equipment operators	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
2.79	8' Dia x 70 Deep Reinforced Concrete foundation caisson (cylindrical) -river crossing	150.00	CY		$ 1,500	$ 1,500	**$ 225,000**	Supply & Install
2.80	Install reinforced concrete slabs to connect all precast piles	513.00	CY		$ 850	$ 850	**$ 436,050**	Supply & Install
2.81	Precast Concrete Slab	1.00	Sum		$ 700,000	$ 700,000	**$ 700,000**	Supply & Install
2.82	Precast Concrete piers per Str. (4' Dia x 100' depth) 66CY per each pile, 6 per structure	2.00	Structure		$ 475,200	$ 475,200	**$ 950,400**	Supply & Install
2.83	Precast Concrete piers per Str. (2' Dia x 80' depth) 13CY per each pile, 4 per structure	3.00	Structure		$ 62,400	$ 62,400	**$ 187,200**	Supply & Install
2.84	Pile Driving Equipment B-21 Bumminghammer Diesel Hammer	360.00	Day		$ 3,000	$ 3,000	**$ 1,080,000**	Supply & Install
2.85	Boring under water	10.00	Bores		$ 500,000	$ 500,000	**$ 5,000,000**	Supply & Install
2.86	Drilling/casing 1840 LF	1,840.00	VLF	$ 200.00		$ 200	**$ 368,000**	
2.87	Rock drilling 240 LF	240.00	VLF		$ 4,200	$ 4,200	**$ 1,008,000**	Supply & Install

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
WG D2 - TOTAL SUPPLY & INSTALL:							**$ 45,533,358**	
WG E New Bus Tie Breaker at Packard Station to be placed in series with existing Breaker R342								
3	**New Bus Breaker at Packard Station**							
3.1	GCB 115kV - 3000A, 63kA	1.00	Unit		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
3.2	115LB1WV1 1 Way Loadbreak Switch Vertical (Located at Structure T and includes the pole)	1.00	Structure		$ 250,000	$ 250,000	**$ 250,000**	
3.3	Relocate 1 No. existing 115kV 3000A disconnect switch 343 to the right of tie breaker R342	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
3.4	Install one new 115kV 123kV , 63kA 3000A SF6 bus tie breaker in series with existing 115kV Areva bus tie R342 breaker	1.00	Sum	$ 150,000.00	$ 50,000	$ 200,000	**$ 200,000**	
3.5	Install new cable and conduit between new tie breaker and control house and associated shield cables	1.00	Sum		$ 35,000	$ 35,000	**$ 35,000**	Supply & Install
3.6	Install new set of AL power conductors and AL four hole pad connectors	1.00	Sum		$ 12,000	$ 12,000	**$ 12,000**	
3.7	Install new AL bus and a 5" upper bus extension to existing breaker R2103 and associated disconnect switches	1.00	Sum		$ 18,000	$ 18,000	**$ 18,000**	
3.8	Structures for Switch and Bus Support	1.00	Sum		$ 30,000	$ 30,000	**$ 30,000**	
3.9	Relocate 115kV disconnect switch 2104 and R2103	1.00	Sum		$ 15,000	$ 15,000	**$ 15,000**	
3.10	Grounding all new electrical equipment	1.00	Sum		$ 10,000	$ 10,000	**$ 10,000**	
3.11	Reconnect, control and integration, test and commissioning	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
3.12	Supply and Install new 115kV switch R2101	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	
3.13	Allowance for all secondary electrical works including DC power, AC power and system protection	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
WG E - TOTAL SUPPLY & INSTALL:							**$ 880,000**	
WG F Replace Thermally Limiting Equipment at Packard Station for Line 181								
4	**Replace existing components by suitable aluminum conductor.**							
4.1	Allowance for Thermally Limiting Equipment Upgrade	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
WG F - TOTAL SUPPLY & INSTALL:							**$ 200,000**	
SEGMENT 2	**H & I**							
WG-H Identified Line Work 130, 133								
5	**Wire Removal Work**							
	Line 130/133 – Remove approximately 18.2 circuit miles, 115kV/69kV (Packard Structures 140 and -Huntley Substation):							
5.1	Remove 18.2 circuit miles (typically 350 MCM 19 strand Copper)	18.20	Mile		$ 15,000	$ 15,000	**$ 273,000**	Supply & Install
5.2	Transfer existing 3/8" x 7 steel EHS shieldwire on 6 structures	26.60	Per Structure		$ 24,000	$ 24,000	**$ 638,400**	
	Structure Removal Work							
	Line 130/133 – Remove 7 double circuit steel deadend lattice towers, 115kV/69kV (Packard Structures 140 and -Huntley Substation):							
	Remove 11 deadend structures:							
5.3	Remove 7 double circuit lattice deadend towers	7.00	Structure		$ 12,000	$ 12,000	**$ 84,000**	
5.4	Remove 4 single pole wood deadend structures	4.00	Structure		$ 6,000	$ 6,000	**$ 24,000**	
5.5	Remove 1 double circuit steel suspension flex tower	1.00	Structure		$ 14,000	$ 14,000	**$ 14,000**	
	Structure Re-inforce Work							
5.6	Install 8 concrete foundation caissons	8.00	Structure		$ 150,000	$ 150,000	**$ 1,200,000**	
5.7	Install 4 wood 3-pole deadend pole structures in kind	4.00	Structure	$ 25,000.00	$ 25,000	$ 50,000	**$ 200,000**	
5.8	Replace seven double circuit steel deadend lattice towers with double circuit steel deadend single pole structures on concrete foundations.	7.00	Structure		$ 85,000	$ 85,000	**$ 595,000**	
5.9	Replace one double circuit steel suspension flex tower with double circuit steel deadend single pole structure on concrete foundation.	1.00	Structure		$ 85,000	$ 85,000	**$ 85,000**	Supply & Install
5.10	Replace steel members on (16) deadend lattice towers	16.00	Structure		$ 10,000	$ 10,000	**$ 160,000**	
5.11	Replace hardware on (30) double circuit deadend structures	30.00	Structure		$ 4,000	$ 4,000	**$ 120,000**	
5.12	Install longitudinal guys on two flex towers	2.00	Structure		$ 25,000	$ 25,000	**$ 50,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Install (4) temporary wood single pole deadend structures at every deadend structure to be replaced	44.00	Unit		$ 15,000	$ 15,000	**$ 660,000**	
	Wire Installation							
5.13	*Line 130/133 – Reconductoring, 115kV/69kV (Packard Structures 140 and -Huntley Substation):*							
5.14	Transfer 4 double circuit miles of 1590 kcmil ACSR "FALCON" conductor	4.00	Mile	$ 28,000.00	$ 40,000	$ 68,000	**$ 272,000**	
5.15	Install 18.2 miles of 3/8" x 7 strand EHS steel shieldwire	18.20	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 432,432**	
5.16	Miscellaneous assemblies	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
5.17	OPGW- 18.2 miles and accessories	18.20	Mile	$ 21,632.00	$ 29,220	$ 50,852	**$ 925,506**	Supply & Install, Splicing, Accessories etc.
	Insulator & Hardware Work							
5.18	Tangent - Porcelain String (10 Discs Assembly)	390.00	Set	$ 900.00	$ 720	$ 1,620	**$ 631,800**	
5.19	Angle & Deadend Porcelain String (10 Disc Assembly)	192.00	Set	$ 1,300.00	$ 1,040	$ 2,340	**$ 449,280**	
5.20	Jumper Post Porcelain String (Assembly)	81.00	Set	$ 500.00	$ 400	$ 900	**$ 72,900**	
5.21	Shieldwire Suspension Clamps	32.00	Set	$ 500.00	$ 400	$ 900	**$ 28,800**	
5.22	Shieldwire DE Clamps	80.00	Set	$ 800.00	$ 640	$ 1,440	**$ 115,200**	
5.23	Miscellaneous materials, dampers, grounding etc.	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
WG H - TOTAL SUPPLY & INSTALL:							**$ 7,261,318**	
WG-I Replace Thermally Limiting Equipment at Huntley Station								
6.1	Upgrade ampacity of Lines 130 & 133 at Huntley Substation	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
6.2	Remove the span between Structures 80 and 414 on the denergized Beck – Terminal Station C 105 sub-transmission line in the vicinity of Structure 167 per input from NY-TLS. A temporary wood single pole structure may be needed in the vicinity of Structure 80 to mitigate any concerns with unbalanced load at the structure. The section of the Beck – Terminal Station C 105 sub-transmission line sharing the ROW with the 130/133 D/C line will be removed as part of the 115 kV Packard –Urban 181 line proposed scope of work for the Western New York Project.	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
6.3	Mitigation works to lower the edge of ROW magnetic fields on the Packard – Huntley 130 line between Structures 140 and 160. The scope of work consists of transposing the top and bottom conductor phases on the 130 line outside Huntley Substation and Walck Road Switch Station in the span between Structure 242 and the bus structures at Huntley Substation and between Walck Road Switch and Structure 132 at Walck Road Switch Station.	1.00	Sum		$ 15,000	$ 15,000	**$ 15,000**	
WG-I - TOTAL SUPPLY & INSTALL:							**$ 235,000**	
SEGMENT 3	**J, K & L**							
WG-J Identified Line Work 191								
7	**Reconductor the Niagara- Packard 191 line with 2156 kcmil ACSS "Bluebird" conductor.**							
	Wire work:							
7.1	Reconductor 3.6 circuit miles with 2156 kcmil ACSS "Bluebird" conductor.	3.60	Mile	$ 55,440.00	$ 79,200	$ 134,640	**$ 484,704**	Supply & Install
7.2	Replace 3.2 miles of existing shieldwire with 7/16" EHS shieldwire.	3.20	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 76,032**	
7.3	Transfer conductor, shieldwire and hardware on existing 101, 102, 61 lines to new suspension structures.	13.00	Structure		$ 20,000	$ 20,000	**$ 260,000**	
7.4	Transfer conductor, shieldwire and hardware on existing 101, 102, 61 lines to new deadend structures.	16.00	Structure		$ 25,000	$ 25,000	**$ 400,000**	
7.5	Replace deadend hardware attachment assemblies at the bus structures on the Niagara Substation and Packard Substation.	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
	Structure work:							
7.6	Replace six double circuit deadend lattice towers with 6 D/C deadend steel davit arm structures.	6.00	Structure	$ 37,500.00	$ 37,500	$ 75,000	**$ 450,000**	Supply & Install
7.7	Replace tower members and bolts on 12 lattice towers	12.00	Structure	$ 25,000.00	$ 25,000	$ 50,000	**$ 600,000**	
7.8	Install 6 caisson foundations (8'x20') for D/C deadend steel davit are structures	6.00	Structure	$ 75,000.00	$ 75,000	$ 150,000	**$ 900,000**	
7.9	Remove concrete footers at 6 structure locations (4 footers per structure)	24.00	Units		$ 20,000	$ 20,000	**$ 480,000**	
WG-J - TOTAL SUPPLY & INSTALL:							**$ 3,670,736**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
SEGMENT 4	**M & N**							
WG-M Identified Line Work 103, 104								
8	**Wire and Hardware Work**							
8.1	Reconductor with 795MCM ACRS conductor to sections of lines 103 & 104 of 636MCM ACC	4,000.00	Ft	$ 3.50	$ 5	$ 9	**$ 34,000**	
8.2	Install 0.1 miles of 3/8" x 7 strand EHS steel shieldwire	0.10	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 2,376**	
	Structure work:							
8.3	Remove existing structures 55A1, 55A2, 55A3, 55B1, 55B2, 55B3, 55B4 and 55B5	5.00	Structure		$ 10,000	$ 10,000	**$ 50,000**	
8.4	Remove existing conductor and 1/2" EHS	5.00	Structure		$ 5,000	$ 5,000	**$ 25,000**	
8.5	Install new steel vertical deadend pulloff structures	2.00	Structure		$ 50,000	$ 50,000	**$ 100,000**	Supply & Install
8.6	Install new steel three pole deadend pullof structure	1.00	Structure		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
	Foundation Work							
8.7	Install 2 foundations using a vibratory caisson, helical pile or other methods	2.00	Structure		$ 75,000	$ 75,000	**$ 150,000**	Supply & Install
8.8	Install 1 new vibratory caisson foundation	1.00	Structure		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
WG-M - TOTAL SUPPLY & INSTALL:							**$ 486,376**	
WG-N Replace Thermally Limiting Equipment at Lockport Station for Lines 101,102								
9	**Upgrade ampacity of Lines 101, 102**							
9.1	Replace Thermally Limiting Equipment at Lockport Station for Lines 101, 102	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
WG-N TOTAL SUPPLY & INSTALL:							**$ 500,000**	
SEGMENT 5	**O, P2, Q, R, S, T, U and V**							
WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64								
10	**Eliminate Double Circuit Contingency for Line 61/64**							
10.1	Install "A" Delta Davit Arm Steel Suspension 230kV	1.00	Structure		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
10.2	Install "B" Davit Arm Steel DE 230kV	3.00	Structure					
10.3	Conductoring 0.70 circuit miles of 1590 ACSR for the 64 Line.	8,500.00	Ft	$ 5.00	$ 8	$ 13	**$ 110,500**	
10.4	Replace OGW overhead ground wire 5/8" Dia (230kV)	2.00	Mile	$ 7,920.00	$ 15,840	$ 23,760	**$ 47,520**	
10.5	Install 8' Dia x 26' deep reinforced concrete foundation caisson (cylindrical) Structure Type S/Q Angle DE (3 Nos)	50.00	CY		$ 1,500	$ 1,500	**$ 75,000**	Supply & Install
10.6	Direct embedment foundation 72" dia x 20' deep	1.00	EA		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
10.7	96" Dia Hole Rock Coring/ Removal	15.00	LF		$ 6,400	$ 6,400	**$ 96,000**	Supply & Install
10.8	*Group O-61/64, P1-181:*							
10.9	Tangent - Porcelain String (10 Discs Assembly)	159.00	Set	$ 900.00	$ 720	$ 1,620	**$ 257,580**	
10.10	Angle & Deadend Porcelain String (10 Disc Assembly)	66.00	Set	$ 1,300.00	$ 1,040	$ 2,340	**$ 154,440**	
10.11	Jumper Post Porcelain String (Assembly)	33.00	Set	$ 500.00	$ 400	$ 900	**$ 29,700**	
WG-O TOTAL SUPPLY & INSTALL:							**$ 1,570,740**	
WG-P2 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)								
11.1	Reconductor approximately 3 miles from Urban Switch to NYSEG owned Erie Substation with 1113 kcmil ACSR conductor (existing is 477 ACSR)	54,648.00	Ft	$ 3.50	$ 5	$ 9	**$ 464,508**	
11.2	Replace 3 miles of double shieldwire	36,432.00	Ft	$ 1.50	$ 3	$ 5	**$ 163,944**	
11.3	Assume full rebuild to support new conductor for strength and clearance purposes	3.00	Miles		$ 50,000	$ 50,000	**$ 150,000**	Supply & Install
11.4	Assuming an approximate ruling span of 600', there will be 27 total structures to replace	27.00	Structure		$ 35,000	$ 35,000	**$ 945,000**	Supply & Install
11.5	Assuming a deadend every 1.5 miles and a few extra deadends for angles = 3 Deadends	3.00	Structure		$ 75,000	$ 75,000	**$ 225,000**	Supply & Install
11.6	Remaining 24 structures will be suspension structures	24.00	Structure		$ 30,000	$ 30,000	**$ 720,000**	Supply & Install
11.7	Suspension: Single circuit wood H-frame suspension structures direct embed (Str. Qty 24)	24.00	Structure	$ 8,000.00	$ 15,000	$ 23,000	**$ 552,000**	
11.8	Deadend: Single circuit steel H-frame steel deadend structures on concrete foundations (Str. Qty 3, Foundation Qty:6)	3.00	Per Structure	$ 42,000.00	$ 37,800	$ 79,800	**$ 239,400**	
11.9	Existing structures are single circuit wood h-frame suspension and deadends	1.00	Sum		$ 5,000	$ 5,000	**$ 5,000**	
11.10	Miscellaneous materials, dampers, grounding etc.	1.00	Sum	$ 50,000.00	$ 50,000	$ 100,000	**$ 100,000**	
WG-P2 TOTAL SUPPLY & INSTALL:							**$ 3,564,852**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181								
12	**Replace Thermally Limiting Equipment at Erie Station for Line 181 (NYSEG 922 Line)**							
12.1	Replacing one 115kV circuit breaker	1.00	Unit	$ 150,000.00	$ 50,000	$ 200,000	**$ 200,000**	Supply & Install
12.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	
12.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
12.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
12.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	
12.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
12.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-Q TOTAL SUPPLY & INSTALL:							**$ 1,250,000**	
WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)								
13	**Replace Thermally Limiting Equipment at Erie Station for line 54 (NYSEG 921)**							
13.1	Replacing one 115kV circuit breaker	1.00	Unit	$ 150,000.00	$ 50,000	$ 200,000	**$ 200,000**	Supply & Install
13.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	
13.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
13.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
13.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
13.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
13.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-R TOTAL SUPPLY & INSTALL:							**$ 1,250,000**	
WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64								
14	**Replace Thermally Limiting Equipment at Robinson Station for Line 64**							
14.1	Replacing two 230kV gang operated circuit breaker	2.00	Unit	$ 250,000.00	$ 75,000	$ 325,000	**$ 650,000**	
14.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
14.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
14.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
14.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	
14.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
14.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64							**$ 1,700,000**	
WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102								
15	**Replace Thermally Limiting Equipment at Niagara Station for Line 102**							
15.1	Substation Equipment Replacement	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
WG-V TOTAL SUPPLY & INSTALL:							**$ 500,000**	
MOBILIZATION, ACCESS, CIVILS, PROJECT MANAGEMENT, OVERHEADS, MISC:								
16	**Contractor Mobilization / Demobilization**							
16.1	Mob / Demob	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
16.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and Cost Manager, SHEQ Staff, Materials Management Staff)	36.00	Months		$ 220,000	$ 220,000	**$ 7,920,000**	
16.3	Site Accommodations, Storage, Amenities, Laydown Yards	1.00	Sum		$ 1,700,000	$ 1,700,000	**$ 1,700,000**	
	Engineering					$ -	**$ -**	
16.4	Design Engineering	1.00	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	
16.5	LiDAR	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
16.6	Geotech	1.00	Sum		$ 1,100,000	$ 1,100,000	**$ 1,100,000**	
16.7	Surveying/Staking	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
	Testing and Commissioning					$ -	**$ -**	
16.8	Testing & Commissioning of T-Line and Equipment	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Permitting and Additional Costs					$ -	**$ -**	
16.9	Environmental Licensing & Permitting Costs (see separate tab for breakdown)	1.00	Sum		$ 3,984,698	$ 3,984,698	**$ 3,984,698**	
16.10	Environmental Mitigation Costs (see separate tab for breakdown)	1.00	Sum		$ 227	$ 227	**$ 227**	
16.11	Warranties / LOC's	1.00	Sum		$ 515,916	$ 515,916	**$ 515,916**	
16.12	Legal Fees	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
16.13	Sales Tax on Materials	1.00	Sum	$ 1,526,384		$ 1,526,384	**$ 1,526,384**	Includes 8.75% sales tax
16.14	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
16.15	Carrying Charges	1.00	Sum			$ -	**$ -**	
16.16	Fees for easements or permits, including roadway, railroad, building or other local permits	1.00	Sum			$ 200,000	**$ 200,000**	
PM, OVERHEADS, ACCESS, MISC TOTAL:							**$ 27,447,225**	
SYSTEM UPGRADE FACILITIES								
SUF 1	**SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)**						**$ 3,750,000**	Contingency for possible additional SUF upgrades
SYSTEM UPGRADE FACILITY TOTAL:							**$ 3,750,000**	

ENVIRONMENTAL LICENSING PERMITTING

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T011							
FEDERAL						Segment 1		Segment 2		Segment 3		Segment 4	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$38,600	$110,750	$16,200	$68,750			$11,920	$60,725
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit; Incidental Take Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$100,000	$1,000,000	$14,200	$66,800	$11,550	$61,500		
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)					$3,000	$9,000		
STATE													
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans								
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000						
NYS Public Service Commission / Department of Public Service (NYSDPS)	Part 102		Construction of a utility overhead transmission facility that will convey electric energy at 65kV or higher for a distance of one mile or longer and are not subject to Article VII of the Public Service Law.	Report may include coordination or studies completed under other line items including: Visual assessment, SHPO determination, OPRHP consultation, Ecological Impacts Assessment Submit to the Commission for 60-day notice period: if no response for a formal investigation project can proceed, if formal investigation ordered project modification may be required	Advantage-Disadvantage Analysis	$13,000	$60,000						
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000	$12,000	$53,000			$12,000	$53,000

ENVIRONMENTAL LICENSING PERMITTING

NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000	$11,200	$38,000	$11,200	$38,000		
Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.	Includes Reports and Plans required for State and Federal Agency Permits, as well as, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan			$10,000	$500,000	$10,000	$500,000	$10,000	$10,000
NYSDOS	State Coastal Zone/ Management Areas	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)		$3,400	$15,000						
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$14,700	$53,500	$7,750	$32,650	$6,700	$29,500		
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400	$1,200	$6,400	$1,200	$6,400		
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000			$17,000	$69,000		
NYSOGS	State-owned Underwater Land	Request for Information	Projects includes use of NYS underwater lands	OGS Real Estate staff do respond to email inquiries to determine based on project location and scope if permit application is applicable.	Easement area survey (not included in costs)	$1,200	$6,400						
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$3,800	$3,800	$3,800	$3,800				
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000	$11,000	$24,000				

ENVIRONMENTAL LICENSING PERMITTING

REGIONAL													
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000			$11,000	$76,000		
LOCAL/MUNICIPAL													
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans								
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000	$6,000	$40,000	$6,000	$40,000		
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000	$6,000	$35,000	$6,000	$35,000		
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000	$6,000	$35,000	$6,000	$35,000		
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000	$6,000	$52,000	$6,000	$52,000	$6,000	$52,000
					Total Cost Range by Segment	$862,100	$4,777,850	$111,350	$955,400	$95,650	$951,400	$39,920	$175,725

	Minimum	Maximum	Expected Value
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT TOII TOTAL**	**$1,109,020**	**$6,860,375**	**$3,984,698**

Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing

Revision: 4

ENVIRONMENTAL MITIGATION ESTIMATE

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	0 acres	0 acres	0.3 acres	0.6 acres
Cost/Acre	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$0	$0	$151	$302

T011 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$151	**$302**	**$227**

*Assumes no offsite wetland mitigation since no clearing of NWI Forested/Shrub Wetland is proposed - all work within existing maintained/cleared ROWs; assumes timber matting impacts to emergent wetlands is considered temporary and restoration seeding costs are accounted for in construction costs

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 538 LF Matting Impacts to Active Agriculture Land by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b) Construction Schedule is in accordance with the Developers proposed schedule - we have assumed continuous working with no breaks in the schedule.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed that pole weights include anchor bolts.
f) The Developer has assumed gravel work pads. During our ROW visit it was determined that matted work pads are required.
g) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
h) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
i) We have assumed Contractor Mark Up (OH&P) of 15%
j) Assumes all environmental data and project details provided are accurate unless noted otherwise
k) Article 7 required for Segment 1 (excluding Grand Island work)
l) Part 102 Authorization is required for Grand Island if it is not included in the Article 7 scope. If Grand Island work is considered independently from Article 7, separate USACE, NYSDEC, SWPPP, NYSDOS, SHPO, and local permits and costs will apply.
m) Segment 1 USFWS T&E Investigation assumes survey and potential incidental take with Habitat Conservation Plan. Minimum and maximum amounts represent variable coordination efforts
n) USFWS T&E for segments 2 and 3 Assumes that ¼ of the total project route per segment will require field survey for T&E (Segment 2 – 2.28 miles, Segment 3 – 1.75 miles)
o) NEPA-Assumes no NEPA because Art VII (Segments 1) and SEQRA (Segments 2, 3, 4)
p)Article 7 Intervenor Fund payment expected to be $100,000
q) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of project route (Segment 1 – 11.5 miles, Segment 2 – 4.55 miles, Segment 3 – 3.5 miles, Segment 4 – no survey)
r) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII or SEQRA review
s) SEQRA for Segments 2, 3 and 4 assumes applicant is not lead agent. Minimum costs assume FEAF Part I with no additional studies. Maximum assumes an expanded EA. SEQRA for Segment 4 assumes minimum only costs.
t) Assumes no coordination with National Parks Service
u) NYSDOS – Assumes only Segment 1

ASSUMPTIONS AND CLARIFICATIONS

v) USACE wetland delineation totals assumed length of NWI wetland estimates on Permitting Summary Table (Segment 1 – 6.9 miles, Segment 2 – 0.62 miles, Segment 3 – no wetlands, Segment 4 – 0.22 miles). Assumes work group line segment length not duplicated. Assumes NYSDEC delineations overlap and are accounted for in USACE costing.
w) Assumes no permanent wetland impacts and no wetland mitigation required
z) Assumes no agricultural project impacts and no mitigation
aa) No tree survey or replanting required outside regulated wetlands areas
ab) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B6

T012 – NATIONAL GRID

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T012 - National Grid High Power Transfer Solution

Revision: 4

SUMMARY OF COST ESTIMATE

Segment	Description	Total Amount
	CLEARING & ACCESS WORKS FOR T-LINE CONSTRUCTION	$ 77,418,870
1	WG A - NEW 230kV NIAGARA TO GARDENVILLE LINE & RELOCATIONS	$ 70,767,955
	WG B NEW 230kV LINE ASSOCIATED WORK AT GARDENVILLE SUBSTATION	$ 1,105,500
	WG C NEW 230kV LINE - NIAGARA SUBSTATION CONNECTION	$ 1,075,000
2	WG-D1 REBUILD & RE-CONDUCTOR	$ 55,276,810
	WG-E NEW BUS BREAKER AT PACKARD STATION	$ 880,000
	WG-F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD SUBSTATION FOR LINE 181	$ 200,000
	WG-G NEW 115kV SWITCHING STATION	$ 11,169,000
3	WG-H PACKARD-HUNTLEY & WALCK-HUNTLEY DOUBLE CIRCUIT LINE WORKS	$ 7,261,318
	WG-I - UPGRADE AMPACITY OF LINES 130 AND 133 AT HUNTLEY SUBSTATION	$ 235,000
4	WG-J - REFURBISHMENT WORKS ON LINES 191	$ 3,670,736
5	WG-M - LINE WORK 103,104	$ 486,376
	WG-N - LINE WORK 101, 102, 103, 104	$ 500,000
6	WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64	$ 1,570,740
	WG-P1 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$ 5,366,640
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$ 1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$ 1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$ 1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$ 500,000
	MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:	$ 56,143,133
	CONTRACTOR MARK UP (OH&P) 15%	$ 44,674,062
	SUBTOTAL:	$ 342,501,140
	CONTINGENCY ON ENTIRE PROJECT (25%)	$ 85,625,285
	TOTAL:	**$ 428,126,425**

SYSTEM UPGRADE FACILITIES	$ 3,750,000
CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 1,312,500
TOTAL (B):	**$ 5,062,500**

TOTAL PROJECT COST (A+B):	**$ 433,188,925**

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
Clearing & Access Works for T-Line Construction								
1.1	Gravel Road	34,084.00	LF		$ 45	$ 45	**$ 1,533,780**	Assumes Type 1 Gravel Road
1.2	Gravel Road Improvement	4,757.00	LF		$ 7	$ 7	**$ 33,299**	
1.3	Temporary Matting (temp access roads)	246,623.00	LF		$ 70	$ 70	**$ 17,263,610**	
1.4	Mowing & Clearing	135.00	Acre		$ 15,000	$ 15,000	**$ 2,025,000**	
1.5	Work Pads	13,308,750.00	SF		$ 4	$ 4	**$ 46,846,800**	
1.6	Restoration for Work Pad areas	1,340,875.00	SF		$ 0.15	$ 0.15	**$ 201,131**	
1.7	Temporary Access Bridge	200.00	EA		$ 20,035	$ 20,035	**$ 4,007,000**	
1.8	Air Bridge	50.00	EA		$ 14,445	$ 14,445	**$ 722,250**	
1.9	Stabilized Construction Entrance	200.00	EA		$ 4,580	$ 4,580	**$ 916,000**	
1.1	Maintenance and Protection of Traffic on Public Roads	1.00	LS		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
1.11	Culverts / Misc. Access	1.00	LS		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
1.12	Concrete Washout Station	200.00	EA		$ 1,850	$ 1,850	**$ 370,000**	
1.13	Snow Removal & Maintenance	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
TOTAL CLEARING & ACCESS:							**$ 77,418,870**	
SEGMENT 1	**WGA**							
WG A - NEW 230kV NIAGARA TO GARDENVILLE LINE & RELOCATIONS								
2	**Foundations (New 230kV Transmission Line)**							
2.1	Direct embedment holes - 6 feet diameter, embedment depth of 20 feet for Type A structure (66 Nos)	66.00	Structure		$ 18,000	$ 18,000	**$ 1,188,000**	
2.2	Concrete caisson foundations - 6 feet diameter, depth of 24 feet for Type C structure (144 Nos)	4,350.00	CY		$ 1,500	$ 1,500	**$ 6,525,000**	
2.3	Direct embedment holes - 3 feet diameter, embedment depth of 13.5 feet for Type E structure (154 Nos)	155.00	Structure		$ 15,000	$ 15,000	**$ 2,325,000**	
2.4	Concrete caisson foundations - 8 feet diameter, depth of 26 feet for Type B structure (14Nos)	820.00	CY		$ 1,500	$ 1,500	**$ 1,230,000**	
2.5	Concrete caisson foundation - 8 feet diameter, depth of 38 feet for Type G structure (1 No)	85.00	CY		$ 1,500	$ 1,500	**$ 127,500**	
2.6	Concrete caisson foundations - 8 feet diameter, depth of 26 feet for Type D structure (25 Nos)	1,500.00	CY		$ 1,500	$ 1,500	**$ 2,250,000**	Supply & Install
2.7	Concrete caisson foundations - 8 feet diameter, depth of 48 feet for Type D vertical structure (5 Nos)	550.00	CY		$ 1,500	$ 1,500	**$ 825,000**	
2.8	Concrete caisson foundations - 6 feet diameter, depth of 29 feet for Type F structure (24 Nos)	880.00	CY		$ 1,500	$ 1,500	**$ 1,320,000**	
2.9	Concrete caisson foundations - 8 feet diameter, depth of 36 feet for Type F 90 degree structure (12 Nos)	970.00	CY		$ 1,500	$ 1,500	**$ 1,455,000**	
2.10	Concrete caisson foundations – 7 feet diameter, depth of 34 feet for Type O structure (2 Nos)	120.00	CY		$ 1,500	$ 1,500	**$ 180,000**	
2.11	Concrete caisson foundation – 5 diameter, depth of 21 feet for Type N structure (1 No)	20.00	CY		$ 1,500	$ 1,500	**$ 30,000**	
2.12	Rock Coring Allowance for Foundations (say 5ft / caisson for 200 caissons)	1,000.00	VF		$ 4,200	$ 4,200	**$ 4,200,000**	Based on 6ft dia
3	**Structures (New 230kV Transmission Line)**							
3.1	230kV (Type A - Single circuit steel delta davit arm suspension structure)	66.00	Structure	$ 11,250	$ 10,125	$ 21,375	**$ 1,410,750**	
3.2	230kV (Type C - Single circuit steel vertical suspension structure)	148.00	Structure	$ 17,100	$ 15,390	$ 32,490	**$ 4,808,520**	
3.3	230kV (Type E - Single circuit wood H-frame suspension structure)	77.00	Structure	$ 3,500	$ 26,000	$ 29,500	**$ 2,271,500**	
3.4	230kV (Type B - Single circuit steel delta davit arm deadend structure)	14.00	Structure	$ 32,400	$ 29,160	$ 61,560	**$ 861,840**	
3.5	230kV (Type G - Double circuit steel davit arm deadend structure)	1.00	Structure	$ 42,000	$ 37,800	$ 79,800	**$ 79,800**	
3.6	230kV (Type D - Single circuit steel vertical deadend structure)	30.00	Structure	$ 39,600	$ 35,640	$ 75,240	**$ 2,257,200**	
3.7	230kV (Type F - Single circuit steel 3-pole deadend structure)	12.00	Structure	$ 56,700	$ 51,030	$ 107,730	**$ 1,292,760**	
3.8	230kV/115kV (Type O – Double circuit steel davit arm deadend structure)	2.00	Structure	$ 42,000	$ 37,800	$ 79,800	**$ 159,600**	
3.9	230kV/115kV (Type N – Double circuit steel davit arm suspension structure)	1.00	Structure	$ 19,000	$ 17,100	$ 36,100	**$ 36,100**	
3.10	115kV (Type W – Single circuit steel vertical deadend structure)	2.00	Structure	$ 50,000	$ 45,000	$ 95,000	**$ 190,000**	
3.11	115kV (Type V – Single circuit steel vertical deadend tap structure)	2.00	Structure	$ 52,000	$ 46,800	$ 98,800	**$ 197,600**	
3.12	115kV (Type Q – Double circuit steel davit arm deadend structure)	2.00	Structure	$ 29,700	$ 26,730	$ 56,430	**$ 112,860**	
4	**Conductors, Shieldwire, Hardware, Misc. (New 230kV Transmission Line)**							
4.1	Conductor-36.2 miles of 1590 kcmil ACSR Falcon	659,400.00	Ft	$ 4	$ 5	$ 9	**$ 5,604,900**	
4.2	Static cable-49 miles of 3/8" x 7 strand EHS steel shieldwire	297,500.00	Ft	$ 2	$ 3	$ 5	**$ 1,338,750**	
4.3	Tangent - Porcelain String (10 Discs Assembly)	876.00	Set	$ 900	$ 720	$ 1,620	**$ 1,419,120**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
4.4	Angle & Deadend Porcelain String (10 Disc Assembly)	384.00	Set	$ 1,300	$ 1,040	$ 2,340	**$ 898,560**	
4.5	Jumper Post Porcelain String (Assembly)	192.00	Set	$ 500	$ 400	$ 900	**$ 172,800**	
4.6	Miscellaneous Materials (Dampers, Grounding & Signage)	36.20	Mile		$ 30,000	$ 30,000	**$ 1,086,000**	Supply & Install
4.7	FAA Lightings/ Marking Systems	30.00	Structure		$ 15,000	$ 15,000	**$ 450,000**	Supply & Install
5	**New 36/37 Ayer Tap**							
5.1	Remove 1.1 circuit miles of 400 MCM 19-strand copper conductor (typical) on the 36 Tap	1.10	Mile		$ 8,500	$ 8,500	**$ 9,350**	
5.2	Remove 1.1 circuit miles of 636 MCM 26/7 ACSR conductor (typical) on the 37 Tap	1.10	Mile		$ 9,000	$ 9,000	**$ 9,900**	
5.3	Remove 2.2 circuit miles of 3/8" x 7 strand steel HS shieldwire	2.20	Mile		$ 6,000	$ 6,000	**$ 13,200**	
5.4	Remove single circuit wood 3-pole deadend structures	2.00	Structure		$ 5,000	$ 5,000	**$ 10,000**	
5.5	Remove single circuit lattice deadend towers	4.00	Structure		$ 6,000	$ 6,000	**$ 24,000**	
5.6	Remove single circuit lattice suspension towers	15.00	Structure		$ 5,500	$ 5,500	**$ 82,500**	
6	**Lines Removal & Reconfiguration of 38/39 Lines**							
6.1	Remove 636 MCM 26/7 ACSR conductor (typical) on the 37 line	0.20	Mile		$ 9,000	$ 9,000	**$ 1,800**	
6.2	Remove 3/8" x 7 strand steel HS shieldwire	0.20	Mile		$ 6,000	$ 6,000	**$ 1,200**	
6.3	Remove single circuit wood 3-pole deadend structure	1.00	Structure		$ 5,000	$ 5,000	**$ 5,000**	
6.4	Remove double circuit lattice suspension tower	1.00	Mile		$ 8,000	$ 8,000	**$ 8,000**	
6.5	Remove double circuit suspension lattice flex tower	1.00	Mile		$ 7,000	$ 7,000	**$ 7,000**	
6.6	Install 0.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor on the 38 line	0.20	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 26,928**	
6.7	Install 0.2 miles of 3/8" x 7 strand steel EHS shieldwire	0.20	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 4,752**	
	Install 13 structures (12 deadend structures and 1 suspension structure:							
6.8	115kV (Type U – Single circuit steel 3-pole deadend structure)	6.00	Structure	$ 70,000	$ 40,000	$ 110,000	**$ 660,000**	Type U has been assumed for budgeting purposes
6.9	115kV (Type R – Single circuit wood davit arm suspension structure	1.00	Structure	$ 5,000	$ 20,000	$ 25,000	**$ 25,000**	
6.10	Allowance for all hardware and other accessories for 115kV structures	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
	Install 25 concrete caisson foundations for 12 structures and install 1 direct embedment hole for 1 structure:							
6.11	Concrete caisson foundations – 5 feet diameter, depth of 28 feet for Type U (18 Nos)	440.00	CY		$ 1,500	$ 1,500	**$ 660,000**	Supply & Install
6.12	Concrete caisson foundations – 8 feet diameter, depth of 38 feet for Type W (4 Nos)	339.71	CY		$ 1,500	$ 1,500	**$ 509,565**	Supply & Install
6.13	Concrete caisson foundation – 6 feet diameter, depth of 25 feet for Type V (1 No)	31.43	CY		$ 1,500	$ 1,500	**$ 47,145**	Supply & Install
6.14	Concrete caisson foundation – 6 feet diameter, depth of 31 feet for Type Q (1 No)	38.97	CY		$ 1,500	$ 1,500	**$ 58,455**	Supply & Install
6.15	Direct embedment hole - 3 feet diameter, embedment depth of 14 feet for Type R	1.00	Structure		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.16	Install approximately two 0.1 circuit-mile section of underground cable in a new manhole and duct system.	1.00	Sum		$ 600,000	$ 600,000	**$ 600,000**	Supply & Install
6.17	Replace approximately two 0.2 circuit-mile section of underground cable on the existing circuits.	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
7	**Maple Road Substation to proposed new substation located near Park Club Lane**							
7.1	Remove 400 MCM 19-strand copper conductor (typical) on the 91 line	2.00	Mile		$ 8,500	$ 8,500	**$ 17,000**	
7.2	Remove 400 MCM 19-strand copper conductor (typical) on the 92 line	2.00	Mile		$ 8,500	$ 8,500	**$ 17,000**	
7.3	Remove 3/8" x 7 strand steel HS shieldwire	4.00	Mile		$ 6,000	$ 6,000	**$ 24,000**	
	Remove 64 structures:							
7.4	Remove double circuit lattice deadend towers	9.00	Structure		$ 6,000	$ 6,000	**$ 54,000**	
7.5	Remove double circuit lattice suspension towers	42.00	Structure		$ 6,000	$ 6,000	**$ 252,000**	
7.6	Remove single circuit wood monopole suspension structures	7.00	Structure		$ 6,000	$ 6,000	**$ 42,000**	
7.7	Remove single circuit 3-pole wood deadend structures	5.00	Structure		$ 7,500	$ 7,500	**$ 37,500**	
7.8	Remove single circuit 2-pole wood deadend structure	1.00	Structure		$ 6,500	$ 6,500	**$ 6,500**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Obstruction Works							
7.9	2.7 miles of new UG feeders with duct banks	2.70	Mile		$ 6,500,000	$ 6,500,000	**$ 17,550,000**	Supply & Install
7.10	4.1 miles of new OH distribution	4.10	Mile		$ 500,000	$ 500,000	**$ 2,050,000**	
7.11	3.1 miles of new aerial cable subtransmission	3.10	Mile		$ 150,000	$ 150,000	**$ 465,000**	
7.12	3.6 miles of distribution removals	3.60	Mile		$ 100,000	$ 100,000	**$ 360,000**	
7.13	0.5 miles of directional boring	0.50	Mile		$ 1,000,000	$ 1,000,000	**$ 500,000**	
WG A - TOTAL SUPPLY & INSTALL:							**$ 70,767,955**	
WG B NEW 230kV LINE ASSOCIATED WORK AT GARDENVILLE SUBSTATION								
8	**Gardenville Substation Connection**							
	Below Ground							
8.1	Supply & Install Conduit, Ground Grid	1.00	Sum	$ 15,000	$ 45,000	$ 60,000	**$ 60,000**	
	Foundations							
8.2	Terminal Structure Foundation	1.00	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
8.3	Bus Support Foundation	1.00	Sum		$ 10,000	$ 10,000	**$ 10,000**	Supply & Install
8.4	Pad Foundation (Upgrade) for Breaker & Switch (use existing pad)	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	Supply & Install
	Structures							
8.5	A Frame DE Structure	1.00	Unit	$ 54,000	$ 30,000	$ 84,000	**$ 84,000**	Assume approx. 30,000lb
8.6	Switch Structure	1.00	Unit	$ 6,500	$ 4,000	$ 10,500	**$ 10,500**	
8.7	Misc. Structures	1.00	Unit	$ 12,000	$ 8,000	$ 20,000	**$ 20,000**	
	Supply and Install Substation Equipment							
8.8	GCB IPO 230kV - 3000A, 50kA	1.00	Unit	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
8.9	DS 230kV Gang Operated - 3000A	2.00	Unit	$ 20,000	$ 15,000	$ 35,000	**$ 70,000**	
8.10	Instrument Transformers	1.00	Sum		$ 122,000	$ 122,000	**$ 122,000**	
	Protection, Telecom, Connections, Misc.							
8.11	Cable and Wire	1.00	Sum	$ 5,000	$ 4,000	$ 9,000	**$ 9,000**	
8.12	Protection, Telecom and Metering Equipment	1.00	Sum	$ 100,000	$ 70,000	$ 170,000	**$ 170,000**	
8.13	Misc. Works / Connections	1.00	Sum		$ 5,000	$ 5,000	**$ 5,000**	Supply & Install
8.14	Fencings, Restorations and Security etc.	1.00	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
WG B - TOTAL SUPPLY & INSTALL:							**$ 1,105,500**	
WG C NEW 230kV LINE - NIAGARA SUBSTATION CONNECTION								
9	**Niagara Substation Connection**							
	Below Ground							
9.1	Supply & Install Conduit, Ground Grid	1.00	Sum	$ 15,000	$ 45,000	$ 60,000	**$ 60,000**	
	Foundations							
9.2	Terminal Structure Foundation	1.00	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
9.3	Equipment Foundations (breaker pad, switch, CCVT)	1.00	Sum		$ 30,000	$ 30,000	**$ 30,000**	Supply & Install
	Support / Structures	1.00						
9.5	DE Structure	1.00	Unit	$ 54,000	$ 30,000	$ 84,000	**$ 84,000**	Assume approx. 30,000lb
9.6	Misc. Structures	1.00	Sum		$ 18,000	$ 18,000	**$ 18,000**	
	Supply and Install Substation Equipment							
9.9	GCB IPO 230kV - 3000A, 50kA	1.00	Unit	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
9.10	DS 230kV Gang Operated - 3000A	3.00	Unit	$ 20,000	$ 15,000	$ 35,000	**$ 105,000**	
9.11	Adder for Motor Operated	1.00	Unit	$ 6,000	$ 2,000	$ 8,000	**$ 8,000**	
9.12	Instrument Transformers	1.00	Sum		$ 65,000	$ 65,000	**$ 65,000**	
	Protection, Telecom, Connections, Misc.							
9.13	Cable and Wire	1.00	Sum		$ 5,000	$ 5,000	**$ 5,000**	Supply & Install
9.14	Protection, Metering & Telecom Equipment	1.00	Sum	$ 100,000	$ 70,000	$ 170,000	**$ 170,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
9.15	Misc. Works / Connections	1.00	Sum		$ 5,000	$ 5,000	**$ 5,000**	
9.16	Fencings, Restorations and Security etc.	1.00	Sum		$ 150,000	$ 150,000	**$ 150,000**	
WG C - TOTAL SUPPLY & INSTALL:							**$ 1,075,000**	
SEGMENT 2								
WG-D1 REBUILD & RE-CONDUCTOR								
Description of Work: The SOW includes re-conductoring portions of the Niagara – Gardenville 180, Packard – Urban 181, Packard – Gardenville 182 115kV lines, as part of the full solution of the Western New York Project. A portion of the Gardenville – Depew 54 line will also be reconductored in support of the project. Reconductoring of the taps is not required except for the American Standard Tap on the 182 line.								
10	**Wire Removal Work**							
	Line 181/105 – Remove approximately 26.6 circuit miles, 115kV/69kV (Packard Substation to Ellicott Junction):							
10.1	Remove 13.3 circuit miles (typically 350 MCM 19 strand Copper) - Line 105	13.30	Mile		$ 15,000	$ 15,000	**$ 199,500**	
10.2	Remove13.3 circuit miles (typically 350 MCM 19 strand Copper) - Line 181	13.30	Mile		$ 15,000	$ 15,000	**$ 199,500**	
10.3	Remove 26.6 miles of existing 3/8” x 7 steel EHS shieldwire	26.60	Mile		$ 12,000	$ 12,000	**$ 319,200**	
10.4	Conductor attachment assembly at Packard Substation	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
	Line 180/181 – Remove approximately 18.2 circuit miles, 115kV (Ellicott Junction to Urban Switch):							
10.5	Remove 9.1 circuit miles (typically 400 MCM 19 strand Copper) - Line 180	9.10	Mile		$ 17,000	$ 17,000	**$ 154,700**	
10.6	Remove 9.1 circuit miles (typically 350 MCM 19 strand Copper) - Line 181	9.10	Mile		$ 15,000	$ 15,000	**$ 136,500**	
10.7	Remove 18.2 miles of existing 3/8” x 7 steel EHS shieldwire	18.20	Mile		$ 12,000	$ 12,000	**$ 218,400**	
10.8	Conductor attachment assembly at Urban Switch	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
	Line 182/92 – Remove approximately 18.2 circuit miles, 115kV/69kV (Ellicott Junction to Urban Switch):							
10.9	Remove 9.1 circuit miles (typically 400 MCM 19 strand Copper) - Line 182	9.10	Mile		$ 17,000	$ 17,000	**$ 154,700**	
10.10	Remove 9.1 circuit miles (typically 400 MCM 19 strand Copper) - Line 92	9.10	Mile		$ 17,000	$ 17,000	**$ 154,700**	
10.11	Remove 18.2 miles of existing 3/8” x 7 steel EHS shieldwire	18.20	Mile		$ 12,000	$ 12,000	**$ 218,400**	
	Line 182 – Remove approximately 0.9 circuit miles, 115kV (Near Urban Switch):							
10.10	Remove circuit miles (typically 400 MCM 19 strand Copper) - Line 182	0.90	Mile		$ 17,000	$ 17,000	**$ 15,300**	
10.11	Remove 0.9 miles of existing 3/8” x 7 steel EHS shieldwire	0.90	Mile		$ 12,000	$ 12,000	**$ 10,800**	
	Line 182/54 – Remove approximately 7.4 circuit miles, 115kV/115kV (Urban Switch to Gardenville Substation):							
10.14	Remove 3.7 circuit miles (typically 400 MCM 19 strand Copper) - Line 182	3.70	Mile		$ 17,000	$ 17,000	**$ 62,900**	
10.15	Remove 3.7 circuit miles (636 KCM 18/1 ACSR) - Line 54	3.70	Mile		$ 18,000	$ 18,000	**$ 66,600**	
10.16	Remove 7.4 miles of existing 3/8” x 7 steel EHS shieldwire	7.40	Mile		$ 12,000	$ 12,000	**$ 88,800**	
10.17	Conductor attachment assembly at Gardenville Substation	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
	Line 182/54 – Remove approximately 7.45 circuit miles, 115kV/115kV (American Standard Tap):							
10.18	Remove 0.02 circuit miles (typically 400 MCM 19 strand Copper) - Line 182 Tap to American Standard Tap	0.02	Mile		$ 17,000	$ 17,000	**$ 340**	
10.19	Remove 0.02 circuit miles (typically 400 MCM 19 strand Copper) - Line 54 Tap to American Standard Tap	0.02	Mile		$ 17,000	$ 17,000	**$ 340**	
10.20	Conductor attachment assembly at American Standard Tap	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
	Line 180/704 – Remove approximately 9.2 circuit miles, 115kV/34.5kV (Urban Switch to Gardenville Substation)							
10.21	Remove 4.6 circuit miles (typically 400 MCM 19 strand Copper) - Line 180	4.60	Mile		$ 17,000	$ 17,000	**$ 78,200**	
10.22	Remove 4.6 circuit miles (typically 336.4 18/1 ACSR) - Line 704	4.60	Mile		$ 16,000	$ 16,000	**$ 73,600**	
10.23	Remove 9.2 miles of existing 3/8” x 7 steel EHS shieldwire	9.20	Mile		$ 12,000	$ 12,000	**$ 110,400**	
10.24	Conductor attachment assembly at Gardenville Substation	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
11	**Structure Removal Work**							
	Line 181/105 – Remove 181 structures (Packard Substation to Ellicott Junction)							
	Remove 37 deadend structures:							
11.1	Remove 34 double circuit lattice deadend towers	34.00	Structure		$ 12,000	$ 12,000	**$ 408,000**	
11.2	Remove 3 single pole wood deadend structures	3.00	Structure		$ 6,000	$ 6,000	**$ 18,000**	
	144 suspension structures:							

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
11.3	Remove 11 double circuit steel suspension towers	11.00	Structure		$ 14,000	$ 14,000	**$ 154,000**	
11.4	Remove 10 double circuit suspension flex towers	10.00	Structure		$ 13,000	$ 13,000	**$ 130,000**	
11.5	Remove 6 H-Frame wood suspension structures	6.00	Structure		$ 10,000	$ 10,000	**$ 60,000**	
11.6	Remove 117 2 pole-wood suspension structures	117.00	Structure		$ 8,000	$ 8,000	**$ 936,000**	
	Line 180/181 – Remove 95 structures (Ellicott Junction to Urban Switch)							
	Remove 58 structures – Ellicott Junction to Pack Club Lane Substation:							
	Remove 18 deadend structures:							
11.8	Remove 14 double circuit lattice deadend towers	14.00	Structure		$ 12,000	$ 12,000	**$ 168,000**	
11.9	Remove 4 double circuit single pole steel deadend structures	4.00	Structure		$ 8,000	$ 8,000	**$ 32,000**	
	Remove 40 suspension structures:							
11.10	Remove 38 double circuit flex towers suspension structures	38.00	Structure		$ 6,600	$ 6,600	**$ 250,800**	
11.11	Remove 1 H-frame suspension structure	1.00	Structure		$ 6,000	$ 6,000	**$ 6,000**	
11.12	Remove 1 double circuit single pole steel suspension structure	1.00	Structure		$ 12,000	$ 12,000	**$ 12,000**	
	Remove 37 structures – Park Club Lane Substation to Urban Switch:							
11.13	Remove 10 double circuit lattice deadend towers	10.00	Structure		$ 12,000	$ 12,000	**$ 120,000**	
	Remove 27 suspension structures:							
11.14	Remove 2 double circuit steel towers suspension structures	2.00	Structure		$ 66,000	$ 66,000	**$ 132,000**	
11.15	Remove 25 double circuit flex towers suspension structures	25.00	Structure		$ 66,000	$ 66,000	**$ 1,650,000**	
	Line 182/92 – Remove 96 structures (Ellicott Junction to Urban Switch)							
	Remove 58 structures – Ellicott Junction to Pack Club Lane Substation							
	Remove 20 deadend structures							
11.15	Remove 13 double circuit lattice deadend towers	13.00	Structure		$ 12,000	$ 12,000	**$ 156,000**	
11.16	Remove 1 single pole wood deadend structure	1.00	Structure		$ 18,000	$ 18,000	**$ 18,000**	
11.17	Remove 5 double circuit steel pole deadend structures	5.00	Structure		$ 14,000	$ 14,000	**$ 70,000**	
11.18	Remove 1 H-frame wood deadend structure	1.00	Structure		$ 6,600	$ 6,600	**$ 6,600**	
	Remove 38 suspension structures:							
11.19	Remove 29 double circuit suspension flex towers	29.00	Structure		$ 14,000	$ 14,000	**$ 406,000**	
11.20	Remove 1 double circuit steel suspension towers	1.00	Structure		$ 6,600	$ 6,600	**$ 6,600**	
11.21	Remove 8 2-pole wood suspension structures	8.00	Structure		$ 8,000	$ 8,000	**$ 64,000**	
	Remove 38 structures – Park Club Lane Substation to Urban Switch:							
11.22	Remove 10 double circuit lattice deadend towers	10.00	Structure		$ 12,000	$ 12,000	**$ 120,000**	
	Remove 27 suspension structures:							
11.23	Remove 2 double circuit steel towers suspension structures	2.00	Structure		$ 6,600	$ 6,600	**$ 13,200**	
11.24	Remove 25 double circuit flex towers suspension structures	25.00	Structure		$ 6,600	$ 6,600	**$ 165,000**	
11.25	Remove 1 switch structure (Urban 369)	1.00	Structure		$ 6,600	$ 6,600	**$ 6,600**	
	Line 182 – Remove 12 structures (Near Urban Switch):							
	Remove 4 deadend structures:							
11.26	Remove 2 double circuit lattice deadend towers	2.00	Structure		$ 16,000	$ 16,000	**$ 32,000**	
11.27	Remove 2 3-pole wood deadend structures	2.00	Structure		$ 8,000	$ 8,000	**$ 16,000**	
	Remove 8 suspension structures:							
11.28	Remove 3 double circuit steel suspension towers	3.00	Structure		$ 8,000	$ 8,000	**$ 24,000**	
11.29	Remove 3 double circuit suspension flex towers	3.00	Structure		$ 6,600	$ 6,600	**$ 19,800**	
11.30	Remove 2 H-frame suspension structures	2.00	Structure		$ 6,000	$ 6,000	**$ 12,000**	
	Line 182/54 – Remove 45 structures (Urban Switch to Gardenville Substation):							
11.31	Remove 12 double circuit lattice deadend towers	12.00	Structure		$ 12,000	$ 12,000	**$ 144,000**	
	Remove 33 suspension structures:							
11.32	Remove 1 double circuit steel suspension tower	1.00	Structure		$ 6,600	$ 6,600	**$ 6,600**	
11.33	*Remove 25 double circuit suspension flex towers:*	25.00	Structure		$ 7,000	$ 7,000	**$ 175,000**	
11.34	Remove 7 2-pole wood suspension structures	7.00	Structure		$ 8,000	$ 8,000	**$ 56,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Line 180/704 – Remove 54 structures (Urban Switch to Gardenville Substation):							
11.35	Remove 21 double circuit lattice deadend towers	21.00	Structure		$ 12,000	$ 12,000	**$ 252,000**	
11.36	Remove 33 suspension structures							
11.37	Remove 3 double circuit steel towers suspension structures	3.00	Structure		$ 6,600	$ 6,600	**$ 19,800**	
11.38	Remove 30 double circuit flex towers suspension structures	30.00	Structure		$ 6,600	$ 6,600	**$ 198,000**	
12	**Wire Installation**							
	Line 181 – Install approximately 18.8 circuit miles, 115kV (Packard Substation to Park Club Lane Substation)							
12.1	Install 18.8 circuit miles of 1590 kcmil ACSR "FALCON" conductor	18.80	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 2,531,232**	
12.2	Install 18.8 miles of 3/8" x 7 strand EHS steel shieldwire	18.80	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 446,688**	
12.3	Conductor attachment assembly at Packard Substation	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 182/180 – Install approximately 11.2 circuit miles, 115kV (Ellicott Junction to Park Club Lane Substation)							
	Install 11.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor:							
12.4	Install 5.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor	5.60	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 753,984**	
12.5	Install 5.6 circuit miles of 1590 kcmil ACSR "FALCON" conductor-Line 180	5.60	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 753,984**	
12.6	Install 11.2 miles of 3/8" x 7 strand EHS steel shieldwire	11.20	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 266,112**	
12.7	Conductor attachment assembly at Park Club Lane Substation	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 181/182 – Install approximately 6.4 circuit miles, 115kV (Park Club Lane Substation to Urban Switch)							
	Install 6.4 circuit miles of 1590 kcmil ACSR "FALCON" conductor:							
12.8	Install 3.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor- Line 181	3.20	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 430,848**	
12.9	Install 3.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor- Line 182	3.20	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 430,848**	
12.10	Install 6.4 miles of 3/8" x 7 strand EHS steel shieldwire	6.40	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 152,064**	
12.11	Conductor attachment assembly at Urban Switch	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 182/54 – Install approximately 8.2 circuit miles, 115kV (Urban Switch to Gardenville Substation):							
	Install 8.2 circuit miles of 1590 kcmil ACSR "FALCON" conductor:							
12.12	Install 4.5 circuit miles of 1590 kcmil ACSR "FALCON" conductor- Line 182	4.50	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 605,880**	
12.13	Install 3.7 circuit miles of 1590 kcmil ACSR "FALCON" conductor-Line 54	3.70	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 498,168**	
12.14	Install 8.2 miles of 3/8" x 7 strand EHS steel shieldwire	8.20	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 194,832**	
12.15	Conductor attachment assembly at Gardenville Substation	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
	Line 182/54 – Install approximately 0.04 circuit miles, 115kV/115kV (American Standard Tap):							
	Install 0.04 circuit miles of 1590 kcmil ACSR "FALCON" conductor							
12.16	Install 0.02 circuit miles of 1590 kcmil ACSR "FALCON"- Line 182 Tap to American Standard Tap	0.02	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 2,693**	
12.17	Install 0.02 circuit miles of 1590 kcmil ACSR "FALCON" - Line 54 Tap to American Standard Tap	0.02	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 2,693**	
12.18	Conductor attachment assembly at American Standard Tap	1.00	Lot		$ 10,000	$ 10,000	**$ 10,000**	
12.19	OPGW- 7 miles and accessories	7.00	Mile	$ 21,632	$ 29,220	$ 50,852	**$ 355,964**	Includes accessories, splicing & testing
13	**Insulator & Hardware Work**							
	Group D1:							
13.1	Tangent - Porcelain String (10 Discs Assembly)	576.00	Set	$ 900	$ 720	$ 1,620	**$ 933,120**	
13.2	Angle & Deadend Porcelain String (10 Disc Assembly)	1,020.00	Set	$ 1,300	$ 1,040	$ 2,340	**$ 2,386,800**	
13.3	Jumper Post Porcelain String (Assembly)	510.00	Set	$ 500	$ 400	$ 900	**$ 459,000**	
14	**Install Structure Work:**							
	Line 181 – Install approximately 240 structures (60 deadends, 180 suspensions) :							
	(Packard Substation to Park Club Lane Substation)							
	Install 180 structures – Packard Substation to Ellicott Junction							
14.1	Install 37 structures (Type S – Single circuit davit arm steel deadend)	37.00	Structure	$ 50,000	$ 45,000	$ 95,000	**$ 3,515,000**	
14.2	Install 143 structures (Type R – Single circuit davit arm wood suspension)	143.00	Structure	$ 3,500	$ 26,000	$ 29,500	**$ 4,218,500**	
	Install 60 structures – Ellicott Junction to Pack Club Lane Substation							
14.3	Install 23 structures (Type S – Single circuit davit arm steel deadend)	23.00	Structure	$ 47,000	$ 26,000	$ 73,000	**$ 1,679,000**	
14.4	Install 37 structures (Type R – Single circuit davit arm wood suspension)	37.00	Structure	$ 3,500	$ 26,000	$ 29,500	**$ 1,091,500**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
	Line 182/180 – Install approximately 60 structures (26 deadends, 34 suspensions), 115kV (Ellicott Junction to Pack Club Lane Substation)							
14.5	Install 1 structure (Type S – Single circuit davit arm steel deadend)	15.00	Structure	$ 47,000	$ 26,000	$ 73,000	**$ 1,095,000**	
14.6	Install 25 structures (Type Q – Double circuit davit arm steel deadend)	25.00	Structure	$ 29,700	$ 26,730	$ 56,430	**$ 1,410,750**	
14.7	Install 34 structures (Type P – Double circuit davit arm steel suspension)	34.00	Structure	$ 21,000	$ 26,000	$ 47,000	**$ 1,598,000**	
	Line 181/182 – Install approximately 39 structures (14 deadends, 24 suspensions, 1 Hframe deadend switch) (Park Club Lane Substation to Urban Switch):							
14.8	Install 14 structures (Type Q – Double circuit davit arm steel deadend)	14.00	Structure	$ 29,700	$ 26,730	$ 56,430	**$ 790,020**	
14.9	Install 24 structures (Type P – Double circuit davit arm steel suspension)	47.00	Structure	$ 21,000	$ 18,900	$ 39,900	**$ 1,875,300**	
14.10	Install 1 H-frame deadend switch structure and switch (Urban 369) (Type T – H-frame deadend switch)	1.00	Structure	$ 45,000	$ 40,500	$ 85,500	**$ 85,500**	
	Line 182/54 – Install approximately 53 structures (15 deadends, 38 suspension tangents) (Urban Switch to Gardenville Substation)							
14.11	Install 15 structures (Type Q – Double circuit davit arm steel deadend)	15.00	Structure	$ 29,700	$ 26,730	$ 56,430	**$ 846,450**	
14.12	Install 38 structures (Type P – Double circuit davit arm steel suspension)	38.00	Structure	$ 21,000	$ 18,900	$ 39,900	**$ 1,516,200**	
15	**Install Foundation Work:**							
	Line 181 – Install 60 drilled shaft foundations and 180 direct embed holes (Packard Substation to Park Club Lane Substation)							
	Install 60 drilled shaft foundations:							
15.1	Install 47 drilled shaft - 6 feet diameter, depth of 23 feet	47.00	Structure		$ 27,000	$ 27,000	**$ 1,269,000**	Supply and Install
15.2	Type S– Single circuit davit arm steel tangent deadend - foundation accessories, misc. works	47.00	Structure		$ 13,000	$ 13,000	**$ 611,000**	
15.3	Install 13 drilled shaft - 8 feet diameter, depth of 37 feet - foundation accessories, misc. works	13.00	Structure		$ 30,000	$ 30,000	**$ 390,000**	
15.4	Type S– Single circuit davit arm 90° line angle deadend)	13.00	Structure		$ 13,000	$ 13,000	**$ 169,000**	
15.5	Install 180 direct embed holes - embedment depth of 14 feet	180.00	Structure		$ 16,000	$ 16,000	**$ 2,880,000**	
15.6	Type R – Single circuit davit arm wood suspension - - foundation accessories, misc. works	180.00	Structure		$ 13,000	$ 13,000	**$ 2,340,000**	
	Line 182/180 – Install 26 drilled shaft foundations and 34 direct embed holes (Ellicott Junction to Pack Club Lane Substation):							
	Install 26 drilled shaft foundations:							
15.7	Install 1 drilled shaft - 6 feet diameter, depth of 23 feet	1.00	Structure		$ 27,000	$ 27,000	**$ 27,000**	
15.8	Type S – Single circuit davit arm steel tangent deadend - foundation accessories, misc. works	1.00	Structure	$ 18,000	$ 13,000	$ 31,000	**$ 31,000**	
15.9	Install 24 drilled shaft - 6 feet diameter, depth of 31 feet	24.00	Structure		$ 28,000	$ 28,000	**$ 672,000**	
15.10	Type Q – Double circuit davit arm steel tangent deadend - foundation accessories, misc. works	24.00	Structure	$ 29,700	$ 13,000	$ 42,700	**$ 1,024,800**	
15.11	Install 1 drilled shaft - 8 feet diameter, depth of 37 feet	1.00	Structure		$ 35,000	$ 35,000	**$ 35,000**	
15.12	Type Q – Double circuit davit arm 90° line angle deadend - foundation accessories, misc. works	1.00	Structure	$ 29,700	$ 13,000	$ 42,700	**$ 42,700**	
15.13	Install 34 direct embed holes - embedment depth of 20 feet	34.00	Structure		$ 18,000	$ 18,000	**$ 612,000**	Supply and Install
15.14	Type P – Double circuit davit arm steel suspension - foundation accessories, misc. works	34.00	Structure		$ 13,000	$ 13,000	**$ 442,000**	
	Line 181/182 – Install16 drilled shaft foundations and 24 direct embed holes (Park Club Lane Substation to Urban Switch):							
	Install 16 drilled shaft foundations:							
15.15	Install 13 drilled shaft - 6 feet diameter, depth of 23 feet	13.00	structure		$ 27,000	$ 27,000	**$ 351,000**	
15.16	Type Q – Double circuit davit arm steel tangent deadend - foundation accessories, misc. works	13.00	structure	$ 29,700	$ 13,000	$ 42,700	**$ 555,100**	
15.17	Install 1 drilled shaft - 8 feet diameter, depth of 37 feet	1.00	structure		$ 30,000	$ 30,000	**$ 30,000**	Supply and Install
15.18	Type Q – Double circuit davit arm 90° angle deadend - foundation accessories, misc. works	1.00	structure	$ 29,700	$ 13,000	$ 42,700	**$ 42,700**	
15.19	Install 2 drilled shaft – 5 feet diameter, depth of 16 feet	2.00	structure		$ 16,000	$ 16,000	**$ 32,000**	Supply and Install
15.20	Type T – H-frame deadend switch - foundation accessories, misc. works	1.00	structure		$ 15,000	$ 15,000	**$ 15,000**	Supply and Install
15.21	Install 24 direct embed holes - embedment depth of 20 feet	24.00	structure	$ 9,000	$ 18,000	$ 27,000	**$ 648,000**	
15.22	Type P – Double circuit davit arm steel suspension - foundation accessories, misc. works	26.00	structure	$ 9,000	$ 13,000	$ 22,000	**$ 572,000**	
	Line 182/54 – Install 15 drilled shaft foundations and 38 direct embed holes (Urban Switch to Gardenville Substation)							
15.23	Install 15 drilled shaft foundations							

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
15.24	Install 14 drilled shaft - 6 feet diameter, depth of 31 feet	14.00	structure		$ 36,000	$ 36,000	**$ 504,000**	Supply and Install
15.25	Type Q – Double circuit davit arm steel tangent deadend - foundation accessories, misc. works	14.00	structure	$ 29,700	$ 13,000	$ 42,700	**$ 597,800**	
15.26	Install 1 drilled shaft - 8 feet diameter, depth of 38 feet	1.00	structure		$ 38,000	$ 38,000	**$ 38,000**	Supply and Install
15.27	Type Q – Double circuit davit arm 90° angle deadend - foundation accessories, misc. works	1.00	structure	$ 29,700	$ 13,000	$ 42,700	**$ 42,700**	
15.28	Install 38 direct embed holes - embedment depth of 20 feet	38.00	structure		$ 18,000	$ 18,000	**$ 684,000**	
15.29	Type P – Double circuit davit arm steel suspension - foundation accessories, misc. works	38.00	structure	$ 9,000	$ 13,000	$ 22,000	**$ 836,000**	
	Line Switches							
15.3	Supply and Install line switch for WG-D1	1.00	Unit		$ 100,000	$ 100,000	**$ 100,000**	Supply and Install
WG D1 - TOTAL SUPPLY & INSTALL:							**$ 55,276,810**	
WG-E NEW BUS BREAKER AT PACKARD STATION								
16	**New Bus Breaker at Packard Station**							
16.1	GCB 115kV - 3000A, 63kA	1.00	Unit		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
16.2	115LB1WV1 1 Way Loadbreak Switch Vertical (Located at Structure T and includes the pole)	1.00	Structure		$ 250,000	$ 250,000	**$ 250,000**	
16.3	Relocate 1 No. existing 115kV 3000A disconnect switch 343 to the right of tie breaker R342	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
16.4	Install one new 115kV 123kV , 63kA 3000A SF6 bus tie breaker in series with existing 115kV Areva bus tie R342 b	1.00	Sum	$ 150,000	$ 50,000	$ 200,000	**$ 200,000**	
16.5	Install new cable and conduit between new tie breaker and control house and associated shield cables	1.00	Sum		$ 35,000	$ 35,000	**$ 35,000**	Supply & Install
16.6	Install new set of AL power conductors and AL four hole pad connectors	1.00	Sum		$ 12,000	$ 12,000	**$ 12,000**	
16.7	Install new AL bus and a 5" upper bus extension to existing breaker R2103 and associated disconnect switches	1.00	Sum		$ 18,000	$ 18,000	**$ 18,000**	
16.8	Structures for Switch and Bus Support	1.00	Sum		$ 30,000	$ 30,000	**$ 30,000**	
16.9	Relocate 115kV disconnect switch 2104 and R2103	1.00	Sum		$ 15,000	$ 15,000	**$ 15,000**	
16.10	Grounding all new electrical equipment	1.00	Sum		$ 10,000	$ 10,000	**$ 10,000**	
16.11	Reconnect, control and integration, test and commissioning	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
16.12	Supply and Install new 115kV switch R2101	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	
16.13	Allowance for all secondary electrical works including DC power, AC power and system protection	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
WG-E - TOTAL SUPPLY & INSTALL:							**$ 880,000**	
WG-F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD SUBSTATION FOR LINE 181								
17	**Replace Thermally Limiting Equipment at Packard Substation for Line 181**							
17.1	Conductor & insulator replacement	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
WG-F - TOTAL SUPPLY & INSTALL:							**$ 200,000**	
WG-G NEW 115kV SWITCHING STATION								
18	**Supply and Install new 115kV Switching Station near Park Club Lane**							
	Structures							
18.1	Angles Bus Support- 3 Phase	7.00	Unit	$ 5,000	$ 10,000	$ 15,000	**$ 105,000**	
18.2	Sta. SVC Stand- 3 Phases	1.00	Unit	$ 15,000	$ 20,000	$ 35,000	**$ 35,000**	
18.3	Switch Stands (assume future SW Stands use bus supports)	18.00	Unit	$ 25,000	$ 30,000	$ 55,000	**$ 990,000**	
18.4	Misc. Structures	1.00	Sum		$ 385,000	$ 385,000	**$ 385,000**	
18.5	Line Terminal (shared columns)	3.00	Unit	$ 18,000	$ 22,000	$ 40,000	**$ 120,000**	
18.6	Lightning Masts	8.00	Unit	$ 45,000	$ 25,000	$ 70,000	**$ 560,000**	
	Equipment		Unit					
18.7	115kV Switches	16.00	Unit		$ 100,000	$ 100,000	**$ 1,600,000**	
18.8	115kV Line Switches	5.00	Unit		$ 100,000	$ 100,000	**$ 500,000**	
18.9	115kV Instrument Transformers	1.00	Sum		$ 545,000	$ 545,000	**$ 545,000**	
18.10	115kV Circuit Breakers	8.00	Unit	$ 150,000	$ 50,000	$ 200,000	**$ 1,600,000**	
18.11	115kV Sta SVC- 1Phase	3.00	Unit	$ 50,000	$ 18,000	$ 68,000	**$ 204,000**	
18.12	Arrestor	15.00	Unit	$ 50,000	$ 25,000	$ 75,000	**$ 1,125,000**	
18.13	Arrestor Sta SVC	3.00	Unit	$ 75,000	$ 25,000	$ 100,000	**$ 300,000**	
	Foundations							
18.14	Grading, Civils, Access Works, Ground Grid, Conduit	1.00	Sum		$ 325,000	$ 325,000	**$ 325,000**	Supply & Install
18.15	Foundations for Low Profile Structures	68.00	Unit		$ 5,000	$ 5,000	**$ 340,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
18.16	Caisson DE Structures	10.00	Structure		$ 75,000	$ 75,000	**$ 750,000**	
18.17	115kV Circuit Breaker Pad	8.00	Sum		$ 10,000	$ 10,000	**$ 80,000**	
18.18	Pier Lighting Mast	8.00	Sum		$ 5,000	$ 5,000	**$ 40,000**	
	Control House							
18.19	Control House 35' x 65' (includes supply & install and foundations)	1.00	Sum	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	Supply & Install (includes foundations)
	Protection, Telecom, Connections, Misc.							
18.20	Cable and Wire	1.00	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
18.21	Protection, Telecom and Metering Equipment (Panels)	23.00	Sum		$ 30,000	$ 30,000	**$ 690,000**	Supply & Install
WG-G - TOTAL SUPPLY & INSTALL:							**$ 11,169,000**	
SEGMENT 3								
WG-H PACKARD-HUNTLEY & WALCK-HUNTLEY DOUBLE CIRCUIT LINE WORKS								
Description of Work: Re-conductor 18.2 circuit miles of the Packard-Huntley and Walck - Huntley Double Circuit Line between structures 140 and Huntley Substation. Scope includes foundation and structure works and replacement of insulators, fittings and hardware.								
19	**Wire Removal Work**							
	Line 130/133 – Remove approximately 18.2 circuit miles, 115kV/69kV (Packard Structures 140 and -Huntley Substation):							
19.1	Remove 18.2 circuit miles (typically 350 MCM 19 strand Copper)	18.20	Mile		$ 15,000	$ 15,000	**$ 273,000**	
19.2	Transfer existing 3/8" x 7 steel EHS shieldwire on 6 structures	26.60	Mile		$ 24,000	$ 24,000	**$ 638,400**	
	Structure Removal Work							
	Line 130/133 – Remove 7 double circuit steel deadend lattice towers, 115kV/69kV (Packard Structures 140 and -Huntley Substation):							
	Remove 11 deadend structures:							Supply & Install
19.3	Remove 7 double circuit lattice deadend towers	7.00	Structure		$ 12,000	$ 12,000	**$ 84,000**	
19.4	Remove 4 single pole wood deadend structures	4.00	Structure		$ 6,000	$ 6,000	**$ 24,000**	
19.5	Remove 1 double circuit steel suspension flex tower	1.00	Structure		$ 14,000	$ 14,000	**$ 14,000**	
	Structure Re-inforce Work							
19.6	Install 8 concrete foundation caissons	8.00	Structure		$ 150,000	$ 150,000	**$ 1,200,000**	
19.7	Install 4 wood 3-pole deadend pole structures in kind	4.00	Structure	$ 25,000	$ 25,000	$ 50,000	**$ 200,000**	
19.8	Replace seven double circuit steel deadend lattice towers with double circuit steel deadend single pole structures on concrete foundations.	7.00	Structure		$ 85,000	$ 85,000	**$ 595,000**	Supply & Install
19.9	Replace one double circuit steel suspension flex tower with double circuit steel deadend single pole structure on concrete foundation.	1.00	Structure		$ 85,000	$ 85,000	**$ 85,000**	
19.10	Replace steel members on (16) deadend lattice towers	16.00	Structure		$ 10,000	$ 10,000	**$ 160,000**	
19.11	Replace hardware on (30) double circuit deadend structures	30.00	Structure		$ 4,000	$ 4,000	**$ 120,000**	
19.12	Install longitudinal guys on two flex towers	2.00	Structure		$ 25,000	$ 25,000	**$ 50,000**	
19.13	Install (4) temporary wood single pole deadend structures at every deadend structure to be replaced	44.00	Unit		$ 15,000	$ 15,000	**$ 660,000**	
	Wire Installation							
19.14	*Line 130/133 – Reconductoring, 115kV/69kV (Packard Structures 140 and -Huntley Substation):*							
19.15	Transfer 4 double circuit miles of 1590 kcmil ACSR "FALCON" conductor	4.00	Mile	$ 28,000	$ 40,000	$ 68,000	**$ 272,000**	
19.16	Install 18.2 miles of 3/8" x 7 strand EHS steel shieldwire	18.20	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 432,432**	
19.17	Miscellaneous assemblies	1.00	Lot		$ 30,000	$ 30,000	**$ 30,000**	
19.18	OPGW- 18.2 miles and accessories	18.20	Mile	$ 21,632	$ 29,220	$ 50,852	**$ 925,506**	Supply & Install, Splicing, Accessories etc.
	Insulator & Hardware Work							
19.19	Tangent - Porcelain String (10 Discs Assembly)	390.00	Set	$ 900	$ 720	$ 1,620	**$ 631,800**	
19.20	Angle & Deadend Porcelain String (10 Disc Assembly)	192.00	Set	$ 1,300	$ 1,040	$ 2,340	**$ 449,280**	
19.21	Jumper Post Porcelain String (Assembly)	81.00	Set	$ 500	$ 400	$ 900	**$ 72,900**	
19.22	Shieldwire Suspension Clamps	32.00	Set	$ 500	$ 400	$ 900	**$ 28,800**	
19.23	Shieldwire DE Clamps	80.00	Set	$ 800	$ 640	$ 1,440	**$ 115,200**	
19.24	Miscellaneous materials, dampers, grounding etc.	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
WG-H - TOTAL SUPPLY & INSTALL:							**$ 7,261,318**	
WG-I - UPGRADE AMPACITY OF LINES 130 AND 133 AT HUNTLEY SUBSTATION								
20.1	Upgrade ampacity of Lines 130 & 133 at Huntley Substation	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
20.2	Remove the span between Structures 80 and 414 on the denergized Beck – Terminal Station C 105 sub-transmission line in the vicinity of Structure 167 per input from NY-TLS. A temporary wood single pole structure may be needed in the vicinity of Structure 80 to mitigate any concerns with unbalanced load at the structure. The section of the Beck – Terminal Station C 105 sub-transmission line sharing the ROW with the 130/133 D/C line will be removed as part of the 115 kV Packard –Urban 181 line proposed scope of work for the Western New York Project.	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
20.3	Mitigation works to lower the edge of ROW magnetic fields on the Packard – Huntley 130 line between Structures 140 and 160. The scope of work consists of transposing the top and bottom conductor phases on the 130 line outside Huntley Substation and Walck Road Switch Station in the span between Structure 242 and the bus structures at Huntley Substation and between Walck Road Switch and Structure 132 at Walck Road Switch Station.	1.00	Sum		$ 15,000	$ 15,000	**$ 15,000**	
WG-I - TOTAL SUPPLY & INSTALL:							**$ 235,000**	
SEGMENT 4								
WG-J - REFURBISHMENT WORKS ON LINES 191								
	WG-J							
21	**Wire work:**							
21.1	Reconductor 3.6 circuit miles with 2156 kcmil ACSS “Bluebird” conductor.	3.60	Mile	$ 55,440	$ 79,200	$ 134,640	**$ 484,704**	
21.2	Replace 3.2 miles of existing shieldwire with 7/16" EHS shieldwire.	3.20	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 76,032**	
21.3	Transfer conductor, shieldwire and hardware on existing 101, 102, 61 lines to new suspension structures.	13.00	Structure		$ 20,000	$ 20,000	**$ 260,000**	Supply & Install
21.4	Transfer conductor, shieldwire and hardware on existing 101, 102, 61 lines to new deadend structures.	16.00	Structure		$ 25,000	$ 25,000	**$ 400,000**	
21.5	Replace deadend hardware attachment assemblies at the bus structures on the Niagara Substation and Packard Substation.	1.00	Sum		$ 20,000	$ 20,000	**$ 20,000**	
22	**Structure work:**					$ -	**$ -**	
22.1	Replace six double circuit deadend lattice towers with 6 D/C deadend steel davit arm structures.	6.00	Structure		$ 75,000	$ 75,000	**$ 450,000**	Supply & Install
22.2	Replace tower members and bolts on 12 lattice towers	12.00	Structure		$ 50,000	$ 50,000	**$ 600,000**	
22.3	Install 6 caisson foundations (8'x20') for D/C deadend steel davit are structures	6.00	Structure		$ 150,000	$ 150,000	**$ 900,000**	
22.4	Remove concrete footers at 6 structure locations (4 footers per structure)	24.00	Units		$ 20,000	$ 20,000	**$ 480,000**	
WG-J- TOTAL SUPPLY & INSTALL:							**$ 3,670,736**	
SEGMENT 5								
WG-M - LINE WORK 103,104								
23	**Wire and Hardware Work**							
23.1	Reconductor with 795MCM ACRS conductor to sections of lines 103 & 104 of 636MCM ACC	4,000.00	Ft	$ 4	$ 5	$ 9	**$ 34,000**	
23.2	Install 0.1 miles of 3/8” x 7 strand EHS steel shieldwire	0.10	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 2,376**	
	Structure work:							
23.3	Remove existing structures 55A1, 55A2, 55A3, 55B1, 55B2, 55B3, 55B4 and 55B5	5.00	Structure		$ 10,000	$ 10,000	**$ 50,000**	
23.4	Remove existing conductor and 1/2" EHS	5.00	Structure		$ 5,000	$ 5,000	**$ 25,000**	
23.5	Install new steel vertical deadend pulloff structures	2.00	Structure		$ 50,000	$ 50,000	**$ 100,000**	Supply & Install
23.6	Install new steel three pole deadend pullof structure	1.00	Structure		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
	Foundation Work							
23.7	Install 2 foundations using a vibratory caisson, helical pile or other methods	2.00	Structure		$ 75,000	$ 75,000	**$ 150,000**	Supply & Install
23.8	Install 1 new vibratory caisson foundation	1.00	Structure		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
WG-M TOTAL SUPPLY & INSTALL:							**$ 486,376**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
WG-N - LINE WORK 101, 102, 103, 104								
24	**Upgrade ampacity of Lines 101, 102, 103, 104**							
24.1	Replace Thermally Limiting Equipment at Lockport Station for Lines 101, 102	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
WG-N TOTAL SUPPLY & INSTALL:							**$ 500,000**	
SEGMENT 6								
WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64								
25	**Eliminate Double Circuit Contingency for Line 61/64**							
25.1	Install "A" Delta Davit Arm Steel Suspension 230kV	1.00	Structure		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
25.2	Install "B" Davit Arm Steel DE 230kV	3.00	Structure					
25.3	Conductoring 0.70 circuit miles of 1590 ACSR for the 64 Line.	8,500.00	Ft	$ 5	$ 8	$ 13	**$ 110,500**	
25.4	Replace OGW overhead ground wire 5/8" Dia (230kV)	2.00	Mile	$ 7,920	$ 15,840	$ 23,760	**$ 47,520**	
25.5	Install 8' Dia x 26' deep reinforced concrete foundation caisson (cylindrical) Structure Type S/Q Angle DE (3 Nos)	50.00	CY		$ 1,500	$ 1,500	**$ 75,000**	Supply & Install
25.6	Direct embedment foundation 72" dia x 20' deep	1.00	EA		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
25.7	96" Dia Hole Rock Coring/ Removal	15.00	LF		$ 6,400	$ 6,400	**$ 96,000**	Supply & Install
	Group O-61/64, P1-181:							
25.8	Tangent - Porcelain String (10 Discs Assembly)	159.00	Set	$ 900	$ 720	$ 1,620	**$ 257,580**	
25.9	Angle & Deadend Porcelain String (10 Disc Assembly)	66.00	Set	$ 1,300	$ 1,040	$ 2,340	**$ 154,440**	
25.10	Jumper Post Porcelain String (Assembly)	33.00	Set	$ 500	$ 400	$ 900	**$ 29,700**	
WG-O TOTAL SUPPLY & INSTALL:							**$ 1,570,740**	
WG-P1 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)								
26	**Foundation Works:**							
26.1	Direct Embed for H Frame's	52.00	Structure		$ 15,000	$ 15,000	**$ 780,000**	Supply & Install
26.2	Caissons for Dead End Structures	8.00	Structure		$ 55,000	$ 55,000	**$ 440,000**	Supply & Install
27	**Structure Work:**							
27.1	Install H Frames	52.00	Structure	$ 3,500	$ 26,000	$ 29,500	**$ 1,534,000**	
27.2	Install Dead Ends	8.00	Structure	$ 42,000	$ 37,800	$ 79,800	**$ 638,400**	
28	**Wire work:**							
28.1	1113 kcmil installation	114,000.00	Ft	$ 4	$ 5	$ 9	**$ 969,000**	
28.2	Install double shield wire	75,600.00	Ft	$ 2	$ 3	$ 5	**$ 340,200**	
29	**Insulators & Hardware Work**							
29.1	Suspension Sets	156.00	Ea.	$ 900	$ 720	$ 1,620	**$ 252,720**	
29.2	Angle / Deadend Sets	48.00	Ea.	$ 1,300	$ 1,040	$ 2,340	**$ 112,320**	
29.3	Shieldwire Fittings / Misc. Works	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
WG-P1 TOTAL SUPPLY & INSTALL:							**$ 5,366,640**	
WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181								
30	**Replace Thermally Limiting Equipment at Erie Station for Line 181 (NYSEG 922 Line)**							
30.1	Replacing one 115kV circuit breaker	1.00	Unit	$ 150,000	$ 50,000	$ 200,000	**$ 200,000**	
30.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	
30.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
30.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
30.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	
30.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
30.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-Q TOTAL SUPPLY & INSTALL:							**$ 1,250,000**	
WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)								
31	**Replace Thermally Limiting Equipment at Erie Station for line 54 (NYSEG 921)**							
31.1	Replacing one 115kV circuit breaker	1.00	Unit	$ 150,000	$ 50,000	$ 200,000	**$ 200,000**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
31.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	
31.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
31.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
31.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	
31.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
31.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-R TOTAL SUPPLY & INSTALL:							**$ 1,250,000**	
WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64								
32	**Replace Thermally Limiting Equipment at Robinson Station for Line 64**							
32.1	Replacing two 230kV gang operated circuit breaker	2.00	Sum	$ 250,000	$ 75,000	$ 325,000	**$ 650,000**	
32.2	Instrument Transformers	1.00	Unit		$ 200,000	$ 200,000	**$ 200,000**	
32.3	New disconnect switches	1.00	Lot		$ 100,000	$ 100,000	**$ 100,000**	
32.4	New A&B relay packages	1.00	Lot		$ 50,000	$ 50,000	**$ 50,000**	
32.5	Conductor and insulator replacement	1.00	Lot		$ 200,000	$ 200,000	**$ 200,000**	
32.6	New cabling (control, instrument, power and panel wiring)	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
32.7	Miscellaneous assemblies	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	
WG-U TOTAL SUPPLY & INSTALL:							**$ 1,700,000**	
WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102								
33	**Replace Thermally Limiting Equipment at Niagara Station for Line 102**							
33.1	Substation Equipment Replacement	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
WG-V TOTAL SUPPLY & INSTALL:							**$ 500,000**	
SEGMENT 7	**Local Transmission Plan**							
MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
34	**Contractor Mobilization / Demobilization**						**$ -**	
34.1	Mob / Demob	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
36	**Project Management, Material Handling & Amenities**					$ -	**$ -**	
36.1	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and Cost Manager, SHEQ Staff, Materials Management Staff)	36.00	Months		$ 350,000	$ 350,000	**$ 12,600,000**	
36.2	Site Accommodations, Storage, Amenities, Laydown Yards	1.00	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
37	**Engineering**					$ -	**$ -**	
37.1	Design Engineering	1.00	Sum		$ 10,000,000	$ 10,000,000	**$ 10,000,000**	
37.2	LiDAR	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	
37.3	Geotech	1.00	Sum		$ 1,800,000	$ 1,800,000	**$ 1,800,000**	
37.4	Surveying/Staking	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	
38	**Testing & Commissioning**					$ -	**$ -**	
38.1	Testing & Commissioning of T-Line and Equipment	1.00	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
39	**Permitting and Additional Costs**					$ -	**$ -**	
39.1	Environmental Licensing & Permitting Costs	1.00	Sum		$ 5,965,150	$ 5,965,150	**$ 5,965,150**	
39.2	Environmental Mitigation Costs	1.00	Sum		$ 7,796,225	$ 7,796,225	**$ 7,796,225**	
39.3	Warranties / LOC's	1.00	Sum		$ 1,277,797	$ 1,277,797	**$ 1,277,797**	
39.4	Real Estate Costs (New)	1.00	Sum		$ 172,069	$ 172,069	**$ 172,069**	
39.5	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 1,157,000	$ 1,157,000	**$ 1,157,000**	
39.6	Legal Fees	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
39.7	Sales Tax on Materials	1.00	Sum		$ 4,574,892	$ 4,574,892	**$ 4,574,892**	Includes 8.75% sales tax
39.8	Fees for easements or permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS - TOTAL:							**$ 56,143,133**	
SYSTEM UPGRADE FACILITIES								

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
SUF 1	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						$ 3,750,000	Contingency for possible additional SUF upgrades
SYSTEM UPGRADE FACILITY TOTAL:							$ 3,750,000	

ENVIRONMENTAL LICENSING AND PERMITTING

Revision: 4

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T012									
FEDERAL						Segment 1		Segment 2		Segment 3		Segment 4		Segment 5	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$27,000	$89,000	$42,500	$118,000	$16,200	$68,750			$11,800	$60,600
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$47,800	$134,000	$57,300	$153,000	$14,300	$67,000	$11,550	$61,500		
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000	$3,000	$9,000	$3,000	$9,000	$3,000	$9,000		
STATE															
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans										
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000	$600,000	$3,100,000						
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000	$12,000	$53,000	$12,000	$53,000			$12,000	$53,000
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000	$11,200	$38,000	$11,200	$38,000	$11,200	$38,000		

ENVIRONMENTAL LICENSING AND PERMITTING

Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.	Includes Reports and Plans required for State and Federal Agency Permits, as well as, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan					$10,000	$500,000	$10,000	$500,000	$10,000	$10,000
NYSDOS	State Coastal Zone/ Management Areas	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)		$3,400	$15,000			$3,400	$15,000				
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$21,200	$73,000	$25,000	$84,400	$7,750	$32,650	$6,700	$29,500		
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400	$1,200	$6,400	$1,200	$6,400	$1,200	$6,400		
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000	$17,000	$69,000						
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$3,800	$3,800	$3,800	$3,800	$3,800	$3,800				
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000	$11,000	$24,000	$11,000	$24,000				
REGIONAL															
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000	$11,000	$76,000						
LOCAL/MUNICIPAL															

ENVIRONMENTAL LICENSING AND PERMITTING

Revision: 4

Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans										
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000	$6,000	$40,000	$6,000	$40,000	$6,000	$40,000		
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000	$6,000	$35,000	$6,000	$35,000	$6,000	$35,000		
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000	$18,000	$92,000	$18,000	$92,000	$18,000	$92,000		
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000	$6,000	$35,000	$6,000	$35,000	$6,000	$35,000		
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000	$6,000	$52,000	$6,000	$52,000	$6,000	$52,000		
					Total Cost Range by Segment	$811,600	$3,944,200	$837,000	$3,988,600	$135,850	$1,071,600	$85,650	$898,400	$33,800	$123,600

		Minimum	Maximum	Expected Value
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT TOI2 TOTAL**	**$1,903,900**	**$10,026,400**	**$5,965,150**

Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing

ENVIRONMENTAL MITIGATION ESTIMATE

	Offsite Wetland Mitigation*		ROW Restoration (Seeding)**		Farmland***	
	Min.	Max.	Min.	Max.	Min.	Max.
Area	21 acres	21 acres	82 acres	163 acres	50 acres	100 acres
Cost/Acre	$100,000	$200,000	$4,000	$4,000	$503	$503
Ratio	1:1	3:1	1:1	1:1	1:1	1:1
Total	$2,100,000	$12,600,000	$328,000	$489,000	$25,150	$50,300

T012 MITIGATION TOTAL	**Minimum**	**Maximum**	**Expected Value**
	$2,453,150	**$13,139,300**	**$ 7,796,225**

*Offsite wetland mitigation area assumes 9141 LF Forested Wetland Project Impact Reported in Permitting Summary Table by 100' ROW clearing width; includes design and installation costs only; does not include land acquisition or long term monitoring

**Assumes hydroseeding restoration only for sensitive areas within the ROW requiring timber matting (minus Active Agriculture) 141990 LF by 25' Wide (Min.) or 50' Wide (Max.)

***Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 87,558 LF Matting Impacts to Active Agriculture Land by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition or monitoring

REAL ESTATE ESTIMATE
(NEW ROW)

COUNTY: NIAGARA
DEVELOPER: NATIONAL GRID
SEGMENT: NIAGARA TO LOCKPORT SEGMENT

		Area (Acres)	Total Cost
	Total Cost	17.98	$ 172,069

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

Revision: 4

COUNTY: NIAGARA & ERIE
DEVELOPER: NATIONAL GRID (T012)
SEGMENT: NIAGARA - GARDENVILLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
T012	National Grid (High Transfer)	Niagara to Gardenville - 36.2 miles	Niagara	203.82	$ 1,157,224
			Erie	92.85	

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
b) Construction Schedule is in accordance with the Developers proposed schedule - we have assumed continuous working with no breaks in the
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed that pole weights include anchor bolts.
f) The Developer has assumed gravel work pads. During our ROW visit it was determined that matted work pads are required.
g) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
h) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
i) 15% Contractor Mark Up (OH&P) has been applied.
j) Assumes all environmental data and project details provided are accurate unless noted otherwise
k) USFWS T&E Assumes that ¼ of the total project route per segment will require field survey for T&E (Segment 1 – 9 miles, Segment 2 – 10.9 miles, Segment 3 – 2.28 miles, Segment 4 – 1.75 miles)
l) NEPA-Assumes no NEPA because Art VII (Segments 1 and 2)
m) Article 7 Intervenor Fund payment expected to be $100,000
n) SHPO- Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of project route (Segment 1 – 18 miles, Segment 2 – 21.8 miles, Segment 3 – 4.55 miles, Segment 4 – 3.5 miles)
o) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII or SEQRA review
p) SEQRA for Segments 3, 4 and 5 assumes applicant is not lead agent. Minimum costs assume FEAF Part I with no additional studies. Maximum assumes an expanded EA. SEQRA for Segment 5 assumes minimum only costs.
q) Assumes no coordination with National Parks Service or OPRHP/State Parks
r) NYSDOS – Assumes coordination needed for work at Niagara Station and Huntley Station (Segments 1 and 3)
s) USACE wetland delineation totals assumed length of NWI wetland estimates on Permitting Summary Table. Assumes work group line segment length not duplicated (Segment 1 - 4 miles, Segment 2 - 7.9 miles, Segment 3 - 1.3 mile, Segment 5 – 0.2 miles). Assumes NYSDEC delineations overlap and are
t) Mitigation costs for landscaping only (no paving, sidewalks, soundwalls, etc.)
u) No tree survey or replanting required outside regulated wetlands areas
v) Agricultural mitigation (Segment 1 only) assumes timber matting impacts and pad impacts on active agriculture land linear feet (87,558) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum

ASSUMPTIONS AND CLARIFICATIONS

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w) Wetland mitigation area 100' wide ROW by 9141' Forested Wetland Project Impact (Segment 1) Reported in Permitting Summary Table. Wetland mitigation includes design and installation costs only; does not include land acquisition or long term monitoring. Offsite mitigation for new ROW disturbance at 1:1 and 3:1 and mitigation within ROW seeding only. Assumes no off-site wetland mitigation is required for other work segments.
x) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B7

T013 – NYPA/ NYSEG

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T013 - NYPA and NYSEG

Revision: 4

SUMMARY OF COST ESTIMATE

	Description	Total Amount
1	DYSINGER SWITCHING STATION	$ 21,947,000
2	GARDENVILLE TO STOLLE ROAD 230KV TRANSMISSION LINE RECONDUCTORING	$ 14,140,200
3	LINE SEPARATION	$ 2,292,025
4	SOUTH PERRY SUBSTATION	$ 5,421,000
5	STOLLE ROAD SUBSTATION	$ 36,859,022
6	DYSINGER - STOLLE ROAD NEW 345kV TRANSMISSION LINE	$ 46,864,263
7	MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 40,364,217
	CONTRACTOR MARK UP (OH&P) 15%	$ 25,183,159
	SUBTOTAL:	$ 193,070,885
	CONTINGENCY ON ENTIRE PROJECT (20%)	$ 38,614,177
	TOTAL PROJECT COST:	**$ 231,685,063**

SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Revision: 4

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
1. DYSINGER SWITCHING STATION								
Description of Work: The proposed new Dysinger Switching Station, an approximately five acre station, is planned to be located in the Town of Royalton in Niagara County, New York. The station requires the acquisition of one parcel of property.								
1	**Supply and Install a New Switching Station**							
1.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.0	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
1.2	Substation Fence	2,020.0	LF		$ 200	$ 200	**$ 404,000**	Supply & Install
1.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
1.4	Switches 3ph	16.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 112,000**	
1.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
1.6	Line Switches 3 ph with motor-operator	5.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 150,000**	
1.7	Instrument Transformers	1.0	Sum		$ 962,000	$ 962,000	**$ 962,000**	
1.8	Breakers	8.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,040,000**	
1.9	Arrestors (3 per line)	15.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 112,500**	
1.10	Two (2) 345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
1.11	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
1.12	Low Profile Foundations	293.0	Ea		$ 5,000	$ 5,000	**$ 1,465,000**	Supply & Install
1.13	Caisson DE Foundations	32.0	Ea		$ 50,000	$ 50,000	**$ 1,600,000**	Supply & Install
1.14	Circuit Breaker Foundations	8.0	Ea		$ 75,000	$ 75,000	**$ 600,000**	Supply & Install
1.15	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
1.16	345 KV Line trap, 2400 A, for phase B on the line to Stolle Rd.	1.0	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 27,000**	Supply & Install
1.17	Control House and Pad (30' x 90')	1.0	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
1.18	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
1.19	Control Cables	1.0	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
1.20	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
1.21	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
1.22	Protection, Telecom and Metering Equipment (Panels)	30.0	Ea		$ 30,000	$ 30,000	**$ 900,000**	Supply & Install
1.23	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
1.24	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
1.25	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
1.26	Cable Trench Systems for Control Cables	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
1.27	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
1.28	Bus Support 1 Ph	118.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 354,000**	
1.29	Switch Stands	23.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 253,000**	
1.30	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
1.31	Misc. Structures	1.0	Sum		$ 44,000	$ 44,000	**$ 44,000**	
1.32	Substation A-Frame Structures Shared Column	12.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 300,000**	
1.35	Arrestor Stands	15.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 52,500**	
1.36	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
1.37	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	Supply & Install
1. DYSINGER SWITCHING STATION - TOTAL SUPPLY & INSTALL:							**$ 21,947,000**	
2. GARDENVILLE TO STOLLE ROAD 230KV TRANSMISSION LINE RECONDUCTORING								
Description of Work: The Gardenville - Stolle Road section includes re-conductoring approximately 12 miles of the existing 230kV Line Gardenville -Stolle Road Circuit #66, between the Towns of West Seneca and Elma, Erie County. The line crosses 14 roads and two railroads. The existing line is supported by double circuit steel structure towers for most of the 12 miles and transitions to wood H-Frame structures for the last four miles connecting to Stolle Road Substation. The project utilizes the existing structures for the re-conductoring. The project also includes upgrade of existing protection relays in the remote ends of Gardenville and Stole Road Substations.								
2	**230kV Reconductoring**						**$ -**	
2.1	Reconductoring 1590 ACSR Falcon	250,000.00	Ft	$ 3	$ 5	$ 8	**$ 1,875,000**	
2.2	Reconductoring shield wire	83,000.00	Ft	$ 1	$ 5	$ 6	**$ 473,100**	
2.3	Reconductoring 48 fibers OPGW (1)	83,000.00	Ft	$ 4	$ 5	$ 9	**$ 763,600**	
2.4	OPGW Splice Boxes	5.00	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 12,500**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
2.5	OPGW Splice & Test	1.00	Sum		$ 6,000	$ 6,000	**$ 6,000**	
2.6	Insulators for suspension structures (ANSI 52-5 and 52-8)	96.00	Set	$ 1,500	$ 1,500	$ 3,000	**$ 288,000**	
2.7	Miscellaneous including hardware, guying, etc.	12.00	Mile		$ 30,000	$ 30,000	**$ 360,000**	Supply & Install
2.8	Matting for wetland & sensitive areas	105,600.00	Ft		$ 70	$ 70	**$ 7,392,000**	
2.9	Access Roads	140.00	Structure		$ 10,000	$ 10,000	**$ 1,400,000**	
2.10	Remove existing conductor	8.00	Mile	$ 15,000	$ 15,000	$ 30,000	**$ 240,000**	
2.11	Replacement of 20% of steel structure arms and cross sections	12.00	Structure	$ 10,000	$ 10,000	$ 20,000	**$ 240,000**	
2.12	Replacement of 20% of wood H-Frames pieces	6.00	Structure	$ 7,500	$ 7,500	$ 15,000	**$ 90,000**	
2.13	Miscellaneous	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
2. GARDENVILLE TO STOLLE ROAD 230KV TRANSMISSION LINE RECONDUCTORING- TOTAL SUPPLY & INSTALL:							**$ 14,140,200**	
3. LINE SEPARATION								
Description of Work: The project includes separation of three structures approximately 3,000 feet of National Grid's Niagara to Packard line 61 and NYSEG's Niagara to Robinson Road line 64.								
3.1	Foundations - Tangents-Delta Configuration-1(single circuit)	1.00	EA		$ 60,000	$ 60,000	**$ 60,000**	Supply & Install
3.2	Foundations - Slight-Angles-Vertical Configuration	1.00	EA		$ 90,000	$ 90,000	**$ 90,000**	Supply & Install
3.3	Foundations - Heavy Angle-Vertical Configuration (15-25 degrees))-1 (double circuit)	1.00	EA		$ 120,000	$ 120,000	**$ 120,000**	Supply & Install
3.4	Foundations - Dead-Ends Vertical Configuration (25-90 degrees)- 2 (single circuit)	1.00	EA		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
3.5	Steel Poles 345kV Heavy Dead-End Structures	1.00	EA	$ 125,000	$ 75,000	$ 200,000	**$ 200,000**	
3.6	Steel Poles 345kV Slight Angles Vertical Structures	1.00	EA	$ 117,000	$ 80,300	$ 197,300	**$ 197,300**	
3.7	Steel Poles 345kV Angles >60 Structures	1.00	EA	$ 93,500	$ 56,000	$ 149,500	**$ 149,500**	
3.8	Steel Poles 345kV Tangent-Delta Configuration Structures	1.00	EA	$ 38,000	$ 23,000	$ 61,000	**$ 61,000**	
3.9	Conductoring 1192 45/7" "BUNTING" ACSR	20,000.00	Ft	$ 3	$ 5	$ 8	**$ 160,000**	
3.10	Shield wiring 7/16 EHS Static	5,000.00	Ft	$ 1	$ 5	$ 6	**$ 28,500**	
3.11	V-strings Suspension and tension strings hardware, OPGW, vibration dampers and spacers	20.00	EA	$ 5,000	$ 5,000	$ 10,000	**$ 200,000**	
3.12	Insulators for suspension structures (ANSI 52-5 and 52-8)	30.00	EA	$ 850	$ 850	$ 1,700	**$ 51,000**	
3.13	Miscellaneous	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	
3.14	Matting for wetland & sensitive areas	5,280.00	Ft		$ 70	$ 70	**$ 369,600**	
3.15	Access Roads to each structure	6.00	EA		$ 10,000	$ 10,000	**$ 60,000**	
3.16	Work Pads	75,000.00	SQFT		$ 4	$ 4	**$ 264,000**	
3.17	Restoration of Work Pad Areas	7,500.00	SQFT		$ 0.2	$ 0.2	**$ 1,125**	
3.18	Clearing existing ROW for work spaces	2.00	Acre		$ 15,000	$ 15,000	**$ 30,000**	
3. LINE SEPARATION- TOTAL SUPPLY & INSTALL:							**$ 2,292,025**	
4. SOUTH PERRY SUBSTATION								
Description of Work: The project includes upgrades to the existing South Perry Substation.								
4	**Supply and Install New Phase Angle Regulator**							
4.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.00	Sum		$ 375,000	$ 375,000	**$ 375,000**	
4.2	Substation Fence	375.00	LF		$ 200	$ 200	**$ 75,000**	Supply & Install
4.3	115kV 82MVA Phase Angle Regulator	1.00	Ea	$ 3,500,000	$ 500,000	$ 4,000,000	**$ 4,000,000**	
4.4	Switches 3ph	2.00	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 14,000**	
4.5	Line Switches 3 ph with motor-operator	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
4.6	Instrument Transformers	1.00	Sum		$ 121,000	$ 121,000	**$ 121,000**	
4.7	Arrestors	9.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 67,500**	
4.8	Low Profile Foundations	11.00	Ea		$ 5,000	$ 5,000	**$ 55,000**	Supply & Install
4.9	Caisson DE Foundations	4.00	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
4.10	Control Cables	1.00	Sum	$ 10,000	$ 10,000	$ 20,000	**$ 20,000**	
4.11	Protection, Telecom and Metering Equipment (Panels)	4.00	Ea		$ 30,000	$ 30,000	**$ 120,000**	Supply & Install
4.12	Control Conduits to Equipment	1.00	Sum		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
4.13	Grounding	1.00	Sum		$ 90,000	$ 90,000	**$ 90,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
4.14	Bus Support 1 Ph	3.00	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
4.15	Switch Stands	2.00	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 22,000**	
4.16	Misc. Structures	1.00	Sum		$ 12,000	$ 12,000	**$ 12,000**	
4.17	Substation A-Frame Structures	1.00	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
4.18	Arrestor Stands	3.00	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
4.19	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 100,000	$ 100,000	**$ 100,000**	
4. SOUTH PERRY SUBSTATION- TOTAL SUPPLY & INSTALL:							**$ 5,421,000**	
5. STOLLE ROAD SUBSTATION								
Description of Work: The project includes upgrades to the existing Stolle Road Substation.								
5	**Supply and Install Substation upgrading equipment**							
5.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
5.2	345-230kV, 240/320/400/448 MVA (55//65 deg C) Auto-transformer connected Y-Y-Delta	2.00	Ea	$ 3,900,000	$ 500,000	$ 4,400,000	**$ 8,800,000**	
5.3	345 kV, 3000A, 40ka Breakers, IPO	9.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 3,420,000**	
5.4	345 kV, 3000A, 3PH-GOP, 63 kA, motor-operated switches	18.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 540,000**	
5.5	345 kV, 3000A, 3PH-GOP, 63 kA, motor-operated switches equipped w/interlocked grounding switch	1.00	Ea	$ 20,000	$ 16,000	$ 36,000	**$ 36,000**	
5.6	Instrument Transformers	1.00	Sum		$ 1,137,200	$ 1,137,200	**$ 1,137,200**	
5.9	Station Class Surge Arresters - ratings: 276 kV/220 kV MVOC	21.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 157,500**	
5.10	345 KV Line trap, 2400 A, for phase B on the line to Dysinger	1.00	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 27,000**	
5.11	XLPE Cable 2000 KCM Supply and Installation	3,000.00	Ft	$ 60	$ 48	$ 108	**$ 324,000**	
5.12	Terminations	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
5.13	Ductbank	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
5.14	345 kV Post Insulators	37.00	Ea	$ 750	$ 600	$ 1,350	**$ 49,950**	
5.15	5" AL T6-6061 IPS Bus bar	4,068.00	Ft	$ 5	$ 4	$ 8	**$ 32,544**	
5.16	1590 KCM AAC Overhead Cable	12,972.00	Ft	$ 3	$ 2	$ 5	**$ 58,374**	
5.17	Control House Steel 26' x 62' and Pad	1.00	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
5.18	RELAY BUS DIFF 115 KV GE B30 SYS B	3.00	Ea	$ 12,000	$ 9,600	$ 21,600	**$ 64,800**	
5.19	RELAY BUS DIFF 115 KV SEL 487B SYS A	3.00	Ea	$ 7,000	$ 5,600	$ 12,600	**$ 37,800**	
5.20	RELAY SEL 421 LN DIST APP SYS A	1.00	Ea	$ 7,000	$ 5,600	$ 12,600	**$ 12,600**	
5.21	RELAY CAP BK/MFER/LN B 115 KV SYSA SEL451	9.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 81,000**	
5.22	RELAY BUS DIFF 345 KV SEL 487E SYS A	4.00	Ea	$ 9,000	$ 7,200	$ 16,200	**$ 64,800**	
5.23	RELAY GE T60 345/115/34/12/KV TFR DIFF/RE	4.00	Ea	$ 9,000	$ 7,200	$ 16,200	**$ 64,800**	
5.24	RELAY PRT MOD GE L90 W7K	1.00	Ea	$ 14,000	$ 11,200	$ 25,200	**$ 25,200**	
5.25	Protection, Telecom and Metering Equipment (Panels)	17.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 153,000**	
5.26	Guard 800, RFL 9780, 9785	3.00	Ea	$ 10,000	$ 8,000	$ 18,000	**$ 54,000**	
5.27	125VDC Substation Battery Systems (345 kV)	2.00	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
5.28	(345 kV, 230 KV, 115 kV)	1.00	Ea	$ 3,750	$ 3,000	$ 6,750	**$ 6,750**	
5.29	JMUX's (Including remote ends)	3.00	Ea	$ 9,000	$ 7,200	$ 16,200	**$ 48,600**	
5.30	HVI-Positron (Including remote ends)	3.00	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 81,000**	
5.31	230 kV, 3000A, 40ka Breakers, 3PH-GOP	5.00	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 1,625,000**	
5.32	230 kV, 3000A, 3PH-GOP, 63 kA, motor-operated switches	12.00	Ea	$ 20,000	$ 15,000	$ 35,000	**$ 420,000**	
5.33	230 kV, 3000A, 3PH-GOP, 63 kA, motor-operated switches equipped w/interlocked grounding switch	1.00	Ea	$ 20,000	$ 15,000	$ 35,000	**$ 35,000**	
5.34	230 kV S/P CCVT, 207000:115-69V (1800-3000:1-1) Instrument Transformers	18.00	Ea	$ 14,000	$ 8,000	$ 22,000	**$ 396,000**	
5.35	Station Class Surge Arresters - ratings: 172 kV/140 kV MVOC	21.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 157,500**	
5.36	XLPE Cable 2000 KCM Supply and Installation	11,448.00	Ft	$ 15	$ 12	$ 26	**$ 297,648**	
5.37	230 kV Post Insulators	39.00	Ea	$ 650	$ 520	$ 1,170	**$ 45,630**	
5.38	5" AL T6-6061 IPS Bus bar	1,951.00	Ft	$ 5	$ 4	$ 8	**$ 15,608**	
5.39	1590 KCM AAC Overhead Cable	2,000.00	Ft	$ 2	$ 2	$ 4	**$ 7,200**	
5.40	RELAY BUS DIFF 115 KV GE B30 SYS B	1.00	Ea	$ 12,000	$ 9,600	$ 21,600	**$ 21,600**	
5.41	RELAY BUS DIFF 115 KV SEL 487B SYS A	1.00	Ea	$ 7,000	$ 5,600	$ 12,600	**$ 12,600**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
5.42	RELAY SEL 421 LN DIST APP SYS A	4.00	Ea	$ 7,000	$ 5,600	$ 12,600	**$ 50,400**	
5.43	RELAY CAP BK/MFER/LN B 115 KV SYSA SEL451	7.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 63,000**	
5.44	RELAY PRT MOD GE L90 W7K	4.00	Ea	$ 14,000	$ 11,200	$ 25,200	**$ 100,800**	
5.45	Protection & Control Panels	7.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 63,000**	
5.46	Guard 800, RFL 9780, 9785	10.00	Ea	$ 10,000	$ 8,000	$ 18,000	**$ 180,000**	
5.47	125VDC Substation Battery Systems (230 kV)	2.00	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
5.48	115 kV, 3000A, 40ka Breakers, 3PH-GOP	2.00	Ea	$ 150,000	$ 50,000	$ 200,000	**$ 400,000**	
5.49	115 kV, 3000A, 3PH-GOP, 63 kA, motor-operated switches	5.00	Ea	$ 15,000	$ 12,000	$ 27,000	**$ 135,000**	
5.51	Station Class Surge Arresters - ratings: 96 kV/76 kV MVOC	6.00	Ea	$ 5,000	$ 700	$ 5,700	**$ 34,200**	
5.52	XLPE Cable 2000 KCM Supply and Installation	5,500.00	Ft	$ 15	$ 12	$ 26	**$ 143,550**	
5.53	4" AL T6-6061 IPS Bus bar	306.00	Ft	$ 4	$ 3	$ 6	**$ 1,928**	
5.54	1590 KCM AAC Overhead Cable	400.00	Ft	$ 2	$ 2	$ 4	**$ 1,440**	
5.55	RELAY CAP BK/MFER/LN B 115 KV SYSA SEL451	2.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 18,000**	
5.56	Protection & Control Panels	1.00	Ea	$ 5,000	$ 4,000	$ 9,000	**$ 9,000**	
5.57	Miscellaneous Materials and Above / Below Ground Works	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
5.58	Control Cables	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
5.59	Conduit	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
5.60	Cable trenches	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
5.61	Bus works	1.00	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
5.62	Cable and Wire	1.00	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
5.63	New fence	3,040.00	LF		$ 200	$ 200	**$ 608,000**	Supply & Install
5.64	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
5.65	Commissioning and Testing	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
5.66	Low Voltage AC Distribution & DC Panels & Switches	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
5.67	Low Profile	402.00	Structure		$ 5,000	$ 5,000	**$ 2,010,000**	Supply & Install
5.68	Caisson Dead End	31.00	Structure		$ 50,000	$ 50,000	**$ 1,550,000**	Supply & Install
5.69	Circuit Breaker	16.00	Structure		$ 75,000	$ 75,000	**$ 1,200,000**	Supply & Install
5.70	Lightning Mast	17.00	Structure		$ 15,000	$ 15,000	**$ 255,000**	Supply & Install
5.71	Transformer with concrete moat and double steel grating.	2.00	Structure		$ 150,000	$ 150,000	**$ 300,000**	Supply & Install
5.72	Bus Support 1ph	77.00	Unit	$ 2,000	$ 1,000	$ 3,000	**$ 231,000**	
5.73	Bus Support 3ph	12.00	Unit	$ 4,500	$ 2,000	$ 6,500	**$ 78,000**	
5.74	Switch Stands	37.00	Unit	$ 8,000	$ 3,000	$ 11,000	**$ 407,000**	
5.75	Misc. Structures	1.00	Sum		$ 90,000	$ 90,000	**$ 90,000**	
5.76	Lightning Masts 70-ft	17.00	Unit	$ 10,000	$ 2,000	$ 12,000	**$ 204,000**	
5.77	A-frame Dead End	8.00	Unit	$ 20,000	$ 5,000	$ 25,000	**$ 200,000**	
5.78	H-frame Dead End	2.00	Unit	$ 30,000	$ 15,000	$ 45,000	**$ 90,000**	
5.79	UG Riser Structure 1ph (assume [2] fnds per ph.)	40.00	Unit	$ 15,000	$ 15,000	$ 30,000	**$ 1,200,000**	
5.80	Grounding	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
5. STOLLE ROAD SUBSTATION - TOTAL SUPPLY & INSTALL:							**$ 36,859,022**	
6. DYSINGER - STOLLE ROAD NEW 345kV TRANSMISSION LINE								
Description of Work: The construction of a new approximately 20 miles 345kV single circuit overhead transmission line originating at the new Dysinger Switching Station, and terminating at the existing NYSEG Stolle Road Substation.								
6	**New 345kV Transmission Line**							
6.1	Foundations for Tangents-Delta Configuration	143.00	Structure		$ 60,000	$ 60,000	**$ 8,580,000**	Supply & Install
6.2	Foundations for Slight-Angles-Vertical Configuration	3.00	Structure		$ 90,000	$ 90,000	**$ 270,000**	Supply & Install
6.3	Foundations for Heavy Angle-Vertical Configuration	1.00	Structure		$ 120,000	$ 120,000	**$ 120,000**	Supply & Install
6.4	Foundations Dead-Ends Vertical Configuration	12.00	Structure		$ 150,000	$ 150,000	**$ 1,800,000**	Supply & Install
6.5	Steel Poles 345kV Heavy Dead-End Structures	12.00	Structure	$ 125,000	$ 75,000	$ 200,000	**$ 2,400,000**	
6.6	Steel Poles 345kV Slight Angles Vertical Structures	3.00	Structure	$ 67,000	$ 40,000	$ 107,000	**$ 321,000**	
6.7	Steel Poles 345kV Angles >60 Structures	1.00	Structure	$ 93,500	$ 56,000	$ 149,500	**$ 149,500**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate	TOTAL	Remarks
6.8	Steel Poles 345kV Tangent-Delta Configuration Structures	143.00	Structure	$ 38,000	$ 23,000	$ 61,000	**$ 8,723,000**	
6.9	Conductoring double bundled 795 Drake ACSR	650,000.00	Ft	$ 2	$ 5	$ 7	**$ 4,355,000**	
6.10	Shield wiring of 7#9 Alumoweld (1)	111,000.00	Ft	$ 1	$ 5	$ 6	**$ 632,700**	
6.11	Wiring of 48 fibers OPGW (1)	111,000.00	Ft	$ 4	$ 5	$ 9	**$ 999,000**	
6.12	OPGW Splice Boxes	9.00	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 22,500**	
6.13	OPGW Splice & Test	1.00	Sum		$ 10,800	$ 10,800	**$ 10,800**	Supply & Install
6.14	Insulators for suspension structures (ANSI 52-5 and 52-8)	1,933.00	Set	$ 850	$ 150	$ 1,000	**$ 1,933,000**	
6.15	V-strings Suspension and tension strings hardware, OPGW, vibration dampers and spacers	1.00	Lot	$ 1,000,000	$ 900,000	$ 1,900,000	**$ 1,900,000**	
6.16	Install grounding	159.00	Ea		$ 5,000	$ 5,000	**$ 795,000**	Supply & Install
6.17	Matting for wetland & sensitive areas	36,960.00	Ft		$ 70	$ 70	**$ 2,587,200**	Supply & Install
6.18	Work Pads	1,837,500.00	SQFT		$ 4	$ 4	**$ 6,468,000**	Supply & Install
6.19	Restoration of Work Pad Areas	183,750.00	SQFT		$ 0.2	$ 0.2	**$ 27,563**	Supply & Install
6.20	Access Roads	159.00	Structure		$ 10,000	$ 10,000	**$ 1,590,000**	Supply & Install
6.21	Clearing of virgin forest land	46.00	Acre		$ 15,000	$ 15,000	**$ 690,000**	Supply & Install
6.22	Clearing existing ROW for work spaces	46.00	Acre		$ 15,000	$ 15,000	**$ 690,000**	Supply & Install
6.23	Maintenance and Protection of Traffic on Public Roads	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	Supply & Install
6.24	Culverts and Misc Access	1.00	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
6.25	Snow Removal	1.00	Sum		$ 700,000	$ 700,000	**$ 700,000**	Supply & Install
6. DYSINGER - STOLLE ROAD NEW 345kV TRANSMISSION LINE - TOTAL SUPPLY & INSTALL:							**$ 46,864,263**	
7. MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS								
7	**Contractor Mobilization / Demobilization**							
7.1	Mob / Demob	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
	Project Management, Material Handling & Amenities	1.00				$ -	**$ -**	
7.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and Cost Manager, SHEQ Staff, Materials Management Staff)	22.00	Months		$ 350,000	$ 350,000	**$ 7,700,000**	
7.3	Site Accommodations, Storage, Amenities, Laydown Yards	1.00	Sum		$ 1,800,000	$ 1,800,000	**$ 1,800,000**	
	Engineering	-				$ -	**$ -**	
7.4	Design Engineering	1.00	Sum		$ 6,000,000	$ 6,000,000	**$ 6,000,000**	
7.5	LiDAR	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
7.6	Geotech	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	
7.7	Surveying/Staking	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
	Testing & Commissioning	-				$ -	**$ -**	
7.8	Testing & Commissioning of T-Line and Equipment	1.00	Sum		$ 2,500,000	$ 2,500,000	**$ 2,500,000**	
	Permitting and Additional Costs	-				$ -	**$ -**	
7.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 2,366,540	$ 2,366,540	**$ 2,366,540**	
7.10	Environmental Mitigation	1.00	Sum		$ 6,312,700	$ 6,312,700	**$ 6,312,700**	
7.11	Warranties / LOC's	1.00	Sum		$ 693,715	$ 693,715	**$ 693,715**	
7.12	Real Estate Costs (New)	1.00	Sum		$ 497,876	$ 497,876	**$ 497,876**	
7.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 1,613,000	$ 1,613,000	**$ 1,613,000**	
7.14	Legal Fees	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
7.15	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
7.16	Carrying Charges	1.00	Sum			$ -	**$ -**	
7.17	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
7.18	Sales Tax on Materials	1.00	Sum	$ 5,380,386		$ 5,380,386	**$ 5,380,386**	
7. MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS - TOTAL SUPPLY & INSTALL:							**$ 40,364,217**	

ENVIRONMENTAL LICENSING AND PERMITTING

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T013	
FEDERAL						Proposal	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$17,880	$124,400
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$42,800	$124,000
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article VII will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88) Assumes Intervenor Fund amount of $100,000	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000

ENVIRONMENTAL LICENSING AND PERMITTING

NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$19,200	$67,000
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000
REGIONAL							
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000
LOCAL/MUNICIPAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000

ENVIRONMENTAL LICENSING AND PERMITTING

Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000
						Minimum	**Maximum**
		ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)			**PROJECT T013 TOTAL**	**$788,280**	**$3,944,800**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing					**Expected Value**	**$2,366,540**	

ENVIRONMENTAL MITIGATION ESTIMATE

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	30 acres	30 acres	16.8 acres	33.7 acres
Cost/Acre	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$1,800,000	$10,800,000	$8,450	$16,951

T013 MITIGATION TOTAL	**Minimum**	**Maximum**	**Expected Value**
	$1,808,450	**$10,816,951**	**$ 6,312,701**

*Offsite wetland mitigation area assumes clearing of NWI Forested/Shrub Wetland Approx. 3.24 miles (17107 lF) by 75' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; costing includes design and installation costs only; does not include land acquisition or long term monitoring

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 5.56 miles (29356.8 LF) Adjacent to Agricultural Land by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

REAL ESTATE ESTIMATE (NEW ROW)

Revision: 4

COUNTY: ERIE

DEVELOPER: NYPA/NYSEG (T013)

SEGMENT: DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
	Sub Total	0.68	$ 4,376.00

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T013 - NYPA and NYSEG

Revision: 4

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NORTH AMERICAN (T006)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	NYPA and NYSEG	Dysinger to Stolle - 20.6 miles	Niagara	5.97	$ 1,613,000
			Erie	318.64	

Revision: 4

REAL ESTATE ESTIMATE (SUBSTATIONS)

COUNTY:	NIAGARA
DEVELOPER:	NYPA/NYSEG (T013)
SEGMENT:	DYSINGER SUBSTATION

		Total Cost
	Total Cost of Proposed Substation Site	$493,500.00

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

a) Cost Estimate is based on 2017 rates.
schedule.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed that pole weights include anchor bolts.
f) The Developer has assumed gravel work pads. During our ROW visit it was determined that matted work pads are required.
g) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
h) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes but budgetary costs for transformers, phase shifting transformers and reactors were obtained from vendors.
i)Acquisition of land includes the new site for Dysinger Substation. Remiander of project utilizes existing ROW.
j)Assumes all environmental data and project details provided are accurate unless noted otherwise.
k)USFWS T&E Species- Assumes that ¼ of the total line in ROW per segments will require field survey for T&E (5 miles + 3miles)
l)NEPA-Assumes no NEPA because Art VII
m)SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of project route (16 miles)
n)NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII
o)Assumes no coordination with National Parks Service or OPRHP/State Parks
p)Consultant delineated approximately 7 miles of wetland along the Dysinger to Stolle Road ROW. Minimum costs assume delineating 1.72 miles along the Stolle to Gardenville ROW at $4000/mile only. Maximum costs assume delineation will need to be repeated along both ROW's for a total of 8.72 miles at $7500/mile. Delineation costs included in USACE permitting not duplicated on NYSDEC. Assumes NYSDEC delineations overlap and are accounted for in USACE costing.
q)Offsite wetland mitigation area costs based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.24 miles (calculated by GEI based on NWI mapper legend categories). Assumes clearing an additional 75 feet within Right of Way. Minimum costs at $60,000/acre, maximum costs at $120,000/acre for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring. Mitigation costs assume no offsite mitigation for Gardenville to Stolle.

ASSUMPTIONS AND CLARIFICATIONS

Revision: 4

r)Agricultural mitigation assumes timber matting impacts and pad impacts on adjacent agriculture land total (5.56 miles) along the Dysinger to Stolle and Gardenville to Stolle routes requires crop damage payments. Payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
s)Assumes Right of Way restoration is accounted for in construction costs
t)Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.)
u)No tree survey or replanting required outside regulated wetlands areas
v)Assumes Article VII Intervenor Fund payment expected to be $100,000
w)Assume preliminary engineering and preparation of interconnection studies are complete.

INDEPENDENT ESTIMATES

ATTACHMENT B8

T014 – NEXTERA ENERGY

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T014 - NextEra Energy

SECO SUBSTATION ENGINEERING COMPANY

SUMMARY OF COST ESTIMATE

		PROPOSAL (T014)	
		PREFERRED ROUTE	ALTERNATIVE ROUTE
	Description	Total Amount	Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 12,717,405	$ 13,571,466
2	TRANSMISSION LINE FOUNDATIONS	$ 3,200,398	$ 10,001,353
3	STRUCTURES - TRANSMISSION LINE	$ 4,688,312	$ 12,215,200
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 6,137,208	$ 6,089,688
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 1,382,170	$ 1,829,571
6	NEW DYSINGER SUBSTATION	$ 37,852,000	$ 37,852,000
7	EAST STOLLE RD SUBSTATION	$ 13,963,000	$ 13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 31,728,688	$ 43,673,566
	CONTRACTOR MARK-UP (OH&P) 15%	$ 16,750,377	$ 20,879,376
	SUBTOTAL:	$ 128,419,558	$ 160,075,219
	CONTINGENCY (20%)	$ 25,683,912	$ 32,015,044
	TOTAL (A):	**$ 154,103,470**	**$ 192,090,263**
9	SYSTEM UPGRADE FACILITIES	$ 19,705,790	$ 19,705,790
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 6,897,027	$ 6,897,027
	TOTAL (B):	**$ 26,602,817**	**$ 26,602,817**
	TOTAL PROJECT COST (A+B):	**$ 180,706,286**	**$ 218,693,080**

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Description of Work: The Project consists of 2 new 345kV Switchyards (Dysinger and new East Stolle Road. TO14 includes the 345kV, 700MVA Phase Shifting Transformer at Dysinger Switchyard), the Scope of Work also includes approximately 20 miles of new 345kV Transmission Line, located in Erie County and Niagara County (Empire State Line). This estimate includes for the Developers Preferred Route which utilizes an existing utility ROW. Wood H-Frames will be used to minimize visual impact.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	139.0	Acre		$ 15,000	$ 15,000	**$ 2,085,000**	
1.2	Access Road	48,535.0	LF		$ 45	$ 45	**$ 2,184,075**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	48,535.0	LF		$ 4	$ 4	**$ 194,140**	
1.4	Matting	56,952.0	LF		$ 70	$ 70	**$ 3,986,640**	
1.5	Snow Removal	1.0	Sum		$ 320,000	$ 320,000	**$ 320,000**	
1.6	ROW Restoration	20.0	Mile		$ 10,000	$ 10,000	**$ 200,000**	
1.7	Work Pads	795,000.00	SF		$ 4	$ 4	**$ 2,798,400**	
1.8	Restoration for Work Pad areas	79,500.00	SF		$ 0.2	$ 0.2	**$ 11,925**	
1.9	Temporary Access Bridge	20.0	EA		$ 20,035	$ 20,035	**$ 400,700**	
1.10	Air Bridge	5.0	EA		$ 14,445	$ 14,445	**$ 72,225**	
1.11	Stabilized Construction Entrance	10.0	EA		$ 4,580	$ 4,580	**$ 45,800**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 300,000	$ 300,000	**$ 300,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 100,000	$ 100,000	**$ 100,000**	
1.14	Concrete Washout Station	10.0	EA		$ 1,850	$ 1,850	**$ 18,500**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 12,717,405**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Direct Embed Foundation 3' x 11'	267.0	Ea		$ 9,680	$ 9,680	**$ 2,584,560**	Supply & Install
2.2	Direct Embed Foundation 3' x 12'	35.0	Ea		$ 10,648	$ 10,648	**$ 372,680**	Supply & Install
2.3	Direct Embed Foundation 3' x 13'	8.0	Ea		$ 11,713	$ 11,713	**$ 93,702**	Supply & Install
2.4	Direct Embed Foundation 3' x 14'	5.0	Ea		$ 12,884	$ 12,884	**$ 64,420**	Supply & Install
2.5	Direct Embed Foundation 3' x 15'	6.0	Ea		$ 14,172	$ 14,172	**$ 85,035**	Supply & Install
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 3,200,398**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Dead-End 3 Pole Wood Structure, H2 80ft	5	Ea	$ 6,000	$ 8,185	$ 14,185	**$ 70,927**	
3.2	Dead-End 3 Pole Wood Structure, H2 90ft	2	Ea	$ 7,200	$ 6,925	$ 14,125	**$ 28,250**	
3.3	Dead-End 3 Pole Wood Structure, H2 100ft	2	Ea	$ 8,640	$ 8,459	$ 17,099	**$ 34,198**	
3.4	Dead-End 3 Pole Wood Structure, H2 110ft	1	Ea	$ 10,368	$ 12,689	$ 23,057	**$ 23,057**	
3.5	Angle 3 Pole Wood Structure, H1-90ft	4	Ea	$ 6,480	$ 13,177	$ 19,657	**$ 78,628**	
3.6	Angle 3 Pole Wood Structure, H1-100ft	1	Ea	$ 7,776	$ 16,471	$ 24,247	**$ 24,247**	
3.7	Tangent H-Frame Wood Structure, H2 85'	1	Ea	$ 4,800	$ 15,373	$ 20,173	**$ 20,173**	
3.8	Tangent H-Frame Wood Structure, H2 90'	118	Ea	$ 5,760	$ 18,448	$ 24,208	**$ 2,856,506**	
3.9	Tangent H-Frame Wood Structure, H2 95'	11	Ea	$ 6,912	$ 22,137	$ 29,049	**$ 319,541**	
3.10	Tangent H-Frame Wood Structure, H2 100'	3	Ea	$ 8,294	$ 8,185	$ 16,480	**$ 49,439**	
3.11	Tangent H-Frame Wood Structure, H2 105'	1	Ea	$ 9,953	$ 6,925	$ 16,878	**$ 16,878**	
3.12	Tangent H-Frame Wood Structure, H2 115'	1	Ea	$ 11,944	$ 8,459	$ 20,403	**$ 20,403**	
3.13	Tangent H-Frame Wood Structure, H2 125'	3	Ea	$ 14,333	$ 12,689	$ 27,021	**$ 81,064**	
3.14	Install Grounding	153.0	Structure		$ 5,000	$ 5,000	**$ 765,000**	Supply & Install
3.15	Guy Wires and Anchors for DE / Angle Structures	15.0	Structure		$ 20,000	$ 20,000	**$ 300,000**	Supply & install
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 4,688,312**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T014 - NextEra Energy

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	21	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 4,457,376**	
4.2	(1) OPGW 48 Fiber	21	Mile	$ 22,176	$ 27,720	$ 49,896	**$ 1,047,816**	
4.3	(1) 3/8" HS Steel	21	Mile	$ 3,696	$ 26,400	$ 30,096	**$ 632,016**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 6,137,208**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	414	Set	$ 900	$ 720	$ 1,620	**$ 670,680**	
5.2	Deadend / Angle Assemblies	96.0	Set	$ 1,500	$ 1,040	$ 2,540	**$ 243,840**	
5.3	OPGW Assembly - Tangent	138.0	Set	$ 200	$ 150	$ 350	**$ 48,300**	
5.4	OPGW Assembly - Angle / DE	34.0	Set	$ 250	$ 150	$ 400	**$ 13,600**	
5.5	OHSW Assembly - Tangent	138.0	Set	$ 200	$ 150	$ 350	**$ 48,300**	
5.5	OHSW Assembly - Angle / DE	34.0	Set	$ 250	$ 150	$ 400	**$ 13,600**	
5.8	OPGW Splice Boxes	9.0	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 22,500**	
5.7	OPGW Splice & Test	1.0	Sum		$ 10,800	$ 10,800	**$ 10,800**	
5.8	Spacer Dampers	2,310.0	Ea	$ 50	$ 35	$ 85	**$ 196,350**	
5.9	Vibration Dampers - Conductor	1,850.0	Ea	$ 32	$ 20	$ 52	**$ 96,200**	
5.10	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 10,000	$ 8,000	$ 18,000	**$ 18,000**	
TOTAL: TRANSMISSION LINE INSULA+52:63TORS, FITTINGS, HARDWARE:							**$ 1,382,170**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final	1.0	Sum		$ 1,650,000.00	$ 1,650,000	**$ 1,650,000**	Supply & Install
6.2	Substation Fence	2,840.0	LF		$ 200.00	$ 200	**$ 568,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	24.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 168,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph w/ motor-operators	7.0	Ea	$ 15,000	$ 15,000.00	$ 30,000	**$ 210,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,214,000	$ 1,214,000	**$ 1,214,000**	
6.8	Breakers	11.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 4,180,000**	
6.9	Arrestors (3 per line)	27.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 202,500**	
6.10	Line Traps	7.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 147,000**	
6.11	345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
6.13	Low Profile Foundations	308.0	Ea		$ 5,000	$ 5,000	**$ 1,540,000**	Supply & Install
6.14	Caisson DE Foundations	52.0	Ea		$ 50,000	$ 50,000	**$ 2,600,000**	Supply & Install
6.15	Circuit Breaker Foundations	11.0	Ea		$ 75,000	$ 75,000	**$ 825,000**	Supply & Install
6.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
6.18	Control House and Pad (30' x 90')	1.0	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.20	Control Cables	1.0	Sum	$ 150,000	$ 150,000	$ 300,000	**$ 300,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea	$ -	$ 25,000	$ 25,000	**$ 50,000**	
6.23	Protection, Telecom and Metering Equipment (Panels)	40.0	Ea		$ 30,000	$ 30,000	**$ 1,200,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 275,000	$ 275,000	**$ 275,000**	Supply & Install
6.29	Bus Support 3 Ph	23.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 149,500**	
6.30	Bus Support 1 Ph	42.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 126,000**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.31	Switch Stands	26.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 286,000**	
6.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.33	Misc. Structures	1.0	Sum		$ 74,000	$ 74,000	**$ 74,000**	
6.34	Substation A-Frame Structures Standalone	13.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 325,000**	
6.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
6.36	Arrestor Stands	21.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 73,500**	
6.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.38	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	Supply & Install
6.39	345kV 700MVA Phase Shifting Transformer	1.0	Sum	$ 11,000,000	$ 500,000	$ 11,500,000	**$ 11,500,000**	
6.40	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 37,852,000**	
7. EAST STOLLE RD SUBSTATION								
7.1	Site Works including sediment controls, access roads, rough grading, final	1.0	Sum		$ 1,000,000.00	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	1,900.0	LF		$ 200.00	$ 200	**$ 380,000**	Supply & Install
7.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
7.4	Switches 3ph	9.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 63,000**	
7.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.7	Instrument Transformers	1.0	Sum		$ 752,000	$ 752,000	**$ 752,000**	
7.8	Breakers	4.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,520,000**	
7.9	Arrestors (3 per line) and shunt reactor	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.10	Line Traps	2.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 42,000.00**	
7.11	345 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
7.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
7.13	Low Profile Foundations	147.0	Ea		$ 5,000	$ 5,000	**$ 735,000**	Supply & Install
7.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
7.15	Circuit Breaker Foundations	4.0	Ea		$ 75,000	$ 75,000	**$ 300,000**	Supply & Install
7.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
7.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
7.18	Control House and Pad (25' x 50' - 1250 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
7.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
7.20	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000**	
7.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
7.23	Protection, Telecom and Metering Equipment (Panels)	18.0	Ea		$ 30,000	$ 30,000	**$ 540,000**	Supply & Install
7.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
7.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
7.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.29	Bus Support 3 Ph	9.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 58,500**	
7.30	Bus Support 1 Ph	21.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 63,000**	
7.31	Switch Stands	13.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 143,000**	
7.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
7.33	Misc. Structures	1.0	Sum		$ 24,000	$ 24,000	**$ 24,000**	
7.34	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000**	
7.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
7.36	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
7.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.38	345kV 30MVAR Shunt Reactor	1.0	Ea	$ 732,000	$ 100,000	$ 832,000	**$ 832,000**	
7.39	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
7.40	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - EAST STOLLE RD SUBSTATION:							**$ 13,963,000**	
8. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS								
	Contractor Mobilization / Demobilization							
8.1	Mob / Demob	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
8.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and Cost Manager, SHEQ Staff, Admin, Materials Management Staff)	14.00	Months		$ 220,000	$ 220,000	**$ 3,080,000**	
8.3	Site Accommodation, Facilities, Storage	1.00	Sum		$ 1,400,000	$ 1,400,000	**$ 1,400,000**	
	Engineering					$ -	**$ -**	
8.4	Design Engineering	1.00	Sum		$ 3,600,000	$ 3,600,000	**$ 3,600,000**	
8.5	LiDAR	1.00	Sum		$ 400,000	$ 400,000	**$ 400,000**	
8.6	Geotech	1.00	Sum		$ 600,000	$ 600,000	**$ 600,000**	
8.7	Surveying/Staking	1.00	Sum		$ 400,000	$ 400,000	**$ 400,000**	
	Testing & Commissioning							
8.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.00	Sum		$ 1,600,000	$ 1,600,000	**$ 1,600,000**	
	Permitting and Additional Costs					$ -	**$ -**	
8.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 2,312,325	$ 2,312,325	**$ 2,312,325**	
8.10	Environmental Mitigation	1.00	Sum		$ 9,472,635	$ 9,472,635	**$ 9,472,635**	
8.11	Warranties / LOC's	1.00	Sum		$ 459,515	$ 459,515	**$ 459,515**	
8.12	Real Estate Costs (New ROW)	1.00	Sum		$ 391,346	$ 391,346	**$ 391,346**	
8.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 1,793,000	$ 1,793,000	**$ 1,793,000**	
8.14	Legal Fees	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
8.15	Sales Tax on Materials	1.00	Sum	$ 3,219,867		$ 3,219,867	**$ 3,219,867**	
8.16	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
8.17	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
8.18	Carrying Charges	1.00	Sum			$ -	**$ -**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 31,728,688**	
9. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so it is limited by line conductor ratings 125/152/181 (NOR/LTE/STE).
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	**$ 75,000**	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 720,000**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 3.1	Roll Rd to Stolle Rd 115kV Transmission Line 928. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Replace limiting terminal equipment at Stolle Rd 115 kV Substation.
SUF 3.2	Engineering, T&C, PM, Indirects for SUF 3.1 (15%)					$ -	**$ 75,000**	
SUF 4	**100MVAR Shunt Reactor at RG&E Sta 80**							
SUF 4.1	Site Works including sediment controls, access roads, rough grading, final	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.2	Substation Fence	600.00	LF		$ 200	$ 200	**$ 120,000**	Supply & Install
SUF 4.3	Shunt Reactor 3ph 345kV 100MVAR	1.00	Ea	$ 1,500,000	$ 500,000	$ 2,000,000	**$ 2,000,000**	
SUF 4.4	Switches 3ph 345kV	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
SUF 4.5	CVT's 345kV	3.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 63,000**	
SUF 4.6	Breakers 345kV	1.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 380,000**	
SUF 4.7	Arrestors - 235kV	3.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
SUF 4.8	Low Profile Foundations	19.00	Ea		$ 5,000	$ 5,000	**$ 95,000**	Supply & Install
SUF 4.9	Circuit Breaker Foundations	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 4.10	Lightning Mast Foundations	2.00	Ea		$ 15,000	$ 15,000	**$ 30,000**	Supply & Install
SUF 4.11	Reactor Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 4.12	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
SUF 4.13	Protection & Telecom Equipment	3.00	Ea		$ 15,000	$ 15,000	**$ 45,000**	Supply & Install
SUF 4.14	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.15	Low Voltage AC Distribution	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
SUF 4.16	Control Conduits	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.17	Cable Trench System for Control Conduits	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
SUF 4.18	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.19	Bus Support 3ph	2.0	Ea	$ 3,000	$ 2,000	$ 5,000	**$ 10,000**	
SUF 4.20	Bus Support 1ph	3.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
SUF 4.21	Switch Stands	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.22	Fuse Stand	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.23	CVT Stand	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
SUF 4.24	Lightning Mast	2.0	Ea	$ 10,000	$ 5,000	$ 15,000	**$ 30,000**	
SUF 4.25	Misc Materials and Above / Below Ground Works	1.0	Ea		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.26	**Engineering, T&C, PM, Indirects (15%)**					$ -	**$ 1,211,190**	
SUF 5	**SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)**						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL -SUF							**$ 19,705,790**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T014 - NextEra Energy

COST ESTIMATE

(ALTERNATE ROUTE)

Revision: 5

Description of Work: The Project consists of 2 new 345kV Switchyards (Dysinger and new East Stolle Road. TO14 includes the 345kV, 700MVA Phase Shifting Transformer at Dysinger Switchyard), the Scope of Work also includes approximately 22 miles of new 345kV Transmission Line, located in Erie County and Niagara County (Empire State Line). This estimate includes for the Developers Alternate Route which uses Steel Poles.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	118.0	Acre		$ 15,000	$ 15,000	**$ 1,770,000**	
1.2	Access Road	53,388.5	LF		$ 45	$ 45	**$ 2,402,483**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	53,388.5	LF		$ 4	$ 4	**$ 213,554**	
1.4	Matting	62,647.2	LF		$ 70	$ 70	**$ 4,385,304**	
1.5	Snow Removal	1.0	Sum		$ 320,000	$ 320,000	**$ 320,000**	
1.6	ROW Restoration	22.0	Mile		$ 10,000	$ 10,000	**$ 220,000**	
1.7	Work Pads	940,000.00	SF		$ 4	$ 4	**$ 3,308,800**	
1.8	Restoration for Work Pad areas	94,000.00	SF		$ 0.2	$ 0.2	**$ 14,100**	
1.9	Temporary Access Bridge	20.0	EA		$ 20,035	$ 20,035	**$ 400,700**	
1.10	Air Bridge	5.0	EA		$ 14,445	$ 14,445	**$ 72,225**	
1.11	Stabilized Construction Entrance	10.0	EA		$ 4,580	$ 4,580	**$ 45,800**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 300,000	$ 300,000	**$ 300,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 100,000	$ 100,000	**$ 100,000**	
1.14	Concrete Washout Station	10.0	EA		$ 1,850	$ 1,850	**$ 18,500**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 13,571,466**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Direct Embed Foundation for Vertical Tangent Poles (5'x 20')	109.0	Ea		$ 18,000	$ 18,000	**$ 1,962,000**	Supply & Install
2.2	Direct Embed Foundation for Vertical Tangent Poles (5'x 20.5')	12.0	Ea		$ 18,900	$ 18,900	**$ 226,800**	Supply & Install
2.3	Direct Embed Foundation for Vertical Tangent Poles (5'x 21')	16.0	Ea		$ 20,790	$ 20,790	**$ 332,640**	Supply & Install
2.4	Direct Embed Foundation for Vertical Tangent Poles (5'x 21.5')	3.0	Ea		$ 22,869	$ 22,869	**$ 68,607**	Supply & Install
2.5	Direct Embed Foundation for Vertical Tangent Poles (5'x 23')	1.0	Ea		$ 25,156	$ 25,156	**$ 25,156**	Supply & Install
2.6	Caisson Foundation for Vertical Angle (9' x 20')	445.5	CUY		$ 1,500	$ 1,500	**$ 668,250**	
2.7	Caisson Foundation for Dead End (10' x 35')	3,978.6	CUY		$ 1,500	$ 1,500	**$ 5,967,900**	
2.8	Rock Adder	500.0	CUY		$ 1,500	$ 1,500	**$ 750,000**	
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 10,001,353**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Steel Vertical Tangent Monopole (130' including embedment)	109	Ea	$ 25,200	$ 15,120	$ 40,320	**$ 4,394,880**	
3.2	Steel Vertical Tangent Monopole (135' including embedment)	12	Ea	$ 27,900	$ 16,740	$ 44,640	**$ 535,680**	
3.3	Steel Vertical Tangent Monopole (141' including embedment)	16	Ea	$ 30,600	$ 18,360	$ 48,960	**$ 783,360**	
3.4	Steel Vertical Tangent Monopole (145' including embedment)	3	Ea	$ 34,200	$ 20,520	$ 54,720	**$ 164,160**	
3.5	Steel Vertical Tangent Monopole (162' including embedment)	1	Ea	$ 37,800	$ 22,680	$ 60,480	**$ 60,480**	
3.6	Steel Vertical Angle Monopole (131')	9	Ea	$ 66,600	$ 39,960	$ 106,560	**$ 959,040**	
3.7	Steel Vertical Deadend Monopole (105')	38	Ea	$ 72,000	$ 43,200	$ 115,200	**$ 4,377,600**	
3.8	Install Grounding	188	Ea		$ 5,000	$ 5,000	**$ 940,000**	Supply & Install
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 12,215,200**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	23	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 4,881,888**	
4.2	(1) OPGW 48 Fiber	23	Mile	$ 22,176	$ 27,720	$ 49,896	**$ 1,147,608**	
4.3	(1) 3/8" HS Steel	2	Mile	$ 3,696	$ 26,400	$ 30,096	**$ 60,192**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 6,089,688**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	450	Set	$ 900	$ 720	$ 1,620	**$ 729,000**	
5.2	Deadend / Angle Assemblies	234.0	Set	$ 1,500	$ 1,040	$ 2,540	**$ 594,360**	

COST ESTIMATE

(ALTERNATE ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
5.3	OPGW Assembly - Tangent	150.0	Set	$ 200	$ 150	$ 350	**$ 52,500**	
5.5	OPGW Assembly - Angle / DE	72.0	Set	$ 250	$ 150	$ 400	**$ 28,800**	
5.6	OHSW Assembly - Angle / DE	15.0	Set	$ 250	$ 150	$ 400	**$ 6,000**	
5.8	OPGW Splice Boxes	10.0	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 25,000**	
5.9	OPGW Splice & Test	1.0	Sum		$ 12,000	$ 12,000	**$ 12,000**	
5.10	Spacer Dampers	2,835.0	Ea	$ 50	$ 35	$ 85	**$ 240,975**	
5.11	Vibration Dampers - Conductor	2,268.0	Ea	$ 32	$ 20	$ 52	**$ 117,936**	
5.12	Shield wire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 15,000	$ 8,000	$ 23,000	**$ 23,000**	
TOTAL: TRANSMISSION LINE INSULATORS, FITTINGS, HARDWARE:							**$ 1,829,571**	
6. NEW DYSINGER SUBSTATION								
6.1	Site Works including sediment controls, access roads, rough grading, final grading and	1.0	Sum		$ 1,650,000.00	$ 1,650,000	**$ 1,650,000**	Supply & Install
6.2	Substation Fence	2,840.0	LF		$ 200.00	$ 200	**$ 568,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	24.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 168,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph w/ motor-operators	7.0	Ea	$ 15,000	$ 15,000.00	$ 30,000	**$ 210,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,214,000	$ 1,214,000	**$ 1,214,000**	
6.8	Breakers	11.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 4,180,000**	
6.9	Arrestors (3 per line)	27.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 202,500**	
6.10	Line Traps	7.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 147,000**	
6.11	345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
6.13	Low Profile Foundations	308.0	Ea		$ 5,000	$ 5,000	**$ 1,540,000**	Supply & Install
6.14	Caisson DE Foundations	52.0	Ea		$ 50,000	$ 50,000	**$ 2,600,000**	Supply & Install
6.15	Circuit Breaker Foundations	11.0	Ea		$ 75,000	$ 75,000	**$ 825,000**	Supply & Install
6.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
6.18	Control House and Pad (30' x 90')	1.0	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.20	Control Cables	1.0	Sum	$ 150,000	$ 150,000	$ 300,000	**$ 300,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea	$ -	$ 25,000	$ 25,000	**$ 50,000**	
6.23	Protection, Telecom and Metering Equipment (Panels)	40.0	Ea		$ 30,000	$ 30,000	**$ 1,200,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 275,000	$ 275,000	**$ 275,000**	Supply & Install
6.29	Bus Support 3 Ph	23.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 149,500**	
6.30	Bus Support 1 Ph	42.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 126,000**	
6.31	Switch Stands	26.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 286,000**	
6.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.33	Misc. Structures	1.0	Sum		$ 74,000	$ 74,000	**$ 74,000**	
6.34	Substation A-Frame Structures Standalone	13.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 325,000**	
6.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
6.36	Arrestor Stands	21.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 73,500**	
6.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.38	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	Supply & Install
6.39	345kV 700MVA Phase Shifting Transformer	1.0	Sum	$ 11,000,000	$ 500,000	$ 11,500,000	**$ 11,500,000**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T014 - NextEra Energy

COST ESTIMATE

(ALTERNATE ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.40	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 37,852,000**	
7. EAST STOLLE RD SUBSTATION								
7.1	Site Works including sediment controls, access roads, rough grading, final grading and	1.0	Sum		$ 1,000,000.00	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	1,900.0	LF		$ 200.00	$ 200	**$ 380,000**	Supply & Install
7.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
7.4	Switches 3ph	9.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 63,000**	
7.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.7	Instrument Transformers	1.0	Sum		$ 752,000	$ 752,000	**$ 752,000**	
7.8	Breakers	4.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,520,000**	
7.9	Arrestors (3 per line) and shunt reactor	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.10	Line Traps	2.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 42,000**	
7.11	345 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
7.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
7.13	Low Profile Foundations	147.0	Ea		$ 5,000	$ 5,000	**$ 735,000**	Supply & Install
7.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
7.15	Circuit Breaker Foundations	4.0	Ea		$ 75,000	$ 75,000	**$ 300,000**	Supply & Install
7.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
7.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
7.18	Control House and Pad (25' x 50' - 1250 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
7.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
7.20	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000**	
7.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
7.23	Protection, Telecom and Metering Equipment (Panels)	18.0	Ea		$ 30,000	$ 30,000	**$ 540,000**	Supply & Install
7.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
7.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
7.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.29	Bus Support 3 Ph	9.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 58,500**	
7.30	Bus Support 1 Ph	21.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 63,000**	
7.31	Switch Stands	13.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 143,000**	
7.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
7.33	Misc. Structures	1.0	Sum		$ 24,000	$ 24,000	**$ 24,000**	
7.34	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000.00**	
7.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
7.36	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	
7.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.38	345kV 30MVAR Shunt Reactor	1.0	Ea	$ 732,000	$ 100,000	$ 832,000	**$ 832,000**	
7.39	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
7.40	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - EAST STOLLE RD SUBSTATION:							**$ 13,963,000**	
8. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
8.1	Mob / Demob	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Project Management, Material Handling & Amenities							

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and Cost Manager, SHEQ Staff, Admin, Materials Management Staff)	14.00	Months		$ 350,000	$ 350,000	**$ 4,900,000**	
8.3	Site Accommodation, Facilities, Storage	1.00	Sum		$ 1,400,000	$ 1,400,000	**$ 1,400,000**	
	Engineering							
8.4	Design Engineering	1.00	Sum		$ 4,770,000	$ 4,770,000	**$ 4,770,000**	
8.5	LiDAR	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
8.6	Geotech	1.00	Sum		$ 1,100,000	$ 1,100,000	**$ 1,100,000**	
8.7	Surveying/Staking	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
	Testing & Commissioning							
8.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.00	Sum		$ 1,600,000	$ 1,600,000	**$ 1,600,000**	
	Permitting and Additional Costs					$ -	**$ -**	
8.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 3,477,113	$ 3,477,113	**$ 3,477,113**	
8.10	Environmental Mitigation	1.00	Sum		$ 8,002,635	$ 8,002,635	**$ 8,002,635**	
8.11	Warranties / LOC's	1.00	Sum		$ 575,441	$ 575,441	**$ 575,441**	
8.12	Real Estate Costs (New ROW)	1.00	Sum		$ 7,993,538	$ 7,993,538	**$ 7,993,538**	
8.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 90,000	$ 90,000	**$ 90,000**	
8.14	Legal Fees	1.00	Sum		$ 3,500,000	$ 3,500,000	**$ 3,500,000**	
8.15	Sales Tax on Materials	1.00	Sum	$ 4,064,839		$ 4,064,839	**$ 4,064,839**	
8.16	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
8.17	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
8.18	Carrying Charges	1.00	Sum			$ -	**$ -**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 43,673,566**	
9. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so it is limited by lien conductor ratings 125/152/181 (NOR/LTE/STE).
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	**$ 75,000**	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 720,000**	
SUF 3.1	Roll Rd to Stolle Rd 115kV Transmission Line 928. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Replace limiting terminal equipment at both Stolle Rd 115 kV Substation and Roll Rd 115 kV Substation.
SUF 3.2	Engineering, T&C, PM, Indirects for SUF 3.1 (15%)					$ -	**$ 75,000**	
SUF 4	**100MVAR Shunt Reactor at RG&E Sta 80**							
SUF 4.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement - approx 1. acre	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.2	Substation Fence	600.00	LF		$ 200	$ 200	**$ 120,000**	Supply & Install
SUF 4.3	Shunt Reactor 3ph 345kV 100MVAR	1.00	Ea	$ 1,500,000	$ 500,000	$ 2,000,000	**$ 2,000,000**	
SUF 4.4	Switches 3ph 345kV	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
SUF 4.5	CVT's 345kV	3.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 63,000**	
SUF 4.6	Breakers 345kV	1.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 380,000**	
SUF 4.7	Arrestors - 235kV	3.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
SUF 4.8	Low Profile Foundations	19.00	Ea		$ 5,000	$ 5,000	**$ 95,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 4.9	Circuit Breaker Foundations	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 4.10	Lightning Mast Foundations	2.00	Ea		$ 15,000	$ 15,000	**$ 30,000**	Supply & Install
SUF 4.11	Reactor Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 4.12	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
SUF 4.13	Protection & Telecom Equipment	3.00	Ea		$ 15,000	$ 15,000	**$ 45,000**	Supply & Install
SUF 4.14	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.15	Low Voltage AC Distribution	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
SUF 4.16	Control Conduits	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.17	Cable Trench System for Control Conduits	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
SUF 4.18	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.19	Bus Support 3ph	2.0	Ea	$ 3,000	$ 2,000	$ 5,000	**$ 10,000**	
SUF 4.20	Bus Support 1ph	3.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
SUF 4.21	Switch Stands	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.22	Fuse Stand	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.23	CVT Stand	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
SUF 4.24	Lightning Mast	2.0	Ea	$ 10,000	$ 5,000	$ 15,000	**$ 30,000**	
SUF 4.25	Misc Materials and Above / Below Ground Works	1.0	Ea		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.26	**Engineering, T&C, PM, Indirects (15%)**					$ -	**$ 1,211,190**	
SUF 5	**SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)**						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL -SUF							**$ 19,705,790**	

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ENVIRONMENTAL LICENSING AND PERMITTING

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PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T014			
FEDERAL						**Preferred Route**		**Alternative Route**	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$26,600	$88,250	$26,600	$88,250
National Park Service	National Parks	Consultation; Special Use Permit	Only applies if National Park located in project area.	Depending on impact of project request for a special use permit may require a NEPA environmental assessment.					
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$27,800	$94,000	$30,300	$99,000
NEPA	National Environmental Policy Act	Categorical Exclusion; EA Finding of No Impact; or EIS Record of Decision	With some exemptions, projects on federally owned lands and/or projects requiring federal permit approvals	Possible NEPA review due if federal agency coordination is required. Federal agency involved to determine if Categorical Exclusion applies. Assumes Article 7 covers NEPA requirements or if an EIS is required it is prepared under SEQRA Task.					
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)				
STATE									
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans				
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Article VII Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000	$600,000	$3,100,000

ENVIRONMENTAL LICENSING AND PERMITTING

NYS Public Service Commission / Department of Public Service (NYSDPS)	Part 102		Construction of a utility overhead transmission facility that will convey electric energy at 65kV or higher for a distance of one mile or longer and are not subject to Article VII of the Public Service Law.	May include coordination or studies completed under other line items including: Visual assessment, SHPO determination, OPRHP consultation, Ecological Impacts Assessment	Advantage-Disadvantage Analysis				
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000	$12,000	$53,000
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000	$11,200	$38,000
Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.					
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)					
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$13,200	$49,000	$14,200	$52,000
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400	$1,200	$6,400

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NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000	$17,000	$69,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)				
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000	$11,000	$24,000
REGIONAL									
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000	$11,000	$76,000
LOCAL/MUNICIPAL									
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans				
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000	$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000	$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000	$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000	$6,000	$52,000

		Minimum	Maximum	Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T014 TOTAL**	**$773,000**	**$3,851,650**	**$776,500**	**$3,859,650**
	Expected Value	**$2,312,325**		**$3,477,112.50**	

Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing

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ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 5

WNY TRANSMISSION PROJECT - ENVIRONMENTAL MITIGATION COST ESTIMATE FOR T014

	Offsite Wetland Mitigation*				Farmland**	
	Preferred Route		Alternative Rotue		Preferred & Alternative Routes	
	Min.	Max.	Min.	Max.	Min.	Max.
Area	45 acres	45 acres	38 acres	38 acres	30 acres	60 acres
Cost/Acre	$60,000	$120,000	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	3:1	1:1	1:1
Total	$ 2,700,000	$16,200,000	$2,280,000	$13,680,000	$15,090	$30,180

T014 PREFERRED ROUTE MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,715,090	**$16,230,180**	**$ 9,472,635**

T014 ALTERNATIVE ROUTE MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,295,090	**$13,710,180**	**$ 8,002,635**

*Offsite wetland mitigation area assumes clearing of NWI Forested/Shrub Wetland approx. 3.24 miles (17107 LF) by 115' ROW width for the Preferred Route and approx. 3.47 (18322 LF) by 90' ROW width for the Alternative Route; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; costing includes design and installation costs only; does not include land acquisition or long term monitoring

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 9.8 miles (51744 LF) Land Adjacent to Agriculture District/Crop Land by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

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REAL ESTATE ESTIMATE
(NEW ROW)

COUNTY: ERIE
DEVELOPER: NEXTERA (T014 & T015 PREFERRED)
SEGMENT: DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
	Total	0.68	$ 4,376.00

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REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 PREFERRED)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	NEXTERA ENERGY	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara	4.59	$ 1,793,000
			Erie	355.48	

Revision: 5

REAL ESTATE ESTIMATE
(NEW ROW - 80FT. CORRIDOR)

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER TO STOLLE ROAD SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	5.30	$ 124,550.00
B	**ERIE COUNTY**		
	Sub Total (B)	191.75	$ 5,572,547.00
	Total (A + B)	197.05	$ 5,697,097.00

REAL ESTATE ESTIMATE
(NEW ROW - 10FT. ADDITIONAL CORRIDOR)

Revision: 5

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER TO STOLLE ROAD SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	0.59	$ 13,865.00
B	**ERIE COUNTY**		
	Sub Total (B)	26.28	$ 858,481.50
	Total (A + B)	26.87	$ 872,346.50

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T014 - NextEra Energy

Revision: 5

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	NEXTERA ENERGY (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara	1.20	$ 90,000
			Erie	17.16	

REAL ESTATE ESTIMATE (HOUSES)

Revision: 5

COUNTY: ERIE

DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)

SEGMENT: DYSINGER - STOLLE SEGMENT

		Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 1,037,124.17

REAL ESTATE ESTIMATE

Revision: 5

COUNTY:	NIAGARA
DEVELOPER:	NEXTERA
SEGMENT:	DYSINGER SUBSTATION

		Total Cost
	Total Cost of Proposed Substation Site	$ 251,450.00

REAL ESTATE ESTIMATE

Revision: 5

COUNTY:	ERIE
DEVELOPER:	NEXTERA
SEGMENT:	STOLLE ROAD SUBSTATION

		Total Cost
	Total Cost of Proposed Substation Site	$ 135,520.00

Revision: 5

ASSUMPTIONS AND CLARIFICATIONS

a) Cost Estimate is based on 2017 rates.
b) Construction Schedule is in accordance with the Developers proposed schedule (6 months for construction - seems light) - we have assumed continuous working with no breaks in the schedule. Six months added for start up and close out works and assisting in pre-construction activities (i.e. permitting activates, material procurement etc.)
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) Wood Pole types are based on Plan and Profile drawings. Direct embed foundations are assumed to be 10% plus 2 ft and rates include backfill. Steel Pole weights and foundation types are estimated based on benchmark data.
f) We have assumed that the Access Road upgrades include gravel updates only.
g) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
h) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
i) The equipment types listed for Dysinger and East Stolle Rd Substation have been taken from a recently completed 345kV substation project, using current pricing.
j) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
k) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section
l) Assumes all environmental data and project details provided are accurate unless noted otherwise.
m) USFWS T&E assumes ¼ of the total Preferred Route will require field survey for T&E (5 miles).
n)USFWS T&E assumes ¼ of the total Alternative Route will require field survey for T&E (5. 5 miles).
o) NEPA-Assumes no NEPA because Art VII.
p) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of Preferred Route (10 miles) and Alternative Route (11 miles).
q) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII.
r) Assumes no coordination with National Parks Service or OPRHP/State Parks.
s) USACE wetland delineation total for Preferred and Alternative Routes is based on combined NYSDEC/USACE wetland length of 3.9 miles from information in Proposal Attachment C.
t) NYSDEC delineations overlap and are accounted for in USACE costing.

ASSUMPTIONS AND CLARIFICATIONS

u) Offsite wetland mitigation area costs for the Preferred Route based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.24 miles (calculated by GEI based on NWI mapper legend categories). Assumes clearing an additional 115 feet within Right of Way. Minimum costs $60,000/acre at 1:1 ratio, maximum costs at $120,000/acre at 3:1 ratio for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.
v) Offsite wetland mitigation area costs for the Alternative Route based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.47 calculated by GEI based on NWI mapper legend categories). Assumes clearing 90 wide feet within Right of Way. Minimum costs at $60,000/acre at 1:1 ratio, maximum costs at $120,000/acre at 3:1 ratio for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.
w) Agricultural mitigation for Preferred and Alternative Routes assumes timber matting impacts and pad impacts on adjacent agriculture land (9.8 miles) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
x) Assumes Right of Way restoration is accounted for in construction costs.
y) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.).
z) No tree survey or replanting required outside regulated wetlands areas.
aa) Article VII Intervenor Fund payment expected to be $100,000.
ab) Expected value of Alt. Route is estimated to be 50% higher than the mean of the range of environmental licensing and permitting costs due to new ROW.
ac) SUF pricing is included at the end of the estimate workbook (costs excluded from main estimate).
ad) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
ae) Reconductor pricing (SUF 2 - Shaw to Swan Reconductor) is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
af) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B9

T015 – NEXTERA ENERGY

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T015 - NextEra Energy

SECO SUBSTATION ENGINEERING COMPANY

SUMMARY OF COST ESTIMATE

		PROPOSAL (T015)	
		PREFERRED ROUTE	ALTERNATIVE ROUTE
	Description	Total Amount	Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 12,717,405	$ 13,571,466
2	TRANSMISSION LINE FOUNDATIONS	$ 3,200,398	$ 10,001,353
3	STRUCTURES - TRANSMISSION LINE	$ 4,688,312	$ 12,215,200
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 6,137,208	$ 6,089,688
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 1,382,170	$ 1,829,571
6	NEW DYSINGER SUBSTATION	$ 25,374,000	$ 25,374,000
7	EAST STOLLE RD SUBSTATION	$ 13,963,000	$ 13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 28,687,203	$ 40,632,082
	CONTRACTOR MARK-UP (OH&P) 15%	$ 14,422,454	$ 18,551,454
	SUBTOTAL:	$ 110,572,150	$ 142,227,813
	CONTINGENCY (20%)	$ 22,114,430	$ 28,445,563
	TOTAL (A):	**$ 132,686,580**	**$ 170,673,375**
9	SYSTEM UPGRADE FACILITIES	$ 19,705,790	$ 19,705,790
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 6,897,027	$ 6,897,027
	TOTAL (B):	**$ 26,602,817**	**$ 26,602,817**
	TOTAL PROJECT COST (A+B):	**$ 159,289,397**	**$ 197,276,192**

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Description of Work: The Project consists of 2 new 345kV Switchyards (Dysinger and new East Stolle Road. TO15 excludes the 345kV, 700MVA Phase Shifting Transformer at Dysinger Switchyard), the Scope of Work also includes approximately 20 miles of new 345kV Transmission Line, located in Erie County and Niagara County (Empire State Line). This estimate includes for the Developers Preferred Route which utilizes an existing utility ROW. Wood H-Frames will be used to minimize visual impact.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	139.0	Acre		$ 15,000	$ 15,000	**$ 2,085,000**	
1.2	Access Road	48,535.0	LF		$ 45	$ 45	**$ 2,184,075**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	48,535.0	LF		$ 4	$ 4	**$ 194,140**	
1.4	Matting	56,952.0	LF		$ 70	$ 70	**$ 3,986,640**	
1.5	Snow Removal	1.0	Sum		$ 320,000	$ 320,000	**$ 320,000**	
1.6	ROW Restoration	20.0	Mile		$ 10,000	$ 10,000	**$ 200,000**	
1.7	Work Pads	795,000.00	SF		$ 4	$ 4	**$ 2,798,400**	
1.8	Restoration for Work Pad areas	79,500.00	SF		$ 0.2	$ 0.2	**$ 11,925**	
1.9	Temporary Access Bridge	20.0	EA		$ 20,035	$ 20,035	**$ 400,700**	
1.10	Air Bridge	5.0	EA		$ 14,445	$ 14,445	**$ 72,225**	
1.11	Stabilized Construction Entrance	10.0	EA		$ 4,580	$ 4,580	**$ 45,800**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 300,000	$ 300,000	**$ 300,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 100,000	$ 100,000	**$ 100,000**	
1.14	Concrete Washout Station	10.0	EA		$ 1,850	$ 1,850	**$ 18,500**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 12,717,405**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Direct Embed Foundation 3' x 11'	267.0	Ea		$ 9,680	$ 9,680	**$ 2,584,560**	Supply & Install
2.2	Direct Embed Foundation 3' x 12'	35.0	Ea		$ 10,648	$ 10,648	**$ 372,680**	Supply & Install
2.3	Direct Embed Foundation 3' x 13'	8.0	Ea		$ 11,713	$ 11,713	**$ 93,702**	Supply & Install
2.4	Direct Embed Foundation 3' x 14'	5.0	Ea		$ 12,884	$ 12,884	**$ 64,420**	Supply & Install
2.5	Direct Embed Foundation 3' x 15'	6.0	Ea		$ 14,172	$ 14,172	**$ 85,035**	Supply & Install
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 3,200,398**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Dead-End 3 Pole Wood Structure, H2 80ft	5	Ea	$ 6,000	$ 8,185	$ 14,185	**$ 70,927**	
3.2	Dead-End 3 Pole Wood Structure, H2 90ft	2	Ea	$ 7,200	$ 6,925	$ 14,125	**$ 28,250**	
3.3	Dead-End 3 Pole Wood Structure, H2 100ft	2	Ea	$ 8,640	$ 8,459	$ 17,099	**$ 34,198**	
3.4	Dead-End 3 Pole Wood Structure, H2 110ft	1	Ea	$ 10,368	$ 12,689	$ 23,057	**$ 23,057**	
3.5	Angle 3 Pole Wood Structure, H1-90ft	4	Ea	$ 6,480	$ 13,177	$ 19,657	**$ 78,628**	
3.6	Angle 3 Pole Wood Structure, H1-100ft	1	Ea	$ 7,776	$ 16,471	$ 24,247	**$ 24,247**	
3.7	Tangent H-Frame Wood Structure, H2 85'	1	Ea	$ 4,800	$ 15,373	$ 20,173	**$ 20,173**	
3.8	Tangent H-Frame Wood Structure, H2 90'	118	Ea	$ 5,760	$ 18,448	$ 24,208	**$ 2,856,506**	
3.9	Tangent H-Frame Wood Structure, H2 95'	11	Ea	$ 6,912	$ 22,137	$ 29,049	**$ 319,541**	
3.10	Tangent H-Frame Wood Structure, H2 100'	3	Ea	$ 8,294	$ 8,185	$ 16,480	**$ 49,439**	
3.11	Tangent H-Frame Wood Structure, H2 105'	1	Ea	$ 9,953	$ 6,925	$ 16,878	**$ 16,878**	
3.12	Tangent H-Frame Wood Structure, H2 115'	1	Ea	$ 11,944	$ 8,459	$ 20,403	**$ 20,403**	
3.13	Tangent H-Frame Wood Structure, H2 125'	3	Ea	$ 14,333	$ 12,689	$ 27,021	**$ 81,064**	
3.14	Install Grounding	153.0	Structure		$ 5,000	$ 5,000	**$ 765,000**	Supply & Install
3.15	Guy Wires and Anchors for DE / Angle Structures	15.0	Structure		$ 20,000	$ 20,000	**$ 300,000**	Supply & install
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 4,688,312**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	21	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 4,457,376**	
4.2	(1) OPGW 48 Fiber	21	Mile	$ 22,176	$ 27,720	$ 49,896	**$ 1,047,816**	
4.3	(1) 3/8" HS Steel	21	Mile	$ 3,696	$ 26,400	$ 30,096	**$ 632,016**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 6,137,208**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	414	Set	$ 900	$ 720	$ 1,620	**$ 670,680**	
5.2	Deadend / Angle Assemblies	96.0	Set	$ 1,500	$ 1,040	$ 2,540	**$ 243,840**	
5.3	OPGW Assembly - Tangent	138.0	Set	$ 200	$ 150	$ 350	**$ 48,300**	
5.4	OPGW Assembly - Angle / DE	34.0	Set	$ 250	$ 150	$ 400	**$ 13,600**	
5.5	OHSW Assembly - Tangent	138.0	Set	$ 200	$ 150	$ 350	**$ 48,300**	
5.5	OHSW Assembly - Angle / DE	34.0	Set	$ 250	$ 150	$ 400	**$ 13,600**	
5.8	OPGW Splice Boxes	9.0	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 22,500**	
5.7	OPGW Splice & Test	1.0	Sum		$ 10,800	$ 10,800	**$ 10,800**	
5.8	Spacer Dampers	2,310.0	Ea	$ 50	$ 35	$ 85	**$ 196,350**	
5.9	Vibration Dampers - Conductor	1,850.0	Ea	$ 32	$ 20	$ 52	**$ 96,200**	
5.10	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 10,000	$ 8,000	$ 18,000	**$ 18,000**	
TOTAL: TRANSMISSION LINE INSULA+52:63TORS, FITTINGS, HARDWARE:							**$ 1,382,170**	
6. NEW DYSINGER SWITCHYARD								
6.1	Site Works including sediment controls, access roads, rough grading, final	1.0	Sum		$1,500,000.00	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,500.0	LF		$200.00	$ 200	**$ 500,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	22.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 154,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph w/ motor-operators	7.0	Ea	$ 15,000	$15,000	$ 30,000	**$ 210,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,214,000	$ 1,214,000	**$ 1,214,000**	
6.8	Breakers	11.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 4,180,000**	
6.9	Arrestors (3 per line)	21.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 157,500**	
6.10	Line Traps	7.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 147,000**	
6.11	345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
6.13	Low Profile Foundations	282.0	Ea		$ 5,000	$ 5,000	**$ 1,410,000**	Supply & Install
6.14	Caisson DE Foundations	48.0	Ea		$ 50,000	$ 50,000	**$ 2,400,000**	Supply & Install
6.15	Circuit Breaker Foundations	11.0	Ea		$ 75,000	$ 75,000	**$ 825,000**	Supply & Install
6.16	Lightning Mast Foundations	5.0	Ea		$15,000	$ 15,000	**$ 75,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
6.18	Control House and Pad (30' x 90')	1.0	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.20	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
6.23	Protection, Telecom and Metering Equipment (Panels)	37.0	Ea		$ 30,000	$ 30,000	**$ 1,110,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 275,000	$ 275,000	**$ 275,000**	Supply & Install
6.29	Bus Support 3 Ph	19.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 123,500**	
6.30	Bus Support 1 Ph	36.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 108,000**	
6.31	Switch Stands	24.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 264,000**	
6.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.33	Misc. Structures	1.0	Sum		$ 74,000	$ 74,000	**$ 74,000**	
6.34	Substation A-Frame Structures Standalone	12.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 300,000**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
6.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
6.36	Arrestor Stands	21.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 73,500**	
6.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.38	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 25,374,000**	
7. EAST STOLLE RD SUBSTATION								
7.1	Site Works including sediment controls, access roads, rough grading, final	1.0	Sum		$ 1,000,000.00	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	1,900.0	LF		$ 200.00	$ 200	**$ 380,000**	Supply & Install
7.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
7.4	Switches 3ph	9.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 63,000**	
7.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.7	Instrument Transformers	1.0	Sum		$ 752,000	$ 752,000	**$ 752,000.00**	
7.8	Breakers	4.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,520,000.00**	
7.9	Arrestors (3 per line) and shunt reactor	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.10	Line Traps	2.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 42,000.00**	
7.11	345 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
7.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
7.13	Low Profile Foundations	147.0	Ea		$ 5,000	$ 5,000	**$ 735,000**	Supply & Install
7.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
7.15	Circuit Breaker Foundations	4.0	Ea		$ 75,000	$ 75,000	**$ 300,000**	Supply & Install
7.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
7.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
7.18	Control House and Pad (25' x 50' - 1250 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
7.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
7.20	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000.00**	
7.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
7.23	Protection, Telecom and Metering Equipment (Panels)	18.0	Ea		$ 30,000	$ 30,000	**$ 540,000**	Supply & Install
7.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
7.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
7.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.29	Bus Support 3 Ph	9.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 58,500**	
7.30	Bus Support 1 Ph	21.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 63,000**	
7.31	Switch Stands	13.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 143,000**	
7.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
7.33	Misc. Structures	1.0	Sum		$ 24,000	$ 24,000	**$ 24,000.00**	
7.34	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000**	
7.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
7.36	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	
7.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.38	345kV 30MVAR Shunt Reactor	1.0	Ea	$ 732,000	$ 100,000	$ 832,000	**$ 832,000**	
7.39	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
7.40	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - EAST STOLLE RD SUBSTATION:							**$ 13,963,000**	
8. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS								
	Contractor Mobilization / Demobilization							

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
8.1	Mob / Demob	1.00	Sum		$ 800,000	$ 800,000	**$ 800,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
8.2	Project Management & Staffing (includes PM, Field Engineers / Supervision,	14.00	Months		$ 220,000	$ 220,000	**$ 3,080,000**	
8.3	Site Accommodation, Facilities, Storage	1.00	Sum		$ 1,400,000	$ 1,400,000	**$ 1,400,000**	
	Engineering					$ -	**$ -**	
8.4	Design Engineering	1.00	Sum		$ 3,000,000	$ 3,000,000	**$ 3,000,000**	
8.5	LiDAR	1.00	Sum		$ 400,000	$ 400,000	**$ 400,000**	
8.6	Geotech	1.00	Sum		$ 600,000	$ 600,000	**$ 600,000**	
8.7	Surveying/Staking	1.00	Sum		$ 400,000	$ 400,000	**$ 400,000**	
	Testing & Commissioning							
8.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Permitting and Additional Costs					$ -	**$ -**	
8.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 2,312,325	$ 2,312,325	**$ 2,312,325**	
8.10	Environmental Mitigation	1.00	Sum		$ 9,472,635	$ 9,472,635	**$ 9,472,635**	
8.11	Warranties / LOC's	1.00	Sum		$ 395,286	$ 395,286	**$ 395,286**	
8.12	Real Estate Costs (New ROW)	1.00	Sum		$ 391,346	$ 391,346	**$ 391,346**	
8.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 1,793,000	$ 1,793,000	**$ 1,793,000**	
8.14	Legal Fees	1.00	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
8.15	Sales Tax on Materials	1.00	Sum	$ 1,442,611		$ 1,442,611	**$ 1,442,611**	
8.16	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
8.17	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
8.18	Carrying Charges	1.00	Sum			$ -	**$ -**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 28,687,203**	
9. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so it is limited by lien conductor ratings 125/152/181 (NOR/LTE/STE).
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	**$ 75,000**	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 720,000**	
SUF 3.1	Roll Rd to Stolle Rd 115kV Transmission Line 928. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Replace limiting terminal equipment at both Stolle Rd 115 kV Substation.
SUF 3.2	Engineering, T&C, PM, Indirects for SUF 3.1 (15%)					$ -	**$ 75,000**	
SUF 4	**100MVAR Shunt Reactor at RG&E Sta 80**							
SUF 4.1	Site Works including sediment controls, access roads, rough grading, final	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.2	Substation Fence	600.00	LF		$ 200	$ 200	**$ 120,000**	Supply & Install
SUF 4.3	Shunt Reactor 3ph 345kV 100MVAR	1.00	Ea	$ 1,500,000	$ 500,000	$ 2,000,000	**$ 2,000,000**	
SUF 4.4	Switches 3ph 345kV	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
SUF 4.5	CVT's 345kV	3.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 63,000**	

COST ESTIMATE

(PREFERRED ROUTE)

Revision: 5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 4.6	Breakers 345kV	1.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 380,000**	
SUF 4.7	Arrestors - 235kV	3.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
SUF 4.8	Low Profile Foundations	19.00	Ea		$ 5,000	$ 5,000	**$ 95,000**	Supply & Install
SUF 4.9	Circuit Breaker Foundations	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 4.10	Lightning Mast Foundations	2.00	Ea		$ 15,000	$ 15,000	**$ 30,000**	Supply & Install
SUF 4.11	Reactor Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 4.12	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
SUF 4.13	Protection & Telecom Equipment	3.00	Ea		$ 15,000	$ 15,000	**$ 45,000**	Supply & Install
SUF 4.14	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.15	Low Voltage AC Distribution	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
SUF 4.16	Control Conduits	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.17	Cable Trench System for Control Conduits	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
SUF 4.18	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.19	Bus Support 3ph	2.0	Ea	$ 3,000	$ 2,000	$ 5,000	**$ 10,000**	
SUF 4.20	Bus Support 1ph	3.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
SUF 4.21	Switch Stands	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.22	Fuse Stand	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.23	CVT Stand	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
SUF 4.24	Lightning Mast	2.0	Ea	$ 10,000	$ 5,000	$ 15,000	**$ 30,000**	
SUF 4.25	Misc Materials and Above / Below Ground Works	1.0	Ea		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.26	**Engineering, T&C, PM, Indirects (15%)**					$ -	**$ 1,211,190**	
SUF 5	**SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)**						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL -SUF							**$ 19,705,790**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T015 - NextEra Energy

COST ESTIMATE

(ALTERNATE ROUTE)

Revision:5

Description of Work: The Project consists of 2 new 345kV Switchyards (Dysinger and new East Stolle Road. TO15 excludes the 345kV, 700MVA Phase Shifting Transformer at Dysinger Switchyard), the Scope of Work also includes approximately 22 miles of new 345kV Transmission Line, located in Erie County and Niagara County (Empire State Line). This estimate includes for the Developers Alternate Route which uses Steel Poles.

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	118.0	Acre		$ 15,000	$ 15,000	**$ 1,770,000**	
1.2	Access Road	53,388.5	LF		$ 45	$ 45	**$ 2,402,483**	Assumes Type 1 Type Gravel Road
1.3	Silt Fence	53,388.5	LF		$ 4	$ 4	**$ 213,554**	
1.4	Matting	62,647.2	LF		$ 70	$ 70	**$ 4,385,304**	
1.5	Snow Removal	1.0	Sum		$ 320,000	$ 320,000	**$ 320,000**	
1.6	ROW Restoration	22.0	Mile		$ 10,000	$ 10,000	**$ 220,000**	
1.7	Work Pads	940,000.00	SF		$ 4	$ 4	**$ 3,308,800**	
1.8	Restoration for Work Pad areas	94,000.00	SF		$ 0.2	$ 0.2	**$ 14,100**	
1.9	Temporary Access Bridge	20.0	EA		$ 20,035	$ 20,035	**$ 400,700**	
1.10	Air Bridge	5.0	EA		$ 14,445	$ 14,445	**$ 72,225**	
1.11	Stabilized Construction Entrance	10.0	EA		$ 4,580	$ 4,580	**$ 45,800**	
1.12	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 300,000	$ 300,000	**$ 300,000**	
1.13	Culverts / Misc. Access	1.0	LS		$ 100,000	$ 100,000	**$ 100,000**	
1.14	Concrete Washout Station	10.0	EA		$ 1,850	$ 1,850	**$ 18,500**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 13,571,466**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Direct Embed Foundation for Vertical Tangent Poles (5'x 20')	109.0	Ea		$ 18,000	$ 18,000	**$ 1,962,000**	Supply & Install
2.2	Direct Embed Foundation for Vertical Tangent Poles (5'x 20.5')	12.0	Ea		$ 18,900	$ 18,900	**$ 226,800**	Supply & Install
2.3	Direct Embed Foundation for Vertical Tangent Poles (5'x 21')	16.0	Ea		$ 20,790	$ 20,790	**$ 332,640**	Supply & Install
2.4	Direct Embed Foundation for Vertical Tangent Poles (5'x 21.5')	3.0	Ea		$ 22,869	$ 22,869	**$ 68,607**	Supply & Install
2.5	Direct Embed Foundation for Vertical Tangent Poles (5'x 23')	1.0	Ea		$ 25,156	$ 25,156	**$ 25,156**	Supply & Install
2.6	Caisson Foundation for Vertical Angle (9' x 20')	445.5	CUY		$ 1,500	$ 1,500	**$ 668,250**	
2.7	Caisson Foundation for Dead End (10' x 35')	3,978.6	CUY		$ 1,500	$ 1,500	**$ 5,967,900**	
2.8	Rock Adder	500.0	CUY		$ 1,500	$ 1,500	**$ 750,000**	
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 10,001,353**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	Steel Vertical Tangent Monopole (130' including embedment)	109	Ea	$ 25,200	$ 15,120	$ 40,320	**$ 4,394,880**	
3.2	Steel Vertical Tangent Monopole (135' including embedment)	12	Ea	$ 27,900	$ 16,740	$ 44,640	**$ 535,680**	
3.3	Steel Vertical Tangent Monopole (141' including embedment)	16	Ea	$ 30,600	$ 18,360	$ 48,960	**$ 783,360**	
3.4	Steel Vertical Tangent Monopole (145' including embedment)	3	Ea	$ 34,200	$ 20,520	$ 54,720	**$ 164,160**	
3.5	Steel Vertical Tangent Monopole (162' including embedment)	1	Ea	$ 37,800	$ 22,680	$ 60,480	**$ 60,480**	
3.6	Steel Vertical Angle Monopole (131')	9	Ea	$ 66,600	$ 39,960	$ 106,560	**$ 959,040**	
3.7	Steel Vertical Deadend Monopole (105')	38	Ea	$ 72,000	$ 43,200	$ 115,200	**$ 4,377,600**	
3.8	Install Grounding	188	Ea		$ 5,000	$ 5,000	**$ 940,000**	Supply & Install
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 12,215,200**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	(2)/Phase - 795kcmil 26/7 Stranded "Drake" ACSR	23	Circuit Mile	$ 53,856	$ 158,400	$ 212,256	**$ 4,881,888**	
4.2	(1) OPGW 48 Fiber	23	Mile	$ 22,176	$ 27,720	$ 49,896	**$ 1,147,608**	
4.3	(1) 3/8" HS Steel	2	Mile	$ 3,696	$ 26,400	$ 30,096	**$ 60,192**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 6,089,688**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Polymer V-String	450	Set	$ 900	$ 720	$ 1,620	**$ 729,000**	
5.2	Deadend / Angle Assemblies	234.0	Set	$ 1,500	$ 1,040	$ 2,540	**$ 594,360**	

COST ESTIMATE

(ALTERNATE ROUTE)

Revision:5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
5.3	OPGW Assembly - Tangent	150.0	Set	$ 200	$ 150	$ 350	**$ 52,500**	
5.5	OPGW Assembly - Angle / DE	72.0	Set	$ 250	$ 150	$ 400	**$ 28,800**	
5.6	OHSW Assembly - Angle / DE	15.0	Set	$ 250	$ 150	$ 400	**$ 6,000**	
5.8	OPGW Splice Boxes	10.0	Ea	$ 1,500	$ 1,000	$ 2,500	**$ 25,000**	
5.9	OPGW Splice & Test	1.0	Sum		$ 12,000	$ 12,000	**$ 12,000**	
5.10	Spacer Dampers	2,835.0	Ea	$ 50	$ 35	$ 85	**$ 240,975**	
5.11	Vibration Dampers - Conductor	2,268.0	Ea	$ 32	$ 20	$ 52	**$ 117,936**	
5.12	Shield wire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 15,000	$ 8,000	$ 23,000	**$ 23,000**	
TOTAL: TRANSMISSION LINE INSULATORS, FITTINGS, HARDWARE:							**$ 1,829,571**	
6. NEW DYSINGER SUBSTATION								
6.1	Site Works including sediment controls, access roads, rough grading, final grading and	1.0	Sum		$1,500,000.00	$ 1,500,000	**$ 1,500,000**	Supply & Install
6.2	Substation Fence	2,500.0	LF		$200.00	$ 200	**$ 500,000**	Supply & Install
6.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
6.4	Switches 3ph	22.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 154,000**	
6.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
6.6	Line Switches 3 ph w/ motor-operators	7.0	Ea	$ 15,000	$15,000	$ 30,000	**$ 210,000**	
6.7	Instrument Transformers	1.0	Sum		$ 1,214,000	$ 1,214,000	**$ 1,214,000**	
6.8	Breakers	11.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 4,180,000**	
6.9	Arrestors (3 per line)	21.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 157,500**	
6.1	Line Traps	7.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 147,000**	
6.11	345 kV buses	2.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 120,000**	
6.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
6.13	Low Profile Foundations	282.0	Ea		$ 5,000	$ 5,000	**$ 1,410,000**	Supply & Install
6.14	Caisson DE Foundations	48.0	Ea		$ 50,000	$ 50,000	**$ 2,400,000**	Supply & Install
6.15	Circuit Breaker Foundations	11.0	Ea		$ 75,000	$ 75,000	**$ 825,000**	Supply & Install
6.16	Lightning Mast Foundations	5.0	Ea		$15,000	$ 15,000	**$ 75,000**	Supply & Install
6.17	SST Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
6.18	Control House and Pad (30' x 90')	1.0	Ea	$ 650,000	$ 200,000	$ 850,000	**$ 850,000**	
6.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
6.2	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000**	
6.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
6.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
6.23	Protection, Telecom and Metering Equipment (Panels)	37.0	Ea		$ 30,000	$ 30,000	**$ 1,110,000**	Supply & Install
6.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
6.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
6.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
6.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
6.28	Grounding	1.0	Sum		$ 275,000	$ 275,000	**$ 275,000**	Supply & Install
6.29	Bus Support 3 Ph	19.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 123,500**	
6.3	Bus Support 1 Ph	36.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 108,000**	
6.31	Switch Stands	24.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 264,000**	
6.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
6.33	Misc. Structures	1.0	Sum		$ 74,000	$ 74,000	**$ 74,000**	
6.34	Substation A-Frame Structures Standalone	12.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 300,000**	
6.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
6.36	Arrestor Stands	21.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 73,500**	
6.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
6.38	Connection of Existing Lines to Dysinger Switchyard	1.0	Sum		$ 5,000,000	$ 5,000,000	**$ 5,000,000**	Supply & Install
TOTAL - DYSINGER SWITCHYARD:							**$ 25,374,000**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T015 - NextEra Energy

COST ESTIMATE

(ALTERNATE ROUTE)

Revision:5

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
7. EAST STOLLE RD SUBSTATION								
7.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement	1.0	Sum		$ 1,000,000.00	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.2	Substation Fence	1,900.0	LF		$ 200.00	$ 200	**$ 380,000**	Supply & Install
7.3	SSVT	1.0	Ea	$ 200,000	$ 50,000	$ 250,000	**$ 250,000**	
7.4	Switches 3ph	9.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 63,000**	
7.5	Fuses 1ph	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.6	Line Switches 3 ph w/ motor-operators	3.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 90,000**	
7.7	Instrument Transformers	1.0	Sum		$ 752,000	$ 752,000	**$ 752,000.00**	
7.8	Breakers	4.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 1,520,000.00**	
7.9	Arrestors (3 per line) and shunt reactor	12.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 90,000**	
7.10	Line Traps	2.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 42,000.00**	
7.11	345 kV buses	1.0	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 60,000**	
7.12	Auxillary Power Generator - 500kW	1.0	Ea	$ 160,000	$ 40,000	$ 200,000	**$ 200,000**	
7.13	Low Profile Foundations	147.0	Ea		$ 5,000	$ 5,000	**$ 735,000**	Supply & Install
7.14	Caisson DE Foundations	20.0	Ea		$ 50,000	$ 50,000	**$ 1,000,000**	Supply & Install
7.15	Circuit Breaker Foundations	4.0	Ea		$ 75,000	$ 75,000	**$ 300,000**	Supply & Install
7.16	Lightning Mast Foundations	5.0	Ea		$ 15,000	$ 15,000	**$ 75,000**	Supply & Install
7.17	SST Foundation	1.0	Ea		$ 75,000.00	$ 75,000	**$ 75,000**	Supply & Install
7.18	Control House and Pad (25' x 50' - 1250 sq. ft)	1.0	Ea	$ 350,000	$ 100,000	$ 450,000	**$ 450,000**	
7.19	Generator Foundation	1.0	Sum		$ 25,000	$ 25,000	**$ 25,000**	Supply & Install
7.20	Control Cables	1.0	Sum	$ 130,000	$ 130,000	$ 260,000	**$ 260,000.00**	
7.21	125VDC Batteries	2.0	Ea	$ 50,000	$ 50,000	$ 100,000	**$ 200,000**	
7.22	Station Services	2.0	Ea		$ 25,000	$ 25,000	**$ 50,000**	
7.23	Protection, Telecom and Metering Equipment (Panels)	18.0	Ea		$ 30,000	$ 30,000	**$ 540,000**	Supply & Install
7.24	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
7.25	Low Voltage AC Distribution & DC Panels & Switches	1.0	Sum		$ 500,000	$ 500,000	**$ 500,000**	Supply & Install
7.26	Control Conduits from Cable Tray to Equipment	1.0	Sum		$ 357,500	$ 357,500	**$ 357,500**	Supply & Install
7.27	Cable Trench Systems for Control Cables	1.0	Sum		$ 975,000	$ 975,000	**$ 975,000**	Supply & Install
7.28	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
7.29	Bus Support 3 Ph	9.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 58,500**	
7.30	Bus Support 1 Ph	21.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 63,000**	
7.31	Switch Stands	13.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 143,000**	
7.32	Fuse Stand	1.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 11,000**	
7.33	Misc. Structures	1.0	Sum		$ 24,000	$ 24,000	**$ 24,000.00**	
7.34	Substation A-Frame Structures Standalone	5.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 125,000**	
7.35	Lightning Masts	5.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 60,000**	
7.36	Arrestor Stands	12.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 42,000**	
7.37	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
7.38	345kV 30MVAR Shunt Reactor	1.0	Ea	$ 732,000	$ 100,000	$ 832,000	**$ 832,000**	
7.39	Transformer Foundation with concrete moat and double steel grating	1.0	Sum		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
7.40	Interconnection arrangement at Stolle Rd Substation	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	Supply & Install
TOTAL - EAST STOLLE RD SUBSTATION:							**$ 13,963,000**	
8. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
8.1	Mob / Demob	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Project Management, Material Handling & Amenities							
8.2	Project Management & Staffing (includes PM, Field Engineers / Supervision, Scheduler and	14.00	Months		$ 350,000	$ 350,000	**$ 4,900,000**	
8.3	Site Accommodation, Facilities, Storage	1.00	Sum		$ 1,400,000	$ 1,400,000	**$ 1,400,000**	

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
	Engineering							
8.4	Design Engineering	1.00	Sum		$ 4,170,000	$ 4,170,000	**$ 4,170,000**	
8.5	LiDAR	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
8.6	Geotech	1.00	Sum		$ 1,100,000	$ 1,100,000	**$ 1,100,000**	
8.7	Surveying/Staking	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	
	Testing & Commissioning							
8.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.00	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Permitting and Additional Costs					$ -	**$ -**	
8.9	Environmental Licensing & Permitting Costs	1.00	Sum		$ 3,477,113	$ 3,477,113	**$ 3,477,113**	
8.10	Environmental Mitigation	1.00	Sum		$ 8,002,635	$ 8,002,635	**$ 8,002,635**	
8.11	Warranties / LOC's	1.00	Sum		$ 511,213	$ 511,213	**$ 511,213**	
8.12	Real Estate Costs (New ROW)	1.00	Sum		$ 7,993,538	$ 7,993,538	**$ 7,993,538**	
8.13	Real Estate Costs (Incumbent Utility ROW)	1.00	Sum		$ 90,000	$ 90,000	**$ 90,000**	
8.14	Legal Fees	1.00	Sum		$ 3,500,000	$ 3,500,000	**$ 3,500,000**	
8.15	Sales Tax on Materials	1.00	Sum	$ 2,287,583		$ 2,287,583	**$ 2,287,583**	
8.16	Fees for permits, including roadway, railroad, building or other local permits	1.00	Sum		$ 200,000	$ 200,000	**$ 200,000**	
8.17	Allowance for Funds Used During Construction (AFUDC)	1.00	Sum			$ -	**$ -**	
8.18	Carrying Charges	1.00	Sum			$ -	**$ -**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 40,632,082**	
9. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Depew to Erie Street 115kV Transmission Line 921. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so it is limited by lien conductor ratings 125/152/181 (NOR/LTE/STE).
SUF 1.2	Engineering, T&C, PM, Indirects for SUF 1.1 (15%)					$ -	**$ 75,000**	
SUF 2.1	Shawnee to Swann Reconductor	12.00	Mile		$ 400,000	$ 400,000	**$ 4,800,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 720,000**	
SUF 3.1	Roll Rd to Stolle Rd 115kV Transmission Line 928. Terminal allowance included. See comments.	1.00	Sum		$ 500,000	$ 500,000	**$ 500,000**	Replace limiting terminal equipment at both Stolle Rd 115 kV Substation and Roll Rd 115 kV Substation.
SUF 3.2	Engineering, T&C, PM, Indirects for SUF 3.1 (15%)					$ -	**$ 75,000**	
SUF 4	**100MVAR Shunt Reactor at RG&E Sta 80**							
SUF 4.1	Site Works including sediment controls, access roads, rough grading, final grading and stone placement - approx 1. acre	1.00	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.2	Substation Fence	600.00	LF		$ 200	$ 200	**$ 120,000**	Supply & Install
SUF 4.3	Shunt Reactor 3ph 345kV 100MVAR	1.00	Ea	$ 1,500,000	$ 500,000	$ 2,000,000	**$ 2,000,000**	
SUF 4.4	Switches 3ph 345kV	1.00	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
SUF 4.5	CVT's 345kV	3.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 63,000**	
SUF 4.6	Breakers 345kV	1.00	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 380,000**	
SUF 4.7	Arrestors - 235kV	3.00	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
SUF 4.8	Low Profile Foundations	19.00	Ea		$ 5,000	$ 5,000	**$ 95,000**	Supply & Install
SUF 4.9	Circuit Breaker Foundations	1.00	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
SUF 4.10	Lightning Mast Foundations	2.00	Ea		$ 15,000	$ 15,000	**$ 30,000**	Supply & Install

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Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Remarks
SUF 4.11	Reactor Foundation with concrete moat and double steel grating	1.00	Ea		$ 150,000	$ 150,000	**$ 150,000**	Supply & Install
SUF 4.12	Control Cables	1.00	Sum	$ 100,000	$ 100,000	$ 200,000	**$ 200,000**	
SUF 4.13	Protection & Telecom Equipment	3.00	Ea		$ 15,000	$ 15,000	**$ 45,000**	Supply & Install
SUF 4.14	SCADA and Communications	1.00	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.15	Low Voltage AC Distribution	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
SUF 4.16	Control Conduits	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.17	Cable Trench System for Control Conduits	1.0	Sum		$ 750,000	$ 750,000	**$ 750,000**	Supply & Install
SUF 4.18	Grounding	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
SUF 4.19	Bus Support 3ph	2.0	Ea	$ 3,000	$ 2,000	$ 5,000	**$ 10,000**	
SUF 4.20	Bus Support 1ph	3.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
SUF 4.21	Switch Stands	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.22	Fuse Stand	1.0	Ea	$ 1,500	$ 800	$ 2,300	**$ 2,300**	
SUF 4.23	CVT Stand	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
SUF 4.24	Lightning Mast	2.0	Ea	$ 10,000	$ 5,000	$ 15,000	**$ 30,000**	
SUF 4.25	Misc Materials and Above / Below Ground Works	1.0	Ea		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	Supply & Install
SUF 4.26	**Engineering, T&C, PM, Indirects (15%)**					$ -	**$ 1,211,190**	
SUF 5	**SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)**						**$ 3,750,000**	Contingency for possible additional SUF upgrades
TOTAL -SUF							**$ 19,705,790**	

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ENVIRONMENTAL LICENSING AND PERMITTING

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PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T015			
FEDERAL						**Preferred Route**		**Alternative Route**	
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$26,600	$88,250	$26,600	$88,250
National Park Service	National Parks	Consultation; Special Use Permit	Only applies if National Park located in project area.	Depending on impact of project request for a special use permit may require a NEPA environmental assessment.					
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$27,800	$94,000	$30,300	$99,000
NEPA	National Environmental Policy Act	Categorical Exclusion; EA Finding of No Impact; or EIS Record of Decision	With some exemptions, projects on federally owned lands and/or projects requiring federal permit approvals	Possible NEPA review due if federal agency coordination is required. Federal agency involved to determine if Categorical Exclusion applies. Assumes Article 7 covers NEPA requirements or if an EIS is required it is prepared under SEQRA Task.					
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)				
STATE									
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans				
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Article VII Intervenor Fund payment expected to be $100,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$600,000	$3,100,000	$600,000	$3,100,000

ENVIRONMENTAL LICENSING AND PERMITTING

NYS Public Service Commission / Department of Public Service (NYSDPS)	Part 102		Construction of a utility overhead transmission facility that will convey electric energy at 65kV or higher for a distance of one mile or longer and are not subject to Article VII of the Public Service Law.	May include coordination or studies completed under other line items including: Visual assessment, SHPO determination, OPRHP consultation, Ecological Impacts Assessment	Advantage-Disadvantage Analysis				
NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000	$12,000	$53,000
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000	$11,200	$38,000
Any State or local government agency that issues permits or approvals	State Environmental Quality Review Act (SEQRA)	Environmental Assessment (EA) Determination of Significance	Projects not covered as a Type II Action (Note a project can not be segmented - all phases/tasks must be considered in the review)	Most projects or activities proposed by a state agency, and all discretionary approvals (permits) from a NYS agency or local government, require an environmental impact assessment. SEQR requires the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity it is proposing or permitting.					
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)					
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies	$13,200	$49,000	$14,200	$52,000
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400	$1,200	$6,400

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NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$69,000	$17,000	$69,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)				
NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000	$11,000	$24,000
REGIONAL									
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$76,000	$11,000	$76,000
LOCAL/MUNICIPAL									
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans				
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000	$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000	$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000	$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000	$6,000	$52,000

		Minimum	Maximum	Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T014 TOTAL**	**$773,000**	**$3,851,650**	**$776,500**	**$3,859,650**
	Expected Value	**$2,312,325**		**$3,477,112.50**	

Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 5

WNY TRANSMISSION PROJECT - ENVIRONMENTAL MITIGATION COST ESTIMATE FOR T014

	Offsite Wetland Mitigation*				Farmland**	
	Preferred Route		Alternative Rotue		Preferred & Alternative Routes	
	Min.	Max.	Min.	Max.	Min.	Max.
Area	45 acres	45 acres	38 acres	38 acres	30 acres	60 acres
Cost/Acre	$60,000	$120,000	$60,000	$120,000	$503	$503
Ratio	1:1	3:1	1:1	3:1	1:1	1:1
Total	$ 2,700,000	$16,200,000	$2,280,000	$13,680,000	$15,090	$30,180

T014 PREFERRED ROUTE MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,715,090	**$16,230,180**	**$ 9,472,635**

T014 ALTERNATIVE ROUTE MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$2,295,090	**$13,710,180**	**$ 8,002,635**

*Offsite wetland mitigation area assumes clearing of NWI Forested/Shrub Wetland approx. 3.24 miles (17107 LF) by 115' ROW width for the Preferred Route and approx. 3.47 (18322 LF) by 90' ROW width for the Alternative Route; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; costing includes design and installation costs only; does not include land acquisition or long term monitoring

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 9.8 miles (51744 LF) Land Adjacent to Agriculture District/Crop Land by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

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REAL ESTATE ESTIMATE
(NEW ROW)

COUNTY: ERIE
DEVELOPER: NEXTERA (T014 & T015 PREFERRED)
SEGMENT: DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
	Total	0.68	$ 4,376.00

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 PREFERRED)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	NEXTERA ENERGY	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara	4.59	$ 1,793,000
			Erie	355.48	

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REAL ESTATE ESTIMATE
(NEW ROW - 80FT. CORRIDOR)

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER TO STOLLE ROAD SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	5.30	$ 124,550.00
B	**ERIE COUNTY**		
	Sub Total (B)	191.75	$ 5,572,547.00
	Total (A + B)	197.05	$ 5,697,097.00

REAL ESTATE ESTIMATE
(NEW ROW - 10FT. ADDITIONAL CORRIDOR)

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COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER TO STOLLE ROAD SEGMENT

	Address	Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	0.59	$ 13,865.00
B	**ERIE COUNTY**		
	Sub Total (B)	26.28	$ 858,481.50
	Total (A + B)	26.87	$ 872,346.50

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

Revision: 5

COUNTY: NIAGARA & ERIE
DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)
SEGMENT: DYSINGER - STOLLE SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
1	NEXTERA ENERGY (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara	1.20	$ 90,000
			Erie	17.16	

REAL ESTATE ESTIMATE (HOUSES)

Revision: 5

COUNTY: ERIE

DEVELOPER: NEXTERA (T014 & T015 ALTERNATIVE)

SEGMENT: DYSINGER - STOLLE SEGMENT

	Address	Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 1,037,124.17

REAL ESTATE ESTIMATE

Revision: 5

COUNTY:	NIAGARA
DEVELOPER:	NEXTERA
SEGMENT:	DYSINGER SUBSTATION

	Address	Total Cost
	Total Cost of Proposed Substation Site	$ 251,450.00

REAL ESTATE ESTIMATE

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COUNTY:	ERIE
DEVELOPER:	NEXTERA
SEGMENT:	STOLLE ROAD SUBSTATION

	Address	Total Cost
	Total Cost of Proposed Substation Site	$ 135,520.00

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ASSUMPTIONS AND CLARIFICATIONS

a) Cost Estimate is based on 2017 rates.
b) Construction Schedule is in accordance with the Developers proposed schedule (6 months for construction - seems light) - we have assumed continuous working with no breaks in the schedule. Six months added for start up and close out works and assisting in pre-construction activities (i.e. permitting activates, material procurement etc.)
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) Wood Pole types are based on Plan and Profile drawings. Direct embed foundations are assumed to be 10% plus 2 ft and rates include backfill. Steel Pole weights and foundation types are estimated based on benchmark data.
f) We have assumed that the Access Road upgrades include gravel updates only.
g) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
h) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
i) The equipment types listed for Dysinger and East Stolle Rd Substation have been taken from a recently completed 345kV substation project, using current pricing.
j) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
k) A Contractor Mark-Up (OH&P) of 15% has been included in the Total section
l) Assumes all environmental data and project details provided are accurate unless noted otherwise.
m) USFWS T&E assumes ¼ of the total Preferred Route will require field survey for T&E (5 miles).
n)USFWS T&E assumes ¼ of the total Alternative Route will require field survey for T&E (5. 5 miles).
o) NEPA-Assumes no NEPA because Art VII.
p) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of Preferred Route (10 miles) and Alternative Route (11 miles).
q) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII.
r) Assumes no coordination with National Parks Service or OPRHP/State Parks.
s) USACE wetland delineation total for Preferred and Alternative Routes is based on combined NYSDEC/USACE wetland length of 3.9 miles from information in Proposal Attachment C.
t) NYSDEC delineations overlap and are accounted for in USACE costing.

ASSUMPTIONS AND CLARIFICATIONS

u) Offsite wetland mitigation area costs for the Preferred Route based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.24 miles (calculated by GEI based on NWI mapper legend categories). Assumes clearing an additional 115 feet within Right of Way. Minimum costs $60,000/acre at 1:1 ratio, maximum costs at $120,000/acre at 3:1 ratio for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.
v) Offsite wetland mitigation area costs for the Alternative Route based on impacts anticipated by clearing of NWI Forested/Shrub Wetland of approximately 3.47 calculated by GEI based on NWI mapper legend categories). Assumes clearing 90 wide feet within Right of Way. Minimum costs at $60,000/acre at 1:1 ratio, maximum costs at $120,000/acre at 3:1 ratio for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring.
w) Agricultural mitigation for Preferred and Alternative Routes assumes timber matting impacts and pad impacts on adjacent agriculture land (9.8 miles) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
x) Assumes Right of Way restoration is accounted for in construction costs.
y) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.).
z) No tree survey or replanting required outside regulated wetlands areas.
aa) Article VII Intervenor Fund payment expected to be $100,000.
ab) Expected value of Alt. Route is estimated to be 50% higher than the mean of the range of environmental licensing and permitting costs due to new ROW.
ac) SUF pricing is included at the end of the estimate workbook (costs excluded from main estimate).
ad) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
ae) Reconductor pricing (SUF 2 - Shaw to Swan Reconductor) is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
af) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.

INDEPENDENT ESTIMATES

ATTACHMENT B10

T017 – EXELON TRANSMISSION

SUBSTATION ENGINEERING COMPANY
8/11/2017

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T017 - Exelon Transmission

Revision: 3

SUMMARY OF COST ESTIMATE

	Description		Total Amount
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	40,368,420
2	TRANSMISSION LINE FOUNDATIONS	$	16,694,900
3	STRUCTURES - TRANSMISSION LINE	$	30,784,427
4	CONDUCTOR, SHIELDWIRE, OPGW	$	15,797,866
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	4,498,017
6	STOLLE ROAD SUBSTATION WORKS:	$	3,616,500
7	GARDENVILLE 230kV SUBSTATION WORKS	$	3,414,500
8	NIAGARA SUBSTATION WORK	$	4,209,000
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:	$	66,804,397
	CONTRACTOR MARK-UP (OH&P) 15%	$	27,928,204
	SUBTOTAL:	$	214,116,230
	CONTINGENCY ON ENTIRE PROJECT (25%)	$	53,529,058
	TOTAL (A):	**$**	**267,645,288**

10	SYSTEM UPGRADE FACILITIES	$	23,287,200
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	8,150,520
	TOTAL (B):	**$**	**31,437,720**

TOTAL PROJECT COST (A+B):	**$**	**299,083,008**

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Description of Work: New Niagara to Stolle Road approx. 47 mile 345kV Line, new Gardenville - Stolle Rd 230kV Line approx. 12 miles, Niagara, Gardenville and Stolle Road Substation Upgrades.								
Item	**Description**	**Quantity**	**Unit**	**Supply Rate**	**Labor & Equipment Rate**	**Total Unit Rate:**	**TOTAL:**	**Comments:**
1. CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION								
1.1	Clearing the ROW (mowing & clearing)	427.0	Acre		$ 15,000	$ 15,000	**$ 6,405,000**	
1.2	Access Road	14,256.0	LF		$ 45	$ 45	**$ 641,520**	Assumes Type 1 Type Gravel Road
1.3	Access Road Improvement	31,680.0	LF		$ 7	$ 7	**$ 221,760**	Assumes Type 1 Type Gravel Road
1.4	Silt Fence	163,680.0	LF		$ 4	$ 4	**$ 654,720**	
1.5	Matting	163,680.0	LF		$ 70	$ 70	**$ 11,457,600**	
1.6	Snow Removal	1.0	Sum		$ 900,000	$ 900,000	**$ 900,000**	
1.7	ROW Restoration	60.0	Mile		$ 10,000	$ 10,000	**$ 600,000**	
1.8	Work Pads	4,520,000.0	SF		$ 4	$ 4	**$ 15,910,400**	
1.9	Restoration for Work Pad areas	452,000.0	SF		$ 0.2	$ 0.2	**$ 67,800**	
1.10	Temporary Access Bridge	60.0	EA		$ 20,035	$ 20,035	**$ 1,202,100**	
1.11	Air Bridge	20.0	EA		$ 14,445	$ 14,445	**$ 288,900**	
1.12	Stabilized Construction Entrance	34.0	EA		$ 4,580	$ 4,580	**$ 155,720**	
1.13	Maintenance and Protection of Traffic on Public Roads	1.0	LS		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	
1.14	Culverts / Misc. Access	1.0	LS		$ 600,000	$ 600,000	**$ 600,000**	
1.15	Concrete Washout Station	34.0	EA		$ 1,850	$ 1,850	**$ 62,900**	
TOTAL - CLEARING & ACCESS FOR TRANSMISSION LINE:							**$ 40,368,420**	
2. TRANSMISSION LINE FOUNDATIONS								
2.1	Drilled Pier 5ft dia.	2,111.2	CUY		$ 1,500	$ 1,500	**$ 3,166,800**	Supply & Install
2.2	Drilled Pier 6ft dia.	4,047.0	CUY		$ 1,500	$ 1,500	**$ 6,070,500**	Supply & Install
2.3	Drilled Pier 7ft dia.	1,320.0	CUY		$ 1,500	$ 1,500	**$ 1,980,000**	Supply & Install
2.4	Drilled Pier 8ft dia.	285.0	CUY		$ 1,500	$ 1,500	**$ 427,500**	Supply & Install
2.5	Drilled Pier 9ft dia.	155.4	CUY		$ 1,500	$ 1,500	**$ 233,100**	Supply & Install
2.6	Drilled Pier 10ft dia.	198.0	CUY		$ 1,500	$ 1,500	**$ 297,000**	Supply & Install
2.7	Rock Excavation Adder	2,260.0	CUY		$ 2,000	$ 2,000	**$ 4,520,000**	
TOTAL - TRANSMISSION LINE FOUNDATIONS:							**$ 16,694,900**	
3. STRUCTURES - TRANSMISSION LINE								
3.1	345kV Dead End / Strain Pole (30-90 deg angle) Ave 114ft	15.0	EA	$ 72,428	$ 43,457	$ 115,885	**$ 1,738,282**	
3.2	345kV Running Angle Pole (3-40 deg angle) Ave 114ft	28.0	EA	$ 58,743	$ 35,246	$ 93,989	**$ 2,631,686**	
3.3	345kV Tangent Pole Ave 112ft	302.0	EA	$ 37,890	$ 22,734	$ 60,624	**$ 18,308,448**	
3.4	345kV / ~~2 - 115kV~~ Dead End / Strain Pole (30-90 deg angle) Ave 168ft	2.0	EA	$ 151,938	$ 91,163	$ 243,101	**$ 486,202**	
3.5	345kV / ~~2 - 115kV~~ Running Angle Pole (3-40 deg angle) Ave 164ft	4.0	EA	$ 111,440	$ 66,864	$ 178,304	**$ 713,215**	
3.6	345kV / ~~2 - 115kV~~ Tangent Pole Ave 163ft	5.0	EA	$ 56,000	$ 33,600	$ 89,600	**$ 447,998**	
3.7	230kV Steel Dead End or Strain Pole (30-90 deg angle) Ave 86ft	8.0	EA	$ 32,834	$ 19,700	$ 52,534	**$ 420,273**	
3.8	230kV Steel Running Angle Pole (3-40 deg angle) Ave 117ft	18.0	EA	$ 43,265	$ 25,959	$ 69,224	**$ 1,246,026**	
3.9	230kV Steel Tangent Pole Ave 110ft	70.0	EA	$ 22,610	$ 13,566	$ 36,176	**$ 2,532,298**	
3.10	Install Grounding	452.0	Structure		$ 5,000	$ 5,000	**$ 2,260,000**	Supply & Install
TOTAL - STRUCTURES TRANSMISSION LINE:							**$ 30,784,427**	
4. CONDUCTOR, SHIELDWIRE, OPGW								
4.1	Bundled Rail ACSR Conductor, 954 kcmil, 45/7, 3 Phases	47.0	Mile	$ 79,200	$ 158,400	$ 237,600	**$ 11,167,200**	
4.2	Ortolan ACSR Conductor, 1033.5kcmil, 45/7, 3 Phases	12.1	Mile	$ 39,600	$ 79,200	$ 118,800	**$ 1,437,480**	
4.3	½" HS Steel (includes 2 x for 345kV, 1 x for 230kV)	560,208.0	Ft	$ 1	$ 5	$ 6	**$ 3,193,186**	
TOTAL: CONDUCTOR, SHIELDWIRE, OPGW:							**$ 15,797,866**	
5. TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE								
5.1	Tangent - Insulator Sets	1,131.0	Set	$ 900	$ 720	$ 1,620	**$ 1,832,220**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Comments:
5.2	Dead End / Angle - Insulator Sets	450.0	Set	$ 1,300	$ 1,040	$ 2,340	**$ 1,053,000**	
5.3	Post Insulators	75.0	Set	$ 1,500	$ 1,350	$ 2,850	**$ 213,750**	
5.4	OHSW Assembly - Angle / DE (2 x shieldwires 345kV, 1 x 230kV single EHS)	248.0	Set	$ 500	$ 400	$ 900	**$ 223,200**	
5.5	OHSW Assembly - Tangent (2 x shieldwires 345kV, 1 x 230kV single EHS)	684.0	Set	$ 250	$ 150	$ 400	**$ 273,600**	
5.6	Spacer Dampers	6,795.0	Ea	$ 50	$ 35	$ 85	**$ 577,575**	
5.7	Vibration Dampers - Conductor	5,436.0	Ea	$ 32	$ 20	$ 52	**$ 282,672**	
5.8	Shieldwire / OPGW Dampers, Misc Fittings	1.0	Sum	$ 30,000	$ 12,000	$ 42,000	**$ 42,000**	
TOTAL: TRANSMISSION LINE INSULATORS, FITTINGS, HARDWARE:							**$ 4,498,017**	
6. STOLLE ROAD SUBSTATION WORKS:								
	345kV Works							
6.1	Low Profile Foundations	22.0	Ea		$ 5,000	$ 5,000	**$ 110,000**	Supply & Install
6.2	Circuit Breaker Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
6.3	Below Grade Conduit & Grounding	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
6.4	Bus Support 1ph	12.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 36,000**	
6.5	Switch Stands	2.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 22,000**	
6.6	Misc. Structures	1.0	Sum		$ 27,000	$ 27,000	**$ 27,000**	
6.7	LA Stands	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
6.8	Instrument Transformers - 345kV	1.0	Sum		$ 146,000	$ 146,000	**$ 146,000**	
6.9	Motor Operated Disconnect Switches	2.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 60,000**	
6.10	Circuit Breaker 345kV	1.0	Ea	$ 300,000	$ 80,000	$ 380,000	**$ 380,000**	
6.11	Arrestors (3 per line)	3.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
6.12	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
6.13	Control Cables	1.0	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
6.14	Protection, Telecom and Metering Equipment	1.0	Sum		$ 90,000	$ 90,000	**$ 90,000**	Supply & Install
	230kV Works							
6.15	Demo 3ph VT Structure and Foundation	1.0	Sum		$ 15,000	$ 15,000	**$ 15,000**	Supply & Install
6.16	Low Profile Foundations	21.0	Ea		$ 5,000	$ 5,000	**$ 105,000**	Supply & Install
6.17	Caisson Dead End Foundation	4.0	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
6.18	Circuit Breaker Foundation	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
6.19	Lightning Mast Foundation	1.0	Ea		$ 15,000	$ 15,000	**$ 15,000**	Supply & Install
6.20	Below Grade Conduit & Grounding	1.0	Sum		$ 300,000	$ 300,000	**$ 300,000**	Supply & Install
6.21	Bus Support 3ph	1.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 6,500**	
6.22	Switch Stands	2.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 22,000**	
6.23	Misc. Structures - 230kV	1.0	Sum		$ 33,000	$ 33,000	**$ 33,000**	
6.24	A-frame Dead End	1.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
6.25	LA Stands	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
6.26	Lightning Mast	1.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 12,000**	
6.27	Circuit breaker - 230kV	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
6.28	Instrument Transformers - 230kV	1.0	Sum		$ 146,000	$ 146,000	**$ 146,000**	
6.29	Switches - 230kV	1.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
6.30	Arrestors (3 per line)	3.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
6.31	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
6.32	VT's 230kV Relocated	3.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 63,000**	
6.33	Control Cables	1.0	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
6.34	Protection, Telecom and Metering Equipment	1.0	Sum		$ 90,000	$ 90,000	**$ 90,000**	Supply & Install
6.35	Misc Above / Below Ground Works (345kV and 230kV)	1.0	Sum		$ 700,000	$ 700,000	**$ 700,000**	Supply & Install
TOTAL - STOLLE RD SUBSTATION WORKS:							**$ 3,616,500**	

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Comments:
7. GARDENVILLE 230kV SUBSTATION WORKS								
7.1	Site Works including sediment controls, access roads, rough grading, final grading	0.3	Sum		$1,000,000.00	$ 1,000,000	**$ 300,000**	Supply & Install
7.2	Substation Fence	200.0	LF		$200	$ 200	**$ 40,000**	Supply & Install
7.3	New microwave antenna pole foundation - caisson type	1.0	Sum		$75,000	$ 75,000	**$ 75,000**	Supply & Install
7.4	Relocate microwave antenna steel pole and ancillary equipment	1.0	Sum		$50,000	$ 50,000	**$ 50,000**	Supply & Install
7.5	Demo microwave antenna pole foundation	1.0	Sum		$20,000	$ 20,000	**$ 20,000**	Supply & Install
7.6	Switches 3ph	2.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 14,000**	
7.7	Line Switches 3 ph w/ motor operators	1.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
7.8	Instrument Transformers	1.0	Sum		$ 260,000	$ 260,000	**$ 260,000**	
7.9	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
7.10	Arrestors (3 per line)	3.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 22,500**	
7.11	Line Traps	1.00	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
7.12	Low Profile Foundations	31.0	Ea		$ 5,000	$ 5,000	**$ 155,000**	Supply & Install
7.13	Caisson DE Foundations	4.0	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
7.14	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
7.15	Lightning Mast Foundations	1.0	Ea		$ 15,000	$ 15,000	**$ 15,000**	Supply & Install
7.16	Control Cables	1.0	Sum	$ 50,000	$ 50,000	$ 100,000	**$ 100,000**	
7.17	Protection , Telecom and Metering Equipment	1.0	Ea		$ 140,000	$ 140,000	**$ 140,000**	Supply & Install
7.18	SCADA and Communications	1.0	Sum		$ 50,000	$ 50,000	**$ 50,000**	Supply & Install
7.19	Control Conduits from Cable Trench to Equipment	1.0	Sum		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
7.20	Grounding	1.0	Sum		$ 100,000	$ 100,000	**$ 100,000**	Supply & Install
7.21	Bus Support 3 Ph	3.0	Ea	$ 4,500	$ 2,000	$ 6,500	**$ 19,500**	
7.22	Bus Support 1 Ph	3.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 9,000**	
7.23	Switch Stands	3.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 33,000**	
7.24	Misc. Structures	1.0	Sum		$ 13,000	$ 13,000	**$ 13,000**	
7.25	Substation A-Frame Structures Standalone	1.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
7.26	Lightning Masts	1.0	Ea	$ 10,000	$ 2,000	$ 12,000	**$ 12,000**	
7.27	Arrestor Stands	3.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 10,500**	
7.28	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	Supply & Install
TOTAL - GARDENVILLE SUBSTATION WORKS:							**$ 3,414,500**	
8. NIAGARA SUBSTATION WORK								
8.1	Site Works including sediment controls, access roads, rough grading, final grading	0.6	Sum		$ 1,000,000	$ 1,000,000	**$ 600,000**	Supply & Install
8.2	Substation Fence	320.0	LF		$ 200	$ 200	**$ 64,000**	Supply & Install
8.3	Switches 3ph	2.0	Ea	$ 5,000	$ 2,000	$ 7,000	**$ 14,000**	
8.4	Line Switches 3 ph w/ motor operators	1.0	Ea	$ 15,000	$ 15,000	$ 30,000	**$ 30,000**	
8.5	Instrument Transformers	1.0	Sum		$ 121,000	$ 121,000	**$ 121,000**	
8.6	Breakers	1.0	Ea	$ 250,000	$ 75,000	$ 325,000	**$ 325,000**	
8.7	Arrestors (3 per line)	6.0	Ea	$ 6,500	$ 1,000	$ 7,500	**$ 45,000**	
8.8	Line Traps	1.0	Ea	$ 13,000	$ 8,000	$ 21,000	**$ 21,000**	
8.9	345 kV buses	0.5	Ea	$ 25,000	$ 35,000	$ 60,000	**$ 30,000**	
8.10	Low Profile Foundations	37.0	Ea		$ 5,000	$ 5,000	**$ 185,000**	Supply & Install
8.11	Caisson DE Foundations	4.0	Ea		$ 50,000	$ 50,000	**$ 200,000**	Supply & Install
8.12	Circuit Breaker Foundations	1.0	Ea		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install
8.13	Control Cables	1.0	Sum	$ 50,000	$ 50,000	$ 100,000	**$ 100,000**	
8.14	Protection , Telecom and Metering Equipment	1.0	Sum		$ 90,000	$ 90,000	**$ 90,000**	Supply & Install
8.15	SCADA and Communications	1.0	Sum		$ 250,000	$ 250,000	**$ 250,000**	Supply & Install
8.16	Control Conduits from Cable Trench to Equipment	1.0	Sum		$ 75,000	$ 75,000	**$ 75,000**	Supply & Install

SECO SUBSTATION ENGINEERING COMPANY

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Comments:
8.17	Cable Trench Systems for Control Cables	1.0	Sum		$ 350,000	$ 350,000	**$ 350,000**	Supply & Install
8.18	Grounding	1.0	Sum		$ 125,000	$ 125,000	**$ 125,000**	Supply & Install
8.19	Underground Riser Structures	6.0	Ea	$ 2,500	$ 1,000	$ 3,500	**$ 21,000**	
8.20	Bus Support 1 Ph	6.0	Ea	$ 2,000	$ 1,000	$ 3,000	**$ 18,000**	
8.21	Switch Stands	2.0	Ea	$ 8,000	$ 3,000	$ 11,000	**$ 22,000**	
8.22	Misc. Structures	1.0	Ea	$ 1,000	$ 1,000	$ 2,000	**$ 2,000**	
8.23	Substation A-Frame Structures Standalone	1.0	Ea	$ 20,000	$ 5,000	$ 25,000	**$ 25,000**	
8.24	Arrestor Stands	6.0	Ea	$2,500	$ 1,000	$ 3,500	**$ 21,000**	
8.25	Miscellaneous Materials and Above / Below Ground Works	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	Supply & Install
8.26	345kV underground cable with terminations. (680 Circuit Ft.)	1.0	Ea		$ 1,200,000	$ 1,200,000	**$ 1,200,000**	Supply & Install
TOTAL - NIAGARA SUBSTATION WORKS:							**$ 4,209,000**	
9. MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:								
	Contractor Mobilization / Demobilization							
9.1	Mob / Demob	1.0	Sum		$ 1,500,000	$ 1,500,000	**$ 1,500,000**	
	Project Management, Material Handling & Amenities					$ -	**$ -**	
9.2	Project Management & Staffing (includes PM, Field Engineers / Supervision,	32.0	Months		$ 350,000	$ 350,000	**$ 11,200,000**	
9.3	Site Accommodation, Facilities, Storage	1.0	Sum		$ 2,000,000	$ 2,000,000	**$ 2,000,000**	
	Engineering					$ -	**$ -**	
9.4	Design Engineering	1.0	Sum		$ 7,200,000	$ 7,200,000	**$ 7,200,000**	
9.5	LiDAR	1.0	Sum		$ 800,000	$ 800,000	**$ 800,000**	
9.6	Geotech	1.0	Sum		$ 1,700,000	$ 1,700,000	**$ 1,700,000**	
9.7	Surveying/Staking	1.0	Sum		$ 1,000,000	$ 1,000,000	**$ 1,000,000**	
	Testing & Commissioning							
9.8	Testing & Commissioning of TRANSMISSION LINE and Equipment	1.0	Sum		$ 1,800,000	$ 1,800,000	**$ 1,800,000**	
	Permitting and Additional Costs					$ -	**$ -**	
9.9	Environmental Licensing & Permitting Costs	1.0	Sum		$ 2,859,705	$ 2,859,705	**$ 2,859,705**	
9.10	Environmental Mitigation	1.0	Sum		$ 18,601,683	$ 18,601,683	**$ 18,601,683**	
9.11	Warranties / LOC's	1.0	Sum		$ 786,713	$ 786,713	**$ 786,713**	
9.12	Real Estate Costs (New)	1.0	Sum		$7,017,412	$ 7,017,412	**$ 7,017,412**	
9.13	Real Estate Costs (Incumbent Utility ROW)	1.0	Sum		$2,774,000	$ 2,774,000	**$ 2,774,000**	
9.14	Legal Fees	1.0	Sum		$ 3,500,000	$ 3,500,000	**$ 3,500,000**	
9.15	Sales Tax on Materials	1.0	Sum	$ 3,864,884		$ 3,864,884	**$ 3,864,884**	
9.16	Fees for permits, including roadway, railroad, building or other local permits	1.0	Sum		$ 200,000	$ 200,000	**$ 200,000**	
TOTAL - MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:							**$ 66,804,397**	
10. SYSTEM UPGRADE FACILITIES								
SUF 1.1	Niagara Falls Blvd to Packard 115kV Line 130 Reconductor	3.67	Mile		$ 400,000	$ 400,000	**$ 1,468,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 1.2	Engineering, T&C, PM, Indirects FOR suf 1.1 (15%)					$ -	**$ 220,200**	
SUF 2.1	Reconductor National Grid 115kV Line 133	9.78	Mile		$ 400,000	$ 400,000	**$ 3,912,000**	Rate for reconductor is pro-rated from National Grid Niagara - Packard reconductor. Note that rate does not include upgrades to structures or foundations.
SUF 2.2	Engineering, T&C, PM, Indirects FOR SUF 2.2 (15%)					$ -	**$ 586,800**	

COST ESTIMATE

Item	Description	Quantity	Unit	Supply Rate	Labor & Equipment Rate	Total Unit Rate:	TOTAL:	Comments:
SUF 3.1	Depew to Erie Street 115kV Transmission Line 921. Terminal Allowance included. See comments.	1.00	Ea		$ 500,000	$ 500,000	**$ 500,000**	Relay was replaced and line ratings increased to 124/137/158 (NOR/LTE/STE) resulting ratings are below line conductor ratings. Scope is to remove all limitations on the circuit so is it limited by the line conductor ratings, 125/152/181 (NOR/LTE/STE). The limiting equipment is not known - scope undefined. Assumed 15% to cover all misc costs
SUF 3.2	Engineering, T&C, PM, Indirects FOR SUF 3.1(15%)					$ -	**$ 75,000**	
SUF 4.1	Packard to Huntley Reconductor	19.62	Mile		$ 400,000	$ 400,000	**$ 7,848,000**	
SUF 4.2	Engineering, T&C, PM, Indirects for SUF 4.1 (15%)					$ -	**$ 1,177,200**	
SUF 5	SYSTEM UPGRADE FACILITIES CONTINGENCY (SEE ASSUMPTIONS & CLARIFICATIONS)						**$ 7,500,000**	Contingency for possible additional SUF upgrades
TOTAL SYSTEM UPGRADE FACILITIES:							**$ 23,287,200**	

PROJECT TITLE WNY PROJECT EVALUATION- ENVIRONMENTAL LICENSING & PERMITTING COST ELEMENTS						ENVIRONMENTAL LICENSING & PERMITTING COST ESTIMATE RANGE FOR PROPOSED WNY TRANSMISSION PROJECT - T017	
FEDERAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans	Min.	Max.
USACE	Waters of the US under Section 404 of the Clean Water Act and Section 10 of the 1899 Rivers and Harbors Act (including regulated wetland areas)	Nationwide Permits (NWP) or Individual Permit (IP)	Any work within the boundaries of regulated wetlands (with the exception of isolated wetlands) or waterways to the spring high tide or ordinary high water mark	If project qualifies for a NWP (<0.5 acre disturbance and within NWP project type parameters), a pre-construction notification (PCN) is typically required. NWPs have a 45 day review period starting from when project logged in system (up to 6wk backlog delay in logging projects) If an IP is triggered, USACE will require Alternative Analysis and Public Notice/Hearing. IPs could also trigger restrictive environmental work windows. IPs have a 120 day review period starting from when permit is "deemed complete"	Wetland Delineation; Wetland Function & Value Assessment; Stream Delineation; Restoration Plan	$46,760	$126,050
USFWS	Endangered Species Act Section 7 (ESA) Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act	Consultation (Formal or Informal); Special Use Permit	Any work that may have an affect on listed species or their habitat; or projects within National Wildlife Refuges	USACE coordinates consultation with USFWS for ESA listed species during their permit review. Also includes the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act compliance. Season restrictions on construction could be imposed.	Rare, Threatened & Endangered Species Search; Preparation of Reports and Conservation Plans	$80,800	$200,000
FAA	Airports / Airspace	Federal Aviation Administration (FAA) Notification	New or Replacement Structures near Airports	Depending on construction locations, this permit may only be needed for OP work.	Obstruction Analysis, Mitigation Plan (assumes Engineering Cost)	$3,000	$9,000
STATE							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
NYS Public Service Commission / Department of Public Service (NYSDPS)	Article VII	Article VII: Certificate of Environmental Compatibility and Public Need and Environmental Management & Construction Plan (EM&CP)	Article 7: Major electric transmission facilities with design capacity of 100kV or more extending for at least 10 miles or 125kV and over extending a distance of 1 mile or more (some exclusions for underground transmission applies)	Article 7 will incorporate all of the required State and Local approvals (costed separately), as well as Engineering and Environmental Studies and Public Outreach. Intervenor Fund payment expected to be $350,000. An Environmental Management & Construction Plan (EM&CP) must be prepared and approved by the PSC. (see 16 NYCRR Parts 85 through 88)	Includes Reports and Plans required for State and Federal Agency Permits, as well as EM&CP, EMF, Noise, Air, Visual Impact Assessment, Invasive Species Control Plan, Mitigation Plans	$850,000	$3,350,000

NYSDEC	Article 15 Stream Disturbance; Article 24 Wetlands, Open Waters, Wetlands Buffers (100' for Freshwater Wetland)	Individual Permit (IP) (unless developer has General Permit (GP))	Any work within the boundaries of regulated waterways or wetlands, and wetland adjacent areas	Any disturbance within wetlands and/or below mean high tide will require an IP. Areas of temporary disturbance will likely require restoration, including a monitoring and maintenance period. Permanent disturbance will require offsite mitigation up to 3:1 area ratio; also includes a monitoring and maintenance period. GP may only be applicable if project ground disturbance is located outside of wetlands areas (above MHW).	Wetland Delineation; Wetland Restoration/Mitigation Plan	$12,000	$53,000
NYSDEC	Stormwater (If >1 Acre Soil Disturbance)	SPDES General Permit for Stormwater Discharges from Construction Activities GP-0-15-002 & SWPPP	Project areas of soil disturbance	If project involves 1 acre or more soil disturbance, then the GP is required. If located within a Regulated MS4 Municipality, additional coordination may be needed. Weekly inspections by a Qualified Inspector during construction will be required.	SWPPP (assumes Engineering Cost includes Sediment & Erosion Control Plan, Hydraulic & Hydrology Studies, Stormwater Management Design)	$11,200	$38,000
NYSDOS	State Coastal Management Program Mapped Coastal Area Boundary	Coastal Consistency Concurrence	Projects within the NYSDOS designated Coastal Zone; and consistency with Local Waterfront Revitalization Plans (LWRPs); e.g., Town of Grand Island LWRP	Online mapping available to check if within coastal zone, a significant coastal fish & wildlife habitat (SCFWH), a local waterfront revitalization program area (LWRP), or a comprehensive management program areas (CMP)		$3,400	$15,000
NYSHPO	National Historic Preservation Act (NHPA) Section 106: State and Federal Historic Places; State Mapped Archeologically Sensitive Areas	Cultural Resource Information System (CRIS) Determination	Local, State, or Federal eligible or designated historic places and/or areas of archeological sensitivity (in off-road areas and areas that have not been previously disturbed)	NYSDEC EAF Online Mapper identifies State or National Register of Historic Places and archeological sensitive areas within or adjacent to the project site. Formally enter project information and supporting documents into SHPO's online CRIS program. Staff will review and email a determination of impacts letter	Phase 1A & 1B Archaeological Studies (not included in costing)	$34,400	$112,600
NYS NHP	Threatened and Endangered Species	Consultation	Activities that may affect T&E species or their habitat.		See USFWS	$1,200	$6,400
NYSDOT/NYS Thruway Authority/FHWA	State Roadways	Highway Work Permit/Utility Permit, Vegetation Management Permit; Easement	Any work within or crossing State highway ROW	May require restoration landscaping coordination. Typically requires compliance with NEPA including SHPO and USFWS effects determination	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$17,000	$200,000
NYS Canal Corporation	Erie Canal - jurisdiction varies along edge	Canal Occupancy & Work Permit (TA-W99072)	Any work involving the Erie Canal	Must coordinate with Division Permit Engineer about particular section of canal being affected. Commercial permit fee = $25 plus $2,000,000 additional General Aggregate Liability Insurance	Work Zone Traffic Control (WZTC) Plan (assumes included in Engineering Cost)	$3,800	$3,800

ENVIRONMENTAL LICENSING AND PERMITTING

NYS Dept. of Agriculture and Markets	All agricultural lands (including Agricultural Districts)	Part of Article 7 & Article 10 Review process	Any work impacting agricultural land	Must minimize impacts and restore damage to agricultural land, and coordinate with County Soil & Water Conservation District; Vineyards are a major concern in WNYS. Pre-application conference with PSC, DEC and Ag& Markets recommended. Must develop EM&CP in conformance with Art. 7/10 Certificate Conditions. Agricultural Monitor must oversee construction & restoration; requisite 2-yrs post restoration monitoring.	Crop/Pasturing Mitigation Plan (not included in costing)	$11,000	$24,000
REGIONAL							
Railroads	Railroad crossings	Consultation-permits may be required; Easement	Access / new structures on RR property		Easement area survey (not included in costs)	$11,000	$200,000
LOCAL/MUNICIPAL							
Agency	Jurisdiction	Permit/Approval	Primary Regulated Areas	General Permitting Notes	Potential Studies/Plans		
County Dept. of Public Works	County Roadways	Lane Closure Permit, Highway Work or Access Permit	Work within county roadways and right-of-ways			$6,000	$40,000
Town, City or Village	Municipal Stormwater (MS4) Review	Approval of SWPPP or EM&CP	Project areas of soil disturbance		See NYSDEC SPDES	$6,000	$35,000
Town, City or Village	Variable	Building Permits	New Structures	Individual Towns/Villages must be consulted on a project specific basis to determine notification and/or permitting procedures. Permit application names vary (e.g. road obstruction permit)		$18,000	$92,000
Town, City or Village	Municipal Roadways	Highway Work Permit; Road Opening Permit	Work within municipal roadways and right-of-ways			$6,000	$35,000
Town, City or Village	Wetlands	Wetland Permit / Conservation Approvals	Mapped wetlands and wetland adjacent areas (buffer width variable)		See USACE / NYSDEC Art. 24	$6,000	$52,000

		Minimum	Maximum
ENVIRONMENTAL LICENSING & PERMITTING COST (EXCLUDING MITIGATION)	**PROJECT T017 TOTAL**	**$1,127,560**	**$4,591,850**
Excluded cost: Mitigation or restoration for impact to regulated wetlands; agricultural land and tree clearing	**Expected Value**	**$2,859,705**	

Client: NYISO
Project: Western Transmission Project Evaluation
Subject: Cost Estimate
Document No: T017 - Exelon Transmission

ENVIRONMENTAL MITIGATION ESTIMATE

Revision: 3

WNY TRANSMISSION PROJECT - ENVIRONMENTAL MITIGATION COST ESTIMATE FOR T017

	Offsite Wetland Mitigation*		Farmland**	
	Min.	Max.	Min.	Max.
Area	106 acres	106 acres	68.5 acres	137 acres
Cost/Acre	$50,000	$100,000	$503	$503
Ratio	1:1	3:1	1:1	1:1
Total	$5,300,000	$31,800,000	$34,455	$68,911

T017 MITIGATION TOTAL	Minimum	Maximum	Expected Value
	$5,334,455	**$31,868,911**	**$ 18,601,683**

*Offsite wetland mitigation area assumes clearing of NWI Forested/Shrub Wetland Approx. 6.68 miles (35270 LF) by 125' ROW width and 0.43 miles (2270 LF) by 95' ROW width; Max. cost per acre assumes additional mitigation required for permanent impacts of proposed structures in non-forested wetlands; cost per acre Min. and Max. reduced due to area total over 50 acres; includes design and installation costs only; does not include land acquisition or long term monitoring.

**Farmland mitigation based on corn bushel yield at 129 BU/Acre and $3.9/BU (production numbers from 2016 USDA NYS Agriculture Overview), area assumes 22.6 miles (119328 LF) based on Agricultural District Lands adjacent to the project route (GEI calculation) by 25' Wide (Min.) or 50' Wide (Max.); does not include land acquisition

Revision: 3

REAL ESTATE ESTIMATE
(NEW ROW)

COUNTY: NIAGARA & ERIE
DEVELOPER: EXELON (T017)
SEGMENT: NIAGARA - DYSINGER - STOLLE SEGMENT

		Area (Acres)	Total Cost
A	**NIAGARA COUNTY**		
	Sub Total (A)	52.72	$ 404,006.00
B	**ERIE COUNTY**		
	Sub Total (B)	0.68	$ 4,376.00
	Total (A + B)	53.40	$ 408,382.00

Revision: 3

REAL ESTATE ESTIMATE
(NEW ROW)

COUNTY: ERIE
DEVELOPER: EXELON (T017)
SEGMENT: STOLLE TO GARDENVILLE SEGMENT

		Area (Acres)	Total Cost
	Total	124.71	5,518,485.00

REAL ESTATE ESTIMATE
(INCUMBENT UTILITY ROW)

Revision: 3

COUNTY: NIAGARA AND ERIE
DEVELOPER: EXELON (T017)
SEGMENT: NIAGARA TO STOLLE TO SEGMENT

	DEVELOPER	SEGMENT	COUNTY	INCUMBENT UTILITY (ROW) (ACRES)	TOTAL ROW COST
T017	Exelon Transmission	Niagara to Stolle - 47.12 miles	Niagara	358.49	$ 2,701,000
			Erie	296.31	
		Stolle Rd SS to Gardenville SS - 12.10 miles	Erie	14.63	$ 73,000

Revision: 3

REAL ESTATE ESTIMATE
(HOUSES)

COUNTY: ERIE
DEVELOPER: EXELON
SEGMENT: STOLLE ROAD SS TO GARDENVILLE SS

		Total Valuation of Property with 3% Escalation/year (as of 2017)
	Total Valuation Cost	$ 1,090,544.99

ASSUMPTIONS AND CLARIFICATIONS

Revision: 3

a) Cost Estimate is based on 2017 rates.
b)We have assumed a construction schedule of 10 months, with no breaks in the schedule. Six months have been added to the construction schedule PM time for start up and close out works and float.
c) Stringing rates allow for protection over crossings (such as rider poles).
d) We have assumed a typical work week (6 x 10 hour days).
e) We have assumed the Access Road included in Developer Estimate will be Type 1 Gravel Type.
f) Costs will vary for handling and disposal of contaminated spoils, depending on type of contaminants and availability / location of the appropriate tipping facility. Since there is not enough information to provide a quantified estimate for this item, allowance is included in the contingency monies.
g) Costs have been developed based on historical data from Projects of a similar nature (AACE Class 5 and 4 Estimating Practices). We have not engaged any subcontractors or material vendors for formal quotes.
h) Estimated quantities have been used for items in red text in Section 1 of the Estimate (CLEARING & ACCESS FOR T-LINE CONSTRUCTION). These items were not quantified in the Developers Estimate, however we believe that they are necessary for the works.
i) Foundation rates include supply and installation of materials. Drilled Pier rates include supply and testing of concrete, rebar cage and the use of temp or permanent casing.
j) Assumes all environmental data and project details provided are accurate unless noted otherwise
k) Considers entire route for costing (Niagara to Packard, Niagara to Stolle, Gardenville to Stolle)
l) USFWS T&E Assumes that ¼ of the Total Line in Right of Way will require field survey for T&E (Approx. 15.6 miles)
m) NEPA-Assumes no NEPA because Art VII
n) SHPO-Assumes consultation and Phase 1A/1B archeological studies with field survey for 50% of Total Line in Right of Way (Approx. 31.2 miles)
o) NYSDOT/FHWA-Assumes any required NEPA coordination/requirements are covered under Article VII
p) Assumes no coordination with National Parks Service or OPRHP/State Parks
q) USACE wetland delineation costs based on total Line Miles in Wetlands (8.94) - NWI and NYSDEC totals calculated by GEI for Niagara to Stolle (7.59 miles) and Stolle to Gardenville (1.35 miles)
r) NYSDEC delineations overlap and are accounted for in USACE costing.

ASSUMPTIONS AND CLARIFICATIONS

s) Offsite wetland mitigation area costs based on a total of approximately 6.68 miles of impacts anticipated by clearing of NWI Forested/Shrub Wetland for Niagara to Stolle and 0.43 miles for Stolle to Gardenville (calculated by GEI based on NWI mapper legend categories) Assumes clearing a width of 125 feet within the Niagara to Stolle Road Right of Way and a width of 95 feet in the Stolle to Gardenville ROW. Minimum costs at $50,000/acre and 1:1 ratio, maximum costs at $100,000/acre and 3:1 ratio for additional permanent impacts of proposed structures in non-forested wetlands. Costing includes design and installation costs only and does not include land acquisition or long term monitoring. Minimum and maximum costs for this proposal assumes a reduced mitigation cost/acre due to size of mitigation.
t) Agricultural mitigation assumes timber matting impacts and pad impacts on a total of 22.56 calculated by GEI from miles of adjacent agriculture district land (Niagara to Stolle and Stolle to Gardenville) requires crop damage payments based on USDA 2016 NYS Agriculture Overview corn yield and bushel price/acre. Minimum assumes 25-foot-wide impact, Maximum assumes 50-foot-wide impact.
u) No tree survey or replanting required outside regulated wetlands areas
v) Article VII Intervenor Fund payment expected to be $350,000
w) Mitigation costs for landscaping only (no paving, sidewalks, sound walls, etc.)
x) SUF pricing is included at the end of the estimate workbook (costs excluded from main estimate).
y) SUF pricing includes 35% to cover Contractor markup (15%) and contingency (20%)
z) SUF reconductor rate is based on Niagara-Packard (National Grid) reconductor estimate, pro-rated to a rate / mile. Note that this is based on conductor, shieldwire and hardware pricing only and does not include structure or foundation works.
aa) System Upgrade Facilities Contingency is allowance for potential additional system upgrades including overdutied breakers, protection changes, unidentified thermal issues, etc that may be identified as detailed studies are completed.