NYRI

EXHIBIT
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32

NEW YORK REGIONAL INTERCONNECTION

DEPARTMENT OF PUBLIC SERVICE (DPS)
INTERROGATORIES, DEFICIENCIES AND
STIPULATIONS
APPENDIX R

3/16/09
32 T-

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
DPS 1	1. Please provide, in digital format, all input files used in the MAPS modeling referenced in Exhibit E-4 of the Article VII application. Also provide in digital form and hard copy all post-processed output files that were developed and support claims regarding energy cost savings, price impacts on the bulk power system, utilization of the transmission system and reliance on natural gas-fired generators in New York City.	Separate	Panel C
	2. Please describe all assumptions regarding modifications, if any, from the current configuration of the bulk power system.	Separate	Panel C
DPS 2	1. Please provide, in digital format, all input files used in the MARS modeling referenced in Exhibit E-4 of the Article VII application. Also provide all calculations that support NYRI's claim regarding the projected $43 million economic benefit it believes would result from the purported reduction in Loss of Load Expectation, as well as all post-processed output files, in digital form and hard copy, that were developed in support of the calculation.	Separate	Panel C
	2. Please describe all assumptions regarding modifications, if any, from the current configuration of the bulk power system.	Separate	Panel C
DPS 3	1. Please provide, in digital form and hard copy, all files used to develop the projected reduction in gas-fired combustion turbine (GT) use between the base MAPS case and the case where NYRI's HVDC line is assumed in service.	Separate	Panel C
	2. Does the reduction in GT use occur only during peak hours or also during off-peak hours?	Separate	Panel C
	3. How many hours of GT use reduction occur on vs off-peak?	Separate	Panel C
DPS 4	1. Please provide copies of the lease rights obtained by NYRI from the New York Susquehanna & Western and Norfolk Southern Railroads.	Separate	Panel E
	2. Provide a copy of the agreement instrument NYRI intends to use to obtain land owner permission to trim or remove trees and danger trees from residences along the railroads Right(s)-of-Way (ROW)?	Separate	Panel E
	3. Provide the number and location of residential properties where tree trimming or removal or structure removal along the railroad ROW will be required?	Separate & Supplemental Article VII Application, Exhibit 4, Figures 4.4.1-1 to 4.4.3-3 and Appendix A	Panel E
	4. How will NYRI gain access to residential properties for vegetation clearing and trimming along the railroad ROW?	Separate & Supplemental Article VII Application, Exhibit 4, Section 4.4	Panel E
	5. What vehicles and machinery will be used in tree trimming or removal on residential properties along the railroad ROW?	Separate and Supplemental Article VII Application, Appendix E, Section 2.5 & 2.6; Exhibit 4, Section 4.4	Panel E
	6. What does NYRI intend to do to remove danger trees if it can not obtain "the property owner's concurrence" outside the railroad ROW (see application Appendix C, page 13)?	Separate	Panel E
	7. Would NYRI be willing to mitigate the impact to residential vegetation along the railroad ROW by offering to replace impacted trees with low growing compatible trees and shrubs?	Separate	Panel E

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
	8. Provide a list and description of local distribution and transmission lines that are along the New York Susquehanna & Western and Norfolk Southern Railroad ROW and indicate where the proposed facility will be located relative to these local lines?	Separate & Supplemental Article VII Application, Appendix A	Panel E
	9. Provide lengths of these existing lines and proposed separation distances.	Separate	Panel E
	10. Provide a typical plan and profile drawing of the proposed EM&CP for a typical section along the New York Susquehanna & Western and Norfolk Southern Railroad ROW showing existing railroad, pole structure locations, vegetation clearing and trimming, property lines, piles of structure main members, and any other proposed construction sites.	Separate	Panel E
	11. How will local traffic be affected by construction along the railroad ROW?	Supplemental Article VII Application, Exhibit E-6.3	Panel E
DPS 5	1. Please list all wetlands by class and vegetation type under State jurisdiction that will require any amount of vegetation clearing or filling and indicate what attempts have been made to avoid them.	Supplemental Article VII Application, Section 4.13.3.1, Table 4.13.3.1-1 and 4.13.3.3	Panel E
DPS 6	1. Describe the detailed analysis and field studies and schedule, including which year(s) for each threatened and endangered species that NYRI proposes to study in the EM&CP stage of the project (see application Appendix C, page 5).	Supplemental Article VII Application, Exhibit 4, Section 4.10.4.4	Panel G
DPS 7	1. According to Exhibit 4, page 84, "NYRI is working with the entities that currently occupy the existing ROW to determine the best location for the proposed HVDC line." Has NYRI reached any agreements for the best location for its line along any of the paralleled facilities? If so, please provide the details of the agreements.	Separate	Panel E
DPS 8	1. Did NYRI study the environmental impacts of Alternatives presented in Exhibit 3? If so, please discuss them in detail.	Supplemental Article VII Application, Appendix L & Exhibit 3	Panel A
	2. What would project costs be for an underground facility in Oneida County along the proposed route compared to an overhead facility?	Separate	Panel D
	3. What would project costs be for an underground facility along the proposed route compared to the overhead Utica East Alternate?	Separate	Panel D
DPS 9	1. Has NYRI discussed the proposed project with Metro North? If so, what concerns has Metro North expressed about the project?	Separate	Panel B
	2. Please show how proposed transmission line construction utilizing the Metro North route would be done, taking into account Metro North's train schedule?	Supplemental Article VII Application, Exhibit E-6.3	Panel B
	3. Please provide a copy of Metro North's passenger train schedule?	Separate	Panel B
DPS 10	1. Provide a figure similar to Figure 4.4.2-1 for the minimum vegetation clearing requirements at midspan for a DC steel pole tower located off railroad ROW?	Supplemental Article VII Application, Exhibit 4, Section 4.4.2, Figure 4.4.2-1	Panel E
DPS 11	1. Provide the relevant parts of the National Electric Safety Code that apply to clearance requirements for the proposed facility?	Supplemental Article VII Application, Exhibit E-1.3.1	Panel D

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
DPS 12	1. Please quantify the transmission congestion that the proposed project will alleviate and the names of the affected transmission lines (Exhibit E-4, pp. 7-8)?	Supplemental Article VII Application, Appendix U	Panel C
DPS 13	1. Explain why the voltage 400 kv DC chosen.	Separate	Panel C
	2. Explain why the capacity of the line chosen to be 1200 MW	Separate	Panel C
	3. Were there any other capacity ratings chosen for this line?	Separate	Panel C
DPS 14	1. Why was the terminus of the facility chosen as Rock Tavern and Edic? Explain your answer. Provide copies of all supporting documents and studies.	Separate & Supplemental Article VII, Appendix U	Panel C
	2. What other terminus points were studied by the applicant? Explain why they were dismissed and supply all supporting documentation.	Separate & Supplemental Article VII Application, Exhibit 3, Section 3.2	Panel A
DPS 15	1. Provide the drawing indicating the size of the area needed for connecting the over head system to an underground cable. Indicated on the drawing the dimensions of the area and location of equipment within the area.	Supplemental Article VII Application, Exhibit E-3, Figs E-3.7-1 & E-3.7-2	Panel D
	2. Provide a drawing showing the vertical view of the equipment and provide the dimensions.	Supplemental Article VII Application, Exhibit E-3, Figs E-3.7-1 & E-3.7-2	Panel D
	3. Provide a drawing showing the dimensions of a typical structure, the expected insulator length, the location of the shield wire.	Supplemental Article VII Application, Exhibit E-1.1.1.1 and E-1.1.1.2 , Figs E-1.1.1-1 thru E-1.1.1 9A	Panel D
	4. Provide a drawing showing all the typical hardware that will be used, include; the dimensions, the standard it is to be manufactured to, and possible finishes.	Separate	Panel D
DPS 16	1. To what ground resistance will the line be constructed?	Supplemental Article VII Application, Exhibit E-1.5.1	Panel D
	2. State what codes or standards the ground resistance for the tower has to meet.	Supplemental Article VII Application, Exhibit E-1.5.1	Panel D
	3. Discuss what options are available for grounding the towers to achieve the desired grounding resistance.	Supplemental Article VII Application, Exhibit E-1.5.2.2	Panel D
	4. How often will the shield wire be grounded to earth?	Supplemental Article VII Application, E-1.5.1	Panel D
DPS 17	1. If counter poise wires are used on the line, explain to what depth will they be buried and provide any supporting information.	Supplemental Article VII Application, Exhibit E-1.5.2.2	Panel D
DPS 18	1. Provide catalog cut sheets of the types of insulators that are under consideration for this transmission line.	Separate	Panel D
	2. Provide the catalogue cut sheets and technical data sheets for the line conductor and shield wire.	Separate	Panel D

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
DPS 19	1. Provide the National Electric Safety Code (NESC) transmission line clearances for the line over roads, rail roads, agricultural lands, abandon roads, seasonal roads, other lines (transmission, distribution and telephone lines), etc. Explain your assumptions and provide copies of all work papers	Separate & Supplemental Article VII Application, Exhibit E-1.3.1	Panel D
	2. Provide the NESC design clearances that specify how far the line needs to be from structures and other objects. Include a copy of your work papers, and all assumptions that are made in your calculations.	Separate & Supplemental Article VII Application, Exhibit E-1.3.1	Panel D
DPS 20	1. Provide the Corona Ring designs for the transmission line; Include a copy of all supporting work papers	Separate	Panel B
	2. Provide an analysis of the line with and without the corona rings for the following: corona, noise, raido and television interference	Separate & Supplemental Article VII, Appendix G	Panel B
DPS 21	1. Provide engineering drawings to scale for each of the possible transmission structures to be used. Include the dimensions of each structure.	Supplemental Article VII Application, Exhibit E-1, Figs E-1.1.1-1 thru E-1.1.1 9A	Panel D
	2. Provide the technical drawings of all caissons, embedded steel poles, etc showing the dimensions. (feet)	Supplemental Article VII Application, Exhibit E-1, Figs E-1.1.1-10 thru E-1.1.1-15	Panel D
DPS 22	1. Provide an engineering drawing of the counter poise system to be installed. Provide a written description of how the system will be installed. Explain how it is connected.	Supplemental Article VII Application, Exhibit E-1.5.2.2, Fig E-1.1.4-2	Panel D
DPS 23	1. Provide a copy of the railroad(s) specification(s) for occupancy in and along Railroad right-of-way.	Separate	Panel B
	2. Provide a discussion and technical examples of how NYRI will meet or exceed the railroad(s) right-of-way specifications. Provide copies of all supporting documents.	Separate	Panel B
DPS 24	1. Provide the study assumptions that were used in the Electro Magnetic Field and electrostatic studies conducted by NYRI. Provide a copy of all work papers.	Separate	Panel B
DPS 25	1. Provide a copy of all filings and requests made of the railroads.	Separate	Panel B
DPS 26	1. If the line were to be used in a mono pole operation, provide a technical description of how the current would be returned. Describe any short comings of using this return method	Supplemental Article VII Application, Exhibit E-2.2.3	Panel D
DPS 27	1. If the transmission line (or any portion thereof) is installed under ground what will NYRI's requirement be regarding vegetation growth over the cables.	Supplemental Article VII Application, Exhibit 4, Section 4.4.3	Panel E
	2. What will the requirement be to insure that trees and other large root growing species will be kept away from the underground cable.	Supplemental Article VII Application, Exhibit 4, Section 4.4.3	Panel E

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Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
	3. For each of the tapes, dielectric material, etc used in the underground cable, provide the electrical characteristics of the materials.	Separate	Panel D
	4. Provide an engineering drawing of the cross section of the cable, indicating the thicknesses of the dielectric and conductive medium.	Supplemental Article VII Application, Exhibit E-3, Fig E-3.2.1-1	Panel D
	5. Provide the trade names of each material and the manufacturer of each material.	Separate	Panel D
DPS 28	1. Provide the lightning design for the transmission towers that are to be considered for this project. Explain your answer and provide a copy of your work papers.	Separate & Supplemental Article VII Application, Exhibit E-1.3.1	Panel D
	2. Provide the catalogue cut sheets and technical specification for the lightning arrestors to be used for the HVDC line.	Separate	Panel D
	3. Provide the catalogue cut sheets and technical specifications for the line switches to be used on the HVDC line.	Separate	Panel D
	4. What are the emergency ratings of the transmission line? Explain your answer.	Supplemental Article VII Application, Exhibit E-1.3	Panel D
	5. What is the conductor temperature at this rating?	Supplemental Article VII Application, Exhibit E-1.3	Panel D
	6. Provide a detailed design mechanical analysis of each transmission line structure to be used. Provide the design requirements that each component must meet and the applicable standard for each component. Provide copies of all supporting documents and work papers.	Separate & Supplemental Article VII Application, Exhibit E-1.3.2	Panel D
	7. Provide a table of loadings assumed on the structure: wind, snow, ice, etc. Provide copies of all supporting documents and work papers.	Separate & Supplemental Article VII Application, Exhibit E-1.3.2	Panel D
	8. Provide an advantage/disadvantage analysis of each structure type.	Supplemental Article VII Application, Exibit E-1.3.2	Panel D
DPS 29	1. In the draft report for "Economic Evaluation of the NYRI HVDC Project": a. The report states "...the transmission system identified no fatal system performance issues...".(page 6.1) Provide copies of the sources, studies that support that conclusion. Provide copies of all supporting work papers and indicate on what pages the documents support the conclusions.	CRA Report Appendix U	Panel C
	2. Provide the supporting documentation and studies that support the conclusions in Appendix P table 5-1 on page 5.10 for the NYRI HVDC line. Include the pages in those documents which support the conclusions.	CRA Report Appendix U	Panel C
DPS 30	1. Provide copies of all work paper and supporting documentation that was used in compiling the report. Include copies of the instruction books for all computer programs used in making the calculations.	Separate	Panel B
	2. Provide copies of all reference materials used in compiling the report.	Separate	Panel B

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
DPS 31	1. Provide a detailed cost estimate break down for the installation of a 3 mile section of underground cable through: a. rock-granite, b. sand & c. shale. Provide the supporting work papers for all assumptions, estimates, time, machines, workers, cable costs, transportation, termination structures, etc.	Separate	Panel D
DPS 32	1. Provide an engineering drawing showing all the major components in the substation. Provide a copy for both the Northern and Southern termini.	Supplemental Article VII Application, Exhibit E-2, Fig E-2.2.1-1,2,3,5,6, Fig E-2.2.2-1	Panel D
	2. Provide the number of reactors to be placed in the filter yard and provide the ambient noise levels they will be designed for. Supply copies of all supporting information.	Supplemental Article VII Application, Appendix Q, Noise Report	Panel D
	3. Provide the design specs for the reactors and the specific standards that they must be designed to. Supply copies of all supporting information	Separate	Panel D
	4. What are the applicant's plans for fire protection inside the substation? Supply copies of all supporting documents.	Separate & Supplemental Article VII Application, Exhibit E-2.2.6	Panel D
	5. Provide the dimensions of the valve hall building.	Supplemental Article VII Application, Exhibit E-2.2.1	Panel D
	6. What are the required clearances between the building and the valves? Supply copies of all supporting documents.	Separate	Panel D
	7. What are the applicant's plans for spare valves?	Separate	Panel D
	8. What are the applicant's plans for redundancy in the valve system in the event a valve becomes inoperable?	Separate	Panel D
	9. What is the outage time expected for the replacement of a valve? Supply copies of all supporting documents.	Separate	Panel D
	10. What are the applicant's plans for fire walls or barriers between major pieces of equipment? Supply copies of all supporting documents.	Separate & Supplemental Article VII Application, Exhibit E-2.2.6	Panel D
	11. Provide a one line operating diagram showing the transformer connections and major components in the stations. Supply copies of all supporting documents.	Supplemental Article VII Application, Exhibit E-2, Figures E-2.1-1 and 1-2	Panel D
	12. Provide a diagram of the control system and describe how it works. Provide copies of all supporting manuals and documentation.	Separate	Panel D
	13. Provide copies of all agreements that have been signed between the applicant and Niagara Mohawk Power Corporation, New York Power Authority, Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc, Orange & Rockland Utilities, Inc, New York State Electric and Gas Corporation, and Rochester Gas and Electric Corporation. Provide any and all updates through out the case.	Separate	Panel C
	14. Provide copies of all agreements that have been signed between the applicant and the New York Independent System Operator. Provide any and all updates through out the case.	Separate	Panel C

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
	15. Provide copies of all agreements that have been signed between the applicant and PJM Interconnection and New England Independent System Operator. Provide any and all updates through out the case.	Separate	Panel C
	16. Provide a list of the harmonics the applicant expects to have to filter for. Provide copies of all supporting documentation.	Separate	Panel D
	17. In the application, the General Electric study provides an interconnect cost for connecting to Edic Substation. Provide the source of the number and all backup work papers that go in to that estimate.	Separate	Panel C
	18. In the application, the General Electric study provides an interconnect cost for connecting to Rock Tavern Substation. Provide the source of the number and all backup work papers that go in to that estimate.	Separate	Panel C
	19. Provide the type of cooling that will be used for the valve hall. Describe what type of cooling medium that will be used.	Supplemental Article VII Application, Exhibit E-2.2.4	Panel D
	20. Provide the MSDS sheets for the cooling medium to be used and explain any hazard associated with the medium.	Separate	Panel D
	21. Provide an engineering drawing of the type of lighting protection the applicant will use in the substation. Explain the philosophy that was used in designing the lightning protection and supply copies of all supporting documents	Separate & Supplemental Article VII Application, Exhibit E-2.2.1	Panel D
	22. Provide the standards to which the substation ground grid will be designed and provide copies of all supporting information.	Separate & Supplemental Article VII Application, Exhibit E-2.2.1	Panel D
	23. Discuss what precautions or measures will be taken near switches or places where an operator will stand to perform an operation. Provide copies of all supporting information.	Separate	Panel D
	24. Provide the catalogue cut sheets for the circuit breakers that will be used in the Northern and Southern termini substations. Include the interrupting ratings. Provide copies of all supporting information	Separate	Panel D
DPS 33	1. Please state the number of days and hours per week that the applicant's office is occupied by a representative knowledgeable about the proposed facility.	Separate	Panel A
DPS 34	1. Provide the estimated peak construction workforce by discipline and the associated home communities from which these workers will be drawn.	Separate	Panel D
	2. Provide the number of permanent jobs by discipline and salary that will be created by this proposal.	Separate	Panel C
	3. Provide a quantification of the potential impact on residential property values along the 190 mile corridor of the proposal.	Separate	Panel C
	4. Provide a quantification of the potential economic impact on business property values as well as on the businesses themselves along the 190-mile corridor of the proposal.	Separate	Panel C

Table 1. Department of Public Service (DPS), Interrogatory Description, Response Location and Witness Panel

Interrogatory Request #	Interrogatory Description	Response Location	NYRI Witness Panels*
	5. Provide a quantification of the potential economic impact on the tourism industry along the 190-mile corridor of the proposal.	Separate & Supplemental Article VII Application, Appendix K and Appendix M	Panel C
	6. Provide any known studies that discuss the economic impact of transmission lines on residential property values, business property values, and on business activity, tourism, and recreational activities.	Separate & Supplemental Article VII Application, Appendix K	Panel C
	7. Provide an assessment of the economic impact on each of the communities adjacent to the 190-mile corridor that the proposed transmission line would follow.	Supplemental Article VII Application, Exhibit 6, Sections 6.1 and 6.2	Panel C
DPS 35	1. Provide a detailed explanation of the basis for any requested waiver in view of the existing technology, factors of cost or economics, or the needs of consumers.	Supplemental Article VII Application, Exhibit 7	Panel A
	2. Provide an analysis of alternatives (such as re-routing, design changes or other measures) that would enable the proposed facility to comply with substantive local requirements.	Supplemental Article VII Application, Exhibit 7	Panel A
DPS 36	1. Describe the applicant's organizational, clearly identifying its lines of ownership and responsibility.	Separate	Panel G
	2. Describe the financial resources that will be available to the applicant to start and sustain the construction of its proposed facility	Separate	Panel G
DPS 37	1. Reference Exhibit 4. Subsection 4.7.3 and Exhibit 7.0. Provide copies of all Comprehensive and Master Land Use Plans, studies and assessments and maps prepared by interstate commissions, federal agencies, state, regions, counties, and local municipalities and local, state and federal (if any) land use controls and laws, and maps that were reviewed by the applicant in the preparation of this subsection and Exhibit 7.0 Local Ordinance Review.	Separate on CD-ROM	Panel A

*See attached witness lists

Witness Panels

Panel A:

Exhibits 1, 2, 3 and 7

Christopher Thompson, President, New York Regional Interconnect Inc.

Richard Bucci, Project Engineering Manager, WGI, Inc.

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Laura Ernst, Project Environmental Consultant, ESS Group, Inc.

Jeffery Nield, Project Environmental Consultant, ESS Group, Inc.

Panel B:

Exhibit 4, section 4.17 and 4.16, Appendix P and G (EMF) and Exhibits E-5 and E-6

Christopher Thompson, President, New York Regional Interconnect Inc.

William Bailey, Project EMF Consultant, Exponent

Richard Bucci, Project Engineering Manager, WGI, Inc.

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Saed Moujtahed, Project Engineering Consultant, WGI, Inc.

Abraham Pichardo , Project Engineering Consultant, WGI, Inc.

Panel C:

Exhibit 6 and Exhibit E-4

Christopher Thompson, President, New York Regional Interconnect Inc.

Richard Bucci, Project Engineering Manager, WGI, Inc.

Abraham Pichardo , Project Engineering Consultant, WGI, Inc.

Aleksansr Rudkevich, Project Consultant, CRA International

Scott L. Englander, Project Consultant, CRA International

James Mitche, Project Consultant, PowerGEM

John Willis, Project Consultant, PowerGEM

Thomas F. Rutherford, Economist, Project Consultant, CRA International

Dr. Thomas Priestly, Project Consultant, CH2M HILL

Panel D:

Exhibits 5, 9, E-1, E-2 and E-3,

Christopher Thompson, President, New York Regional Interconnect Inc.

Richard Bucci, Project Engineering Manager, WGI, Inc.

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Saed Moujtahed, Project Engineering Consultant, WGI, Inc.

Abraham Pichardo , Project Engineering Consultant, WGI, Inc.

Panel E:

Exhibit 4 sections 4.1, 4.2 4.3, 4.4 4.5, 4.6, 4.11. 4.12, 4.13, 4.14, 4.15

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Laura Ernst, Project Environmental Consultant, ESS Group, Inc.

Richard Bucci, Project Engineering Manager, WGI, Inc.

Saed Moujtahed, Project Engineering Consultant, WGI, Inc.

Abraham Pichardo , Project Engineering Consultant, WGI, Inc.

Panel F:

Exhibit 4 sections 4.7, 4.8, 4.9

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Karen Hartgen & Lori Blair, Project Cultural Resources Consultants, Hartgen Archaeological

Gordon Perkins, Diane Enders & JoAnne Gagliano, Project Visual Analysis Consultants, EDR

Richard Bucci, Project Engineering Manager, WGI, Inc.

Panel G:

Exhibit 4, Section 4.10 and Appendix O

Peter Feinberg, Project Environmental Consultant, Bagdon Environmental

Darrell Oakley, Project Environmental Consultant, ESS Group, Inc.

Stephen Wood, Project Environmental Consultant, ESS Group, Inc.

Table 2. Deficiency Letter Descriptions and Response Locations

Description	Supplemental Article VII Application Location
Proposed Route Supplemental Assessment	
Create NYSDOT topographic edition 1:24,000 project maps (D)	Appendix A
Create aerial photographs of project at scale of 1:400 (D)	Exhibit 2, Appendix B
Add Known NRE sites on Article VII filed route within 3 miles (D)	Exhibit 4.9
Move map symbols as necessary to insure unobscured viewing of map & aerial details (D)	Appendices A&B, Exhibit 2
Identify location of proposed ROW relative to existing paralleled facilities (D)	Appendices A&B
Add ROW location to aerial photos (D)	Exhibit 2, Appendix B
Add ROW location to NYSDOT topo maps (D)	Appendix A
Add legend to 1:250,000 NYSDOT map indicating points of interconnection (D) (with other facilities)	Exhibit 2, Figure 2.2-1a-d
Add alternates considered to Ramapo to 1:250,000 NYSDOT map (D)	Exhibit 2 Figures
Amplify application text re: rational alternates to Ramapo are not reasonable (D)	Exhibit 3
Address PSC Stipulation for Alternate Route CL mapping on 1:400 orthophotography (D)	Exhibit 3, Appendix S
Obtain NYISO info on underlying 115 kV and bulk power system and incorporate into application (D)	Exhibit E-4, Appendix L
Develop format for confidentiality on the bulk power system map filing with PSC (D)	Exhibit E-4 - figure(s)
Supplement original filing with missing table 4.7.1-1 Existing Land Use (D)	Exhibit 4
Prepare SRIS and submit to TPAS (D)	E-4.1.2
Develop statement of project reliability benefits (D)	Exhibit E-4.2
TPAS approval of SRIS (D)	Exhibit E-4.1.2 and Appendix H, NYISO Review Letter
Existing Converter station locations	
Add existing converter station location actual footprint to aerials & NYSDOT maps (D)	Exhibit 2, Appendices A&B
Produce and File Supplement	
Application service to 7 additional municipalities and NY Legislature Districts (D)	Notification

Table 3. Department of Public Service Stipulation Description and Response Location

Request #	Description	Supplemental Article VII Location
Stipulation	Analysis of the Potential Cumulative Impact of the Facilities of Millennium Pipeline Company, LLC	Appendix P
Stipulation	PSC Ordered Alternatives Assessment: NYS Thruway Evaluation and Marcy South Evaluation	Appendix L
Stipulation	Addressing Threatened and Endangered Species Issues	Appendix O
Stipulation	Supplemental Visual Impact Assessment	Appendix M
Stipulation	Supplemental Visual Impact Assessment (Add'l Clarification)	Appendix M

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-1
Requested By:	Steven Keller, David Wheat
Date of Request:	September 8, 2006
Reply Date:	February 20, 2008
Witness:	Panel C
Subject:	MAPS analyses

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1. Please provide, in digital format, all input files used in the MAPS modeling referenced in Exhibit E-4 of the Article VII application. Also provide in digital form and hard copy all post-processed output files that were developed and support claims regarding energy cost savings, price impacts on the bulk power system, utilization of the transmission system and reliance on natural gas-fired generators in New York City.

Response:

Response submitted May 18, 2007. However, the MAPS modeling referenced in Exhibit E-4 of the Application has been superseded by the MAPS modeling referenced in Exhibit E-4 and Appendix U of the Supplement.

2. Please describe all assumptions regarding modifications, if any, from the current configuration of the bulk power system.

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New York Regional Interconnect Inc. Application

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INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-2
Requested By:	Steven Keller, David Wheat
Date of Request:	September 8, 2006
Reply Date:	February 20, 2008
Witness:	Panel C
Subject:	MARS analyses

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1. Please provide, in digital format, all input files used in the MARS modeling referenced in Exhibit E-4 of the Article VII application. Also provide all calculations that support NYRI's claim regarding the projected $43 million economic benefit it believes would result from the purported reduction in Loss of Load Expectation, as well as all post-processed output files, in digital form and hard copy, that were developed in support of the calculation.

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New York Regional Interconnect Inc. Application

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INTERROGATORY/DOCUMENT REQUEST

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Date of Request:	September 8, 2006
Reply Date:	February 20, 2008
Witness:	Panel C
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1. Please provide, in digital form and hard copy, all files used to develop the projected reduction in gas-fired combustion turbine (GT) use between the base MAPS case and the case where NYRI's HVDC line is assumed in service.

Response:

Response submitted May 18, 2007. However, the MAPS modeling referenced in Exhibit E-4 of the Application has been superseded by the MAPS modeling referenced in Exhibit E-4 and Appendix U of the Supplement.

2. Does the reduction in GT use occur only during peak hours or also during off-peak hours?

Response:

Response submitted May 18, 2007. However, the MAPS modeling referenced in Exhibit E-4 of the Application has been superseded by the MAPS modeling referenced in Exhibit E-4 and Appendix U of the Supplement.

3. How many hours of GT use reduction occur on vs off peak?

Response:

Response submitted May 18, 2007. However, the MAPS modeling referenced in Exhibit E-4 of the Application has been superseded by the MAPS modeling referenced in Exhibit E-4 and Appendix U of the Supplement.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-4
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel E
Subject:	Railroad ROWs

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1. **Please provide copies of the lease rights obtained by NYRI from the New York Susquehanna & Western and Norfolk Southern Railroads.**

Response:

Copies of the leases are attached hereto.

2. **Provide a copy of the agreement instrument NYRI intends to use to obtain land owner permission to trim or remove trees and danger trees from residences along the railroads Right(s)-of-Way (ROW)?**

Response:

An agreement has not been developed at this time.

3. **Provide the number and location of residential properties where tree trimming or removal or structure removal along the railroad ROW will be required?**

Response:

NYRI has not compiled an inventory of property parcels with and without residences which may be adjacent to the railroad properties where tree trimming or removal will be required.

NYRI's supplemental application does denote the limits of tree clearing (see Exhibit 4, Section 4.4, Figures 4.4.1-1 - 4.4.3-3 and aerial photography map panels in Appendix A).

NYRI has confirmed that no structures along the railroad properties will be required to be removed based on the project

NYRI has confirmed that no structures along the railroad properties will be required to be removed based on the project location and design as presented in the Supplemental Article VII Application.

4. **How will NYRI gain access to residential properties for vegetation clearing and trimming along the railroad ROW?**

Response:

Where vegetation clearing and trimming on property adjacent to the railroad properties is prescribed, work performance rights, including the right of access to the adjacent properties, will be acquired via an open negotiation process with the property owners. See the Supplemental Article VII Application, Exhibit 4, Section 4.4.

NYRI intends to the fullest extent practicable to perform the limited incremental clearing and or trimming on properties adjacent to the railroads via use of equipment mounted on railcars. (I.E. 150 foot bucket trucks or cranes mounted on flatbeds, etc.).

5. **What vehicles and machinery will be used in tree trimming or removal on residential properties along the railroad ROW?**

Response:

Standard utility tree clearing equipment will be employed. Examples include bucket trucks, brush and whole tree chippers, Mechanical mowers, chain and brush saws, cranes, hydraulic grapples, bulldozers and hydraulic winches. However as noted in the response to DPS 4-4 above, this equipment will work from a railcar position to the extent practicable. See also Appendix E, Section 2.5 & 2.6 and Exibit 4, Section 4.4 of the Supplemental Article VII Application.

6. **What does NYRI intend to do to remove danger trees if it can not obtain "the property owner's concurrence" outside the railroad ROW (see application Appendix C, page 13)?**

Response:

If NYRI is not able to obtain "the property owner's concurrence" outside the railroad ROW as indicated in the Supplemental Article VII Application in Exhibit 4, Section 4.4, NYRI will not remove vegetation from that particular area.

7. **Would NYRI be willing to mitigate the impact to residential vegetation along the railroad ROW by offering to replace impacted trees with low growing compatible trees and shrubs?**

Response:

NRYI would generally be willing to plant low growing compatible trees and shrubs in residential areas that are directly impacted by tree removal in vegetation clearing zones.

8. **Provide a list and description of local distribution and transmission lines that are along the New York Susquehanna & Western and Norfolk Southern Railroad ROW and indicate where the proposed facility will be located relative to these local lines?**

Response:

NYRI has not compiled a list of existing local distribution lines along the Railroad properties. Distribution line information is normally obtained for a new transmission project like NYRI's during the detailed engineering field services which are performed in preparation of the Environmental Management and Construction Plan. NYRI will identify these existing distribution lines and make standard industry practice and National Electric Safety Code provisions for them in the final design of the DC transmission line.

The existing transmission lines on and immediately adjacent to the Railroad properties are noted on the aerial photography map panels in Appendix A. Attached is a table which presents descriptive information regarding these transmission facilities.

9. **[illegible] lengths of these existing lines and proposed separation distances.**

Response:

The length of the existing transmission lines for those portions which are within or immediately adjacent to the railroad properties are noted in the attached table which is also referenced in the response to DPS 4-8 above.

As presented in the reply to DPS-7, the nominal center line to center line separation distance between existing transmission facilities which may be paralleled and the NYRI HVDC line is 100 feet.

10. **Provide a typical plan and profile drawing of the proposed EM&CP for a typical section along the New York Susquehanna & Western and Norfolk Southern Railroad ROW showing existing**

railroad, pole structure locations, vegetation clearing and trimming, property lines, piles of structure main members, and any other proposed construction sites.

Response: See attached Typical Plans & Profiles along NS Railway and NYSW Railway sections.

11. **How will local traffic be affected by construction along the railroad ROW?**

Response: See Supplemental Article VII Application Exhibit E-6.3

Attachment for Interrogatory
DPS-4.1

ENERGY TRANSMISSION SYSTEM LEASE AGREEMENT

between:

THE NEW YORK, SUSQUEHANNA AND WESTERN RAILWAY CORPORATION

- and -

NIAGARA REINFORCEMENT, L.L.C.

Dated as of November 21, 2003

THIS ENERGY TRANSMISSION SYSTEM LEASE AGREEMENT (hereafter the "Agreement") is made as of the 21st day of November, 2003 (the "Effective Date"), by and between THE NEW YORK, SUSQUEHANNA AND WESTERN RAILWAY CORPORATION, a New Jersey corporation ("NYS&W" or "Grantor"), as party of the first part, and NIAGARA REINFORCEMENT, L.L.C., a limited liability company organized and existing under the laws of the State of Michigan (the "Grantee"), as party of the second part.

RECITALS

WHEREAS NYS&W is the holder of an extensive network of property interests, including rights-of-way over multiple inter-urban routes, that are utilized in the operation of Grantor's railroad business;

AND WHEREAS GRANTEE wishes to utilize a limited portion of such rights-of-way to construct and operate high voltage direct current ("HVDC") transmission lines that will benefit consumers in the receiving region by increasing the supply of electricity available from the lower cost production region and that will increase the efficiency and reliability of the public electrical grid by increasing the number of inter-region connections;

AND WHEREAS GR[illegible] requested that Grantor enter into this Agreement granting Grantee the ri[illegible] use the portion o[illegible] oad right-of-way identified herein for the construction, [illegible]intenance of a transmission system consisting generally of underground facilities and above ground facilities described herein as "Transmission System";

AND WHEREAS RAILROADS have historically granted utility companies rights to install longitudinal utility facilities along rail lines, inasmuch as such installations are compatible with railroad operations and property interests and contribute to the public welfare, and Grantor is willing to enter into this Agreement with Grantee;

NOW THEREFORE, in consideration of the covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby expressly acknowledged, the parties agree as follows:

ARTICLE 1.DEFINITIONS

(a) "Agreement" means this agreement, including the exhibits attached hereto.

"Approved Plans" is defined in Section 8.01.

"C&S Impact Analysis" is defined in Section 5.02.

"C&S Systems" is defined in Section 5.02.

"Code" means the United States Internal Revenue Code of 1986, as amended from time to time, or any corresponding Federal tax statute enacted after the date of this Agreement. A reference to a specific section (§) of the Code refers not only to such specific section but also to any corresponding provision of any Federal tax statute enacted after the date of this Agreement, as such specific section or corresponding provision is in effect on the date of application of the provisions of this Agreement containing such reference.

"Construction Rent" is defined in Section 6.02 and EXHIBIT C.

"Construction Term" is defined in Section 4.03.

"Converter Station" means a structure containing equipment used for converting the electricity carried on the Transmission System from alternating to direct current and vice versa.

"Design/Permitting Term" is defined in Section 4.02.

"Due Diligence Term" is defined in Section 4.01.

"Effective Date" is defined in the Preamble.

"Environmental Studies" is defined in Section 5.02.

"Event of Default" is defined in Section 15.01.

"Force Majeure" is defined in Section 8.04.

"Grantee" means Niagara Reinforcement, L.L.C. or any entity to whom this Agreement has been assigned in compliance with its terms and conditions.

"Grantee Assessment Activities" is defined in Section 5.02.

"Grantor" means The New York, Susquehanna and Western Railway Corporation.

"Grantor Assessment Activities" is defined in Section 5.01.

"HVDC" is defined in the Recitals.

"Impositions" is defined in Section 10.01.

"Industrial Development Agencies" is defined in Section 2.03.

"IDA Leases" is defined in Section 2.03.

"Lease Fees" is defined in Section 6.03 and EXHIBIT C.

"Material Taking" is defined in Section 12.01.

"NYS&W" is defined in the Preamble.

"Non-Compl[illegible]ns" is defined in Section 9.01.

"[illegible]ing" is defined Section 12.02.

"Optio[illegible]s" is defined in Section 6.01 and EXHIBIT C.

"Plan" is defined in Section 8.01.

"Preliminary Plan" is defined in Section 5.02.

"Pre-Paid Rent" is defined in Section 6.02 and EXHIBIT C.

"Primary Term" is defined in Section 4.04.

"Primary Term Inception Date" is defined in Section 4.04.

"RW Route" is defined in Section 2.01 and on EXHIBIT A.

"RW Studies" is defined in Section 5.02.

"Remainder" is defined in Section 6.02 and EXHIBIT C.

"Renewal Fee" is defined in Section 6.05 and EXHIBIT C.

"Renewal Term" is defined in Section 4.05.

"Storage Locations" is defined in Section 3.01.

"Technical Studies" is defined in Section 5.02.

"Term" means the Due Diligence Term, Design/Permitting Term, Construction Term, Primary Term and/or Renewal Term, as the context requires.

"Termination Fee" is defined in Section 4.06.

"Transmission System" means any or all of the materials, equipment, structures and improvements installed along the RW Route by Grantee as part of its HVDC transmission system, including underground conduits, cables, vaults, and manholes and above ground poles, towers, cables and Converter Stations and other structures, the preliminary details of which are specified on EXHIBIT B.

ARTICLE 2.GRANT OF LEASE

Section 2.01. Grant of Lease. Grantor hereby grants unto Grantee as of the Effective Date a non-exclusive Lease to utilize the right-of-way identified on EXHIBIT A (the "RW Route"), at the locations within the RW Route to be approved by Grantor as part of the Approved

Plans, for the purpose of designing, constructing, operating and maintaining the Transmission System.

Section 2.02. Limitations on Grant. Grantee acknowledges that the grant of Lease hereunder is a quitclaim grant, made without covenants, representations or warranties (including any express or implied covenant of quiet enjoyment) in respect of Grantor's (i) title in the RW Route, or (ii) right to use or make available to others the RW Route for the purposes contemplated herein.

A. Certain Limitations. Grantee acknowledges that the RW Route may be subject to underlying fee interests, conditions, covenants, easements, encroachments, leases, licenses, mortgages, indentures, reversionary interests, zoning restrictions and other legislative and regulatory limitations, and that the rights granted hereunder are subject and subordinate to each and all of the foregoing.

B. Defense of Claims. Grantor shall afford Grantee reasonable cooperation to enable Grantee to defend against any claims that the rights granted to Grantee hereunder are in violation of the rights of the claimant in the RW Route, including without limitation allowing Grantee access to Grantor's non-confidential books and records pertaining to Grantor's interest in the RW Route during normal business hours on mutually acceptable dates. Grantee shall bear the costs of its defense of said claims. In the event of a [illegible] title of a portion of the RW Route, and upon proof of such [illegible] required to pay a third party for the use of such portion of the RW Route, then Grantor shall refund and reimburse Grantee for such payments to the third party, but not exceeding, the Pre-Paid Rent and the Lease Fees that theretofore have been paid to Grantor by Grantee for use of such portion of the RW Route. Grantee shall

continue thereafter to pay to Grantor for the RW Route the difference between (i) the Pre-Paid Rent and the Lease Fees Grantee would have paid under this Agreement and (ii) an amount equal to the amount of any payments to a third party for the affected portion of the RW Route, provided that such amount shall not exceed the Pre-Paid Rent and the Lease Fees that Grantee would have paid to Grantor for use of the affected portion of the RW Route. Grantee shall not be obligated to agree to a settlement that would provide Grantor with rights greater than what is needed by Grantor to grant this Lease to Grantee, unless there is an equitable division of the settlement consideration between the rights applicable to this Agreement and the rights applicable to other existing and potential grants by Grantor, with Grantor paying the latter portion at the time payment is made to the third party.

Section 2.03. Industrial Development Agencies:

(a) Legal title to portions of the RW Route located between Binghamton, NY and Utica, NY is held the Broome County Industrial Development Agency, the Chenango County Industrial Development Agency, the Madison County Industrial Development Agency and the Oneida County Industrial Development Agency (hereinafter the "Industrial Development Agencies"). Pursuant to lease agreements with the Industrial Development Agencies (the "IDA Leases"), Grantor has all equitable ownership of the RW Route (subject to the limitations set forth in Section 2.02), including the right, at Grantor's option, to reacquire legal title to the RW Route for nominal consideration, and the right to enter into this Lease Agreement.

(b) In the event the IDA Leases shall expire or terminate for any reason prior to expiration or termination of the Primary Term or the Renewal Term, NYS&W shall reacquire

legal title to the RW Route from the Industrial Development Agencies subject to the use and occupancy by Grantee of the RW Route under and subject to this Agreement.

ARTICLE 3.PURPOSE OF GRANT; GRANTEE'S USE OF RW ROUTE

Section 3.01. Use of RW Route. During the Term, Grantee shall have the right to design, install and operate the Transmission System in, upon, over, under, across, along and through the RW Route at locations to be approved by Grantor under Section 7.01. Grantee also shall have the right to design and construct, without additional compensation due hereunder, lateral connections not to exceed five hundred feet (500') in length between the Transmission System and Grantee's offsite network elements or facilities of third parties to which the Transmission System will be linked (including utility facilities providing supporting services to the Transmission System as well as utility facilities transferring electricity to and from the Transmission System), in, upon, over, under, across, along and through the RW Route at locations to be approved by Grantor under Section 7.01. Use of the RW Route shall include the right to attach the Transmission System to existing poles, towers, bridges, tunnels and other structures where approved by Grantor. Use of the RW Route also shall include access to and use of two (2) storage locations for purposes of housing repair and maintenance materials and equipment for the Transmission System of reasonable dimensions in reasonable quantities (the "Storage Locations"), provided that: (i) such Storage Locations are available in Grantor's reasonable commercial judgment, (ii) the Storage Locations shall not interfere in Grantor's sole discretion with railroad operations or the rights of prior grantees, and (iii) Grantee shall not store any hazardous materials as defined by any governmental agency or authority. Each Storage Location shall not exceed 40,000 square feet in size and shall be located as mutually determined by Grantor and Grantee during the Due Diligence Term. The location of each Storage Location

shall be documented and attached hereto (without formal amendment of this Agreement) as a supplement to EXHIBIT A. Grantee shall be responsible for the security of materials and equipment at the Storage Locations against theft, vandalism or any other damage. Any security measures Grantee desires to implement with respect to the Storage Locations shall be subject to the prior written approval of Grantor, such approval not to be unreasonably withheld. Grantor shall not be liable for any equipment or materials lost, stolen or missing from or damaged at the Storage Locations.

Section 3.02. Limitations on Use of RW Route. (a) Grantee shall use the RW Route only for the purposes prescribed hereunder, provided that the Transmission System may contain elements necessary for, and utilized for no other purpose than, communications used in the operation of the Transmission System. Grantee acknowledges that its use and occupancy of the RW Route are subject and subordinate to the prior and continuing right and obligation of Grantor to use, in its sole discretion, the RW Route in performing services as a railroad. Notwithstanding the foregoing, Grantor covenants that, following completion of installation of the Transmission System, it will not disturb Grantee's use and occupancy of the RW Route except as authorized in this Agreement, and that it will use commercially reasonable efforts to minimize such disturbance even when so authorized.

(b) Nothing in this Agreement shall be deemed or construed as a limitation on Grantor's right to discontinue transportation service over any portion of the RW Route. Grantor shall also have the right to abandon any portion of the RW Route, provided that Grantor shall give Grantee not less than six (6) months' written notice of intent prior to consummation of an abandonment authorization received from the Surface Transportation Board or by operation of law by exemption regulation. Notwithstanding any other provision of this Section 3.02, Grantor may

consent to negotiate under section 8(d) of the National Trails System Act, 16 U.S.C. §1247(d), and negotiate a reasonable agreement preserving per 16 U.S.C. §1247(d) at least that portion of the RW Route otherwise to be abandoned which portion is occupied by the Transmission System or parts thereof and is needed to maintain a connection to the interstate rail network, provided only that a government entity or qualified organization requests railbanking and is prepared to fulfill the obligations of 16 U.S.C. §1247(d).

(c) In the event Grantor intends to abandon a portion or all of the RW Route during the Construction Term, Grantor shall provide Grantee the opportunity to request from Grantor the option of deferring abandonment up until the end of the Construction Term at an amount per month charged to the Grantee to compensate Grantor for its costs of continued ownership of said portion of the RW Route that otherwise could be avoided through the abandonment process and its costs of continued operation and deferral of abandonment of said portion of the RW Route. The amounts of such fees shall be determined by Grantor in its reasonable business judgment.

(d) Except in the case of a transaction pursuant to the National Trails System Act as set forth in Section 3.02(b), if Grantor proposes to abandon and sell a portion of the RW Route, Grantee shall have the right of first refusal to purchase any rights that Grantor may retain with respect to said portion of the RW Route, provided that any contract of sale between Grantor and Grantee shall reserve unto Grantor the right to reactivate the affected portion of the RW Route.

Section 3.03. Use of RW Route by Others. Grantee acknowledges that its use and occupancy of the RW Route are subject and subordinate to any prior grants of easements, licenses and rights by Grantor to third parties to permit others to conduct passenger rail operations or to install conduits, pipelines, power lines, communications lines, and other facilities in, upon, over, under, across, along and through the RW Route. Grantee shall design

the Transmission System so that it will be constructed and operated without physical conflict or interference with prior occupancies of the RW Route. Grantor shall make commercially reasonable efforts to cooperate and coordinate information with Grantee in the identification of prior occupancies of the RW Route. During the Term, Grantor shall not grant to any third party any rights to occupy the RW Route longitudinally in a manner that would pose a material risk of interference with Grantee's construction or operation of the Transmission System. Any such third party use that involves digging or drilling of any type within five feet (5') of the centerline of any underground components of the Transmission System or involves installation of facilities within five feet (5') of any above-ground components of the Transmission System shall be deemed a material interference. Prior to granting any subsequent third party rights that would involve installation of any facilities within five feet (5') of the centerline of any underground components of the Transmission System or within five feet (5') of any above-ground components of the Transmission System, Grantor shall notify Grantee in writing and provide Grantee with adequate information and a reasonable period of time for Grantee to determine whether such proposed facilities are likely to pose a material risk of damage to the Transmission System. If Grantee reasonably determines that such proposed grant would be likely to pose a material risk of damage to the Transmission System and Grantee so notifies Grantor, Grantor shall not make such proposed grant.

ARTICLE 4.TERM

Section 4.01. Due Diligence Term. This Agreement shall commence on the Effective Date and shall continue for a preliminary term ending at 11:59 p.m. on the thirty-first (31st) day of August, 2004 (the "Due Diligence Term") allowing the Parties time to carry out due diligence activities described in Article 5 of this Agreement. If either party determines, as a result of such

due diligence activities, that construction of the Transmission System is in its sole judgment infeasible or inadvisable, such party may terminate this Agreement at the end of the Due Diligence Term by delivering a written notice to the other party before such date. Termination by either party under this Section 4.01 shall not entitle Grantee to a return of the Option Fees or any other fees accrued and/or paid prior to termination.

Section 4.02. Design/Permitting Term. Provided (i) neither party has terminated this Agreement under Section 4.01 and (ii) Grantee shall have paid and continue to pay to Grantor all accrued Option Fees, then this Agreement shall continue until the earlier of the date the Construction Term begins or five (5) years following expiration of the Due Diligence Term (the "Design/Permitting Term"). During the Design/Permitting Term, Grantee shall have the exclusive right to design the Transmission System on the RW Route.

Section 4.03. Construction Term. Provided (i) Grantee has not terminated this Agreement under Section 4.06, (ii) the Plan is approved pursuant to Section 8.01, (iii) all necessary regulatory permits have been obtained, and (iv) Grantee has paid to Grantor the Construction Rent, then this Agreement shall continue for up to five (5) years following expiration of the Design/Permitting Term (the "Construction Term"). During the Construction Term, Grantee shall have the exclusive right to build the Transmission System on the RW Route but shall not have the right to operate the Transmission System.

Section 4.04. Pri[illegible]. Provided (i) Grantee has not terminated this Agreement under [illegible], (ii) [illegible] as paid to Grantor the Pre-Paid Rent and (iii) Grantee is not [illegible]igations under this Agreement, Grantee may extend this Agreement for a primary term (the "Primary Term") (a) commencing on a date selected by Grantee (with notice in writing to Grantor) after the end of the Construction Term, but before the thirty-first (31st) day

of December 2014 (the "Primary Term Inception Date"), and (b) expiring at 11:59 p.m. on the day before the fortieth (40th) anniversary of the Primary Term Inception Date.

Section 4.05 Renewal Term. Provided Grantee is not then in default under this Agreement, Grantee shall have the right to renew this Agreement for an additional term of forty (40) years (the "Renewal Term") commencing upon expiration of the Primary Term. Grantee shall exercise the foregoing renewal by written notice to Grantor not less than six (6) months before the expiration of the Primary Term.

Section 4.06. Grantee Early Termination. (a) Except as provided in Section 4.01, Grantee may terminate this Agreement at any time that it determines in its sole judgment that construction and/or operation of the Transmission System is not feasible or advisable by giving Grantor ninety (90) days' written notice thereof.

(b) In the event of termination by Grantee under this Section 4.06 during the Design/Permitting Term, Grantee shall not be entitled to a return of any Option Fees or any other fees accrued and/or paid prior to such termination.

(c) In the event of termination by Grantee under this Section 4.06 during the Construction Term: (i) Grantee shall not be entitled to a return of any Option Fees, the Construction Rent or any other fees accrued and/or paid prior to such termination; (ii) Grantee shall pay to Grantor no later than the date of termination the Remainder; and (iii) installed components of the Transmission System will be subject to disposition under Section 14.01.

(d) In the event of termination by Grantee under this Section 4.06 during the Primary Term: (i) Grantee shall not be entitled to a return of any Option Fees, Pre-Paid Rent, Lease Fees or any other fees paid and/or accrued prior to such termination; (ii) Grantee shall pay to Grantor no later than the date of termination a termination fee equal to the net present value of all outstanding

Lease Fees that, but for termination, would be owed to Grantor through the end of the Primary Term (the "Termination Fee"); and (iii) components of the Transmission System will be subject to disposition under Section 14.01. The Termination Fee shall be calculated using a discount rate of fifteen percent (15%).

ARTICLE 5.DUE DILIGENCE

Section 5.01. Grantor Due Diligence. (a) During the Due Diligence Term, Grantor and/or its agents and representatives shall perform certain assessment activities ("Grantor Assessment Activities") based on the Preliminary Plan, including:

(i) facilitate on-site inspection of the RW Route to verify feasibility of its use for the Transmission System;

(ii) evaluate C&S Impact Analysis and, in view of the C&S Impact Analysis, evaluation of the feasibility of the RW Route for use for the Transmission System;

(iii) evaluate required upgrades to Grantor C&S Systems, if any, and feasibility of any such upgrades;

(iv) evaluation of the impact of the Transmission System on Grantor's pole lines, underground cabling and communications facilities and the feasibility of accommodating any required changes thereto;

(v) determination of minimum above- and below-ground clearance envelope for the Transmission System with respect to the RW Route and, in consideration of such envelope, the feasibility of the RW Route for use for the Transmission System;

(vi) completion of all other engineering and technical studies that Grantor in its discretion believes are necessary or desirable to assess the feasibility of the Transmission System.

(b) In addition and not in limitation of the Grantor Assessment Activities and in support of the Grantee Assessment Activities, Grantor shall deliver to Grantee: (i) a list of details to be included in the Preliminary Plan, and (ii) two (2) copies of maps describing RW Route,

such as they are, in as fine a detail as possible. Grantor agrees to make this information and documents available to the Grantee no later than thirty (30) days from the Effective Date.

Section 5.02. Grantee Due Diligence. (a) During the Due Diligence Term, Grantee and/or its agents and representatives shall perform certain assessment activities (the "Grantee Assessment Activities"), including, but not limited to:

(i) analyses of market and business conditions for the Transmission System;

(ii) to be completed and delivered to Grantor no later than ninety (90) days before the end of the Due Diligence Term, an analysis of the impact of an HVDC transmission system on Grantor's Communications and Signal systems ("C&S Systems"), including wayside and grade crossing warning protection systems, VHF radio communications (160 Mhz for base station-to-mobile and mobile-to-mobile unit communications), UHF radio (450 Mhz for EOT, RCL, and Distributed power), and UHF radio (900 Mhz Data radio for Code line and PTC communications), as well as recommended mitigation measures (the "C&S Impact Analysis"), such C&S Impact Analysis then becoming the property of Grantor;

(vii) technical analyses to confirm optimal systems, requisite ancillary equipment, voltages, configurations and hardware and installation costs ("Technical Studies");

(viii) preliminary examination of title, with the assistance and cooperation of Grantor;

(iv) physical inspection and examination of RW Route (via "high-rail") for Technical Studies, Environmental Studies, title surveys, and other Transmission System purposes (collectively, "RW Studies");

(v) analyses of the potential environmental impact of the Transmission System ("Environmental Studies"); and

(vi) more generally to complete and conduct all other engineering and technical studies that are reasonably required and necessary to assess the feasibility of the Transmission System.

(b) In addition to and not in limitation of the Grantee Assessment Activities and in support of the Grantor Assessment Activities, Grantee shall at its sole expense and within ninety

(90) days of the Effective Date provide Grantor with a preliminary engineering design and construction plan for the Transmission System (the "Preliminary Plan").

Section 5.03. Due Diligence Expenses. Grantor shall bear the expenses of the Grantor Assessment Activities. Grantee shall bear the expenses of the Grantee Assessment Activities.

ARTICLE 6. FEES

Section 6.01. Option Fees. Grantee shall pay Grantor option fees in the amounts and in the manner specified in attached EXHIBIT C (the "Option Fees"). Option Fees not paid when due shall accrue interest at ten percent (10%) per annum until paid. Acceptance of Option Fees by Grantor shall be assumed indicative of Grantor's approval of the Preliminary Plan. Option Fees paid to Grantor shall be automatically deducted from Construction Rent.

Section 6.02. Pre-Paid Rent. Grantee shall pay Grantor pre-paid rent for the use of the RW Route in conjunction with the Transmission System in the amounts specified in EXHIBIT C (the "Pre-Paid Rent"), such Pre-Paid Rent to be paid as follows:

a) Construction Rent. Grantee shall pay Grantor forty percent (40%) of the Pre-Paid Rent (the "Construction Rent") on the first day of the Construction Term. Acceptance of the Construction Rent by Grantor shall be assumed indicative of Grantor's acceptance and approval of the Plan, as described in Section

b) Remainder. Grantee shall pay Grantor the remaining sixty percent (60%) of the Pre-Paid Rent (the "Remainder") prior to the first day of commercial operation of the Transmission System or on December 31, 2015, whichever shall first occur.

Section 6.03. Lease Fees for Primary Term. Commencing as of the Primary Term Inception Date, Grantee shall pay to Grantor during the Primary Term the fees specified in EXHIBIT C (the "Lease Fees"). Grantee shall pay the Lease Fees quarterly in advance, with the first such payment due on the Primary Term Inception Date and subsequent payments during the Primary Term due on the first day of each calendar quarter thereafter. Lease Fees not paid when due shall accrue interest at ten percent (10%) per annum until paid. Lease Fees due with respect to a period that is less than a full calendar quarter shall be prorated on a daily basis.

Section 6.04. Lease Fees for Renewal Term. Lease Fees for the Renewal Term, if any, shall be calculated as set forth in EXHIBIT C and shall be payable in the same manner prescribed in Section 6.03.

Section 6.05. Renewal Fee. If this Agreement shall be in effect on and after the fortieth (40th) anniversary of the Primary Term Inception Date, Grantee shall pay to Grantor within thirty (30) days thereof an additional amount for the continued use of railroad right-of-way in conjunction with the Transmission System (the "Renewal Fee") as set forth in EXHIBIT C.

Section 6.06. Taxes. Grantor shall receive the Option Fees, Pre-Paid Rent, Lease Fees, Renewal Fee and all other sums due hereunder as gross/pre-tax amounts. All applicable taxes, if any, shall be the sole and exclusive responsibility of Grantor, however both Grantor and Grantee shall cooperate to minimize taxes that might be payable.

Section 6.07. Most Economically Favorable Terms. The economic terms of this Article 6 shall be subject to the proviso that Grantor shall enjoy economic benefits under the Agreement no less than the most economically favorable terms that any other party whose right-of-way of ten (10) miles or more in length of right-of-way is utilized in conjunction with the Transmission System, as calculated on per mileage usage, (including without limitation Norfolk Southern

Railway Company, Pennsylvania Lines, LLC, New Jersey Transit and Canadian Pacific Railway Company) shall obtain from Grantee and/or its agents, representatives and assigns. Notwithstanding the foregoing, such most economically favorable terms shall not include costs or expenses to Grantee claimed or charged by a third party on account of failure of title with respect to a portion of the RW Route.

Section 6.08. Grantor Audit Rights. Upon reasonable notice in writing, Grantor shall have the right to audit, no more than once per calendar quarter, Grantee's books and records pertaining to the determination of Lease Fees under EXHIBIT C and compliance with Section 6.06. Any audit shall occur during normal business hours at Grantee's place of business where such books and records are maintained, at Grantor's expense. Without limiting the foregoing, Grantee shall provide to Grantor a copy of Grantee's audited financial statements for a given fiscal year as soon as available and in any event within one hundred and twenty (120) days after the end of such fiscal year.

ARTICLE 7. GRANTEE'S ENTRY AND PRESENCE ON RW ROUTE

Section 7.01. Entry and Presence on RW Route. Subject to Article 3, throughout the Term Grantee may enter upon, and may cause its employees, agents and contractors to enter upon, the RW Route for the purpose of designing, constructing, operating, inspecting, repairing and maintaining the Transmission System. Grantee's employees, agents and contractors shall not enter the RW Route without giving Grantor at least five (5) days advance written notice, except in the case of emergency repairs, as to which Grantee shall give Grantor notice by telephone as far in advance as possible. Contact information for Grantor and

Grantee personnel to be notified in the event of an emergency are set forth on EXHIBIT D. Grantee shall furnish Grantor with a list of names of Grantee's authorized representatives who may enter the RW Route in connection with the Transmission System, and such named representatives may be permitted repeat entry upon and access to the RW Route on terms Grantor prescribes.

ARTICLE 8. ENGINEERING AND CONSTRUCTION OF TRANSMISSION SYSTEM

Section 8.01. Preparation and Approval of Engineering and Construction Plan. Before the Construction Term shall commence and construction of the Transmission System shall begin, Grantee shall submit for Grantor's advance written approval an engineering design and construction plan (the "Plan"), which Grantor shall approve, approve conditionally, or reject in writing within forty-five (45) days. Grantor's review rights relate solely to potential impacts on railroad operations and facilities and Grantor's prior grantees. If Grantor rejects or approves conditionally Grantee's Plan, Grantor shall confer promptly with Grantee on revisions necessary to obtain approval, and shall approve, approve conditionally or reject Grantee's revised Plan(s) within thirty (30) days of resubmission, with such process being repeated until Grantee has obtained final approval. Grantee understands and acknowledges that no construction activities shall commence without Grantor's final approval of the Plan. Upon completion and approval of the Plan, the Plan may be attached hereto (without formal amendment of this Agreement) as a supplement to EXHIBIT B. Such approved Plan (the "Approved Plans") shall remain the property of Grantee and shall be deemed Grantee's information subject to the protections of Article 18 hereto, and Grantee shall retain all intellectual and other property rights with respect thereto. Grantor shall have no right to use or permit any third party to use the Approved Plans or any derivation thereof for any purpose other than performing Grantor's obligations hereunder.

Section 8.02. Permits and Approvals. Grantee shall be responsible for obtaining, at its sole cost and expense, all permits and governmental approvals required to implement the Approved Plans for the Transmission System.

Section 8.03. Grantor's Cooperation. Grantor agrees to provide reasonable cooperation to assist Grantee in preparing and implementing the Approved Plans for the Transmission System, including: (i) meeting in person and conferring by telephone with Grantee; (ii) escorting Grantee on inspection trips of the RW Route; (iii) providing maps, surveys, as-built drawings and other data relating to the RW Route in Grantor's possession, subject to any third party confidentiality protections; (iv) providing timely review and approval of Plans or any requested alterations to Approved Plans; (v) providing reasonable assistance and cooperation to Grantee in its performance of the Technical Studies, the RW Studies and the Directional Drilling Studies; and (vi) providing reasonable assistance and cooperation to Grantee in its performance of the Environmental Studies, including, but not limited to, providing information requested by Grantee (to the extent available to Grantor and already in its possession) concerning the RW Route, such as core samples, geological and geophysical information, and a description of property characteristics and conditions. Grantee shall be responsible for obtaining (A) environmental approvals, and (B) permits, licenses or approvals of governmental agencies or authorities necessary for the use of any structures or facilities (including streets, roads or utility poles) along or across the RW Route. Grantee acknowledges that maps and other materials supplied by Grantor may not have been prepared as real estate title maps, and that the property lines, right-of-way [illegible] may not be accurate or correct. Grantee further acknowledges that the absence of markers or monuments on such maps or on or about the RW Route indicating the presence of subterranean facilities or other occupations does not constitute a warranty or

representation by Grantor that none exist. Grantee accepts this Agreement and Grantor's cooperation hereunder cognizant of the fact that Grantee's engineering and construction costs may increase by reason of undisclosed facilities within the RW Route, and Grantee agrees to accept sole responsibility for such costs.

Section 8.04. Scheduling and Prosecution of Construction. Upon Grantor's approval of the Plan, Grantee shall have the right to construct the Transmission System in compliance with the Approved Plans, and Grantor shall not have any right to require changes in such Approved Plans following Grantor's approval of same unless required in order to maintain safe railroad operations on the RW Route. Promptly after Plan approval, Grantor and Grantee shall determine a mutually convenient schedule for construction of the Transmission System, to which Grantor and Grantee shall make commercially reasonable efforts to adhere. Subject to the availability of track-time and other railroad-related contingencies involving the RW Route, Grantee shall have the right to access the construction sites and to move personnel, equipment and materials. Subject to payment of Grantor's charges as defined below in Section 8.05, Grantee shall have the right to obtain from Grantor the services of flagmen and supervisors for construction of the Transmission System. Grantor shall use commercially reasonable efforts to accommodate Grantee's requests for track time and personnel and equipment support. Grantee acknowledges that it shall be reasonable for Grantor to satisfy Grantor's needs in the operation of the railroad prior to accommodating Grantee's requests. Upon commencement of construction, Grantee shall work diligently toward completion, subject to unavoidable delays, including strikes, acts of God, litigation, legal or administrative proceedings, inability to obtain labor or materials, governmental restriction, enemy action, civil commotion, fire, unavoidable casualty and other causes beyond the reasonable control of Grantee (collectively, "Force Majeure"). During initial

construction and any subsequent major repair or renovation projects, Grantee shall have the right, without payment of additional compensation but with prior notice in writing to Grantor, to utilize portions of the RW Route reasonably designated by Grantor for temporary storage (not to exceed fifty-two (52) weeks) of project materials and equipment, location of trailers and other temporary project field offices, and other typical "staging" activities, including installation of temporary fences and other security measures, provided that the foregoing activities do not interfere in Grantor's sole discretion with railroad operations or the rights of prior grantees.

Section 8.05. Cost of Construction. Grantee shall bear the entire cost and expense of constructing, operating and maintaining the Transmission System, including without limitation the entire cost and expense associated with any construction or alteration of railroad facilities required by the presence of the Transmission System on the RW Route. Grantor shall have the right to post notices of non-responsibility upon the RW Route, and otherwise to notify any entity or person supplying services or materials in connection with the Transmission System that Grantor is not responsible for the cost thereof. Grantee agrees to reimburse Grantor for the cost and expense to Grantor (direct labor costs shall be calculated as the hourly wages or prorated salary of personnel plus one hundred and ten percent (110%) to cover overhead; equipment costs shall be at the standard rates then charged to third parties) of furnishing any equipment (such as locomotives) or materials or performing any labor in connection with construction or maintenance of the Transmission System, including watchmen, flagmen, inspectors, and supervisors as Grantee or as Grantor may reasonably deem necessary or appropriate for the protection of Grantor's personnel, property and operations. Payment of costs and expenses under this Section 8.05 shall be made within thirty (30) days of Grantee's receipt from Grantor of a reasonably itemized invoice plus copies of backup

documentation for out-of-pocket expenditures unless other payment arrangements have been mutually agreed upon. Payments not received when due shall accrue interest at a rate of ten percent (10%) per year until paid in full. Grantor reserves the right to require pre-payment of estimated amounts due before providing flagging and other services hereunder if Grantee fails to timely pay invoices or if, in Grantor's judgment, Grantee demands unreasonable backup documentation prior to payment. Upon reasonable notice in writing, Grantee shall have the right to audit, no more than once per calendar quarter, Grantor's books and records pertaining to costs and expenses billed to Grantee under this Section 8.05. The audit shall occur during normal business hours at Grantor's place of business where such books and records are maintained. In no event shall Grantee withhold or delay payment of amounts due hereunder pending the exercise of Grantee's audit rights or challenge regarding partial amounts payable. In the event of an overpayment, Grantor shall reimburse Grantee for the amount of the overpayment, with interest at the aforesaid rate from the date of Grantee's original payment until the reimbursement.

Section 8.06. General Engineering and Construction Specifications. The parties adopt the following general engineering and construction specifications for the Transmission System, which may be modified only upon Grantor's approval (which may be given in the form of Grantor's approval of the Plan). No materials or equipment used in constructing the Transmission System shall be stored within fifteen (15) feet of the centerline of any track without the prior written consent of Grantor. When installed underground, the Transmission System shall be installed with a minimum cover of forty-eight (48) inches except that where it crosses under rail facilities, it shall be encased in steel and installed at a minimum depth of sixty-six (66) inches below the base of the rail. Grantee shall endeavor to install underground segments of the Transmission System near the outer edge of the RW Route, and Grantor and Grantee shall

cooperate to achieve mutually acceptable engineering solutions in physically constricted areas. Unless otherwise authorized by Grantor or contra-indicated by security concerns, Grantee shall install and maintain monuments and markers in compliance with industry practice showing the location of the Transmission System, changes in direction of the Transmission System, and the Transmission System's presence on each side of grade crossings. Aerial crossings of railroad tracks shall be at or above the minimum elevations required under Grantor's standard engineering practices. Additional general engineering and construction specifications are set forth in EXHIBIT E. Grantee shall not dispose of or release wastes of any kind, whether hazardous or not, on the RW Route and shall not conduct any activity requiring a hazardous waste treatment, storage, or disposal facility permit. The Grantee or Grantee's contractor or contractors, as the case may be, shall provide a performance bond in an amount equal to that of the contract cost for the work being performed by such contractor.

Section 8.07. Provision of "As Built" Drawings. As the exact location of the Transmission System is determined by construction, Grantee shall provide Grantor, at its expense, "as built" maps and drawings within one hundred and eighty (180) days of completion of each phase of the Transmission System. Maps and drawings shall be furnished in both hard-copy and electronic versions (AutoCAD or Microstation format).

ARTICLE 9.PROTECTION OF RW ROUTE AND TRANSMISSION FACILITIES

Section 9.01. Compliance with Grantor's Directions and Laws Governing RW Route. Grantee acknowledges that control and supervision of the RW Route shall remain with Grantor at all times during design, construction, operation and maintenance of the Transmission System, and that Grantor may in its sole discretion require Grantee, its employees, contractors and agents temporarily to cease their activities on and vacate the RW Route if they fail to comply with

Grantor's directions for the safety and protection of Grantor's personnel, property and operations. In the event of a work stoppage under this Section 9.01 that is expected to exceed twenty-four (24) hours, Grantor shall provide Grantee within twelve (12) hours of the stoppage with written notice setting forth in reasonable detail: (1) the reason(s) for the stoppage (the "Non-Complying Conditions") and (2) such remedial action(s) as Grantor may identify to be taken or caused to be taken by Grantee. Upon remediation of the Non-Complying Conditions, Grantee shall provide Grantor with written notice thereof, and, within twelve (12) hours of receipt of such notice, Grantor shall inspect the affected work site and, provide Grantee with a copy of the inspection results. Upon satisfactory inspection results, authorize Grantee to resume work on the RW Route. Notice and reporting under this Section 9.01 may be given by facsimile transmission and when so given shall be deemed received upon machine confirmation of successful transmission. Grantee shall at all times conform to, and cause all persons using or occupying the RW Route to conform to, all applicable laws, ordinances, rules, orders and regulations, including those relating to health, safety, noise, environmental protection, waste disposal and air and water quality.

Section 9.02. Inspection of Transmission System. Grantor shall have the right to inspect the RW Route and the Transmission System to determine whether Grantee's undertakings pursuant to this Agreement are being complied with; provided, however, Grantor shall not touch or disturb the Transmission System during such inspections. Any such inspections conducted during the construction process shall not interfere with such construction. Grantor shall notify Grantee promptly in writing of any violation of this Agreement noted during any such inspection.

Section 9.03. Non-Interference with Rail Operations; Relocation of Transmission System. (a) In the event that Grantor determines in its sole discretion that the construction or alteration of railroad facilities is required for railroad purposes, as defined below, and in the event that Grantor further determines in its reasonable business judgment that such construction or alteration of railroad facilities necessitates relocation of the Transmission System, Grantor shall so notify Grantee in writing. Grantee shall be responsible for obtaining any requisite approvals for relocation of the Transmission System from any and all state and federal authorities exercising regulatory oversight over the Transmission System, and Grantee shall initiate any requisite approval process(es) within forty-five (45) days of receipt of notice from Grantor. Within three (3) months after receiving the last required approval (or, in the event the relocation involves more than one (1) kilometer of the RW Route, within six (6) months after receiving the last required approval), Grantee shall relocate the Transmission System to such other location within the RW Route or other rights-of-way owned or held by Grantor as Grantor has designated, or as approved in the preliminary plan. For each such relocation event, Grantee shall bear the costs of such change or relocation of the Transmission System for a segment up to and including five thou[illegible] (5,000') in length; thereafter, Grantor shall reimburse Grantee for fifty percent (50%) of such costs associated with that portion of a segment in excess of five thousand feet (5,000'). For purposes of the foregoing provision, "railroad purposes" shall mean those actions required for the operation of rail freight or passenger trains. "Railroad purposes" shall not inc[illegible]ion of tracks or other railroad facilities to enable Grantor to sell property or [illegible] to third parties other than rail freight or passenger operators. [illegible]nstanding the foregoing, Grantor acknowledges that Converter Stations cannot be relocated.

(b) In the event that a governmental entity with requisite authority shall determine that circumstances make the relocation of the Transmission System necessary or desirable and so orders such relocation, Grantee shall relocate the Transmission System at its sole cost to such other location within the RW Route or other rights-of-way owned or held by Grantor as Grantor has designated, or as approved in the preliminary plan.

Section 9.04 Risk of Harm from Rail Operations. Grantee acknowledges that Grantor's railroad operations routinely involve the movement and derailment of heavy equipment, track construction and maintenance, excavation, demolition and other activities on or about the RW Route that pose an inherent risk of harm to the Transmission System. Grantor acknowledges the public interest in and essential nature of the functioning of the Transmission System and Grantee's services and agrees to take appropriate precautions to avoid such harm. Grantor shall retain the right to maintain and repair the railroad facilities within the RW Route as determined necessary by Grantor in its sole discretion, provided that Grantor shall make a good faith effort to give prior notice of such activity to Grantee. Except in the event of a derailment or other similar railroad emergency, such good faith effort shall include written notice pursuant to this Agreement at least thirty (30) days in advance of any such activity that is reasonably likely to touch or disturb the Transmission System. Any digging or drilling within five feet (5') of components of the Transmission System shall automatically be deemed likely to disturb the Transmission System. Grantee may request, and Grantor shall make a good faith effort to accommodate such a request, to be present during any activities of Grantor posing a risk of disturbance to the Transmission System; provided, however, under no circumstances shall Grantor be obligated to postpone or delay its activities on the RW Route to accommodate Grantee's presence. Grantor acknowledges that the Transmission System carries high voltage

electricity and should not be approached or disturbed by personnel who have not been properly trained. Grantor agrees to notify Grantee within six (6) hours of any derailment in which derailed rail cars come within ten feet (10') of Transmission System components. Provided that Grantor has given Grantee notice as specified above, Grantor shall not be liable for damages, or be subject to injunctive relief, resulting from harm to the Transmission System, except in the event that such harm or interruption is the result of gross negligence or willful misconduct of Grantor, its employees, agents or others performing services for Grantor. In the event of harm to the Transmission System from Grantor's railroad operations not caused by gross negligence or willful misconduct, Grantee agrees to bear all costs and expenses necessary to restore full and continuing operations to the Transmission System. In any event, Grantor shall use its good faith efforts to provide track time and support services to Grantee, at the charges specified above in Section 8.05, in order to restore any damage to the Transmission System caused by any activities of Grantor, its employees, agents or others performing services for Grantor.

Section 9.05. Grantee Maintenance. On and after the Primary Term Inception Date, Grantee shall have the right to keep the portion of the RW Route on which the Transmission System is built (i.e., the area within ten feet (10') of the outer edge of underground portions of the Transmission System and within five feet (5') of the outer edge of above-ground portions of the Transmission System, but in no event closer than fifteen feet (15') from the centerline of Grantor's tracks) clear of trees, shrubs, debris or other physical conditions that might endanger the operation of the [illegible]stem or the accessibility thereof. If any portion of such area [illegible] area normally maintained by Grantor, Grantee shall not be charged any additional [illegible] portion of the maintenance performed by Grantor that also benefits Grantee. If Grantee requests Grantor to extend Grantor's normal maintenance area to include areas that

benefit Grantee, such request shall be treated as a request for services for which Grantee will compensate Grantor as provided herein. If Grantor operations over any portion of the RW Route are discontinued and Grantor no longer maintains said portion of the RW Route, Grantee, upon notice of such circumstances from Grantor, shall have the right to maintain the area from outer edge up to five (5) feet of the centerline.

ARTICLE 10. TAXES, LIENS AND INSURANCE

Section 10.01. Taxes. In addition to the Option Fees, Pre-Paid Rent, Lease Fees, Renewal Fee and other sums due hereunder, during the Design/Permitting Term, the Construction Term, the Primary Term and the Renewal Term, if any, Grantee shall pay and discharge all taxes, general and special assessments and other charges of every description (collectively, "Impositions") that are attributable to, separately levied upon or assessed against the Transmission System. If Grantee fails to pay and discharge any Impositions within forty-five (45) days of written notice, Grantor may pay and discharge such Impositions, and such sums shall be immediately due and payable to Grantor by Grantee as additional fees hereunder, and shall bear interest at ten percent (10%) per annum until paid. Grantee shall have the right to contest the amount or validity of any such Impositions by appropriate legal proceedings, but this right shall not be deemed or construed in any way as relieving, modifying or extending Grantee's covenants to pay Impositions. Grantee shall give Grantor prior written notice of any contest.

Section 10.02. Liens. Grantee shall discharge any liens or encumbrances filed with respect to the RW Route as a consequence of failure to pay any Impositions or as a consequence of work, labor, services, goods or materials supplied to or for the benefit of Grantee. If Grantee fails to discharge any such liens within forty-five (45) days following written notice, Grantor may pay such sums as may be necessary to discharge the liens, and such sums shall be

immediately due and payable to Grantor by Grantee as additional fees hereunder, and shall bear interest at ten percent (10%) per annum until paid.

Section 10.03. Insurance. Except as otherwise provided herein, Grantee shall at its expense obtain and maintain during the entirety of the Term, in a form and with companies satisfactory to Grantor, the following insurance coverages:

A.Commercial General Liability Insurance with a combined single limit of not less than $2,000,000 per occurrence for injury to or death of persons and damage to or loss or destruction of property during the Due Diligence Term and Design/Permitting Term, and with a combined single limit of not less than $10,000,000 per occurrence for injury to or death of persons and damage to or loss or destruction of property during the Construction Term, Primary Term and Renewal Term. Such policy or policies shall be endorsed to provide contractual liability coverage for liability assumed under this Agreement. In addition, such policy or policies shall be endorsed to name Grantor as an additional insured, as its interests may appear, and shall include a severability of interests provision.

B.Railroad Protective Liability Insurance with limits of not less than a combined single limit of $5,000,000 each occurrence and $10,000,000 in the aggregate. Said policy shall name Grantor as the named insured and shall be underwritten on Insurance Services Office Form Number CG 00 35 01 96 or an equivalent form satisfactory to Grantor. Notwithstanding the foregoing, Grantee shall not be required to obtain and maintain said Railroad Protective Liability Insurance until such date that Grantee or its employees, representatives or agents first undertake to enter upon the RW Route. Any other provision herein to the contrary notwithstanding, such entry upon the RW Route is not

authorized and shall not be permitted until such Railroad Protective Liability Insurance has been obtained and the conditions of Section 10.04 have been satisfied by Grantee with respect to such Railroad Protective Liability Insurance.

Section 10.04. Grantee's Insurance Information. Grantee shall furnish certificates of insurance to Grantor's Director, Risk Management, certifying the existence of its general liability insurance. Grantee shall also furnish Grantor's Director, Risk Management with the original Railroad Protective Liability Insurance Policy. Grantee's general liability insurance policies shall be endorsed to state that coverage shall not be suspended, voided, canceled or reduced in coverage or limits without thirty (30) days' advance written notice to Grantor. The insurance coverage required herein shall in no way limit Grantee's liability under this Agreement.

Section 10.05. Insurance Escalation. Commencing on the fifth anniversary of the Effective Date and continuing every five (5) years thereafter, Grantor may require an increase in the amount of insurance coverage required by Section 10.03. In the event that the parties cannot agree to a given increase, the matter may be submitted to arbitration pursuant to Article 17.

ARTICLE 11.INDEMNIFICATIONS

Section 11.01. Indemnifications. Grantee agrees to investigate and, at Grantor's election, defend with counsel approved by Grantor, indemnify and hold Grantor harmless from and against any and all third party claims for losses, damages, liability, demands, detriments, costs, charges and expenses (including reasonable attorneys' fees and court costs) arising out of (i) Grantee's or its employees', contractors' or agents' entry upon and occupancy of the RW Route, (ii) the presence of the Transmission System on the RW Route, and (iii) Grantee's or its employees', contractors' or agents' construction, operation or maintenance of the Transmission System, excluding only losses, damages, liability, claims, demands, costs, charges and expenses

(including reasonable attorneys' fees and court costs) imposed upon Grantee resulting solely from the negligence (except as provided in Section 9.04), gross negligence or willful misconduct of Grantor, its employees, contractors or agents. Grantee agrees that each and all of its indemnity commitments herein shall (i) extend to Grantor's parent, subsidiaries, affiliates and its and their directors, officers, employees and agents, and (ii) survive expiration or termination of this Agreement. Grantor agrees to investigate and, at Grantee's election, defend with counsel approved by Grantee, indemnify and hold Grantee harmless from and against any and all third party claims for losses, damages, liability, demands, detriments, costs, charges and expenses (including reasonable attorneys' fees and court costs) arising out of the negligence (except as provided in Section 9.04), gross negligence or willful misconduct of Grantor or its employees, contractors or agents, excluding only losses, damages, liability, claims, demands, costs, charges and expenses (including reasonable attorneys' fees and court costs) imposed upon Grantor resulting solely from the negligence, gross negligence or willful misconduct of Grantee, its employees, contractors or agents. Grantor agrees that each and all of its indemnity commitments herein shall (i) extend to Grantee's parent, subsidiaries, affiliates, assigns and its and their directors, officers, employees and agents, and (ii) survive expiration or termination of this Agreement.

ARTICLE 12.CONDEMNATION

Section 12.01. Material Taking. In the event of a Material Taking or condemnation by any competent authority for any public or quasi-public use or purpose of the whole or a part of the RW Route during the Term, Grantee shall have the option to terminate this Agreement, either [illegible] only with respect to the portions so taken and such other portions that are not economically useful to Grantee without the portions so taken, upon vesting of title in, or taking

of possession by, the condemnor, whichever occurs first. For purposes of this Section 12.01, a "Material Taking" shall mean a taking under the conditions in the preceding sentence that renders the Transmission System (i) incapable of construction or inoperable in a commercially reasonable manner, and (ii) incapable of placement in or restoration to service without the expenditure by Grantee of commercially unreasonable sums. In the event of a Material Taking, Grantee shall receive compensation only for the taking and damaging of the Transmission System, relocation expenses and loss of business or interference with Grantee's operations. The award for the land value and interest therein shall accrue to Grantor. In the event of a partial termination of this Agreement, the Pre-Paid Rent and Lease Fees payable thereafter shall be reduced proportionally on a mileage basis.

Section 12.02. Non-Material Taking. In the event of a Non-Material Taking or condemnation by any competent authority for any public or quasi-public use or purpose of the whole or a part of the RW Route during the Term, this Agreement shall not terminate by reason thereof. For purposes of this Section 12.02, a "Non-Material Taking" shall mean a taking under the conditions in the preceding sentence that leaves the Transmission System (i) operable in a commercially reasonable manner, or (ii) capable of restoration to service through the expenditure by Grantee of commercially reasonable sums. In the event of a Non-Material Taking, Grantee shall continue to pay the Option Fees, Pre-Paid Rent, Lease Fees, Renewal Fee and other sums due hereunder. Grantee shall be entitled to seek compensation from the condemning authority for Grantee's damages arising out of such taking. Except to the extent it may be prevented by the terms of the order of the condemning authority and except as qualified herein, Grantee shall perform and observe all of Grantee's covenants, conditions and obligations as though such Non-Material Taking or condemnation had not occurred.

Section 12.03 Substitute Path. In the event of either a Material Taking or a Non-Material Taking that requires a relocation of any portion of the Transmission System, Grantor shall endeavor to provide Grantee with an acceptable alternate location within the RW Route to which Grantee can relocate such facilities. Grantor reserves the right to require additional Option Fees, Pre-Paid Rent and/or Lease Fees for any such alternate location on a similar cost per mile basis as shall be paid for the current RW Route considered herein.

ARTICLE 13.ASSIGNMENT AND FINANCING

Section 13.01. Assignment. Prior to the Primary Term Inception Date, Grantee shall not assign this Agreement without the prior written consent of Grantor. After the Primary Term Inception Date, Grantee may in connection with the sale of the Transmission System assign this Agreement without the consent of Grantor, provided that (i) any assignee of this Agreement shall assume all obligations of Grantee hereunder and (ii) no such assignment shall release Grantee of liability for its obligations under this Agreement, provided that if in Grantor's reasonable judgment such assignee's creditworthiness is superior to Grantee's creditworthiness, Grantor shall release Grantee from any further liability hereunder.

Section 13.02. Financing. Notwithstanding Section 13.01, Grantee may at any time without the consent of, but with notice to Grantor, collaterally assign this Agreement to one or more lenders as security for ob" gations of Grantee. Provided it first cures any prior default or breach of Grantee, s· ..y without the consent of Grantor exercise its rights under the relo· ..y agreement to complete, possess and/or operate the Transmission System on behalf ·· ..nd otherwise to take actions necessary to safeguard its collateral, without becoming liable for the obligations of Grantee hereunder. Furthermore, such lender may, provided it first cures any default or breach of Grantee and obtains Grantor's prior written

consent, effect the assignment of this Agreement to a third party that assumes the Agreement in writing, and after such assumption such lender shall have no liability hereunder. Provided Grantee's lenders so demand, Grantor shall subordinate it's lenders interests to those of the Grantee's lenders, so that in the event the Grantor defaults on its obligations (to its lenders) for reasons not related to this agreement, then the interests of Grantee's lenders shall not be subordinated to those of the Grantor's lenders.

ARTICLE 14. TERMINATION OR EXPIRATION OF AGREEMENT

Section 14.01. Actions upon Termination or Expiration. Without limiting or restricting the applicability of Section 4.06, upon the termination or expiration of this Agreement, Grantee shall, commencing on the 31st day after the termination or expiration of this Agreement, without further notice: (i) deliver up to Grantor possession of the RW Route; (ii) remove from the RW Route any and all above-ground components of the Transmission System (such removal extending to one (1) foot below the ground surface); and (iii) repair any damage to the RW Route caused by such removal, matching all affected areas with adjacent grade and profile. Notwithstanding the foregoing, Grantor may elect to purchase at fair market value the Transmission System by giving notice to Grantee of that election within thirty (30) days after termination or expiration of this Agreement, specifying a proposed purchase price. If Grantor elects to purchase the Transmission System, and Grantor and Grantee cannot agree on fair market value within thirty (30) days of Grantor's notice, either party may invoke arbitration under Article 17 without need for further negotiations. If Grantor elects to take title to the Transmission System, Grantee, upon request by Grantor, shall provide Grantor with a bill of sale conveying title to the Transmission System on a quitclaim basis, and Grantor shall pay all transfer and sales taxes incurred as a result of such conveyance. If, after the termination or

expiration of this Agreement, the Transmission System is not purchased by Grantor pursuant to the foregoing provisions and Grantor is required by applicable law or order of any governmental authority having jurisdiction to remove below-ground components of the Transmission System, Grantee shall reimburse Grantor within thirty (30) days after receipt of an invoice for its pro rata share of such removal costs, including any special disposal costs or special landfill costs. Any obligation of the parties relating to monies owed, as well as those provisions relating to limitations on liability and actions, shall survive termination or expiration of this Agreement.

ARTICLE 15.DEFAULTS AND REMEDIES

Section 15.01. Events of Default. Each of the following shall be an "Event of Default" under this Agreement:

A.Grantee fails to pay when due the Options Fees, the Pre-Paid Rent, the Renewal Fee and/or the Lease Fees;

B. Grantee fails to pay when due fees under Section 8.05, or any other sum when due hereunder, and such failure continues for more than ninety (90) days;

C. The filing of a mechanic's or materialman's lien against all or any part of the RW Route because of acts or omissions of Grantee or its agents unless released or bonded within ninety (90) days following demand by Grantor;

D. An assignment of this Agreement by Grantee or its lender in violation of Article 13;

Either party fails to perform any non-monetary obligation when due hereunder, and such failure continues for more than thirty (30) days following written notice from the other party; provided, however, if such default cannot reasonably be cured within

thirty (30) days, the defaulting party shall have such additional time as is reasonably necessary to complete a cure provided such party commences cure within the thirty (30) day period and proceeds diligently thereafter.

Section 15.02. Remedies upon Failure to Cure. Upon the occurrence of any Event of Default, each of which shall be deemed to be a material breach of this Agreement, the non-defaulting party may exercise any remedies available at law and equity, including the right to terminate this Agreement by giving the defaulting party written notice of termination.

Section 15.03. Grantor's Self-Help upon Grantee's Failure to Cure. Upon the occurrence of any Event of Default caused by Grantee and Grantee's failure to cure within the specified period, Grantor may engage in self-help by (i) paying or causing to be paid any reasonable sum, or (ii) taking or causing to be taken any reasonable action necessary to cure such default, and Grantee shall reimburse to Grantor such reasonable sums paid, or reasonable costs and expenses of acts taken, together with all costs of collection, including reasonable attorneys' fees.

Section 15.04.Lender's Rights to Cure. If Grantee has assigned this Agreement to a lender as security, such lender may register its existence with Grantor by sending Grantor written notice in the manner required hereunder, which notice shall be countersigned by Grantee and shall provide an address to which Grantor may deliver notices hereunder to such registered lender (a "Lender"). Thereafter, Grantor shall contemporaneously deliver to each such Lender a duplicate of any notice delivered to Grantee. Such Lender shall have the right, but, except as provided in Section 13.02, not the obligation, to cure any breach of this Agreement by Grantee, during the relevant cure period afforded hereunder to Grantee.

ARTICLE 16.REPRESENTATIONS AND WARRANTIES

Section 16.01.Mutual Representations and Warranties. Each party covenants and warrants to the others that: (i) it has full right, power and authority to execute this Agreement; (ii) it has been duly organized and registered and is validly existing in good standing under the laws of the state of its formation and is duly qualified to do business in each state in which it is required to be so qualified to perform its obligations hereunder; and (iii) the execution and delivery of this Agreement, and the performance of its obligations hereunder, have been duly authorized by all necessary corporate actions and do not violate any provision of law or the party's organization and internal governance documents.

ARTICLE 17. ARBITRATION

Section 17.01. Commencement of Arbitration. The parties adopt the following arbitration provisions to avoid the problems of litigation or deadlock in the event they cannot resolve any dispute between them, including any failure to reach mutual agreement under any provision of this Agreement which requires, permits or conditions the occurrence of any event or the exercise of any right upon mutual agreement of the parties; provided, however, (i) Grantee's obligation to pay the Option Fees, the Pre-Paid Rent, the Lease Fees, the Renewal Fee or fees pursuant to Section 8.05 when due, (ii) Grantor's right to engage in self-help for the protection of its personnel and preservation of its property following a Grantee Event of Default, and (iii) any matter left to a party's sole discretion or judgment shall not be subject to arbitration hereunder. If a dispute arises from or relates to this Agreement, the parties agree that upon request of either party they shall try in [illegible] the dispute within sixty (60) days of such request, following which either may commence arbitration using the procedures set forth herein.

Section 17.02. Appointment of Arbitrators. Any dispute as to which a party commences arbitration shall be referred to a panel of arbitrators consisting of three (3) disinterested,

competent persons, one selected by Grantor, one selected by Grantee, and one selected by the aforesaid two, who shall have the power of an umpire. If the parties cannot agree on a third arbitrator, the third arbitrator shall be appointed by the Arbitration Committee of the American Arbitration Association.

Section 17.03. Arbitration Proceeding. After the appointment of the arbitrators, all proceedings shall be in accordance with the then-current Commercial Arbitration Rules of the American Arbitration Association. The arbitrators shall not have the authority to award consequential or punitive damages. The decision and award of such arbitrators, or any two of them or, in case of disagreement among all arbitrators, of the umpire, shall be conclusive and binding. In any judicial proceeding to enforce this agreement to arbitrate, the only issues to be determined shall be the existence of the agreement to arbitrate and the failure of one party to comply with that agreement, and these issues shall be decided by the court without a jury. All other issues shall be decided by the arbitrators, whose decision shall be final and binding. Judgment on any award rendered by the arbitrators may be entered in any court of competent jurisdiction. The parties agree that there shall be no appeal of an order completing arbitration except as part of an appeal concerning confirmation of the decision of the arbitrators. The arbitrators shall have the authority to award attorneys fees and costs to the prevailing party.

Section 17.04. Arbitration Venue; Other. The location of the arbitration shall be New York, New York, at a site designated jointly by the parties, or failing that, by the arbitrators. Either party may, without waiving any remedy under this Agreement, seek from any court having jurisdiction any interim or provisional relief that is necessary to protect the rights or property of that party, pending the arbitral tribunal's determination of the merits of the controversy. Except as may be required by law, neither a party nor an arbitrator may disclose the

existence, content, or results of any arbitration hereunder without the prior written consent of both parties.

ARTICLE 18. CONFIDENTIALITY

Section 18.01. Treatment of Confidential Information. During and after the Term of this Agreement, Grantor and Grantee (including their respective employees, officers, agents and directors) shall treat as confidential and proprietary and not disclose without the prior written consent of the other party (except as legally mandated or as necessary to perform the services contemplated by this Agreement or to exercise the rights granted hereunder, and then only on a confidential basis documented by a confidentiality agreement in customary form) any information, whether oral or written, or any description (including any technical information, experience or date), of either party's plans, operations or customers, which may come within its knowledge. The foregoing restrictions against disclosure to third parties shall not apply to the other parties whose rights-of-way are utilized in conjunction with constructing and operating the Transmission System (including without limitation NS, Canadian Pacific Railway Company, Mohawk, Adirondack and Northern Railroad, and New Jersey Transit) or to information if it has become publicly known through no fault of the receiving party or if it has become known to the disclosing party through disclosure by a third party not bound by confidentiality restrictions or by independent development by the receiving party prior to receipt from the disclosing party. Notwithstanding the foregoing, Grantee shall have the exclusive right to make a public announcement of its intention to proceed with the Project; provided, however, that any such announcement regarding the RW Route and/or the ownership of the RW Route shall be subject to the prior written approval of Grantor.

Section 18.02. Compelled Disclosure of Confidential Information. In the event either party is required by subpoena, court, or administrative order to disclose any confidential or proprietary information, it shall give immediate written notice to the other party. Thereupon, the party whose information is subject to disclosure may interpose all objections it may have to such disclosure.

Section 18.03.Survival. The foregoing obligations of this Article 18 shall survive the termination or expiration of this Agreement, and shall continue until the earlier of two (2) years or a written release is given by the other party.

ARTICLE 19. NOTICES

Section 19.01. Notices. Except as otherwise provided herein, any notice or demand under this Agreement shall be in writing and shall be effective upon receipt, as proven by (i) signed receipt upon personal delivery to the addressee, (ii) return receipt from the United States Postal Service, when sent postage prepaid, certified mail, return receipt requested, or by Express Mail service, or (iii) the records of a commercial overnight delivery service when committed to such service. Until notified of a different address, all notices shall be addressed to the parties as follows:

If to Grantor:

NYS&W:
President
NYS&W Railway Corporation
1 Railroad Avenue
Cooperstown, NY 13326

With a copy to:
Vice President – Law
NYS&W Railway Corporation
1 Railroad Avenue
Cooperstown, NY 13326

If to Grantee:

NIAGARA REINFORCEMENT, L.L.C.,
103 Saint Clair Street,
Point Edward, Ontario N7V 1P0,
Attention: Mr. Richard Muddiman,
President; Facsimile No: (519) 332-6154

With a copy to: Peter Metzger, Esq., Cullen and Dykman, 177 Montague Street, Brooklyn, NY 11201, Facsimile No: (718) 935-1304, E-Mail/Internet Address: *(pmetzger@cullenanddykman.com);*

ARTICLE 20. MISCELLANEOUS

Section 20.01. Binding Effect of Agreement. Each of the covenants, conditions and obligations in this Agreement shall inure to the benefit of and shall be binding upon the successors in interest of Grantor and, subject to the restrictions set forth herein, the permitted assigns and successors of Grantee.

Section 20.02. Cumulative Remedies. The rights and remedies provided by this Agreement are cumulative, and the use of any one right or remedy by any person shall not preclude or waive its right to use any or all other available remedies. The rights and remedies hereunder are given in addition to any other rights the parties may have at law or equity, by statute, ordinance or otherwise.

Section 20.03. Failure to Pursue Remedies. The failure to seek redress for violation of, or to insist upon the strict performance of, any provision of this Agreement shall not prevent a subsequent act, which would have originally constituted a violation, from having the effect of an original violation.

Section 20.04. Governing Law. This Agreement and the rights hereunder shall be interpreted in accordance with the laws of New York, and all rights and remedies shall be governed by such laws without regard to principles of conflict of laws that would fix jurisdiction elsewhere.

Section 20.05. Integration. This Agreement constitutes the entire agreement pertaining to the subject matter hereof and supersedes all prior agreements and understandings pertaining thereto, whether written or oral. Any amendment, change, modification or waiver of the terms, conditions or obligations of this Agreement shall be made in writing and signed by the parties' duly authorized representatives.

Section 20.06. Interpretation. All references herein to "Articles" and "Sections" shall refer to corresponding provisions of this Agreement. Whenever the words "include," "includes" or "including" are used in this Agreement, they shall be deemed to be followed by the words "without limitation." The words "hereof," "herein" and "hereunder" and words of similar import when used in this Agreement shall refer to this Agreement as a whole and not to any particular provision of this Agreement.

Section 20.07. Recordation. Neither party hereto shall record this Agreement without the written consent of the other party hereto; however, upon the request of either party, the other party shall join in the execution of a memorandum or "short form" of this Agreement for the purpose of recordation. The memorandum or short form shall describe the parties and the RW Route, shall incorporate this Agreement by reference, may include the length of term and addresses of the parties, and shall include such other information and be in such form as is required for recordation and to give adequate public notice of the material rights of the parties. Such short forms may be recorded on a county-by-county basis in the appropriate public records,

including the land records. Grantee may execute and record collateral assignments related to such short forms in order to effectuate financings secured by Grantee's interest under this Agreement. The Transmission System shall be and remain the property of Grantee, notwithstanding the fact that it may be affixed or attached to the RW Route, and shall, during and after the Term, belong to and be removable by Grantee. Grantee shall have the right to file public notice of the presence of the Transmission System and the existence of Grantee's contract rights under this Agreement pursuant to and in compliance with the Uniform Commercial Code.

Section 20.08. Severability. The invalidity or unenforceability of any particular provision of this Agreement shall not affect the other provisions hereof, and this Agreement shall be construed in all respects as if such invalid or unenforceable provision were omitted.

Section 20.09. Survival of Obligations. Any termination or expiration hereunder shall not relieve either party from any obligation incurred, or covenant or representation made, to the other party under the terms of this Agreement.

Section 20.10. Limitation on Claims. Notwithstanding any other provision of this Agreement, neither party shall be liable to the other for any special, indirect, punitive, exemplary, incidental, or consequential damages of any type, whether foreseeable or not, due to claims (including any claims (i) for lost revenues or profits, (ii) by customers for lost services, (iii) for cost of capital, or (iv) for any cost of replacement facilities or services) arising under this Agreement or from any breach or default hereunder.

IN WITNESS WHEREOF, Grantor and Grantee have caused this Agreement to be executed in multiple original counterparts, each of which shall be deemed an original, as of the date set forth herein as the "Effective Date", by their representatives duly authorized in that behalf.

NIAGARA REINFORCEMENT, LLC

Witness: _____

Name: _____

By: _____

Date: Nov 21, 2003

Name: _____

Title: COO

THE NEW YORK, SUSQUEHANNA AND WESTERN RAILWAY CORPORATION

Witness: _____

Name: NATHAN R. FEARN

By: _____

Date: Dec 5, 2003

Name: WALTER G. RICH

Title: PRESIDENT

EXHIBIT A

RW ROUTE

At the time of signature of this Agreement, the Grantee has not determined the final routing of the Transmission System. At a minimum, the RW Route shall include Grantor's property between Binghamton, NY and Utica, NY as set forth below. Prior to the end of the Due Diligence Term, Grantee shall deliver written notice to Grantor of Grantee's election to include Grantor's property between Warwick, NY and Jersey City, NJ described below in the RW Route.

BINGHAMTON, NY TO UTICA, NY

Beginning at The New York, Susquehanna and Western Railway Corporation ("NYS&W") milepost 190.72 at Binghamton, New York and extending northerly along the NYS&W right of way to NYS&W milepost 286.40 at Utica, New York.

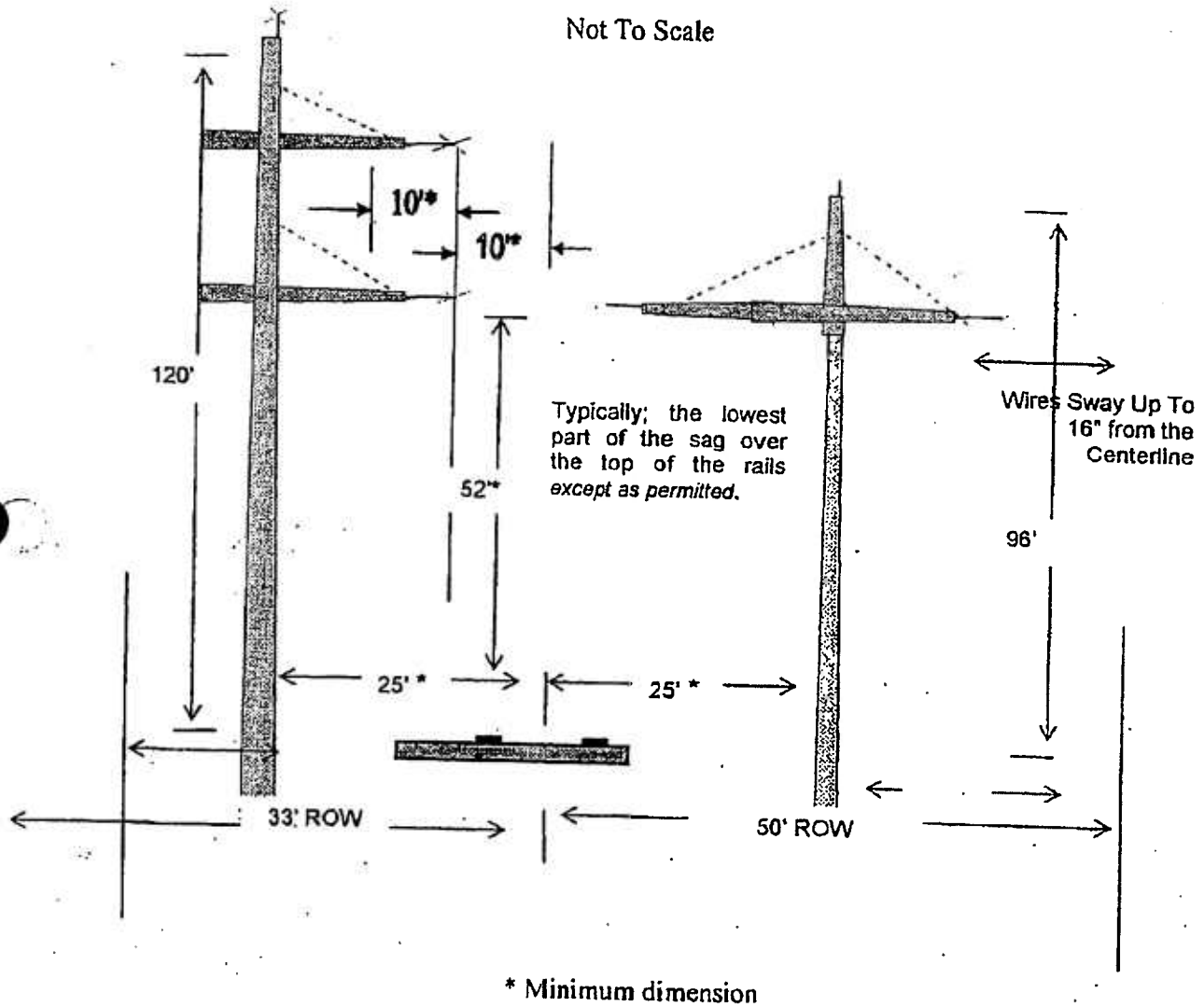
WARWICK, NY TO JERSEY CITY, NJ

Beginning at the intersection between the lines of NSR and the lines of NYS&W at NYS&W Milepost 84.45 and proceeding generally south east along the NYS&W right of way to NYS&W Milepost 4.41.

EXHIBIT B

TRANSMISSION SYSTEM

Not To Scale



* Minimum dimension

REDACTED

NOTE: All amounts are expressed as United States currency.

EXHIBIT C

FEES

1. **OPTION FEES:** Grantee shall pay to Grantor $100,000 no later than August 31st, 2004, then an additional $200,000 one year thereafter, then an additional $300,000 one year thereafter, then an additional $400,000 one year thereafter, then an additional $500,000 one year thereafter. Option Fees shall be deducted from Construction Rent (described below).

REDACTED

EXHIBIT D

CONTACT INFORMATION FOR GRANTEE AND GRANTOR PERSONNEL

Grantee:

Name	Phone	Fax
Richard A. Muddiman	**(519) 542-8414**	**(519) 332-6154**
Andrew Marks	**(647) 282-3482**	

Grantor:

Name	**Phone**	**Fax**
Vice President – Engineering (for access)		

EXHIBIT E

GRANTOR REQUIREMENTS FOR ENGINEERING AND CONSTRUCTION ON RAILWAY PROPERTY

Table of Contents

1 - DEFINITIONS

Those capitalized terms in this Exhibit E not otherwise defined in the main body of the Agreement shall have the meaning ascribed to them herein.

A. Railway – The New York, Susquehanna and Western Railway Corporation.

B. Consultant – The design firm and qualified individuals representing the design firm employed by the Grantee to provide the survey, plans, and construction specifications.

C. Plans – The Preliminary Plans, the Plan and/or the Approved Plans, as the context requires.

D. Project – The work with respect to the Transmission System proposed by the Grantee and described by the Plans.

E. Railway's Engineer – The qualified individual and/or firm employed by the Grantor to provide coordination, monitoring, instruction, guidelines and inspection of the Project construction on behalf of the Railway.

F. Contractor – The company or individual contracted by the Grantee to accomplish the work indicated by the Plans.

G. Flagman – The qualified Railway employee(s) designated to protect the Consultant's employees, contractors and representatives from Railway's operational activities and to protect the Railway and Railway facilities from Project-related activities.

2 - SCOPE

The requirements of this Exhibit E cover the concept, survey, design, plans, safety and permit requirements for engineering and the construction of the Project on Grantor's property. Where the terms of this Exhibit E conflict with the terms of the remainder of the Agreement, if at all, the Agreement shall control.

3 – GENERAL INSTRUCTIONS

A. Safety

(i) Grantee shall ensure that its employees and the employees of Consultant, Contractor and any subcontractors, vendors, suppliers, etc., wear while on or about Grantor's property appropriate head and eye protection. Appropriate hearing

protection shall be required in areas with excessive noise and as instructed by the Flagman or other Railway official.

(ii) Suitable protective clothing and footwear shall be worn while on Railway property. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen. Tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip-on type boots are prohibited. Hard sole, lace up footwear, zippered boots or boots cinched up with straps which fit snugly about the ankle is adequate. Steel-toed safety boots are recommended. All clothing and protective equipment must be in good condition and properly fitted.

(iii) Grantee shall ensure that Consultant and Contractor observe the safety provisions of applicable laws and building and construction codes.

(iv) Anyone working on Grantor's property found to be under the influence of alcohol or other intoxicant, narcotic or hallucinogenic drug, or in possession of such intoxicant or drug, shall be dismissed from the property by Grantee and not allowed to return.

(v) When anyone on Grantor's property is injured, Grantee shall ensure that arrangements for emergency medical assistance are made, if needed, and that Railway's Engineer is notified of such incident by the quickest method of communication available.

(vi) No one shall be allowed within fifteen feet (15') of the centerline of the nearest track without specific authorization of the Flagman.

(vii) No one shall be allowed to cross tracks without specific authorization of the Flagman.

(viii) All persons working near track while train is passing are to look out for dragging bands, chain, and protruding or shifted cargo.

(ix) No one shall be allowed to pass between, over, or under rail cars.

(x) No [illegible] chain or measuring tape shall be allowed to cross or touch [illegible] ...ission of the Flagman.

(xi) No materials shall be placed on tracks without the approval of the Flagman or Railway's Engineer.

(xii) No trucks or other equipment shall touch the ballast line of the track without specific permission of the Flagman.

B. Working on Grantor Right of Way and Flag Protection

(i) Grantee shall ensure that Contractor requires that its employees, agents and subcontractors be trained in all applicable provisions of Railway's Roadway Worker Protection Program as required by FRA WORKPLACE SAFETY RULES, 49 CFR Part 214.

(ii) Grantee shall ensure that Consultant and Contractor obtain permission and right of entry from Railway prior to entering upon Grantor's property for surveying, inspection, construction or any other activity.

(iii)Railway will provide flag protection at Grantee's expense. Grantee agrees that all its employees, consultants, contractors, subcontractors, agents, suppliers, and other individuals allowed onto Railway property shall strictly observe flagging directions given by the Flagman. Failure of the Flagman to provide direction will not relieve the Grantee from any of its indemnification commitments in the Contract.

(iv)Grantee shall ensure that Consultant's or Contractor's action(s) do not interfere with normal train operations. Grantee shall ensure that Consultant and Contractor provide at least five (5) days in advance of the applicable period a weekly and monthly forecast (by days of the week) of activities while on Grantor's property.

(v) Railway may limit allowable work periods when working on or near operating tracks and may provide a schedule of allowable work periods. Such schedules may change due to changes in Railway operations. Grantor shall act in a commercially reasonable manner in scheduling the allowable work periods. No claim by Grantee, Consultant or Contractor against the Railway will be allowed for delay caused by the Railway's train operations.

4 – ENGINEERING STUDIES

A. Due to space constraints, it appears that Project installation on the RW Route would require utilization of vertically stacked parallel lines. Studies on effects of vertically stacked parallel lines are required as set forth in Section 5.02.

B. Grantee shall prepare, for Railway's review, studies that address the effects of vertically stacked parallel HVDC lines on human health and safety as well as its effect on Railway's communication, signal and positive train control equipment and systems.

5 - DESIGN GUIDELINES

A. Route Design

In addition to Grantee's normal criteria, the design of the Project route should include the following criteria relative to Grantor's property and Railway's operations:

(i) Safety and security of the Transmission System
(ii) Maintenance and restoration considerations
(iii) Safety during construction and maintenance

B. Railway Signal and Communication Lines

(i) Grantee shall ensure that neither Consultant nor Contractor locate, mark or tamper with any Railway signal or communication lines. Such work shall only be done by a qualified Railway employee. This provision does not apply to locating above ground structures.

(ii) Grantee shall ensure that Consultant and/or Contractor obtain(s) permission from other railroads to locate, mark or tamper with their signal and communication lines.

C. Status Reports

Consultant and Contractor will provide monthly status reports to Railway indicating work accomplished and work proposed for the following report period.

D. Buried Project Components

(i) Buried Project components will be installed with a minimum cover of forty-eight inches (48") from the top of the conduit to the ground surface when trenching or plowing parallel to track structure.

(ii) Minimum cover shall be sixty-six inches (66") from the top of casing to the bottom of rail when crossing beneath a railroad track when trench, open cut or standard jack and bore installations are utilized.

(iii) Minimum cover for cased directional bore at track crossings all locations shall be ten feet (10').

(iv) Trenching will not be allowed on an embankment or excavation slope or within two feet (2') of the top edge of such slope.

(v) Minimum distance from the centerline of the track to the nearest edge of a [illegible] shall be twenty-five feet (25') unless approved in writing by Grantor prior to installation.

[illegible] separation of five feet (5') shall be maintained between the Project and any existing underground facilities where possible except for Railway drainage culverts. Greater minimum separations may be required as directed by the Railway or

Railway's Engineer. Separations less than five feet (5') must be approved, in writing, by the Railway prior to installation of the plant. Trenching, boring and/or digging within three feet (3') of Railway's underground facilities is prohibited.

(vii) Minimum separation from bottom of plow trench to top of Railroad drainage pipe or culvert shall be twenty-four inches (24") unless a greater separation is required by Railway's Engineer.

(viii) Backfill and compaction will be required for trenching operations, for plowing operations, around excavations for vaults, handholes, manholes and other structures, and where deemed necessary by the Railway's Engineer.

(ix) All earth backfills shall be made in uniform layers of not more than six inches (6") thick after compaction. Each layer shall be free from mud, snow, ice, or excessive (standing) water when a subsequent layer is placed. Rock may be placed in compacted layers of not more than twenty-four inches (24") thick.

(x) Backfill shall be formed with suitable materials.

(xi) Organic material such as brush, stumps, roots and trees or other perishable items shall not be placed in backfill.

(xii) All fill layers shall be compacted to ninety-five percent (95%) of maximum density per Standard Proctor in accordance with AASHTO T99, or ninety percent (90%) of maximum density per Modified Proctor in accordance with AASHTO T180.

(xiii) All excavated areas, fill areas, and areas disturbed to obtain backfill material shall be repaired, seeded mulched to the satisfaction to Railway's Engineer.

(xiv) At all at-grade crossing signals and wayside signal locations, the Project route will not be plowed or buried between any signal case or signal mast and the near rail. Standard practice will be to route the conduit around all such locations unless Railway approves otherwise.

(xv) No blasting will be allowed on Grantor's property without written approval of the Railway. Such blasting, if allowed, shall be done in accordance with Railway's blasting specifications, which will be furnished by Railway when needed.

E. Above-Ground Project Components

(i) Poles or any other structures or supports shall be located as close to the outer edges of the RW Route as possible.

(ii) No structure or part thereof shall be located closer than twenty-five feet (25') horizontal from the centerline of the near track, except that the wires may be

located a minimum of ten feet (10') horizontal from the track when the vertical clearance is fifty-two feet (52') or greater, unless approved in writing by the Grantor.

(iii) Poles or other structures shall not be located on slopes/embankments of the Railway roadbed section.

(iv) The minimum clearance between the top of the high rail to bottom of sag of the bottom wire at 65 degrees F shall be fifty-two feet (52') at track crossings.

(v) Foundations of any structures shall not lie within three feet (3') of Railway's underground facilities.

6 – PLANS, DRAWINGS AND SPECIFICATIONS

A. Drawing/Plan Requirements

(i) Drawings shall be prepared using CADD system compatible to MicroStation or AutoCadd.

(ii) Drawings shall be furnished by the Consultant to the Railway on sheets with dimensions of 11" x 17".

(iii) Scale of the Plans shall be such that it is clear and can be easily read, typically 1"=100', but in no case less than 1"=100'.

(iv) Profiles of alignment may be required depending on local conditions and permitting requirements.

(v) The Plans shall include but not be limited to the following:

1. All tracks on the RW Route located by centerline.
2. Proposed Project alignment.
3. Size and type of cables and structures
4. Location of proposed poles, towers, vaults, manholes, handholes and pull boxes and distance from track centerline.
5. Installation (aerial, plowing, trenching, jack & bore, and directional bore) and location by station of beginning and ending point.
6. Railway stations shown at both ends of each drawing indicated to the 0.1
7. All roads, public and private indicating names of public roads.
8. Right of way lines and property lines.
9. Existing underground and overhead utilities.
10. Railway signal and communication facilities (provided that Grantor shall be responsible for locating and marking underground signal and communication facilities).
11. Overpasses and underpasses of Railway with such indication thereof.

12. Indication of type of railroad crossings.
13. Road crossing details including appurtenances, dimensions and road names.
14. Necessary construction details.
15. Existing fiber optic lines and appurtenances.
16. Horizontal distances from facilities to centerline of track.
17. Legend of symbology (symbology must be consistent for entire Project).
18. North arrow.
19. Name of each city, county and state as appropriate.
20. Respective railroad valuation map number for each sheet of the Plans (such information to be provided to Grantee by Grantor for incorporation into Plans).
21. Date of drawing.
22. Scale of drawing.

Drawings will read from left to right with lower milepost to left and higher milepost to right.

(vi) Grantor acknowledges that Plans and other materials supplied by Grantee may not have been prepared as real estate title maps, and that the property lines, right-of-way lines and other information may not be accurate or correct. Grantor further acknowledges that the absence of markers or monuments on such maps or on or about the RW Route indicating the presence of subterranean facilities or other occupations does not constitute a warranty or representation by Grantee that none exist.

(vii). Stationing will begin at 0+00 at each milepost and increase to next milepost. Match line will be placed at each milepost with equality station noted for ending station of previous mile equal to 0+00 of new mile. Alignment stationing shall be based off the centerline of the nearest track.

(viii) Terminal points with direction arrows shall be placed on each end of each Plan sheet. Such terminal points shall be the railroad location nearest the beginning and end of the Project.

(ix)All sheets of the Plans shall contain the following notes:

1. Grantee shall be responsible to have all public and private utilities located and marked prior to construction.

2. Railway shall be responsible for locating and marking underground signal and communication facilities.

3. Railway requirement <u>not</u> to disturb railroad slopes supercedes <u>all</u> dimensions shown on the Plans.

4. Contractor shall field verify depth of all under track drainage culverts prior to trenching or plowing above culvert. A twenty-four inch

(24") separation between closest extremities of culvert and buried Project components is required.

5. For buried Project components, Railway requirement to trench behind railroad signal equipment shall apply where feasible. Where such trenching is not feasible, directional bores will be required with entry and exit points located at a distance greater than thirty feet (30') from any above-ground facility. A minimum depth requirement of ten feet (10') shall apply to all bores that pass beneath railroad signal equipment.

B. Plan Sets

(i) A minimum of seven (7) sets of the Plans shall be furnished to the Railway at its Atlanta office.

(ii) Sets shall be bound in segments no greater than 50 miles.

C. Erosion and Sediment Control

The Plans shall include details of allowable erosion and sediment control devices and shall indicate locations of such devices in connection with the Project.

D. Governmental Regulations

All governmental requirements regarding environmental issues must be determined by the Consultant and indicated on the Plans.

E. Construction Specifications

Grantee will provide or have provided to Railway seven (7) sets of construction specifications specific ...oject and prepared in accordance with the requirements of the general specifications.

F. As-Built Plans

Grantee will provide or have provided to Railway five (5) sets of as-built plans along with the computer file reflecting actual construction measurements and field conditions within one hundred and e... ...30) days following completion of the Project.

7 - PERMITS

A. General

Grantee shall be responsible for producing and providing all drawings and other requirements as needed for all permits.

B. Governmental and Agency Permitting

Governmental permitting, where required, shall be the responsibility of Grantee.

C. Private Property

Permission from private property owners or users to enter, encroach, occupy, disturb or in any way require use of such private property or private facilities for the survey, planning or design of the Project shall be the responsibility of Grantee.

8 -CONSTRUCTION REQUIREMENTS

A. Insurance

The provisions of Sections 10.03 and 10.04 of the Agreement shall govern.

B. Construction Procedures

(i) Grantee shall ensure that Contractor plans its work, in coordination with Railway supervision and/or the Railway's Engineer, so as to complete the Project as quickly as possible without interference to other contractors or to Railway's operations.

(ii) Grantee shall ensure that Contractor provides to Railway a written, overlapping, two-week construction schedule on a weekly basis. When starting a new job or new segment, the Contractor shall provide the schedule one (1) week in advance of segment/job start up. The schedule is required to properly manage the Project. The schedule is to be used to ensure safe operations, and for planning work in advance so that proper coordination can be accomplished with Railway's Engineer as well as Railway's Transportation, Signal, and Maintenance of Way Departments. The schedule will enable all parties involved to ensure that all activities are properly coordinated and planned sufficiently ahead of the construction so that minimum delays to construction are encountered due to insufficient planning or poor communication. Information that shall be included in the schedule provided to the Railway's Engineer includes Contractor's planned area of operation, proposed actions, and hours of operation for the upcoming period. Any changes to the schedule shall be provided to the Railway's Engineer. At the Railway's Engineer's request, Contractor shall provide method of construction, including sequence and detail. The schedule shall contain sufficient detail to facilitate discussion and planning for the following period.

(iii) Grantee shall ensure that Contractor attends a weekly planning meeting scheduled and held by the Railway's Engineer in which Contractor shall furnish all attendees with the two-week construction schedule. Attendees from the Railway's Engineer include, but are not limited to, the Project Director (meeting facilitator) and

the Segment Project Managers. Those expected to attend the meeting representing the Contractors shall include the Project Manager, the Safety Officer, and the Segment Construction Managers. Representatives of the Railway, as well as representatives from utility companies with a vested interest in the Project, may also be present at the meeting. The meeting will be consistently held on the same day/same time, unless attendees are otherwise notified of a change in meeting schedule one week in advance by the Project Director or a designated member of the Railway's Engineer. The meeting will be centrally located to the Project. The agenda shall be open to discuss all matters related to Project staffing, scheduling, productivity, planning, environmental, and railway safety issues. In addition to discussion concerning the two-week schedule, the Contractor should be in a position to discuss the activities of the previous period.

(iv) Grantee shall ensure that Contractor maintains adequate supervision on all phases/locations of the Project to ensure job efficiency and appropriate quality assurance. At the Railway's Engineer's request, Grantee shall ensure that Contractor increases supervision to the extent and at locations designated by the Railway's Engineer.

(v) Grantee (including its agents) must ensure that all federal, state, and local environmental laws, regulations and ordinances are adhered to during Project construction.

(vi) Grantee shall procure, at its expense and in a timely manner, all permits, licenses, surveys, inspections, certificates and authorizations, of any description, that may be necessary for the construction of the Project. The Contractor shall furnish the Railway's Engineer all certificates of inspection for any part of the work for which a certificate is required.

(vii) Grantee shall ensure that Contractor establishes and maintain at an accessible location convenient to the work site a field office(s) from which its operations shall be directed.

(viii) At Grantor's expense, Railway's Engineer shall have a separate field office(s) in close proximity to Contractor's field office.

C. Equipment and Materials

(i) Grantee shall ensure that Contractor provides security for its equipment and materials against theft and vandalism. Grantor shall not be liable for any such equipment or materials lost, stolen or missing from the Project site(s).

(ii) Transportation of equipment, material and labor to and from the Project site(s) shall be the responsibility of the Contractor.

D. Ingress and Egress

(i) Grantee shall be responsible for ingress and egress from the work site(s) for all personnel, equipment, materials, etc. in connection with the Project.

(ii) Grantee shall be responsible for all permits and temporary construction measures required for such ingress and egress.

(iii) All parties associated with the Project shall be allowed to use such ingress and egress obtained by Grantee at no additional expense.

(iv) Any damage caused or arising from by such ingress and egress to the Project site(s) shall be repaired and/or restored by the Contractor to a condition satisfactory to the entity allowing such ingress and egress.

(v) All damage to any public or private roadway caused by Grantee or its agents in connection with the Project shall be repaired by Grantee to the satisfaction of the owner or the applicable governmental agency.

E. Railway Facilities

Grantee shall be responsible for all repair costs associated with track, signal, communication or other facilty damage due to Contractor activities. Any track repair required will be performed by Railway.

F. Explosives

The use of explosives is prohibited except where approved in advance by the Grantor [as per 5.D.(xv) above].

G. Underground Utilities

(i) Grantee shall be responsible for locating underground utilities and maintaining required clearances therefrom.

(ii) Grantee shall notify all underground utilities and owners of other underground facilities that could be affected by the Project construction. The notification shall be made through the applicable local one-call agency, along with any individual notices needed to insure that all existing agencies' facilities are located. Grantee shall provide Railway with a record of all notifications.

(iii) Grantee shall ensure that Contractor does not proceed with the work in the vicinity of underground utilities and facilities until such utilities have actually been located by the appropriate one-call agency or the utility company itself and approval is received from the affected party and procedures and actions required by affected parties are complied with.

(iv) Grantee shall provide or have provided to the Railway's Engineer all information and verification that such calls have been made and that utilities have been located on the Project site(s).

(v) Grantee shall provide or have provided to Railway's Engineer drawing of all utilities prior to any work being done in the vicinity of such utilities. Drawings shall indicate plan and profile information for the utilities in addition of type and size of pipes, material handled by the utility and the distance to existing facilities such as track centerline, roadways, other utilities, etc.

(vi) Grantee shall ensure that Contractor exposes (potholes) all utilities in the vicinity of the running line of proposed underground construction.

(vii) Grantee is responsible for acquiring permits/paying fees associated with potholing utilities within public right of ways, and Grantee is also responsible for paying applicable public or private agency charges for their services/assistance in locating their utilities in the vicinity of the running line.

(viii) Any underground utilities damaged by Contractor's activities shall be removed, repaired, replaced or otherwise remedied by Grantee as required by the applicable utility and/or governmental authority. All contamination of the affected area(s) resulting from the Grantee's activities, or the activities of the Grantee's contractors or representatives, and cleanup resulting from such damage shall be the responsibility of Grantee.

H. Permits

(i) Grantee shall be responsible for all governmental or agency permits that may be required for the Project.

(ii) Grantee shall obtain permission from all private property owners for any work, access across, or use of such private property.

(iii) Grantee shall ensure that Contractor abides by all restrictions and requirements of all p[illegible]ther obtained by Grantee or any other party.

(iv) When additional working space is necessary for excavation across rivers or for [illegible]ntractor's equipment beyond Grantor's property, Grantee [illegible]sponsible for procuring such working space.

[illegible]ngineering and Staking

(i) Grantee shall be responsible for staking the running line, handholes, any drainage work or alterations, and for any grading or other work that may be required.

(ii) Staking shall indicate the Project stationing as indicated on the Plans and shall indicate the type of installation being performed at the staked location.

J. Daily Cleanup

(i) Grantee shall ensure that Contractor cleans the Project site(s) daily.

(ii) Railway reserves the right to employ a separate contractor, at Grantee's expense, to clean Project sites if such sites are not consistently kept clean to the satisfaction of Railway and the property owner, if applicable.

K. Safety Compliance

Failure of any individual to fully comply with the safety requirements and/or Flagman's instructions may result in such individual's and Contractor's dismissal from Grantor's property.

L. Railroad Flagging

(i) Railway will determine railroad flagging requirements for the Project and, at Grantee's expense, will provide Flagmen for Contractor as needed for activities on the RW Route. Grantor will work closely with Grantee so as to facilitate and expedite construction.

(ii) Grantee shall ensure that Contractor follows all instructions of the Flagman and complies with all safety requirements of Railway.

M. Erosion and Sediment Control

(i) Grantee shall ensure that Contractor complies with all federal, state, and local erosion and sediment control laws, ordinances and regulations applicable to the Project work.

(ii) Grantee shall ensure that Contractor adheres to all erosion and sediment control requirements and procedures described in any erosion and sediment control plan(s) governing the Project work, as directed by the Railway's Engineer, and/or as required by any governmental agency having authority in connection with erosion and sediment control measures.

(iii) Grantee shall ensure that Contractor will, prior to commencement of land disturbing activities, implement and maintain, until construction activity ceases and permanent stabilization is achieved, required erosion and sediment control measures.

N. Clearing and Grubbing

(i) Any vegetation or objects that require preservation and protection that lie within the areas proposed to be cleared will be designated by the Railway's Engineer.

(ii) Grantee shall ensure that Contractor performs its work in full compliance with all federal, state and local statutes, laws, ordinances, regulations, rules and codes.

(iii) Grantee shall ensure that, before clearing operations begin, Contractor installs temporary and permanent erosion and sediment control measures as shown on the Plans or as directed by the Railway's Engineer.

(iv) In the event of excessive clearing beyond what is needed for the Contractor to perform the Project work, Grantee shall be responsible for all related re-landscaping.

(v) Grantee shall ensure that items cleared, grubbed and not used as brush barriers are removed or demolished and disposed of by the Contractor in accordance with governmental ordinance or law.

O. Barricades

(i) Grantee shall ensure that Contractor provides and places barricades around any and all open pits and trenches.

(ii) No excavation will be permitted to remain open overnight.

(iii) All barricades will have flashing lights, and barricade tape will be used to rope off all excavated areas.

P. Trench Construction

(i) Hand trenching will be required in areas within two feet (2') or less of signal or communication cables or facilities or as directed by the Railway's Engineer.

(ii) Hand trenching may be required in other areas where the Railway's Engineer determines that machine trenching, plowing or other method of conduit installation is not feasible.

(iii) Trenches shall be excavated such that minimum cover over conduit(s) will be forty-eight inches.

The bottom of any trench shall be graded uniformly with no cover dimension less than the minimum forty-eight inches (48").

Q. Directional Boring

(i) Directional bores shall be done only with the approval of the Railway's Engineer.

(ii) Directional bores shall be at a minimum horizontal distance of twenty feet (20') from the centerline of the track as measured perpendicularly to the closest edge of the bore.

(iii) Depth of cased directional bores shall be a minimum of ten feet (10') below the bottom of tie when crossing under tracks as measured vertically therefrom. Such depth shall remain until reaching a distance of twenty feet (20') from each side of the centerline of the track as measured perpendicularly or radially therefrom.

(iv) Holes made by boring shall not be more that four inches (4") larger than the outside diameter of the pipe being installed.

(v) Grantee shall ensure that any voids that develop in connection with the boring operations are repaired by the Contractor at its expense to the satisfaction of the Railway and jurisdictional authority of the area affected.

(vi) Grantee shall ensure that, before drilling, the Contractor verifies that all utility companies and/or the utility "one call' service has been contacted and that they have marked and located all such existing underground facilities. Grantee shall ensure that Contractor positively locates, exposes, and stakes all existing lines, cables, and other underground facilities which are located within twenty feet (20') of the designed drilled path. Grantee shall ensure that Contractor modifies drilling practices and downhole assemblies as necessary to prevent damage to existing facilities.

(vii) Grantee shall ensure that Contractor at all times provides and maintains instrumentation which will document and accurately locate the pilot hole, measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. **If at any time there is a loss of instrument signal, the boring is to be stopped immediately until the signal is restored.** Railway will have access to these documents and instruments along with their readings at all times.

(viii) The composition of all drilling fluids proposed for use shall be submitted to Railway for approval prior to start of work. No fluid will be approved or utilized that does not comply with permit requirements and environmental regulations.

(ix) Grantee shall be responsible for obtaining, transporting and storing any water required for the drilling fluids.

(x) Grantee shall ensure that Contractor maximizes recirculation of drilling fluid surface returns and that Contractor provides solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse. Railway may specify standards for solids control and cleaning equipment performance or for treatment of excess drilling fluid and drilled spoil.

(xi) Directional drilling fluids and drill cuttings shall be contained in the drilling pits and surrounded by a silt fence. Disposal of drilling fluids and drill cuttings shall be the responsibility of Grantee and shall not be discharged into any waterbody or wetland. After the directional boring is complete, the drilling

fluids/cuttings are to be hauled to an authorized off-site disposal area selected by Grantee and shall be in compliance with all environmental regulations and permit requirements.

(xii) Grantee shall ensure that Contractor and all subcontractors performing work comply with all legal, regulatory and contract provisions. Grantee shall ensure that Contractor establishes a procedure under which all Contractor personnel, as well as subcontractor personnel, involved in any aspect of directional drilling operations be specifically advised of the legal, regulatory and contract provisions which prohibit unpermitted discharges and require proper waste disposal. This procedure shall provide that instruction is proved initially and repeated weekly as long as directional drilling operations are occurring on the project. Should there be any Contractor and/or subcontractor violations that result in penalties levied against Railway and/or Grantor, Grantee shall indemnify Railway and/or Grantor therefrom.

(xiii) Grantee shall ensure that Contractor employs its best efforts to maintain full annular circulation of drilling fluids and minimize drilling fluid returns at locations other than the entry and exit points. Grantee shall ensure that, in the event that annular circulation is lost, Contractor takes steps to restore circulation. If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers and collected using pumps as practical. If the amount of the surface return is not great enough to allow practical collection, the affected area will be diluted with fresh water and the fluid will be contained with hand placed barriers and collection sumps. If the amount of surface return exceeds that which can be contained and collected using barriers or sumps, drilling operations will be suspended until surface return volumes can be brought under control.

(xiv) Only that amount of water necessary to cool the boring head may be utilized for boring operation (i.e., no water jetting or use of excess water will be permitted).

(xv) **In the event of a "frac-out" within the limits of Railway's roadbed, the boring operation will cease immediately and Railway will be called for an inspection. Work will not resume until authorized by Railway.**

(xvi) [illegible] shall be reported to Railway for inspection prior to subsequent attempts.

(xvii) In the event any pipe has been placed underground and the bore fails, such pipe shall be cut and left in place. All voids shall be grouted.

R. [illegible]

(i) Steel casing pipe shall be used for installation located beneath railroad tracks.

(ii) Directional bore depths for casing and conduit shall be a minimum of ten feet (10') below bottom of cross ties to top of the casing pipe or top of the highest conduit for all tracks.

S. Conduit Cover and Separations

(i) Minimum cover for all conduit shall be forty-eight inches (48") from top of the conduit to ground surface for unobstructed plowing and trenching.

(ii) Minimum cover under railroad tracks shall be sixty-six inches (66") from the base of the rail to the top of the steel casing for jack and bore installations.

(iii) Minimum cover under croplands shall be forty-eight inches (48") from the ground surface to the top of the conduit.

(iv) Minimum cover under any waterway shall be ten feet (10') from the lowest point in the waterway to the top of the steel casing. Grantee shall ensure that Contractor installs the conduit underneath the bed of the stream, river or watercourse at such depth that shall prevent scouring action to the conduit by flow of the water.

(v) Unless otherwise specified or instructed by the owner or governing authority, minimum cover under track and roadside ditches shall be forty-eight inches (48") from lowest point in ditch to top of conduit.

(vi) Unless otherwise specified by the owner or governing authority, minimum cover under roadway surfaces shall be sixty inches (60") from the roadway surface to top of conduit.

(vii) Minimum separation between the nearest extremities of a gas line pipe and the steel casing for the transmission conduit line shall be five feet (5') unless otherwise approved in writing from the Railway's Engineer.

(viii) Minimum separation between the nearest points of the conduit to any utility other that a gas line shall be two feet (2').

(ix) Minimum separation between the conduit running line and any underground electrical line shall be two feet (2').

T. Fences and Gates

(i) When necessary and required by the Project work, construction fences will be cut and temporary gates installed in a manner acceptable to the Railway's Engineer.

(ii) Grantee shall ensure that Contractor submits a plan for any proposed temporary fence gate to Railway for approval at every location necessary for passage of equipment and for performance of the Project work. Openings shall not extend beyond the boundary of the RW Route, and Grantee shall obtain permission from the property and fence owner.

(iii) Grantee shall ensure that Contractor complies with all restrictions and requirements of the property and fence owner, including any repairs or replacement. All repairs shall restore the fence to the original or better condition.

(iv) Proper bracing of the fence shall be done prior to making the gate opening. Fence wire tautness will be maintained.

(v) All livestock shall be prevented from entering or leaving through the gate opening, and, if necessary, Grantee shall ensure that Contractor provides a watchman for such purposes.

(vi) Gates shall be maintained in good condition and in accordance with the Railway's Engineer's instructions until the fence is permanently repaired.

U. Damage to Existing Facilities

Grantee shall be responsible to restore or repair all properties damaged or caused to be damaged during construction to the satisfaction of the property owner, public agency and/or Railway. Such damage includes, but is not limited to, public and private roads, structures, utilities, environmental degradation, real estate and other items.

V. Seeding and Mulching

(i) Grantee shall ensure that Contractor seeds and mulches all areas disturbed during Project work. Such seeding and mulching work shall include without limitation preparation of the seed bed, placement of the seed, application of fertilizer and lime and mulching.

(ii) Unless treated otherwise, Grantee shall be responsible for seeding and mulching earth slopes and surfaces constructed within the RW Route; other areas designated in an applicable erosion and sediment control plan; and any other areas designated by the Railway's Engineer.

W. Final Cleanup

(i) Upon completion of the Project, Grantee shall ensure that Contractor cleans the RW Route of all remaining construction materials, scrap, rubbish, etc., resulting from the Project work.

(ii) [illegible] materials shall be disposed of by Grantee at its expense and in accordance with all applicable laws and regulations and to the satisfaction of any impacted property owners.

(iii) **Burial of materials on Grantor's property is strictly prohibited.**

(iv) Sanitary wastes shall not be discharged into any waterways or streambeds. Grantee shall ensure that Contractor provides refuse containers and sanitary chemical retention or other approved toilets, convenient to principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations.

(v) Non-combustible wastes such as conductor, ceramic or metal scrap shall be hauled away and disposed in accordance with all applicable regulatory requirements.

(vi) Combustible wastes such as packaging material shall be hauled away and disposed in accordance with all applicable regulatory requirements. Burning will not be allowed unless approved by the Railway's Engineer. Grantee shall ensure that Contractor acquires all governmental permits for burning before such activities take place. Grantee shall be responsible for all damage caused by such burning activities, including without limitation any permit violations.

(vii) Grantee shall ensure that Contractor removes its equipment from the RW Route in a timely manner.

X. Testing

Grantee will notify Grantor in writing at least twenty-one (21) days before the Transmission System is proposed to be placed in service. Prior to placing the Transmission System in service and after any approved mitigation measures, as determined in Section 5.02 (ii), have been implemented, joint tests involving the energized and fully loaded Transmission System and involving both Grantor and Grantee will be conducted on Railway's C&S Systems, including without limitation wayside signals and grade crossing warning devices and Railway's communication system, including VHF radio and UHF radio, to determine if the energized Transmission System is causing interference with Grantor's C&S Systems. If then or at any time thereafter the Transmission System causes degradation of the railroad-operations-related signal, communications or other electronic facilities of Grantor or its affiliates or subsidiaries, or endangers the personnel of Grantor or anyone else entitled to be on Grantor's property, through inductive or electrostatic interference or otherwise, Grantee, at the request of Grantor, and at Grantee's expense, will modify the Transmission System to the satisfaction of Grantor so as to eliminate such degradation or danger. Such modification may include, without limiting the generality of the foregoing, providing additional shielding, filters, reactances or any other corrective measure deemed necessary or desirable. The most cost effective solution may be alterations to both the Grantee's Transmission System and the Grantor's C&S Systems, in which case Grantee and Grantor shall examine the suitability of such modifications to the C&S Systems as well. Should Grantor agree to such modifications then upon agreement of Grantor and Grantee to the nature and timing of such modifications, Grantor shall make such changes to its C&S Systems and Grantee shall reimburse such costs to Grantor within 180 days of both completion of said changes and written notification with supporting documentation by

Grantor to Grantee. If Grantee fails to take such corrective measures in a timely manner or if an emergency situation is presented which, in the Grantor's judgment, requires immediate action, Grantor may undertake such corrective measures as Grantor deems necessary or desirable but at Grantee's expense.

ASSIGNMENT, ASSUMPTION AND CONSENT AGREEMENT

THIS ASSIGNMENT, ASSUMPTION AND CONSENT AGREEMENT (this "Agreement"), made this 17th day of July, 2006, by and among Niagara Reinforcement, LLC, a limited liability company organized and existing under the laws of the State of Michigan ("Assignor"); New York Regional Interconnect Inc., a corporation organized and existing under the laws of the State of New York ("Assignee"); and The New York Susquehanna and Western Railway Corporation, a corporation organized and existing under the laws of New Jersey ("Grantor"),

WITNESSETH:

WHEREAS, Assignor and Grantor are parties to that certain Energy Transmission Lease Agreement dated as of the 21st day of November, 2003 (the "Lease"), governing the lease of the RW Route to Assignor by Grantor;

WHEREAS, Assignor desires to assign its rights, duties and obligations under the Lease to Assignee, and Assignee is willing to assume such rights, duties and obligations of Assignor hereunder (collectively, the "Assignment");

WHEREAS, the Assignment requires the prior written consent of Grantor, which consent is evidenced herein;

NOW, THEREFORE, in consideration of the sum of One and 00/100 Dollars ($1.00) and other good and lawful consideration paid by the Assignee to the Assignor, the receipt of which is acknowledged, the parties hereto agree as follows:

1. Capitalized terms used herein without definition shall have the meanings ascribed to them in the Lease.

2. Grantor hereby consents to the Assignment as more fully described in Sections 3 and 4 of this Agreement.

3. Assignor hereby assigns all of its right, title and interest, and delegates all of its duties and obligations, under the Lease to Assignee, its successors and assigns.

4. Assignee hereby accepts the assignment of all of Assignor's right, title and interest, and assumes all of Assignor's duties and obligations, under the Lease and covenants to fully perform under the terms and conditions of the Lease, including without limitation the payment of Pre-Paid Rent and Lease Fees.

IN WITNESS WHEREOF, the parties have signed and delivered this instrument on the day first above written.

Niagara Reinforcement, LLC

By: _____

New York Regional Interconnect Inc.

By: _____

The New York Susquehanna and Western Railway Corporation

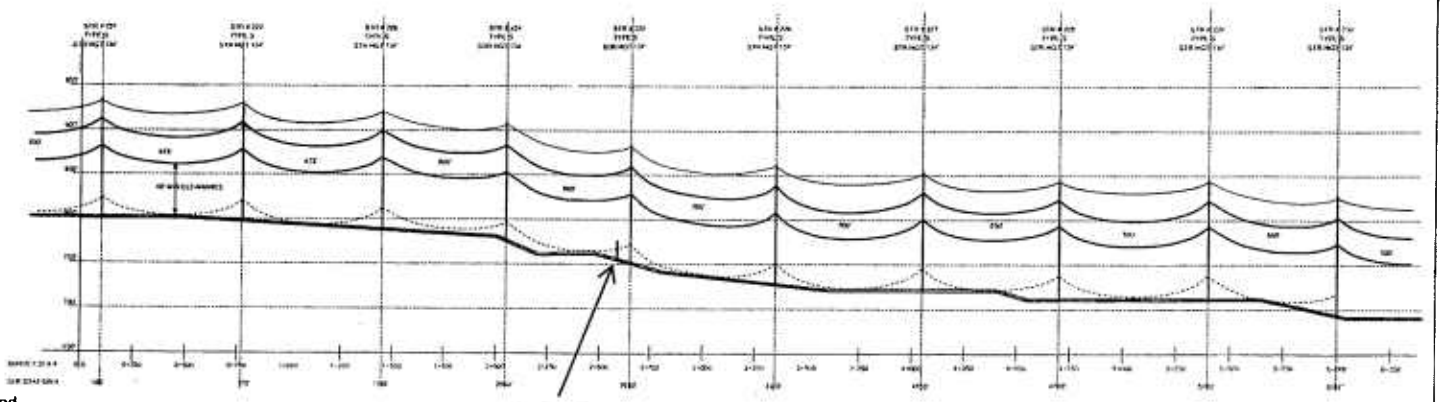
By: _____

President

Attachment for Interrogatory
DPS-4.8

RAILROAD OWNER	TRANSMISSION LINE OWNER	kV	LINE LOCATION IN RELATION TO NYRI	APPROXIMATE STATION #	NYRI ROUTE TYPE (OH/UG)	BUFFER FROM RR Property line (ft)	LENGTH INTERFACING NYRI (miles)
GVTAR	NGrid L6	115	Adj. northeast	2	OH	100	0.80
NYS&W	NGrid L23/L29	46	Adj. west and east	5-6	UG	100	1.14
NYS&W	NGrid L23/L29	46	Adj. east and west	6-7	UG	100	0.40
NYS&W	NGrid L29	46	Adj. east	9-11	UG	100	1.99
NYS&W	NGrid L29	46	Adj. varies west and east	12-15	UG	100	2.24
NYS&W	Sherburne Muni	46	Adj. varies west and east and at times within RR Property	47-48	OH	100	0.89
Norfolk Southern	NYPA	345	Intersects NYRI and RR which is 450 ft away	167	OH	100	1.10
Norfolk Southern	O&R	115	Intersects NYRI and adj. north	178	OH	100	0.47
Norfolk Southern	NYPA	345	Adj. south, intersect NYRI	184-185	OH	100	0.73

Attachment for Interrogatory
DPS-4.10



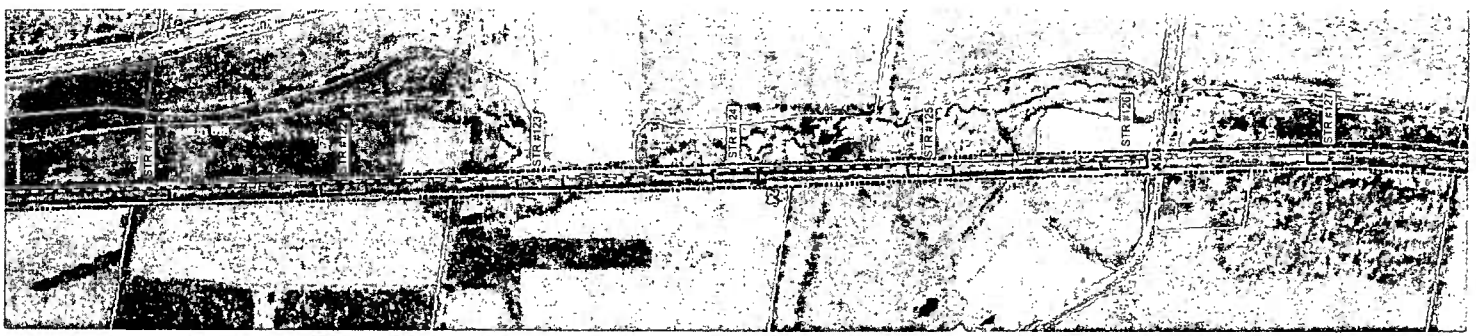
Legend

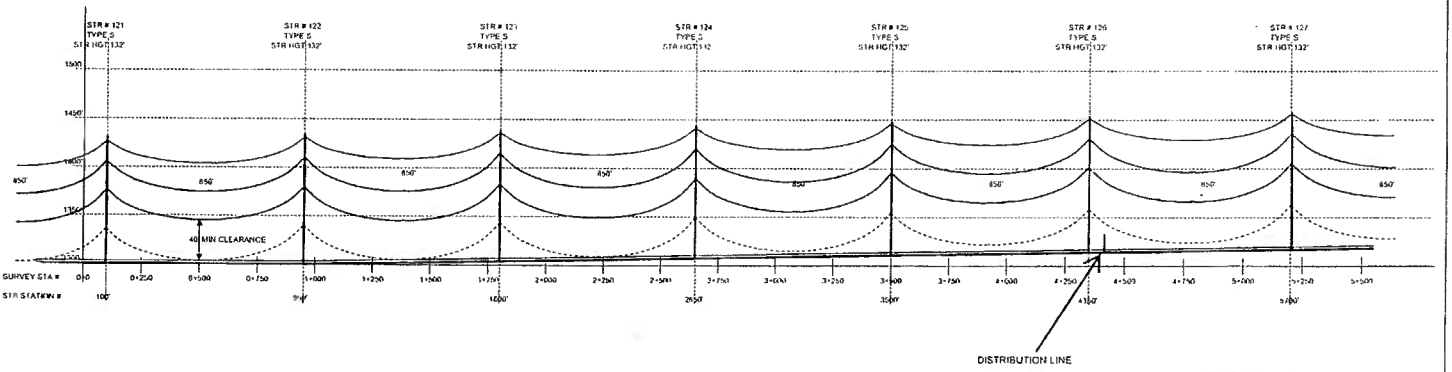
- Structure Location
- Access Road at Existing Road Crossing
- Station Number
- Proposed Route (Overhead)
- Access Road
- Structure Fabrication Area
- Proposed Route Transmission Corridor
- Stream Network
- Parcel Boundaries
- Vegetative Clearing Zone A
- Vegetative Clearing Zone B
- NYSDEC Wetlands

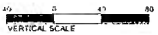
VERTICAL SCALE

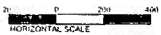
HORIZONTAL SCALE

Washington Group International









Legend

- Structure Location
- Access Road at Existing Road Crossing
- Station Number
- Proposed Route (Overhead)
- Access Road
- Structure Fabrication Area
- Proposed Route Transmission Corridor
- Stream Network
- Parcel Boundaries
- Vegetative Clearing Zone A
- Vegetative Clearing Zone B
- NYSDEC Wetlands

Washington Group International

Typical Plan & Profile Along NY SW Railway Section

DPS 4.19A

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-5
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel E
Subject:	Wetlands

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1. Please list all wetlands by class and vegetation type under State jurisdiction that will require any amount of vegetation clearing or filling and indicate what attempts have been made to avoid them.

Response:

See Exhibit 4, Section 4.13.3.1 and 4.13.3.3, of the Supplemental Article VII application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-6
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel G
Subject:	Threatened and Endangered Species

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1. Describe the detailed analysis and field studies and schedule, including which year(s) for each threatened and endangered species that NYRI proposes to study in the EM&CP stage of the project (see application Appendix C, page 5)?

Response:

See Exhibit 4, Section 4.10.4.4, of the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-7
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel E
Subject:	Parallel Facilities

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1. According to Exhibit 4, page 84, "NYRI is working with the entities that currently occupy the existing ROW to determine the best location for the proposed HVDC line." Has NYRI reached any agreements for the best location for its line along any of the paralleled facilities? If so, please provide the details of the agreements.

Response:

As a result of a series of meetings and discussions with National Grid, New York State Electric & Gas, Millennium pipeline, Orange & Rockland and Central Hudson Gas & Electric, , NYRI confirmed its proposed separation distance from the electric facilities and modified its plans for separation from the Millennium pipeline. The nominal separation distance will be 100 feet center line to center line when NYRI is constructed in an overhead configuration paralleling the existing energy facilities located separate structures. There may be exceptions to this standard 100 foot separation in limited locations where a narrower separation will help facilitate the navigation of a specific location where land use space limitations may be encountered. In these exception areas in all instances the governing provisions of the National Electric Safety Code will be satisfied in the design of the project.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-8
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel A and Panel D
Subject:	Alternative Routes

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1. Did NYRI study the environmental impacts of Alternatives presented in Exhibit 3? If so, please discuss them in detail. An environmental assessment was conducted for the Marcy South alternate and other alternate route segments.

Response:

While the Article VII regulations do not specifically require the environmental assessment of the alternatives presented in Exhibit 3, the Supplemental Application does report results of certain environmental assessments performed on the alternative routes and segments. The Marcy South alternate assessment is presented in Appendix L of the Supplemental Article VII Application and the alternate route segment assessments are presented in Exhibit 3 including associated tables.

2. What would project costs be for an underground facility in Oneida County along the proposed route compared to an overhead facility?

Response:

The estimated project installation cost for an underground facility in Oneida County along the proposed route is $342,300,000. The estimated project installation cost for the proposed facility in Oneida County (which consists of both overhead and underground construction) is $177,000,000. See Attached Table "NYRI-400 kV HVDC T/L Underground vs. Overhead Comparison (DPS 8.2 and 8.3) Rough Order of Magnitude (ROM) Cost Estimate" for details. Note that non-installation costs (Land and Right-of-Way Acquisition Costs, Permitting Costs, Finance Costs including Interest During Construction, Fees for Legal Services, etc.) are not included in these estimates.

3. What would project costs be for an underground facility along the proposed route compared to the overhead Utica East Alternate?

A comparable geographic configuration to the overhead Utica East Alternate as presented in Exhibit 3 of the Supplemental Article VII Application would consist of route segments designated Proposed OH A, plus Alternate O plus Alternate A/O, plus Alternate MS - B plus Alternate B . This combination of overhead alternate segments as presented in the Supplemental Article VII Application filing represents an overhead alternate route extending from Edic to the vicinity of the proposed route transition station south of Clayville.

The estimated project installation cost for an underground facility along the proposed route that is comparable to the overhead alternate route segments described above is $189,400,000. The estimated project installation cost along the overhead alternate route segments above is $62,500,000. See Attached Table "NYRI-400 kV HVDC T/L Underground vs. Overhead Comparison (DPS 8.2 and 8.3) Rough Order of Magnitude (ROM) Cost Estimate for details. Note that non-installation costs (Land and Right-of-Way Acquisition Costs, Permitting Costs, Finance Costs including Interest During Construction, Fees for Legal Services, etc.) are not included in these estimates.

Attachment for Interrogatory
DPS-8.2 and DPS-8.3

Date: 11/9/07

NYRI - 400 kV HVDC T/L UNDERGROUND vs. OVERHEAD COMPARISON (DPS 8.2 and 8.3)
Rough Order of Magnitude (ROM) Cost Estimate

UG Cable Type: MIND Type Underground Direct Buried Cable

ESTIMATE SUMMARY

Route Segments			includes Transition Stations (2 each segment)
DPS 8.2	What would project costs be for an underground facility in Oneida County along the proposed route compared to an overhead facility?	Proposed Route in Oneida Cty, north to south:	
		a) OH Lgth : 3.2mi open + 1.5 mi constricted	$43,607,679
		b) UG Lgth: 11.8 miles (REF: Utica-Chad-Clayvl sheet)	$138,356,552
		c) OH Lgth: 14.6 constricted	$158,077,401
		2 Transition Stations	$2,263,305
		UNDERGROUND TOTAL, 31.1 miles	**$342,304,938**
Proposed Route Costs: 4.2 miles MP-Horiz; 15.1 miles MP-vertical; 11.8 miles underground - Utica			**$176,956,552**

DPS 8.3	What would project costs be for an underground facility along the proposed route compared to the overhead Utica East Alternate?	UG Along Proposed Route:	
		a) UG Lgth: 0.6 miles open	$5,131,284
		b) UG Lgth: 11.8 miles (REF: Utica-Chad-Clayvl sheet)	$138,356,552
		c) UG Lgth: 3.2 open	$27,366,851
		d) UG Lgth: 1.5 constricted	$16,240,829
		2 Transition Stations	$2,263,305
		UNDERGROUND TOTAL, 17.1 miles	**$189,358,821**
Overhead Utica East Alternate Costs: Proposed OH A +Alt O +A/O + MS-B + Alt B			**$62,500,000**

Notes:

Highly Constricted Area - route through areas of extreme limited access, such as a congested city or downtown type of area, or other areas where normal underground construction methods are restricted, including physical space, presence of existing infrastructure and/or environmental features, vehicle or pedestrian traffic, time of day and schedule restrictions, etc.

Constricted Area - route through areas where access limitations exist, but there is sufficient access and space along the route such that normal construction methods can be used without significant accommodations due to infrastructure or environmental features, noise, time of day, other schedule issues or traffic, for example as found in many suburban areas, or in and around housing, commercial or industrial developments.

Open Area - route through areas with sufficient access such that normal construction methods can be used unencumbered by limitations due to infrastructure or environmental features, noise, time of day restrictions, schedule conflicts, traffic, etc., for example as may be found in rural areas.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-9
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel B
Subject:	Metro North

---

1. Has NYRI discussed the proposed project with Metro North? If so, what concerns has Metro North expressed about the project?

Response:

NYRI has had numerous communication exchanges with Metro North officials, including meeting on two occasions at their New York City offices. At these meetings the parties exchanged information and discussed matters of mutual interest. Included in the discussions were initial coordination elements regarding NYRI's proposal and facility installation schedule, engineering and design parameters, train service scheduling and NYRI project construction, Metro North's general procedure for access to railroad property, Construction Management Specifications for Working on or Adjacent to Railroad Property, Electromagnetic fields effects study and informational needs, Induced Currents, Railroad signaling and communication systems, permitting, insurance, and Metro North flag and inspection personnel deployment obligations, protocol for gaining access to the right of way for engineering and environmental field investigations and Metro North's plans for modifications or additions to their facilities within the Norfolk Southern property between the Port Jervis and Salisbury Mill- Cornwall Stations.

2. Please show how proposed transmission line construction utilizing the Metro North route would be done, taking into account Metro North's train schedule?

Response:

See Exhibit E-6.3 of the Supplemental Article VII application.

3. Please provide a copy of Metro North's passenger train schedule?

Response:

The proposed route within the Norfolk Southern property would interface with the Metro's North's passenger service on the Main and Bergen County Line extending between the Port Jervis and Salisbury Mills -Cornwall stations. The passenger schedule current as of January 16, 2008 between these stations for both weekday and weekends between these stations is attached. This schedule is also posted on the Metro North NJ transit website at www.njtransit.com/sf/sf_servlet.srv?hdnPageAction=TrainSchedulesTo#.

Attachment for Interrogatory
DPS-9.3

Metro North/ NJ Transit passenger schedules for Main/Bergen/Port Jervis for segments between Port Jervis and Salisbury Mills-Cornwall Stations

THE FOLLOWING 4 PAGES PRESENT PASSENGER SCHEDULES IN EFFECT ON JANUARY 16, 2008.

Port Jervis to Salisbury Mills Cornwall

Day Of Service: **Weekday**

Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
03:54 AM - MNBNP	04:42 AM	48 minutes
04:36 AM - MNBNP	05:24 AM	48 minutes
05:06 AM - MNBNP	05:55 AM	49 minutes
05:37 AM - MNBNP	06:26 AM	49 minutes
05:55 AM - MNBNP	06:44 AM	49 minutes
06:07 AM - MNBNP	06:56 AM	49 minutes
06:55 AM - MNBNP	07:43 AM	48 minutes
07:39 AM - MNBNP	08:28 AM	49 minutes
09:18 AM - MNBNP	10:10 AM	52 minutes
11:31 AM - MNBNP	12:19 PM	48 minutes
01:28 PM - MNBNP	02:15 PM	47 minutes
09:28 PM - MNBNP	10:18 PM	50 minutes

Port Jervis to Salisbury Mills Cornwall

Day Of Service: **Saturday**

Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
04:49 AM - MNBNP	05:36 AM	47 minutes
07:24 AM - MNBNP	08:11 AM	47 minutes
08:49 AM - MNBNP	09:36 AM	47 minutes
10:46 AM - MNBNP	11:36 AM	50 minutes
03:10 PM - MNBNP	03:59 PM	49 minutes
05:31 PM - MNBNP	06:20 PM	49 minutes
08:49 PM - MNBNP	09:36 PM	47 minutes

Port Jervis to Salisbury Mills Cornwall

Day Of Service: **Sunday**

Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
04:49 AM - MNBNP	05:36 AM	47 minutes
07:24 AM - MNBNP	08:11 AM	47 minutes
08:49 AM - MNBNP	09:36 AM	47 minutes
10:46 AM - MNBNP	11:36 AM	50 minutes
03:10 PM - MNBNP	03:59 PM	49 minutes
05:31 PM - MNBNP	06:20 PM	49 minutes
08:49 PM - MNBNP	09:36 PM	47 minutes

Salisbury Mills Cornwall to Port Jervis
Day Of Service: **Weekday**
Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
09:47 AM - MNBNP	10:37 AM	50 minutes
11:22 AM - MNBNP	12:14 PM	52 minutes
05:24 PM - MNBNP	06:14 PM	50 minutes
06:06 PM - MNBNP	06:56 PM	50 minutes
06:34 PM - MNBNP	07:24 PM	50 minutes
07:06 PM - MNBNP	07:56 PM	50 minutes
07:24 PM - MNBNP	08:14 PM	50 minutes
07:46 PM - MNBNP	08:35 PM	49 minutes
08:21 PM - MNBNP	09:11 PM	50 minutes
09:12 PM - MNBNP	10:06 PM	54 minutes
11:38 PM - MNBNP	12:27 AM	49 minutes
01:42 AM - MNBNP[1]	02:31 AM	49 minutes
01:42 AM - MNBNP[2]	02:31 AM	49 minutes

Salisbury Mills Cornwall to Port Jervis
Day Of Service: **Saturday**
Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
10:41 AM - MNBNP	11:32 AM	51 minutes
12:41 PM - MNBNP	01:32 PM	51 minutes
[illegible]MNBNP	03:54 PM	53 minutes
05:20 PM [illegible]	06:12 PM	52 minutes
07:34 PM - MNBNP	08:24 PM	50 minutes
11:05 PM - MNBNP	11:54 PM	49 minutes
01:42 AM - MNBNP	02:31 AM	49 minutes

Salisbury Mills Cornwall to Port Jervis
Day Of Service: **Sunday**
Main/Bergen/Port Jervis (MNBNP)

Origin Departure	**Destination Arrival**	**Total Travel Time**
10:41 AM - MNBNP	11:32 AM	51 minutes
12:41 PM - MNBNP	01:32 PM	51 minutes
03:01 PM - MNBNP	03:54 PM	53 minutes
05:20 PM - MNBNP	06:12 PM	52 minutes
07:34 PM - MNBNP	08:24 PM	50 minutes
11:05 PM - MNBNP	11:54 PM	49 minutes
01:42 AM - MNBNP	02:31 AM	49 minutes

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-10
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel E
Subject:	Vegetation Clearing

---

1. Provide a figure similar to Figure 4.4.2-1 for the minimum vegetation clearing requirements at midspan for a DC steel pole tower located off railroad ROW?

Response:

See Exhibit 4, Section 4.4, Figure 4.4.2-1 in the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-11
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	NESC

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1. Provide the relevant parts of the National Electric Safety Code that apply to clearance requirements for the proposed facility?

Response:

See Exhibit E-1.3.1, in the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-12
Requested By:	James de Waal Malefyt
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel C
Subject:	Congestion

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1. Please quantify the transmission congestion that the proposed project will alleviate and the names of the affected transmission lines (Exhibit E-4, pp. 7-8)?

Response:

The subject exhibit, pages 7-8, has been amended and supplemented using the report found in Appendix U titled "New York Regional Interconnect: An Impact Analysis", prepared by CRA International. Specifically the report provides the quantitative results for transmission congestion and the affected interfaces/lines in section 3.2.3 pages 20-22.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-13
Requested By: Edward Schrom
Date of Request: October 2, 2006
Reply Date: February 20, 2008
Witness: Panel C
Subject: Design of line

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1. Explain why the voltage 400 kv DC chosen.

Response:

The selection of HVDC system voltage can be influenced by a number of factors. In the case of NYRI, the selected voltage level of +/-400 kV would be considered a typical voltage level for a 1200MW HVDC system. Higher voltages are undesirable for the project for a number of reasons including possible clearance issues due to the restrictive nature of the transmission line corridor in a number of areas and increased costs associated with the transmission line construction in the form of longer insulators and larger towers. Selection of a lower voltage is also undesirable as it would result in increased costs associated with transmission line losses which are proportional to the square of the current flowing in the line. A reduction in voltage results in an increase in current, and hence losses, in order to transfer the same amount of power over the line.

2. Explain why the capacity of the line chosen to be 1200MW.

Response:

1200 MW was selected as the steady state capacity for the line as it corresponded to the largest single contingency that sets the 10 minute operating reserve for reliability purposes within New York State.

3. Were there any other capacity ratings chosen for this line?

Response:

There were no other capacity ratings chosen for the line.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-14
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel A and Panel C
Subject:	Design of line

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1. Why was the terminus of the facility chosen as Rock Tavern and Edic? Explain your answer. Provide copies of all supporting documents and studies.

Response:

Edic substation was chosen for the northern terminus because of its largely unconstrained location in the New York Control area, which is north of the major constrained interfaces elsewhere in New York State. The Edic 345kv substation is in close proximity to the Railroad rights of way which the Project owns development rights with which to construct transmission facilities. Rock Tavern, a 345kv bulk power substation was chosen due to its location south of the known Central East and UPNY-SENY constrained interfaces and was an existing interconnection location that allowed optimization of the right of way agreements with the railroads for development rights. The analysis in the CRA report in Appendix U discusses the Locational [illegible]nal Costs impacts of the wholesale power market as a result of interconnecting those two points in the system.

2. What other terminus points were studied by the applicant? Explain why they were dismissed and supply all supporting documentation.

Response:

In addition to Edic and Rocktavern, the NYPA Marcy substation in the town of Marcy, NY and the Orange and Rockland Ramapo Substation were considered for interconnection locations. Additional information on why they were not selected can be found in Exhibit 3, Section 3.2.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-15
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

---

1. Provide the drawing indicating the size of the area needed for connecting the over head system to an underground cable. Indicated on the drawing the dimensions of the area and location of equipment within the area.

Response:

See Exhibit E-3.8, Figs E-3.7-1 & E-3.7-2 of the Supplemental Article VII application.

2. Provide a drawing showing the vertical view of the equipment and provide the dimensions.

Response:

See Exhibit E-3.8, Figs E-3.7-1 & E-3.7-2 of the Supplemental Article VII application.

3. Provide a drawing showing the dimensions of a typical structure, the expected insulator length, the location of the shield wire.

Response:

See Exhibit E-1.1.1.1 and E-1.1.1.2, Figs E-1.1.1-1 thru E-1.1.1-9A, of the Supplemental Article VII application.

4. Provide a drawing showing all the typical hardware that will be used, include; the dimensions, the standard it is to be manufactured to, and possible finishes.

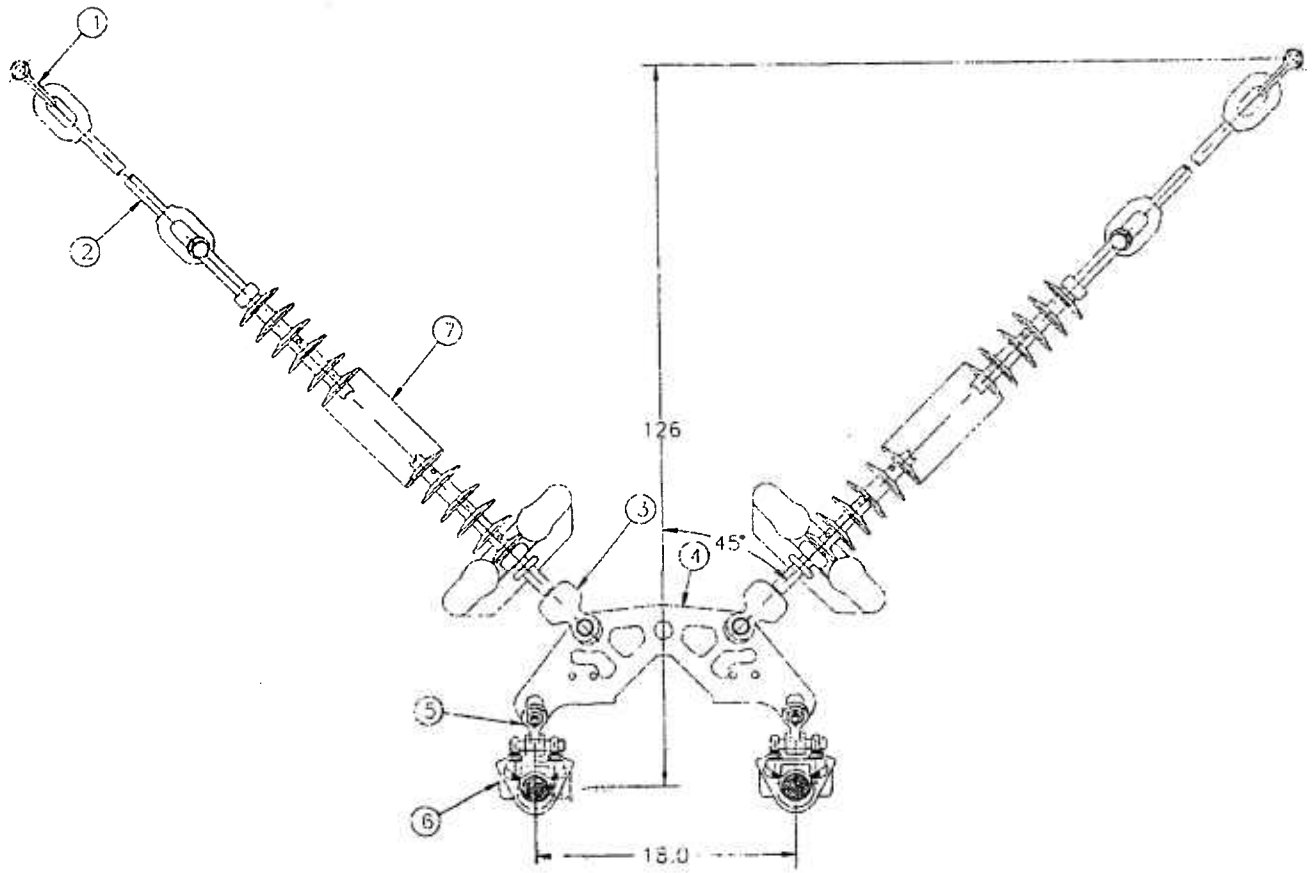
Response:

See attached specification sheets *Transmission Assemblies* and *Transmission Connectors*.

Attachment for Interrogatory
DPS-15.4

EHV TANGENT SUSPENSION
DOUBLE CONDUCTOR, SINGLE INSULATOR VEE STRING

ASSEMBLY
TAT22



(345kV)

Contact HPS for assistance in selection of compatible components for specific conductor and voltage application.
Ball & socket dimensions per ANSI Class 52-5.

Item	CATALOG TYPE	DESCRIPTION	QTY.	MATERIAL	ULTIMATE STRENGTH LBS.
1	A825LBNK	Anchor Shackle	2	Forged Steel	30,000
2	HOO3036	Oval Eye/Oval Eye Link (36")	2	Forged Steel	30,000
3	SYC30SN	Socket Y-Clevis	2	Ductile Iron	30,000
4	YPV30172592	Yoke Plate	2	Ductile Iron	30,000
5	YCS1690	Y-Clevis Eye	2	Ductile Iron	30,000
6	CFS182N	Suspension Clamp	2	Aluminum	25,000
7	515018W201	Insulator, Susp. W/Ring	2	Polymer Composite	30,000

TRANSMISSION ASSEMBLIES

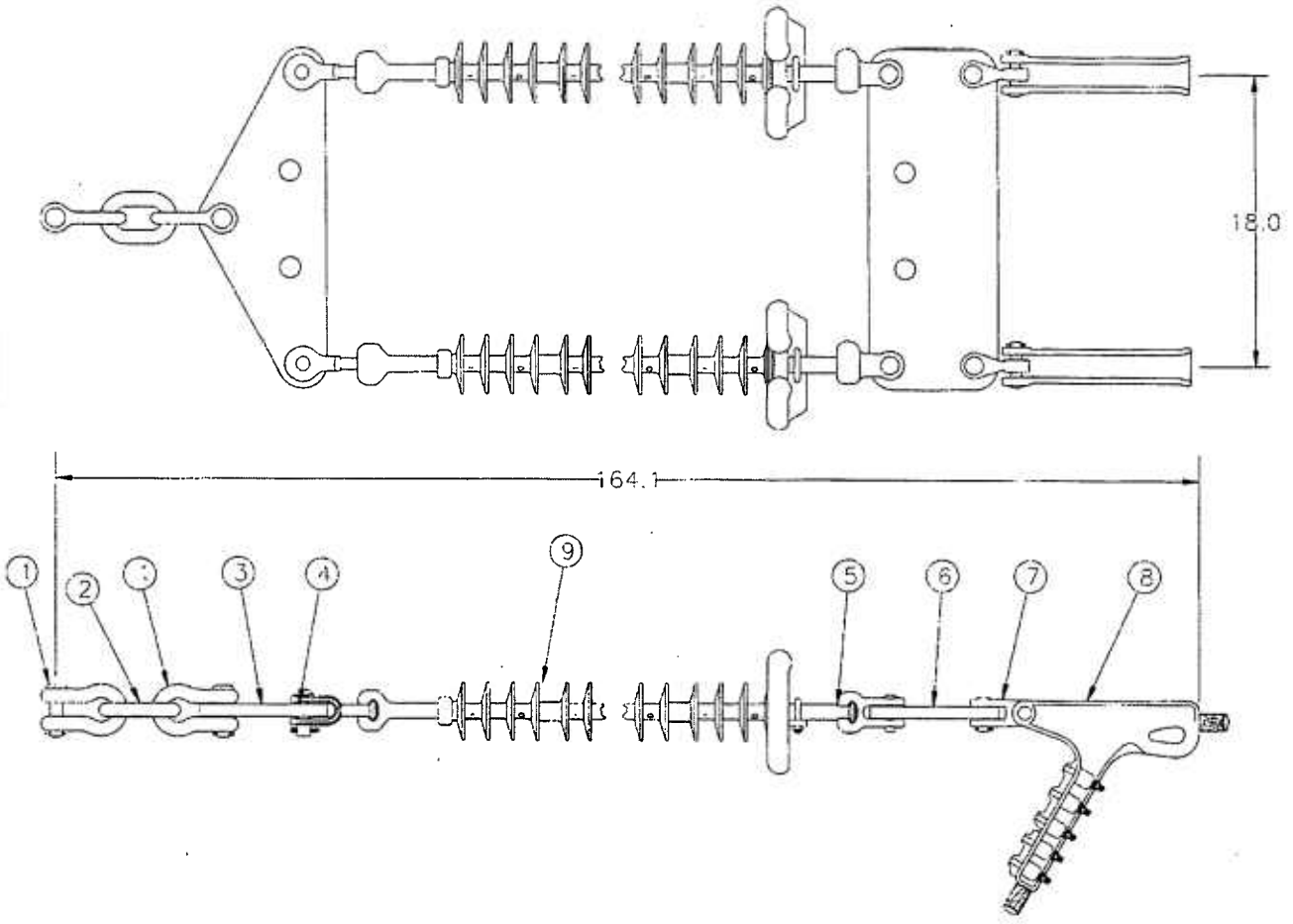
HUBBELL POWER SYSTEMS, INC.

T1A

EHV DEADEND
DOUBLE CONDUCTOR, DOUBLE INSULATOR STRING

ASSEMBLY
TAD22

TF-8



(345kV)

Contact HPS for assistance in selection of compatible components for specific conductor and voltage application. Ball &socket dimensions per ANSI Class 52-5.

ITEM	CATALOG TYPE	DESCRIPTION	QTY.	MATERIAL	ULTIMATE STRENGTH LBS.
1	AS50BNK	Anchor Shackle	2	Forged Steel	60,000
2	LK60	Chain Link	1	Forged Steel	60,000
3	YPD50185491	Yoke Plate	1	Ductile Iron	50,000
4	BC30	Ball Clevis	2	Ductile Iron	30,000
5	SC30	Socket Clevis	2	Ductile Iron	30,000
6	YPR30173512	Yoke Plate	1	Ductile Iron	30,000
7	CE05410	Clevis Eye	2	Ductile Iron	40,000
8	SD130NCRF	Strain Clamp	2	Aluminum	35,000
9	515018W201	Insulator, Susp. W/Ring	2	Polymer Composite	30,000

TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.
T16

SUSPENSION
ALUMINUM CORONA FREE CLAMP
(FOR USE WITH ARMOR RODS)

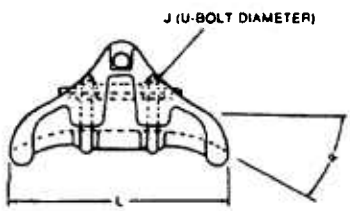
ALUMINUM
CFS

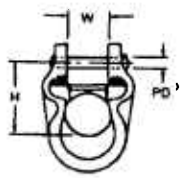
TB-2

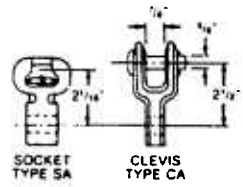
Designed for use on extra-high voltage transmission lines. Corona and RIV are controlled through the design of the clamp thus eliminating the need for control rings.

Type CFS is recommended for all aluminum, ACSR or aluminum alloy conductors with straight, tapered or formed armor rods.

Material: Body and Keeper—356-T6 aluminum alloy
Hardware—galvanized steel
Socket and Clevis—ductile iron, galvanized
Cotter Pin—#302 stainless steel
Grommet—neoprene







CATALOG NUMBER	FITTING TYPE	FITTING CAT. NO.	CLAMPING RANGE INCHES (MM)	ULTIMATE BODY STRENGTH LBS. (KG)	MAX. TAKE-OFF ANGLE Δ	DIMENSIONS INCHES (MM) L	W	H	J	PD	APPROX. WT. EACH LBS. (KG)
CFS182N CFS182S CFS182C	None Socket Clevis	— SA16 CA16	1.55-1.82 (39.4-46.2)	25,000 (11,340)	·· 1/2·	10 (254.0)	2-1/16 (52.4)	3-1/4 (82.50)	1/2 (12.70)	5/8 (15.88)	4.5 (2.04) 6.3 (2.86) 6.3 (2.86)
CFS204N CFS204S CFS204C	None Socket Clevis	— SA16 CA16	1.73-2.04 (43.94-51.82)	25,000 (11 2·· ·/	·17 1/2·	10-1/2 (266.70)	2-7/32 (56.36)	3-1/2 (88.90)	1/2 (12.70)	5/8 (15.88)	5.0 (2.27) 6.8 (3.08) 6.8 (3.08)
CFS213N CFS213S CFS213C	None Socket Clevis	— SA16 C· ·	(·· ·-54.10)	25,000 · · ·	·17 1/2·	11 (279.40)	2-5/16 (58.74)	3-5/8 (92.08)	5/8 (15.88)	5/8 (15.88)	6.2 (2.81) 8.0 (3.63) 8.0 (3.63)
CFS227N CFS227S CFS227C	None Socket Clevis	— SA22 CA22	·· (49.02-57.66)	25,000 (11,340)	·17 1/2·	11 (279.40)	2-3/8 (60.33)	4 (101.60)	5/8 (15.88)	5/8 (15.88)	6.7 (3.04) 8.6 (3.90) 9.0 (4.08)
CFS280N CFS280S CFS280C	None Socket Clevis	— SA2613 CA2413	2.29-2.80 (58.17-71.12)	30,000 (13,608) 30,000 (13,608) 25,000 (11,340)	·20·	14 (355.60)	3 (76.20)	5-1/32 (127.79)	5/8 (15.88)	3/4 (19.05)	11.4 (5.17) 14.3 (6.46) 14.3 (6.51)

NOTES: (1) Recommended torque on U-bolts: 1/2"– · · —720 in· lbs.
(2) Clamps may be furnished · · · · ·ttings (refer to Line and Tower End Hardware Section)
·For larger angles · · · · · ·amp is available. For information on special clamps, contact factory.

Anderson manufactures a complete line of quality line and tower end hardware to meet all transmission line construction needs. A variety of devices are available to bundle conductors, attach conductors to insulator strings and attach insulator strings to support arms.

Most of our line and tower end hardware is manufactured from ductile iron. Ductile iron castings offer great design flexibility and freedom to utilize design improvements without expensive tooling changes. We also provide a line of forged steel tower end fittings. Steel forgings are often required to provide the necessary ultimate strength when dimensional restrictions are imposed such as with most ball fittings, shackles and links.

Ball and socket fittings are specified under an ANSI class with respect to insulators. We offer two types of ball and socket fittings: Standard fittings (rated 30,000 pounds) for ANSI 52-3 and 52-5 class insulators, and high strength fittings (rated 50,000 pounds) for ANSI 52-8 and 52-11 class insulators.

The ultimate strength rating of our line and tower end hardware indicates the load where rupture can occur. It is a fairly common industry practice to match the ultimate strength of line and tower end hardware to that of the associated insulators. Consequently, the ultimate strengths should not be construed to be a recommended constant tension applied to a fitting. It is expected that the customer will apply suitable safety factors.

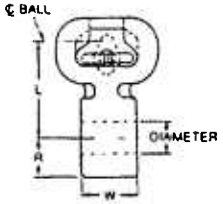
TRANSMISSION CONNECTORS

HARDWARE FITTINGS
DUCTILE IRON
SOCKET EYE

HUBBELL POWER SYSTEMS, INC.

T12

DUCTILE IRON
SA



Socket eyes can be used for connecting conductor clamping devices to ball and socket type insulators.

Material: Body—ductile iron, galvanized
Cotter Pin—stainless steel

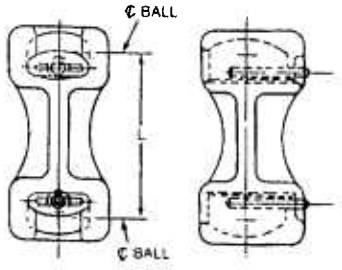
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		W	R	L	DIA.	
SA04	18,000 (8,165)	1/2 (12.70)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.25 (.57)
SA049	20,000 (9,072)	1/2 (12.70)	13/16 (20.64)	3-1/4 (82.55)	9/16 (14.29)	1.28 (.58)
SA05	20,000 (9,072)	5/8 (15.88)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.25 (.57)
SA06	25,000 (11,340)	3/4 (19.05)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.30 (.59)
936032000	27,000 (12,247)	3/4 (19.05)	1 (25.40)	3 (76.20)	13/16 (20.64)	2.2 (1.00)
SA07	30,000 (13,608)	7/8 (22.23)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.35 (.61)
SA10	30,000 (13,608)	1 (25.40)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.40 (.64)
SA10054	30,000 (13,608)	1 (25.40)	13/16 (20.64)	5-1/2 (139.70)	11/16 (17.46)	1.90 (0.86)
SA11	30,000 (13,608)	1-1/8 (28.58)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.50 (.68)
936062000	30,000 (13,608)	1-1/4 (31.75)	1 (25.40)	3 (76.20)	1-1/16 (26.99)	2.3 (1.04)
936063002	30,000 (13,608)	1-1/4 (31.75)	1 (25.40)	3 (76.20)	1-3/16 (30.16)	2.3 (1.04)
SA13	30,000 (13,608)	1-3/8 (34.93)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.70 (.77)
SA13054	30,000 (13,608)	1-3/8 (34.93)	13/16 (20.64)	5-1/2 (139.70)	11/16 (17.46)	2.00 (0.91)
*SA1550	50,000 (22,680)	1-5/8 (41.28)	1 (25.40)	3-9/32 (83.34)	1-1/16 (26.99)	3.00 (1.36)
*SA15501	30,000 (13,608)	1-5/8 (41.28)	1 (25.40)	3-9/32 (83.34)	11/16 (17.46)	3.00 (1.36)
*SA15502	30,000 (13,608)	3/4 (19.05)	1 (25.40)	3-9/32 (83.34)	11/16 (17.46)	2.75 (1.25)
*SA15503	36,000 (16,344)	1-5/16 (33.34)	1 (25.40)	3-9/32 (83.34)	13/16 (20.64)	2.90 (1.32)
SA16	30,000 (13,608)	1-3/4 (44.45)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.80 (.82)
SA20	30,000 (13,608)	2 (50.80)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.85 (.84)
SA22	30,000 (13,608)	2-1/4 (57.15)	13/16 (20.64)	2-1/16 (52.39)	11/16 (17.46)	1.85 (.84)
SA1013	30,000 (13,608)	1 (25.40)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	1.50 (.68)
SA10.513	30,000 (13,608)	1-1/16 (26.99)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	1.30 (.50)
SA1113	30,000 (13,608)	1-1/8 (28.58)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	1.50 (.68)
SA1313	30,000 (13,608)	1-3/8 (34.93)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	1.75 (.79)
SA1417	30,000 (13,608)	1-1/2 (38.10)	1 (25.40)	2-1/2 (63.50)	1-1/16 (26.99)	1.75 (.79)
SA1613	30,000 (13,608)	1-3/4 (44.45)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	1.85 (.84)
SA16054	30,000 (13,608)	1-3/4 (44.45)	13/16 (20.64)	5-1/2 (139.70)	11/16 (17.46)	2.10 (0.95)
SA2113	[illegible]	2-1/8 (53.98)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	2.00 (.91)
SA2213	(13,608)	2-1/4 (57.15)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	2.00 (.91)
SA2413	30,000 (13,608)	2-1/2 (63.50)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	2.25 (1.02)
SA2613		2-3/4 (69.85)	13/16 (20.64)	2-1/16 (52.39)	13/16 (20.64)	2.85 (1.29)
	(22,680)	1-1/16 (26.99)	1-1/8 (28.58)	5-1/2 (139.70)	1-1/16 (26.99)	5.8 (2.63)
*909642000	50,000 (22,680)	1-3/16 (30.16)	1-1/8 (28.58)	5-1/2 (139.70)	13/16 (20.64)	5.3 (2.40)
*9096-2000	50,000 (22,680)	1-7/32 (30.96)	1-1/8 (28.58)	5-1/2 (139.70)	1-3/16 (30.16)	5.6 (2.54)
*909622000	50,000 (22,680)	1-7/16 (36.51)	1-1/8 (28.58)	5-1/2 (139.70)	1-3/16 (30.16)	5.8 (2.63)
*909612000	50,000 (22,680)	1-1/2 (38.10)	1-1/8 (28.58)	5-1/2 (139.70)	13/16 (20.64)	6.0 (2.72)

NOTE: (1) For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

HARDWARE FITTINGS
DUCTILE IRON
SOCKET-SOCKET

Socket-sockets are used to connect ball and socket insulators to associated hardware within an insulator string.

Material: Body—ductile iron, galvanized
Cotter Pin—stainless steel



DUCTILE IRON
SS

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)	APPROX. WT. EACH LBS. (KG)
		L	
SS30	30,000 (13,608)	3 (76.2)	2.00
*SS50	50,000 (22,680)	4 (101.6)	4.00 (1.81)

Note: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

HARDWARE FITTINGS
DUCTILE IRON
SOCKET Y-CLEVIS

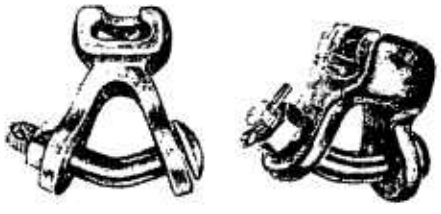
DUCTILE IRON
SYC

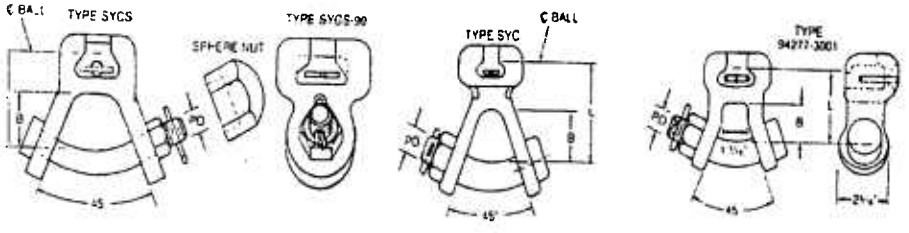
TG-3

Socket Y-clevises are used to connect yoke plates or associated hardware to ball and socket insulators. The bent bolt in the Y-section provides an additional point of articulation within an assembly.

Type SYCS is a short coupling version of Type SYC that offers the same articulation advantages.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel





CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)			APPROX. WT. EACH LBS. (KG)
		L	B	PD	
SYC30	30,000 (13,608)	2-3/4 (69.85)	1-9/16 (39.69)	3/4 (19.05)	3.0 (1.36)
**SYC4020	40,000 (18,144)	2-3/4 (69.85)	1-9/16 (39.69)	7/8 (22.23)	5.0 (2.27)
*942773001	50,000 (22,680)	2-15/16 (74.61)	1 5/8 (41.28)	7/8 (22.23)	5.0 (2.27)
*SYC50	50,000 (22,680)	2-7/8 (73.0)	1 5/8 (41.28)	7/8 (22.23)	5.0 (2.27)
SYCS3090	30,000 (13,608)	2-9/32 (57.94)	1-3/16 (30.16)	3/4 (19.05)	2.5 (1.13)
SYCS375	37,500 (17,010)	2-13/32 (61.12)	1-3/8 (34.93)	7/8 (22.23)	3.5 (1.59)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C 29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C 29.2-71.
**For use with IEC-20 MM insulators per IEC Pub. #20.
Sphere nut can be supplied by adding suffix "SN" to catalog number. Example: SYC30SN.

TRANSMISSION CONNECTORS

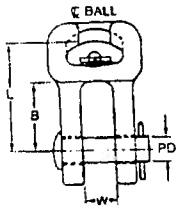
HUBBELL POWER SYSTEMS, INC.

HARDWARE FITTINGS
DUCTILE IRON
SOCKET CLEVIS

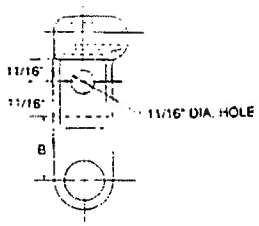
DUCTILE IRON
SC

Socket clevises are used primarily for connecting associated hardware to ball and socket type insulators.

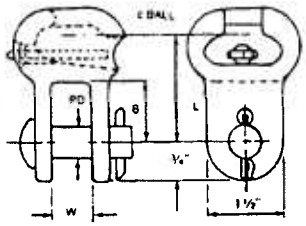
Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



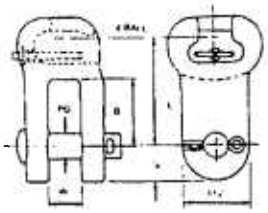
TYPE SC



TYPE SC30AHM



TYPE 115452000



TYPE 876032000

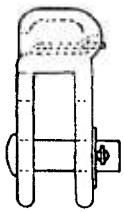
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		W	L	B	PD	
876032000	30,000 (13,608)	13/16 (20.64)	2-5/8 (66.68)	1-5/8 (41.28)	5/8 (15.88)	2.7 (1.22)
SC30	30,000 (13,608)	7/8 (22.23)	2-5/8 (66.68)	1-11/16 (42.86)	5/8 (15.88)	2.0 (.91)
SC30AHM	30,000 (13,608)	7/8 (22.23)	4-1/2 (114.30)	1-15/16 (49.21)	5/8 (15.88)	3.5 (1.58)
SC301	30,000 (13,608)	1-1/8 (28.58)	3-7/8 (98.40)	2-7/8 (72.03)	5/8 (15.88)	3.0 (1.36)
†115452000	18,000 (8,168)	13/16 (20.64)	2-1/8 (53.98)	1-3/16 (30.16)	5/8 (15.88)	1.35 (.61)
*SC501	50,000 (22,680)	1-1/8 (28.58)	3-9/32 (85.30)	2-1/16 (52.39)	7/8 (22.23)	4.6 (2.09)
*SC50L	50,000 (22,680)	15/16 (23.81)	4-15/32 (113.51)	2-1/4 (57.15)	7/8 (22.23)	5.0 (2.27)

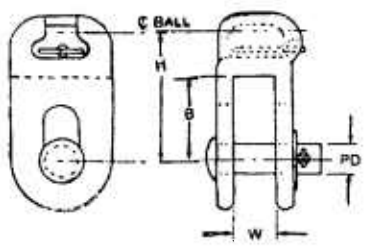
NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.
† For use with class 52-3 insulators only per ANSI Spec. C-29.2-71.

TG-4

HARDWARE FITTINGS
DUCTILE IRON
SOCKET SLOTTED CLEVIS

DUCTILE IRON
SSC





Slotted socket clevises are used primarily for connecting associated hardware to ball and socket type insulators.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel
Washer—galvanized steel

CATALOG	LBS. (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		H	B	W	PD	
SSC3090	30,000 (13,608)	3 (76.20)	1-7/8 (47.63)	15/16 (23.81)	5/8 (15.88)	3.0 (1.36)

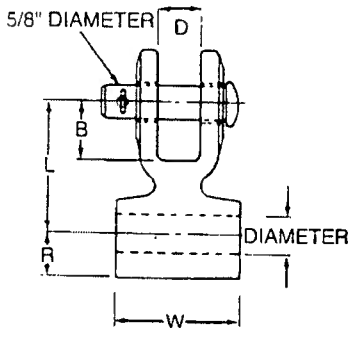
Note: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.

TRANSMISSION CONNECTORS

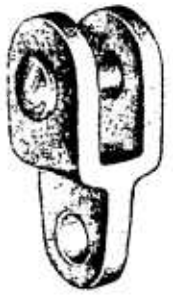
HARDWARE FITTINGS
DUCTILE IRON
CLEVIS EYE

Clevis eyes are used to connect conductor clamping devices to clevis tongue insulators.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



DUCTILE IRON
CA



CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		R	W	B	D	L	DIA.	
CA04	18,000 (8,165)	13/16 (20.64)	1/2 (12.70)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.6 (.73)
CA05	20,000 (9,072)	13/16 (20.64)	5/8 (15.88)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.6 (.73)
CA05033	30,000 (13,608)	15/16 (23.81)	5/8 (15.88)	1-3/4 (44.45)	7/8 (22.23)	3-3/8 (85.73)	11/16 (17.48)	2.6 (1.18)
CA06	25,000 (11,340)	13/16 (20.64)	3/4 (19.05)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.7 (.77)
CA10	25,000 (11,340)	13/16 (20.64)	1 (25.40)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.7 (.77)
CA11	25,000 (11,340)	13/16 (20.64)	1-1/8 (28.58)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.7 (.77)
CA13	25,000 (11,340)	13/16 (20.64)	1-3/8 (34.93)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	1.8 (.82)
CA16	25,000 (11,340)	13/16 (20.64)	1-3/4 (44.45)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	2.0 (.91)
CA22	25,000 (11,340)	13/16 (20.64)	2-1/4 (57.15)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	11/16 (17.48)	2.3 (1.04)
CA1013	25,000 (11,340)	13/16 (20.64)	1 (25.40)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	13/16 (20.64)	2.0 (.91)
CA1313	25,000 (11,340)	13/16 (20.64)	1-3/8 (34.93)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	13/16 (20.64)	2.0 (.91)
CA1517033*	30,000 (13,608)	1-1/32 (26.19)	1-5/8 (41.28)	1-3/4 (44.45)	13/16 (20.64)	3-3/8 (85.73)	1-1/16 (26.99)	2.3 (1.04)
CA2213	25,000 (11,340)	13/16 (20.64)	2 1/4 (57.15)	1-1/16 (26.99)	7/8 (22.23)	2-1/2 (63.50)	13/16 (20.64)	2.5 (1.13)

*Furnished with 3/4" dia. clevis pin.

TG-5

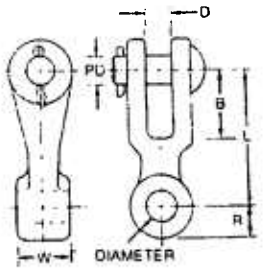
TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.

T12

HARDWARE FITTINGS
DUCTILE IRON
CLEVIS EYE

DUCTILE IRON
CE



Type CE clevis eyes are used to connect quadrant type deadends to clevis tongue insulators or yoke plates. The eye of type CE is 90° from type CA.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)							APPROX. WT. EACH LBS. (KG)
		D	W	L	B	R	PD	DIA.	
CE02504	20,000 (9,072)	7/8 (22.23)	1/2 (12.7)	2-5/8 (66.68)	1-1/4 (31.75)	13/16 (20.64)	5/8 (15.88)	11/16 (17.46)	1.7 (.77)
CE02506	25,000 (11,340)	7/8 (22.23)	3/4 (19.05)	2-5/8 (66.68)	1-1/4 (31.75)	13/16 (20.64)	5/8 (15.88)	11/16 (17.46)	1.7 (.77)
CE02513	25,000 (11,340)	7/8 (22.23)	1-3/8 (34.92)	2-5/8 (66.68)	1-1/4 (31.75)	13/16 (20.64)	5/8 (15.88)	11/16 (17.46)	2.2 (1.00)
CE025504	18,000 (8,165)	13/16 (20.64)	1/2 (12.7)	2-11/16 (68.26)	1-1/16 (26.99)	7/8 (22.22)	5/8 (15.88)	11/16 (17.46)	1.7 (.77)
CE03305	30,000 (13,608)	7/8 (22.23)	5/8 (15.88)	3-3/8 (85.72)	1-9/16 (39.69)	7/8 (22.22)	5/8 (15.88)	11/16 (17.46)	1.8 (.82)
CE03404	20,000 (9,072)	7/8 (22.23)	1/2 (12.7)	3-1/2 (88.9)	2-1/2 (63.5)	1 (25.4)	5/8 (15.88)	13/16 (20.64)	1.8 (.82)
CE0340611	36,000 (16,330)	1 (25.4)	3/4 (19.05)	3-1/2 (88.9)	1-1/2 (38.1)	1 (25.4)	3/4 (19.05)	11/16 (17.46)	2.2 (1.00)
CE0340615	36,000 (16,330)	1 (25.4)	3/4 (19.05)	3-1/2 (88.9)	1-1/2 (38.1)	1 (25.4)	3/4 (19.05)	15/16 (23.81)	2.1 (.95)
CE03410	30,000 (13,608)	7/8 (22.23)	1 (25.4)	3-1/2 (88.9)	2-1/2 (63.5)	1 (25.4)	5/8 (15.88)	13/16 (20.64)	2.0 (.91)
CE03413	30,000 (13,608)	7/8 (22.23)	1-3/8 (34.92)	3-1/2 (88.9)	2-1/2 (63.5)	1 (25.4)	5/8 (15.88)	13/16 (20.64)	2.5 (1.13)
CE03415	50,000 (22.680)	7/8 (22.23)	1-5/8 (41.28)	3-1/2 (88.9)	2-1/2 (63.5)	1 (25.4)	3/4 (19.05)	1-1/16 (26.99)	2.9 (1.32)
CE03616	25,000 (11,340)	7/8 (22.23)	1-3/4 (44.45)	3-3/4 (95.25)	2-3/4 (69.85)	1 (25.4)	5/8 (15.88)	11/16 (17.46)	2.7 (1.23)
879002000	36,000 (16.330)	7/8 (22.23)	3/4 (19.05)	5-1/2 (139.7)	2-1/8 (53.98)	1-1/4 (31.75)	3/4 (19.05)	13/16 (20.64)	3.9 (1.77)
CE054106	50,000 (22.680)	7/8 (22.23)	1-1/16 (26.99)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	3/4 (19.05)	13/16 (20.64)	3.0 (1.36)
CE05410	40,000 (18,144)	1 (25.4)	1 (25.4)	5-1/2 (139.7)	2-1/2 (63.5)	1 (25.4)	3/4 (19.05)	13/16 (20.64)	3.2 (1.45)
CE0541160	60,000 (27,216)	7/8 (22.23)	1-1/8 (28.58)	5-1/2 (139.7)	2-1/8 (53.98)	1-1/8 (28.58)	3/4 (19.05)	13/16 (20.64)	3.7 (1.68)
CE054125	30,000 (13,608)	7/8 (22.23)	1-5/16 (33.34)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	5/8 (15.88)	13/16 (20.64)	3.5 (1.59)
CE05414	50,000 (22.680)	7/8	1-1/2 (38.1)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	3/4 (19.05)	1-3/16 (30.16)	3.5 (1.59)
CE05415	50,000 (22.680)		1-5/8 (41.28)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	3/4 (19.05)	1-1/16 (26.99)	3.5 (1.59)
CE0541660	60,000 (27.216)	7/8 (22.23)	1-3/4 (44.45)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	7/8 (22.22)	13/16 (20.64)	3.7 (1.68)
CE05420	50,000 (22.680)	(22.23)	2 (50.8)	5-1/2 (139.7)	2-1/8 (53.98)	1 (25.4)	3/4 (19.05)	13/16 (20.64)	3.7 (1.68)

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
DUCTILE IRON
CLEVIS EYE

Wide clevis eyes are used to attach suspension clamps to associated hardware in a single conductor VEE string assembly.

DUCTILE IRON
CEW

Material: Body—ductile iron, galvanized
Hardware—galvanized steel

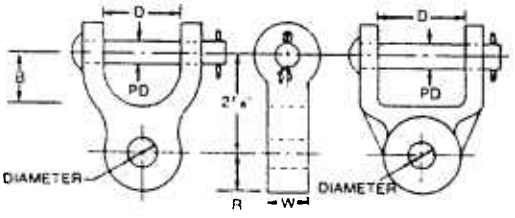


FIGURE 1 FIGURE 2

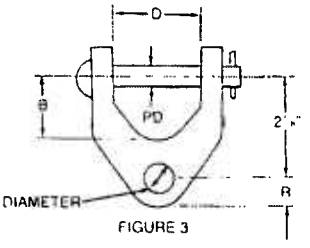
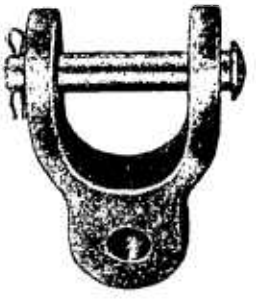


FIGURE 3



CATALOG NUMBER	FIG. NO.	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
			W	D	B	PD	R	DIA.	
CEW0520	3	20,000 (9,072)	5/8 (15.88)	2-1/4 (57.15)	1-13/16 (46.04)	5/8 (15.88)	13/16 (20.64)	11/16 (17.46)	2.4 (1.09)
CEW1030	1	30,000 (13,608)	1 (25.40)	2-1/4 (57.15)	1-15/16 (49.21)	5/8 (15.88)	1 (25.40)	11/16 (17.46)	2.6 (1.18)
CEW103075	2	30,000 (13,608)	1 (25.40)	2-13/16 (71.44)	1-9/16 (39.69)	3/4 (19.05)	15/16 (23.81)	11/16 (17.46)	3.0 (1.36)
CEW13530	1	30,000 (13,608)	1-7/16 (36.51)	2 (50.80)	1-13/16 (46.04)	5/8 (15.88)	1 (25.40)	11/16 (17.46)	2.6 (1.18)
CEW1353013	1	30,000 (13,608)	1-7/16 (36.51)	2 (50.80)	1-13/16 (46.04)	5/8 (15.88)	1 (25.40)	13/16 (20.64)	2.6 (1.18)
CEW1630	1	30,000 (13,608)	1-3/4 (44.45)	2 (50.80)	1-13/16 (46.04)	5/8 (15.88)	1 (25.40)	11/16 (17.46)	2.8 (1.27)
CEW2230	1	30,000 (13,608)	2-1/4 (57.15)	2 (50.80)	1-13/16 (46.04)	5/8 (15.88)	1 (25.40)	11/16 (17.46)	3.2 (1.45)
CEW223013	1	30,000 (13,608)	2-1/4 (57.15)	2 (50.80)	1-13/16 (46.04)	5/8 (15.88)	1 (25.40)	13/16 (20.64)	3.2 (1.45)
CEW2330	2	30,000 (13,608)	2-3/8 (60.33)	2-1/4 (57.15)	1 7/16 (36.51)	5/8 (15.88)	13/16 (20.64)	11/16 (17.46)	3.5 (1.59)

TG-7

TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.

T12

HARDWARE FITTINGS
DUCTILE IRON
Y-CLEVIS EYE

DUCTILE IRON
YCS

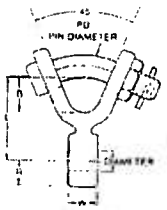


FIGURE 1 YCS

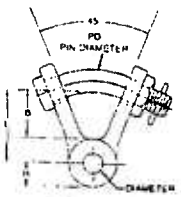


FIGURE 2 YCS90

Y-clevis eyes are primarily used to attach clamping devices to yoke plates or other associated hardware in a bundle conductor assembly. The bent bolt in the Y-section provides an additional point of articulation within an assembly.

Material: Body—ductile iron or forged steel, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	FIG. NO.	ULTIMATE STRENGTH LBS. (KG)	DIMESNIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
			B	L	W	R	PD	DIA.	
YCS04	1	19,000 (8,618)	1-3/8 (34.92)	2-13/16 (71.44)	1/2 (12.70)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.75 (.79)
YCS0490	2	19,000 (8,618)	1-5/8 (41.28)	2-7/16 (61.98)	1/2 (12.70)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.75 (.79)
YCS04034	1	19,000 (8,618)	1-3/4 (44.45)	3-1/2 (88.9)	1/2 (12.70)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.7 (1.22)
854502000*	1	30,000 (13,608)	1-1/2 (38.1)	3-3/4 (95.25)	5/8 (15.88)	25/32 (19.84)	3/4 (19.05)	11/16 (17.46)	2.0 (.91)
854512000*	2	30,000 (13,608)	1-1/2 (38.1)	3-3/4 (95.25)	5/8 (15.88)	25/32 (19.84)	3/4 (19.05)	11/16 (17.46)	2.0 (.91)
YCS05	1	20,000 (9,072)	1-3/8 (34.92)	2-13/16 (71.44)	5/8 (15.88)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.85 (.84)
YCS0590	2	20,000 (9,072)	1-5/8 (41.28)	2-7/16 (61.98)	5/8 (15.88)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.85 (.84)
YCS059030	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	5/8 (15.88)	7/8 (22.23)	3/4 (19.05)	11/16 (17.46)	1.85 (.84)
YCS06	1	25,000 (11,340)	1-3/8 (34.92)	2-13/16 (71.44)	3/4 (19.05)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.90 (.86)
YCS0-90	2	25,000 (11,340)	1-5/8 (41.28)	2-7/16 (61.98)	3/4 (19.05)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.90 (.86)
YCS069040	2	40,000 (13,144)	2 (50.80)	3-5/16 (84.14)	3/4 (19.05)	1 (25.40)	7/8 (22.23)	13/16 (20.64)	3.4 (1.54)
YCS07	1	30,000 (13,608)	1-3/8 (34.92)	2-13/16 (71.44)	7/8 (22.23)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.90 (.86)
YCS10	1	30,000 (13,608)	1-3/8 (34.92)	2-13/16 (71.44)	1 (25.40)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.95 (.88)
YCS1090	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1 (25.40)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	1.95 (.88)
YCS10590	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1-1/16 (26.99)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.00 (.91)
YCS1059013	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1-1/16 (26.99)	13/16 (20.64)	3/4 (19.05)	13/16 (20.64)	2.00 (.91)
YCS11	1	30,000 (13,608)	1-3/8 (34.92)	2-13/16 (71.44)	1-1/8 (28.58)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.00 (.91)
YCS119045	2	45,000 (20,412)	1-1/16 (26.99)	2-9/16 (65.09)	1-1/8 (28.58)	29/32 (23.02)	7/8 (22.23)	13/16 (20.64)	2.50 (1.13)
YCS1290	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1-1/4 (31.75)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.50 (1.13)
YCS129040	2	40,000 (18,144)	1-9/16 (39.69)	2-3/8 (60.32)	1-1/4 (31.75)	13/16 (20.64)	7/8 (22.23)	13/16 (20.64)	2.50 (1.13)
YCS1390	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1-3/8 (34.92)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.25 (1.02)
YCS1690	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	1-3/4 (44.45)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.30 (1.04)
YCS169040	2	40,000 (18,144)	1-9/16 (39.69)	2-3/8 (60.32)	1-3/4 (44.45)	13/16 (20.64)	7/8 (22.23)	13/16 (20.64)	2.50 (1.13)
YCS2090	2	30,000	1-5/8 (41.28)	2-7/16 (61.98)	2 (50.8)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.75 (1.25)
YCS209040	2	,144)	1-9/16 (39.69)	2-3/8 (60.33)	2 (50.8)	13/16 (20.64)	7/8 (22.23)	13/16 (20.64)	3.00 (1.36)
YCS219013	2	30,000	1-5/8 (41.28)	2-7/16 (61.98)	2-1/8 (53.98)	13/16 (20.64)	3/4 (19.05)	13/16 (20.64)	3.00 (1.36)
YCS			1-9/16 (39.69)	2-3/8 (60.32)	2-1/8 (53.98)	13/16 (20.64)	7/8 (22.23)	13/16 (20.64)	3.00 (1.36)
YCS2290	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	2-1/4 (57.15)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	2.75 (1.25)
YCS2490	2	30,000 (13,608)	1-5/8 (41.28)	2-7/16 (61.98)	2-1/2 (63.5)	13/16 (20.64)	3/4 (19.05)	11/16 (17.46)	3.00 (1.36)
YCS269040	2	40,000 (18,144)	1-9/16 (39.69)	2-3/8 (60.32)	2-3/4 (69.85)	13/16 (20.64)	7/8 (22.23)	13/16 (20.64)	3.45 (1.47)

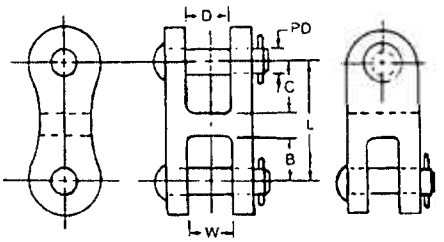
*Forged Steel

HARDWARE FITTINGS
DUCTILE IRON
CLEVIS CLEVIS

DUCTILE IRON
CCC

Clevis clevises are used to attach clevis tongue insulators to various associated hardware within an insulator string.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



TYPE CCC TYPE CCC90

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	C	W	D	PD	
CCC25	25,000 (11,340)	3 (76.20)	1-1/16 (26.99)	1-1/2 (38.10)	11/16 (17.46)	1-3/16 (30.16)	5/8 (15.88)	2.5 (1.13)
CCC251	25,000 (11,340)	5 (127.00)	1-1/2 (38.10)	1 (25.40)	1-3/16 (30.16)	11/16 (17.46)	5/8 (15.88)	3.7 (1.68)
CCC30	30,000 (13,608)	4 (101.60)	1-3/4 (44.45)	1-3/4 (44.45)	7/8 (22.23)	7/8 (22.23)	5/8 (15.88)	2.5 (1.13)
CCC30115	30,000 (13,608)	4 (101.60)	2 (50.80)	1-1/2 (38.10)	1-3/16 (30.16)	7/8 (22.23)	5/8 (15.88)	3.0 (1.36)
CCC3090	30,000 (13,608)	3 (76.20)	1-3/8 (34.92)	1-3/8 (34.92)	7/8 (22.23)	7/8 (22.23)	5/8 (15.88)	2.5 (1.13)
CCC309055	30,000 (13,608)	5-1/2 (139.70)	1-3/4 (44.45)	1-3/4 (44.45)	15/16 (23.81)	15/16 (23.81)	5/8 (15.88)	5.7 (2.59)
CCC40	40,000 (18,144)	4 (101.60)	1-3/4 (44.45)	1-3/4 (44.45)	7/8 (22.23)	7/8 (22.23)	3/4 (19.05)	3.2 (1.45)
CCC4090	40,000 (18,144)	3-1/2 (88.90)	1-1/2 (38.10)	1-1/2 (38.10)	7/8 (22.23)	7/8 (22.23)	3/4 (19.05)	3.2 (1.45)
CCC50	50,000 (22,680)	4-1/2 (114.30)	2 (50.80)	2 (50.80)	1 (25.40)	1 (25.40)	3/4 (19.05)	4.0 (1.81)
CCC5090	50,000 (22,680)	4-1/2 (114.30)	2 (50.80)	2 (50.80)	1 (25.40)	1 (25.40)	3/4 (19.05)	4.0 (1.81)
CCC80BNK	80,000 (36,288)	5-1/8 (130.18)	2-1/4 (57.15)	2-1/4 (57.15)	1-5/8 (41.28)	1-1/4 (31.75)	+	6.0 (2.72)

+Furnished with bolt, nut and cotter pin; 1" diameter bolt at "D" opening, 1 1/8" diameter bolt at "W" opening.

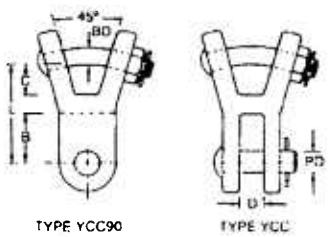
TG-9

HARDWARE FITTINGS
DUCTILE IRON
Y-CLEVIS CLEVIS

DUCTILE IRON
YCC

Y-clevis clevises are used to attach clevis tongue insulators to various associated hardware within an insulator string. The ball in the Y-clevis section provides an additional point of articulation within an assembly.

Material: Body—ductile iron, galvanized
Hardware—steel



TYPE YCC90 TYPE YCC

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		D	L	B	C	PD	BD	
YCC30	30,000 (13,608)	7/8 (22.23)	3-1/4 (82.55)	1-3/8 (34.92)	1-3/8 (34.92)	5/8 (15.88)	3/4 (19.05)	2.5 (1.13)
YCC3090	30,000 (13,608)	7/8 (22.23)	3-1/4 (82.55)	1-3/8 (34.92)	1-1/2 (38.10)	5/8 (15.88)	3/4 (19.05)	2.5 (1.13)

TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.

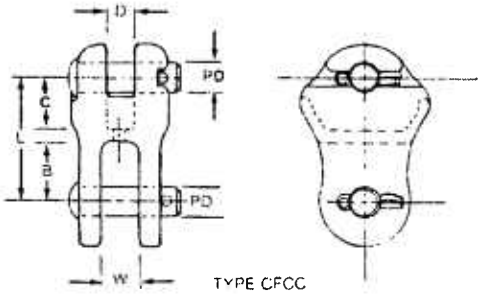
T12

HARDWARE FITTINGS
DUCTILE IRON
CORONA FREE CLEVIS CLEVIS

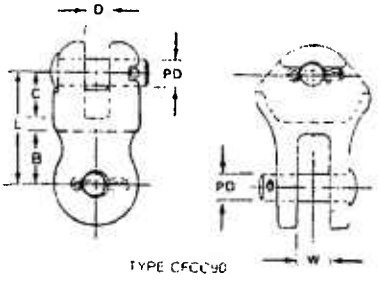
DUCTILE IRON
CFCC

Corona free clevis clevises are used at EHV levels to attach clevis tongue insulators to various associated hardware within an insulator string.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



TYPE CFCC



TYPE CFCC90

TG-10

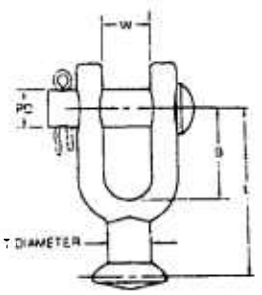
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	C	W	D	PD	
CFCC30	30,000 (13,608)	3-1/8 (79.38)	1-19/32 (40.48)	1-7/32 (30.96)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	3.00 (1.36)
CFCC3090	30,000 (13,608)	3-1/8 (79.38)	1-19/32 (40.48)	1-7/32 (30.96)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	3.00 (1.36)
CFCC40	40,000 (18,144)	3-1/4 (82.55)	1-3/4 (44.45)	1-3/16 (30.16)	7/8 (22.23)	15/16 (23.81)	3/4 (19.05)	4.75 (2.15)
CFCC4090	40,000 (18,144)	3-1/4 (82.55)	1-3/4 (44.45)	1-3/16 (30.16)	7/8 (22.23)	15/16 (23.81)	3/4 (19.05)	4.75 (2.15)

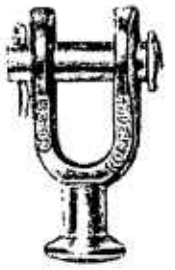
HARDWARE FITTINGS
FORGED STEEL
BALL CLEVIS

FORGED STEEL
BC

Ball clevises are used to attach ball and socket insulators to other associated tower hardware.

Material: Body—galvanized steel
Clevis Pin—galvanized steel
Cotter Pin—stainless steel





CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)					APPROX. WT. EACH LBS. (KG)
		L	B	W	PD	T DIA.	
BC30	30,000 (13,608)	2-7/8 (73.03)	1-9/16 (39.69)	15/16 (23.81)	5/8 (15.88)	23/32 (18.26)	.95 (.43)
*BC50	50,000 (22,680)	4-5/16 (109.54)	1-15/16 (49.21)	15/16 (23.81)	7/8 (22.23)	57/64 (22.62)	2.3 (1.04)
704882000	30,000 (13,608)	3-15/16 (100.01)	2-1/2 (63.50)	13/16 (20.64)	5/8 (15.88)	23/32 (18.26)	1.24 (.56)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

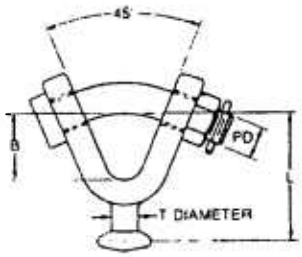
TG-11

HARDWARE FITTINGS
FORGED STEEL
BALL Y-CLEVIS

FORGED STEEL
YBC

Ball Y-clevises are used to attach ball and socket insulators to other associated hardware. The bent bolt in the Y-clevis section provides an additional point of articulation.

Material: Body—galvanized steel
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		L	B	PD	T DIA.	
YBC30	30,000 (13,608)	3-3/32 (78.49)	1-1/2 (35.10)	3/4 (19.05)	23/32 (18.26)	1.90 (.86)
*YBC50	50,000 (22,680)	3-15/16 (100.20)	1-13/16 (46.04)	7/8 (22.23)	57/64 (22.62)	2.80 (1.27)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

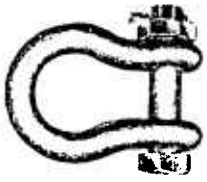
TRANSMISSION CONNECTORS

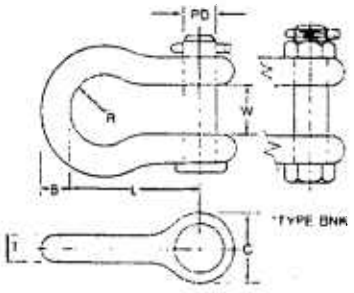
HARDWARE FITTINGS
FORGED STEEL
ANCHOR SHACKLE

HUBBELL POWER SYSTEMS, INC.

T12

FORGED STEEL
AS





Anchor shackles are used to attach hardware to the tower pad. Back to back anchor shackles are commonly used at the tower attachment point to orient the plane of the tower plate and the balance of the insulator hardware.

Material: Body—galvanized steel
Hardware—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)							APPROX. WT. EACH LBS. (KG)
		L	B	W	C	T	R	PD	
AS25	30,000 (13,608)	2-3/8 (60.33)	5/8 (15.88)	7/8 (22.22)	1-3/8 (34.92)	1/2 (12.7)	11/16 (17.46)	5/8 (15.88)	.74 (.34)
AS25BNK	30,000 (13,608)	2-3/8 (60.33)	5/8 (15.88)	7/8 (22.22)	1-3/8 (34.92)	1/2 (12.7)	11/16 (17.46)	5/8 (15.88)	.86 (.39)
AS25L	30,000 (13,608)	2-25/32 (70.64)	5/8 (15.88)	7/8 (22.22)	1-3/8 (34.92)	1/2 (12.7)	21/32 (16.67)	5/8 (15.88)	1.00 (.45)
AS25LBNK	30,000 (13,608)	2-25/32 (70.64)	5/8 (15.88)	7/8 (22.22)	1-3/8 (34.92)	1/2 (12.7)	21/32 (16.67)	5/8 (15.88)	1.12 (.51)
AS25WBNK	30,000 (13,608)	3 (76.2)	5/8 (15.88)	1-3/4 (44.45)	1-11/16 (42.86)	5/8 (15.88)	1 (25.4)	5/8 (15.88)	1.65 (.75)
AS35	35,000 (15,876)	2-25/32 (70.64)	11/16 (17.46)	1-1/16 (26.99)	1-11/16 (42.86)	5/8 (15.88)	3/4 (19.05)	3/4 (19.05)	1.47 (.67)
AS35BNK	40,000 (18,144)	2-25/32 (70.64)	11/16 (17.46)	1-1/16 (26.99)	1-11/16 (42.86)	5/8 (15.88)	3/4 (19.05)	3/4 (19.05)	1.66 (.75)
AS50	50,000 (22,680)	3-1/2 (88.9)	7/8 (22.22)	7/8 (22.23)	1-7/8 (47.62)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)	2.25 (1.02)
AS50BNK	60,000 (27,216)	3-1/2 (88.9)	7/8 (22.22)	7/8 (22.23)	1-7/8 (47.62)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)	2.44 (1.11)
970303001	60,000 (27,216)	5 (127.0)	5/8 (15.88)	1-1/8 (28.58)	1-7/8 (47.62)	3/4 (19.05)	9/16 (14.29)	3/4 (19.05)	2.4 (1.10)
*970303002	60,000 (27,216)	5 (127.0)	5/8 (15.88)	1-1/8 (28.58)	1-7/8 (47.62)	3/4 (19.05)	9/16 (14.29)	3/4 (19.05)	2.5 (1.13)
AS50W	50,000 (22,680)	3-1/2 (88.9)	7/8 (22.22)	1-1/4 (31.75)	1-15/16 (49.21)	3/4 (19.05)	1 (25.4)	7/8 (22.22)	2.25 (1.02)
AS50WBNK	60,000 (27,216)	3-1/2 (88.9)	7/8 (22.22)	1-1/4 (31.75)	1-15/16 (49.21)	3/4 (19.05)	1 (25.4)	7/8 (22.22)	2.75 (1.25)
AS60BNK	80,000 (36,288)	3-3/4 (95.25)	7/8 (22.22)	1-7/16 (36.51)	2-1/8 (53.98)	7/8 (22.23)	1-1/8 (28.58)	1 (25.4)	4.31 (1.96)
AS60875BNK	72,000 (32,688)	3-3/4 (95.25)	7/8 (22.22)	1-7/16 (36.51)	2-1/8 (53.98)	7/8 (22.23)	1-1/8 (28.58)	7/8 (22.22)	4.10 (1.86)
*974153001	120,000 (54,432)	6 (152.4)	1 (25.4)	1-1/2 (38.1)	2-3/8 (60.33)	1 (25.4)	1-1/16 (26.99)	1-1/8 (28.58)	6.20 (2.81)
974153002	100,000 (45,360)	6 (152.4)	1 (25.4)	1-1/2 (38.1)	2-3/8 (60.33)	1 (25.4)	1-1/16 (26.99)	1-1/8 (28.58)	6.00 (2.72)
*976743001	100,000 (45,360)	4-5/16 (109.54)	1 (25.4)	1-11/16 (42.86)	2-3/8 (60.33)	1 (25.4)	1-11/32 (34.13)	1-1/8 (28.58)	5.90 (2.69)
*946693001	100,000 (45,360)	4-5/16 (109.54)	1 (25.4)	1-3/16 (46.04)	2-3/8 (60.33)	1 (25.4)	1-11/32 (34.13)	1-1/8 (28.58)	5.70 (2.59)
AS135	135,000 (61,236)	6 (152.4)	1-1/2 (38.1)	2-1/4 (57.15)	3-3/8 (85.72)	1-3/8 (34.92)	1-13/16 (46.04)	1-1/2 (38.1)	15.75 (7.14)
AS135BNK	150,000 (68,040)	6 (152.4)	1-1/2 (38.1)	2-1/4 (57.15)	3-3/8 (85.72)	1-3/8 (34.92)	1-13/16 (46.04)	1-1/2 (38.1)	15.75 (7.14)

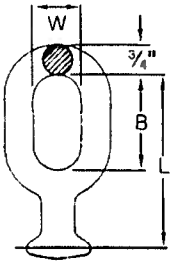
*These shackles are type BNK.

HARDWARE FITTINGS
FORGED STEEL
BALL EYES

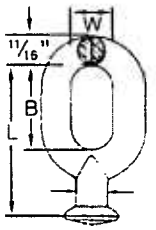
Ball eyes are used to attach ball and socket insulators to other associated hardware. The use of the ball oval eye and an anchor shackle is one of the most common distribution tower attachment combinations.

Material: Galvanized steel

FORGED STEEL
BE



909462000



BE30

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)			APPROX. WT. EACH LBS. (KG)
		L	B	W	
**BE30	30,000 (13,608)	3-23/32 (94.49)	2 (50.80)	1 (25.40)	1.00 (.45)
***909462000	50,000 (22,680)	4-1/2 (114.30)	2-1/2 (63.50)	1 1/4 (31.75)	1.55 (.70)

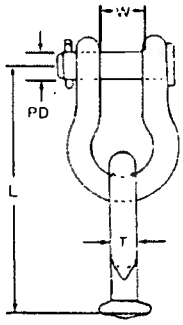
NOTE: **For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
***For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

TG-12

HARDWARE FITTINGS
FORGED STEEL
BALL OVAL-EYE ANCHOR SHACKLE COMBINATION

Ball oval-eye anchor shackle combinations are popular combinations which are sold as assemblies to save field assembly time. Contact factory for other pre-assembled combinations.
Material: Body—galvanized steel

FORGED STEEL
BEAS

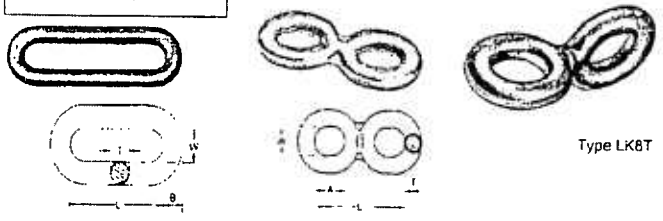


CATALOG NUMBER	ULTIMATE STRENGTH (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		W	L	T	PD	
BE30AS25	30,000 (13,608)	7/8 (22.23)	5-29/32 (150.02)	11/16 (17.46)	5/8 (15.88)	1.74 (.79)
BE30AS35	30,000 (13,608)	1-1/16 (26.99)	6-1/2 (165.10)	11/16 (17.46)	3/4 (19.05)	2.47 (1.12)
BE30AS50	30,000 (13,608)	7/8 (22.23)	7-7/32 (183.36)	11/16 (17.46)	3/4 (19.05)	3.25 (1.47)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
Other combinations may be used, contact factory for additional information.

HARDWARE FITTINGS
FORGED STEEL
CHAIN LINK

FORGED STEEL
LK



Type LK8T

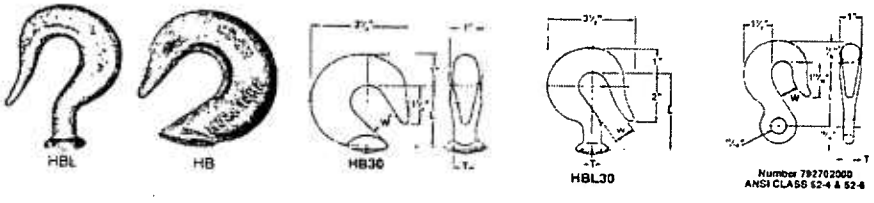
Links are used to maintain proper tower clearance and connect associated hardware within an insulator string.

Material: Galvanized steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)					APPROX. WT. EACH LBS. (KG)
		L	A	B	W	T	
LK30	30,000 (13,608)	2-1/4 (57.15)	—	1/2 (12.70)	1 (25.40)	1/2 (12.70)	.44 (.20)
LK60	60,000 (27,216)	3-1/2 (88.90)	—	3/4 (19.05)	1 (25.40)	3/4 (19.05)	1.5 (.68)
LK80	80,000 (36.288)	4 (101.60)	—	7/8 (22.23)	1-1/4 (31.75)	7/8 (22.23)	2.15 (.96)
LK150	150,000 (68,040)	5-1/2 (139.70)	—	1-3/8 (34.93)	1-3/4 (44.45)	1-3/8 (34.93)	6.90 (3.13)
LK830	30,000 (13,608)	3-3/8 (85.70)	1-1/8 (28.58)	—	7/8 (22.23)	9/16 (14.30)	.75 (.34)
LK830T	30,000 (13,608)	3-3/8 (85.70)	1-1/8 (28.58)	—	7/8 (22.23)	9/16 (14.30)	.75 (.34)
792722000	45,000 (20.412)	3-1/4 (82.55)	—	11/16 (17.53)	1 (25.40)	11/16 (17.53)	.95 (.43)

TG-14

HARDWARE FITTINGS
FORGED STEEL
HOOKS



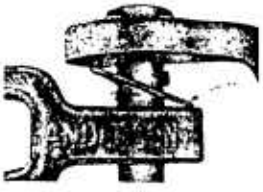
Hooks are used to attach ball and socket or clevis insulators directly to the tower attachment pad. All hooks are of the self-locking design.

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)			APPROX. WT. EACH LBS. (KG)
		L	W	T	
HB30	30,000 (13,608)	2 (50.80)	13/16 (20.64)	23.32 (18.26)	1.05 (.48)
HBL30	30,000 (13.608)	3-1/8 (79.38)	7/8 (22.23)	23.32 (18.26)	1.33 (.60)
792702000	30,000 (13,608)	3 (76.20)	13/16 (20.64)	1/2 (12.70)	1.30 (.59)

Hooks For Use With Class 52-3 And 52-5 Insulators Per ANSI Spec. C-29.2-71.

797202000 for use with class 52-4 and 52-6 clevis type insulators per ANSI Spec. C-29.2-71.

HARDWARE FITTINGS
STEEL



RIV CLIP
CATALOG NUMBER 941104001

Clevis connections, especially if working under light mechanical load, can develop oxide films on their bearing surfaces. If these films are not fractured by weight and movement, they are subject to puncture by line voltages whose small discharges can create RIV. By establishing a shunt around the clevis joint, by means of RIV clips, the condition is easily remedied. Clips are made of spring stainless steel wire with ends cut flat and sharp to give good point contact. They are held securely by snapping around the Clevis Pin. Clip weight is 0.845 pounds per hundred.

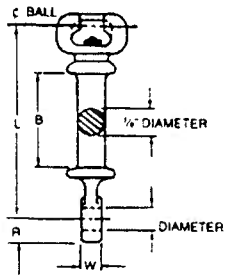
TRANSMISSION CONNECTORS

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE SOCKET EYE

DUCTILE IRON
HSE

Hot line socket eyes are used to connect ball and socket insulators to other associated hardware. Shoulders are provided to accommodate hot line tools.

Material: Body—ductile iron, galvanized
Cotter Pin—stainless steel



CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)					APPROX. WT. EACH LBS. (KG)
		L	B	W	R	DIA.	
HSE07712	30,000 (13,608)	7-7/8 (200.03)	4-1/8 (104.78)	1-1/4 (31.75)	1 (25.40)	11/16 (17.46)	3.23 (1.47)
HSE10004	19,000 (8,618)	10 (254.00)	6-1/4 (158.75)	1/2 (12.70)	13/16 (20.64)	11/16 (17.46)	2.78 (1.26)
HSE10005	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	5/8 (15.88)	7/8 (22.23)	11/16 (17.46)	2.87 (1.30)
HSE100055	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	11/16 (17.46)	7/8 (22.23)	11/16 (17.46)	2.9 (1.32)
HSE10006	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	3/4 (19.05)	7/8 (22.23)	11/16 (17.46)	2.97 (1.36)
HSE100065	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	13/16 (20.64)	15/16 (23.81)	13/16 (20.64)	3.00 (1.36)
HSE1000613	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	3/4 (19.05)	7/8 (22.23)	13/16 (20.64)	2.97 (1.36)
HSE10010	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	1 (25.40)	1 (25.40)	1-1/16 (26.99)	3.00 (1.36)
HSE100105	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	1-1/16 (26.99)	1-1/4 (31.75)	1-1/16 (26.99)	3.10 (1.41)
HSE10012	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	1-1/4 (31.75)	1 (25.40)	1-3/16 (30.16)	3.10 (1.41)
HSE100121116	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	1-1/4 (31.75)	1 (25.40)	11/16 (17.46)	3.20 (1.45)
HSE12560613	30,000 (13,608)	12-9/16 (319.09)	8-13/16 (223.84)	3/4 (19.05)	1 (25.40)	13/16 (20.64)	3.36 (1.52)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.

TRANSMISSION CONNECTORS

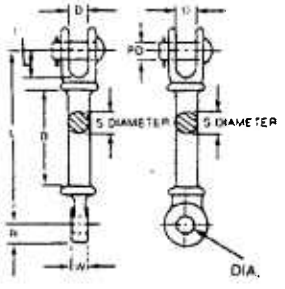
HUBBELL POWER SYSTEMS, INC.

T12

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE EXTENSION CLEVIS EYE

DUCTILE IRON
HCE

TYPE-HCE



TYPE-HCE90

Hot line clevis eyes are used to connect clevis tongue insulators to various associated hardware. Shoulders are provided to accommodate hotline tools.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

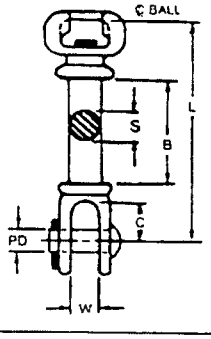
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)								APPROX. WT. EACH LBS. (KG)
		L	B	D	W	R	DIA.	PD	S	
HCE0705	30,000 (13,608)	7 (177.8)	3 (76.20)	13/16 (20.64)	5/8 (15.88)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	7/8 (22.23)	2.5 (1.13)
HCE10005	30,000 (13,608)	10 (254.00)	6 (152.40)	13/16 (20.64)	5/8 (15.88)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	7/8 (22.23)	2.7 (1.22)
HCE1000590	30,000 (13,608)	10 (254.00)	6 (152.40)	1 (25.40)	5/8 (15.88)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	7/8 (22.23)	2.8 (1.27)
HCE10006	30,000 (13,608)	10 (254.00)	6 (152.40)	13/16 (20.64)	3/4 (19.05)	7/8 (22.23)	11/16 (17.46)	5/8 (15.88)	7/8 (22.23)	3.1 (1.41)
HCE1000613	30,000 (13,608)	10 (254.00)	6 (152.40)	13/16 (20.64)	3/4 (19.05)	7/8 (22.23)	13/16 (20.64)	5/8 (15.88)	7/8 (22.23)	3.1 (1.41)
HCE1101240	40,000 (18,141)	11 (279.40)	6 (152.40)	7/8 (22.23)	1-1/4 (31.75)	1-1/4 (31.75)	1-3/16 (30.16)	3/4 (19.05)	1-1/8 (28.58)	3.52 (1.60)

TG-16

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE EXTENSION SOCKET CLEVIS

DUCTILE IRON
HSC

HSC110501



Hot line socket clevis are used to connect ball and socket insulators to other associated hardware. Shoulders are provided to accommodate hot line tools.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	C	W	PD	S	
HSC083	30,000 (13,608)	8-3/8 (212.73)	4-5/8 (117.48)	1-1/2 (38.10)	1 (25.40)	5/8 (15.88)	7/8 (22.23)	3.0 (1.36)
HSC100	30,000 (13,608)	10 (254.00)	6-1/4 (158.75)	1-1/2 (38.10)	1 (25.40)	5/8 (15.88)	7/8 (22.23)	3.5 (1.59)
HSC10035	35,000 (15,876)	10 (254.00)	6-3/32 (154.78)	1-5/8 (41.28)	1 (25.40)	3/4 (19.05)	1-1/32 (26.19)	4.5 (2.04)
*HSC110501	50,000 (22,680)	11 (279.40)	6-13/16 (173.04)	2 (50.80)	1-5/16 (33.34)	7/8 (22.23)	1-3/16 (30.16)	7.0 (3.18)

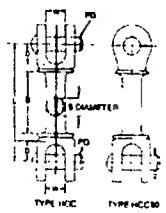
NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

TRANSMISSION CONNECTORS

HOT LINE CLEVIS CLEVIS
TYPE HCC

A hot line clevis clevis is used to connect associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel



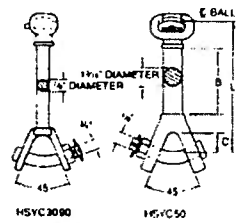
DUCTILE IRON
HCC

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS—INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	W	D	S DIA	PD	
HCC30	30,000 (13,608)	10 (254)	5-7/8 (149.22)	1 (25.40)	1-5/8 (41.28)	7/8 (22.23)	5/8 (15.88)	3.4 (1.54)
HCC3090	30,000 (13,608)	10 (254)	6 (152.4)	1 (25.40)	1-5/8 (41.28)	7/8 (22.23)	5/8 (15.88)	3.4 (1.54)
HCC309015	30,000 (13,608)	15 (381)	11 (279.40)	1 (25.40)	1-1/2 (38.10)	7/8 (22.23)	5/8 (15.88)	4.0 (1.81)
HCC4015	40,000 (18,144)	15 (381)	9-3/4 (247.64)	1-1/16 (26.99)	2 (50.80)	1-1/8 (28.58)	3/4 (19.05)	4.5 (2.04)

HOT LINE SOCKET Y-CLEVIS
TYPE HSYC

Hot line socket Y-clevises are used to attach ball and socket insulators to other associated hardware. Shoulders are provided to accommodate hot line tools and the bent bolt in the Y-section provides an additional point of articulation within an assembly.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel



DUCTILE IRON
HSYC

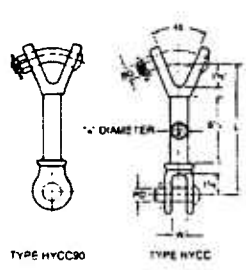
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSION—INCHES (MM)			APPROX. WT. EACH LBS. (KG)
		L	B	C	
HSYC30	30,000 (13,608)	9-11/16 (246.06)	6 (152.40)	1-9/16 (39.69)	3.6 (1.63)
HSYC3090	30,000 (13,608)	9-11/16 (246.06)	6 (152.40)	1-9/16 (39.69)	3.6 (1.63)
*HSYC50	50,000 [illegible]	10-5/16 (261.91)	5-29/32 (150.02)	1-5/8 (41.28)	7.5 (3.40)

NOTE: For use with class 52-3 and [illegible] per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 per ANSI Spec. C-29.2-71.

HOT LINE Y-CLEVIS CLEVIS
TYPE HYCC

Hot line Y-clevis clevises are used to connect associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools and the bent bolts in the Y-clevises provide additional points of articulation within an assembly.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel



DUCTILE IRON
HYCC

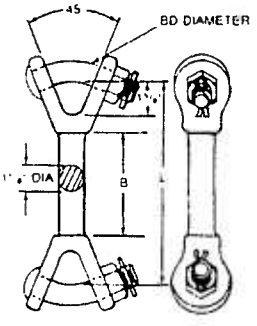
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS—INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		L	W	PD	BD	
HYCC30	30,000 (13,608)	10-3/8 (263.53)	1 (25.40)	5/8 (15.88)	3/4 (19.05)	3.5 (1.59)
HYCC3090	30,000 (13,608)	10-3/8 (263.53)	1 (25.40)	5/8 (15.88)	3/4 (19.05)	3.5 (1.59)

TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.
T12

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE Y-Y-CLEVIS

DUCTILE IRON
HYYC



Hot line Y-Y-clevis is used to connect associated hardware within an insulator string or connecting deadend clamps to yoke plates providing clearances for jumper ends. Shoulders are provided to accommodate hot line tools and the bent bolts in the Y-clevises provide additional points of articulation within an assembly.

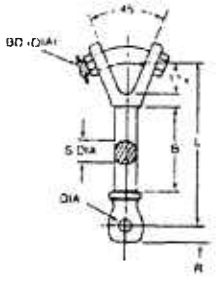
Material: Body—ductile iron, galvanized.
Hardware—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE BODY STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)				APPROX. WT. EACH LBS. (KG)
		L	B	BD (DIA.)	S DIA.	
HYYC3015	30,000 (13,608)	15 (381.0)	10-3/8 (263.65)	3/4 (19.05)	7/8 (22.23)	4.3 (1.98)
HYYC50157	50,000 (22,680)	15 (381.0)	10-1/8 (257.18)	7/8 (22.23)	1-1/8 (28.57)	9.0 (4.08)

TG-18

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE Y-CLEVIS EYE

DUCTILE IRON
HYCE



HYCE


HYCE90

Hot line Y-clevis eyes are used to connect associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools. The bent bolt in the Y-section provides an additional point of articulation within an assembly.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel

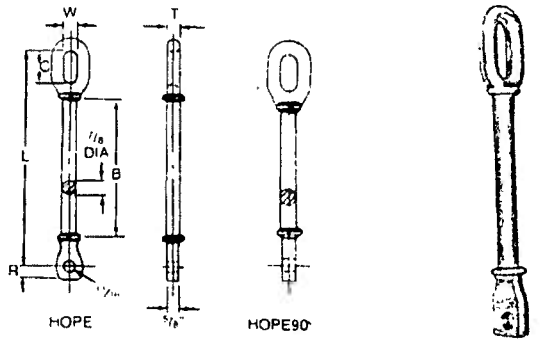
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)							APPROX. WT. EACH LBS. (KG)
		L	R	S. DIA.	B	DIA.	W	BD	
HYCE157875	15,000 (6,804)	7-7/8 (200.02)	15/16 (23.81)	5/8 (15.88)	3-1/4 (82.55)	11/16 (17.46)	1/2 (12.7)	3/4 (19.05)	3.1 (1.41)
HYCE15787590	15,000 (6,804)	7-7/8 (200.02)	15/16 (23.81)	5/8 (15.88)	3-1/4 (82.55)	11/16 (17.46)	1/2 (12.7)	3/4 (19.05)	3.1 (1.41)
HYCE1512	15,000 (6,804)	12 (304.8)	15/16 (23.81)	5/8 (15.88)	7-3/8 (187.32)	11/16 (17.46)	1/2 (12.7)	3/4 (19.05)	3.4 (1.54)
HYCE3011	30,000 (13,608)	11 (279.4)	15/16 (23.81)	7/8 (22.22)	6-3/8 (161.92)	11/16 (17.46)	5/8 (15.88)	3/4 (19.05)	4.2 (1.91)
HYCE301190	30,000 (13,608)	11 (279.4)	15/16 (23.81)	15/16 (23.81)	6-3/8 (161.92)	11/16 (17.46)	5/8 (15.88)	3/4 (19.05)	4.57 (2.07)
HYCE301590	30,000 (13,608)	15 (381)	15/16 (23.81)	15/16 (23.81)	10-3/8 (263.52)	11/16 (17.46)	5/8 (15.88)	3/4 (19.05)	5.09 (2.31)
HYCE401190	40,000 (18,144)	11 (279.4)	1-1/32 (26.19)	1-1/8 (28.58)	6-5/8 (168.28)	13/16 (20.64)	25/32 (19.84)	7/8 (22.23)	4.87 (2.20)

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE OVAL EYE PAD EYE

DUCTILE IRON
HOPE

Hot line oval-eye, pad-eye extension link is used to maintain proper tower clearance and can be used to connect clevis tongue insulators to various associated hardware.

Material: Body—ductile iron, galvanized



CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSION INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	C	R	W	T	
HOPE3012	30,000 (13,608)	12 (304.8)	7 (177.80)	2-1/8 (53.98)	15/16 (23.81)	15/16 (23.81)	23/32 (18.26)	2.8 (1.27)
HOPE301290	30,000 (13,608)	12 (304.8)	7 (177.80)	2-1/8 (53.98)	15/16 (23.81)	15/16 (23.81)	13/16 (20.64)	2.8 (1.27)

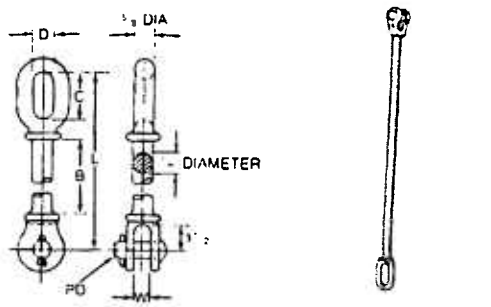
TG-19

HARDWARE FITTINGS
DUCTILE IRON
HOT LINE OVAL-EYE—CLEVIS

DUCTILE IRON
HOEC

Hot line oval-eye clevis extension is used to maintain proper tower clearance. Shoulders are provided to accommodate hot line tools. Oval eye section provides an additional point of articulation.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel



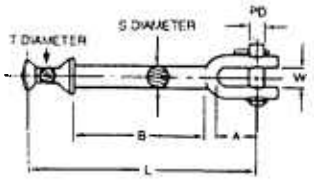
CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSION INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	C	D	W	PD	
HOEC202725	20,000 (9,072)	27-1/4 (692.15)	22-1/2 (571.50)	2 (50.8)	13/16 (20.64)	1 (25.4)	5/8 (15.88)	3.5 (1.59)

TRANSMISSION CONNECTORS

HUBBELL POWER SYSTEMS, INC.

HARDWARE FITTINGS
FORGED STEEL
HOT LINE BALL CLEVIS

FORGED STEEL
HBC



Hot line ball clevises are used to attach ball and socket insulators to other associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools.

Material: Body—ductile iron, galvanized
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS NCHES (MM)							APPROX. WT. EACH LBS. (KG)
		A	L	B	W	PD	S DIA	T DIA	
HBC30	30,000 (13.608)	1-3/4 (44.45)	9-9/16 (242.89)	5-7/8 (149.22)	15/16 (23.81)	5/8 (15.88)	7/8 (22.23)	23/32 (18.26)	2.45 (1.11)
*HBC50	50,000 (22,680)	1-7/8 (47.63)	10-1/16 (255.59)	5-3/8 (136.53)	15/16 (23.81)	7/8 (22.23)	7/8 (22.23)	57/64 (22.62)	3.50 (1.59)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

FORGED STEEL
HYBC

HARDWARE FITTINGS
FORGED STEEL
HOT LINE Y-CLEVIS BALL

TG-20

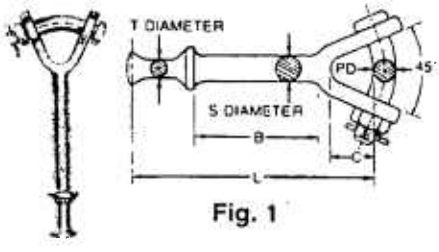


Fig. 1

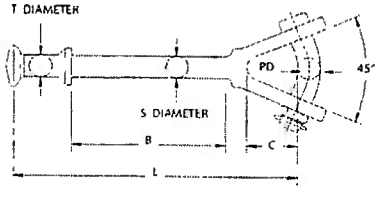


Fig. 2

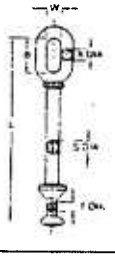
Hot line Y-clevis balls are used to attach ball and socket insulators to other associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools and the bent bolt in the Y-section provides an additional point of articulation within an assembly.

Material: Body—galvanized steel
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	Fig	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
			L	B	C	PD	S DIA	T DIA	
HYBC30	30,000 (13,608)	1	9-5/16 (236.54)	5-3/8 (136.53)	1-1/2 (38.10)	3/4 (19.05)	7/8 (22.23)	23/32 (18.26)	2.8 (1.27)
*HYBC5011	50,000 (22,680)	2	11 (279.40)	6-13/16 (173.04)	1-11/16 (42.86)	7/8 (22.23)	7/8 (22.23)	57/64 (22.62)	4.42 (2.00)

NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.
*For use with class 52-8 and 52-11 insulators per ANSI Spec. C-29.2-71.

FORGED STEEL
HOEB



HARDWARE FITTINGS
FORGED STEEL
HOT LINE OVAL-EYE BALL

Hot line oval-eye ball is used to attach ball and socket insulators to other associated hardware within an insulator string. Shoulders are provided to accommodate hot line tools.

Material: Galvanized steel

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		A	B	L	W	S DIA	T DIA	
HOEB30	30,000 (13,608)	11/16 (17.46)	2 (50.80)	11 (279.40)	1 (25.40)	7/8 (22.23)	23/32 (18.26)	2.31 (1.05)

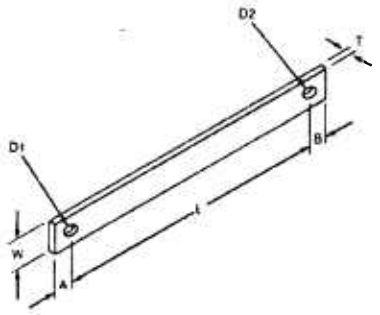
NOTE: For use with class 52-3 and 52-5 insulators per ANSI Spec. C-29.2-71.

HARDWARE FITTINGS
DUCTILE IRON
EXTENSION STRAP

STEEL
ES

Extension straps are used to attach associated hardware and maintain proper tower clearance within a transmission assembly. The reduced delivery time make extension straps an attractive solution for your clearance applications. Because extension straps may be furnished in a variety of lengths, widths, thicknesses, as well as hole spacings, please contact factory for dimensional variations and different ultimate strengths.

Material: Galvanized steel



CATALOG NUMBER	ULTIMATE STENGTH LBS. (KG)	DIMENSIONS INCHES (MM)							APPROX. WT. EACH LBS. (KG)	
		A	B	D1	D2	W	T	L	MIN. L	ADD PER INCH
ES307819L	30,000 (13,608)	1-1/8 (28.58)	1-1/8 (28.58)	15/16 (23.81)	15/16 (23.81)	2 (50.8)	3/4 (19.05)	MIN. "L" 4" PLEASE SPECIFY	2.62 (1.19)	.44 (.60)
ES407819L	40,000 (18,144)	1-1/2 (38.1)	1-1/2 (38.1)	15/16 (23.81)	15/16 (23.81)	2-1/2 (63.5)	3/4 (19.05)		3.67 (1.66)	.55 (.25)
ES607819L	60,000 (27,216)	2 (50.8)	2 (50.8)	1-1/8 (28.58)	1-1/8 (28.58)	2-1/2 (63.5)	1 (25.4)		5.60 (2.54)	.73 (.33)
ES807819L	80,000 (36,288)	2 (50.8)	2 (50.8)	1-1/4 (31.75)	1-1/4 (31.75)	3 (76.2)	1 (25.4)		6.72 (3.05)	.87 (.39)

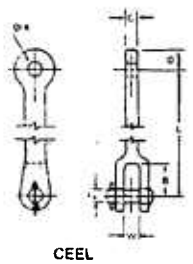
TG-21

HARDWARE FITTINGS
DUCTILE IRON
CLEVIS EYE EXTENSION LINK

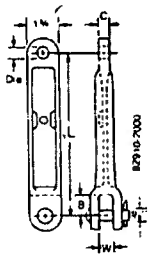
DUCTILE IRON
CEEL

Clevis eyes are used to connect clevis tongue insulators to various associated hardware and maintain conductor spacing in deadend assemblies.

Material: Body—ductile iron, galvanized
Hardware—galvanized steel
Cotter Pin—stainless steel



CEEL



	(KG)	DIMENSION INCHES (MM)						APPROX. WT. EACH LBS. (KG)
		L	B	W	C	D	DIA.	
829102000	20,000 (9,072)	10 (254)	1-1/8 (28.58)	13/16 (20.64)	5/8 (15.88)	7/8 (22.22)	11/16 (17.46)	3.9 (1.77)
CEEL093065	50,000 (22,680)	9-3/8 (238.12)	6 (152.4)	1 (25.4)	13/16 (20.64)	1-3/8 (34.92)	13/16 (20.64)	6.0 (2.72)
CEEL15506	50,000 (22,680)	15-5/8 (396.87)	2-1/8 (53.98)	1 (25.4)	3/4 (19.05)	1-3/8 (34.92)	13/16 (20.64)	7.0 (3.18)

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
FORGED STEEL
HOT LINE EXTENSION LINKS

FORGED STEEL
H/F

Extension links are forged from high-strength steel and contain no welded joints. Because of the variety of fittings and lengths, links are made only to order. Please specify by catalog number and length required.

All links have shoulders to accommodate hot-line tools. Links are protected by a heavy coating of galvanizing.

NOTES: Be sure to specify lengths in 1/2" increments. Example: HOO40205 for 20-1/2" long.

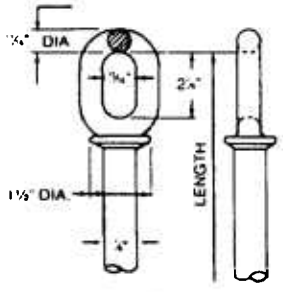
Normal manufacturing tolerances: Up to 50 inches—±1 inch.
Above 50 inches—±2%.

TG-22

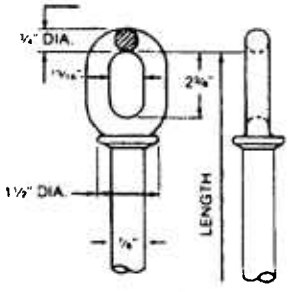
IDENTIFICATION	ULTIMATE STRENGTH LBS. (KG)	SHAPE AND ORIENTATION OF ENDS	CATALOG NUMBER	FIGURE	AVAILABLE RANGE OF LENGTHS		APPROX. PACKED WEIGHT* PER 100 MINIMUM LENGTH POUNDS (KG)
					MINIMUM INCHES (MM)	MAXIMUM INCHES (MM)	
Chain Eye/Chain Eye	30,000 (13,608)		HOO30L	1	12 (304.80)	144 (3,658)	383 (174)
			HOOT30L				
	40,000 (18,144)		HOO40L	2	12 (304.80)	144 (3,658)	383 (174)
			HOOT40L				
	60,000 (27,200)		HOO50L	3	13 (330.20)	144 (3,658)	536 (243)
			HOOT50L				
	80,000 (36,288)		HOO80L	4	14 (355.60)	144 (3,658)	616 (279)
			HOOT80L				
Clevis Eye	30,000 (13,608)		FHCE30L	5 & 9	11 (279.40)	144 (3,658)	366 (166)
			FHCE30L90				
Y-Clevis Eye	30,000 (13,608)		FHYCE30L	7 & 9	11 (279.40)	144 (3,658)	369 (167)
			FHYCE30L90				
Chain Eye/Eye	30,000 (13,608)		FOPE30L	2 & 9	11 (279.40)	144 (3,658)	294 (133)
			FOPE30L90				
Clevis/Clevis	30,000 (13,608)		FHCC30L	5	12 (304.80)	144 (3,658)	372 (169)
			FHCC30L90				
Chain Eye/Clevis	30,000 (13,608)		FHOEC30L	2 & 5	11 (279.40)	144 (3,658)	357 (162)
			FHOEC30L90				
	50,000 (22,680)		FHOEC50L	3 & 6	12 (304.80)	144 (3,658)	527 (239)
			FHOEC50L90				
Chain Eye/Y-Clevis	30,000 (13,608)		HYCOE30L	2 & 7	11 (279.40)	144 (3,658)	451 (205)
			HYCOE30L90				
	50,000 (22,680)		HYCOE50L	3 & 8	14 (355.60)	144 (3,658)	451 (205)
			HYCOE50L90				
Clevis/Ball	30,000 (13,608)		HBC30L	5 & 10	10 (254.00)	144 (3,658)	272 (123)
Y-Clevis/Ball	30,000 (13,608)		HYBC30L	7 & 10	11 (279.40)	144 (3,658)	342 (155)
	50,000 (22,680)		HYBC50L	8 & 11	11 (279.40)	144 (3,658)	442 (200)
Chain Eye/Ball	30,000 (13,608)		HOEB30L	1 & 10	11 (279.40)	144 (3,658)	323 (147)
	50,000 (22,680)		HOEB50L	3 & 11	11 (279.40)	144 (3,658)	430 (195)

*For links longer than minimum length, add to packed weight per 100 pieces, 28 pounds per inch for number HOO80L and HOOT80L. All others, add 17 pounds per inch. Refer to next page for dimensions.

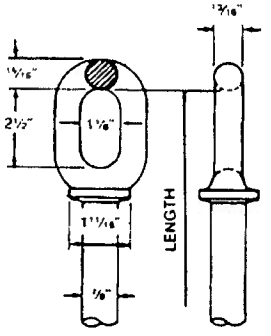
FORGED STEEL



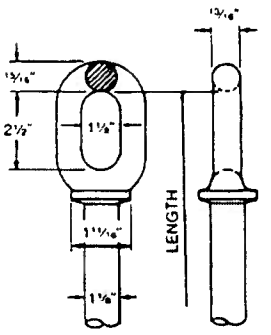
Chain Eye
Ultimate Strength—30,000 Lbs.
FIGURE 1



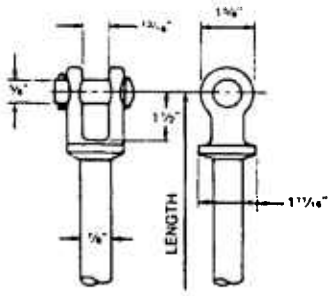
Chain Eye
Ultimate Strength—40,000 Lbs.
FIGURE 2



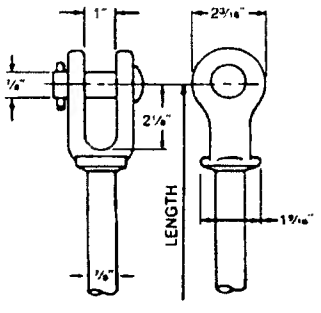
Chain Eye
Ultimate Strength—60,000 Lbs.
FIGURE 3



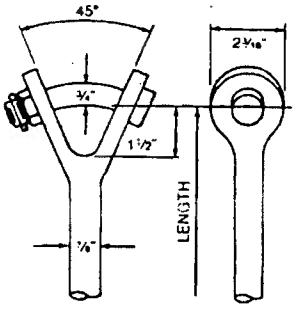
Chain Eye
Ultimate Strength—80,000 Lbs.
FIGURE 4



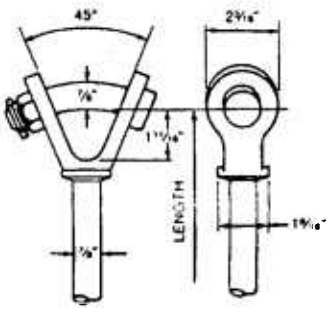
Clevis
Ultimate Strength—30,000 Lbs.
Will connect with ANSI Class
52-4 and Class 52-6 insulators.
FIGURE 5



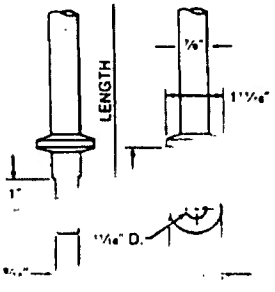
Clevis
Ultimate Strength—50,000 Lbs.
Will connect with ANSI Class
52-12 insulators.
FIGURE 6



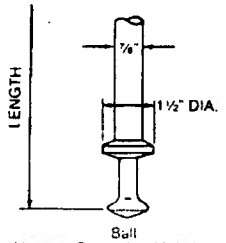
Y-Clevis
Ultimate Strength—30,000 Lbs.
FIGURE 7



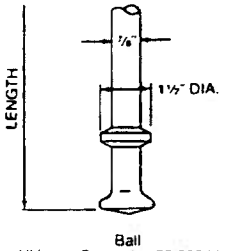
Y-Clevis
Ultimate Strength—50,000 Lbs.
FIGURE 8



Eye
Ultimate Strength—30,000 Lbs.
Will connect with ANSI Class
52-4 and Class 52-6 insulators.
FIGURE 9



Ball
Ultimate Strength—30,000 Lbs.
ANSI Class 52-3 and Class 52-5.
FIGURE 10



Ball
Ultimate Strength—50,000 Lbs.
ANSI Class 52-8 and Class 52-11.
FIGURE 11

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
FORGED STEEL
TURNBUCKLES

FORGED STEEL
TB

TYPE JJ

TYPE EE

TYPE JE

Turnbuckles are used as adjustable extension links to maintain proper tower clearance on assemblies at tower end.

Safe working load is 20% of ultimate strength rating shown.

Turnbuckles are not supplied with jam nuts for locking in position.

Jaw ends are supplied with clevis pin and humpback cotter pin.

Material: Galvanized forged steel

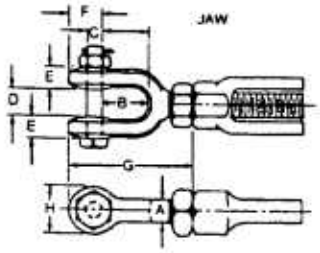
Note: When ordering replace XX with Type in Cat. No. Example: TB58EE6 for eye-eye end fittings with 6" take up.

Add "LN" if jam nuts are required.
Add "BNK" if bolt nut and cotter pin are required.
All 5/8" sizes must be ordered with "BNKLN"

CATALOG NUMBER	DIAMETER & TAKE UP—IN. (MM)	AVERAGE COUPLING LENGTH CLOSED—IN. (MM)	WT. EACH—POUNDS (KG)		
			EYE-EYE	JAW-EYE	JAW-JAW
TB58XX6BNKLN	5/8 X 6 (15.88) (152.4)	14 (355.6)	2.74 (1.24)	2.35 (1.06)	3.02 (1.36)
TB58XX12BNKLN	12 (304.8)	20 (508.0)	3.50 (1.58)	3.78 (1.70)	3.38 (1.52)
TB34XX6	3/4 X 6 (19.05) (152.4)	15-7/16 (392.1)	3.89 (1.75)	3.87 (1.74)	4.11 (1.85)
TB34XX12	12 (304.8)	21-7/16 (544.5)	5.43 (2.44)	5.36 (2.41)	5.65 (2.54)
TB34XX18	18 (457.2)	27-7/16 (696.9)	7.25 (3.26)	7.00 (3.15)	7.00 (3.15)
TB78XX12	7/8 X 12 (22.23) (304.8)	22-3/4 (577.9)	8.1 (3.65)	8.00 (3.6)	8.17 (3.68)
TB78XX18	18 (457.2)	28-3/4 (730.3)	9.25 (4.16)	9.75 (4.39)	9.13 (4.11)
TB1XX6	1 X 6 (25.4) (152.4)	18-13/16 (477.8)	9.33 (4.2)	8.92 (4.01)	9.75 (4.39)
TB1XX12	12 (304.8)	24-13/16 (630.3)	11.93 (5.37)	11.20 (5.04)	12.00 (5.40)
TB1XX18	18 (457.2)	30-13/16 (782.7)	14.00 (6.30)	13.30 (6.00)	14.00 (6.30)
TB1XX24	24 (609.6)	36-13/16 (935.1)	17.25 (7.76)	17.00 (7.65)	17.00 (7.65)
TB114XX12	1-1/4 X 12 (31.75) (304.8)	27-5/16 (693.8)	16.50 (7.43)	20.00 (9.0)	21.50 (9.68)
TB114XX18	18 (457.2)	33-5/16 (846.2)	23.00 (10.35)	24.18 (10.88)	24.25 (10.91)
TB114XX24	24 (609.6)	39-5/16 (998.6)	24.00 (10.80)	28.40 (12.78)	28.00 (12.60)
TB112XX12	1-1/2 X 12 (38.1) (304.8)	29-3/16 (741.4)	27.50 (12.4)	28.99 (13.05)	30.05 (13.52)
TB112XX18	18 (457.2)	35-3/16 (893.8)	31.00 (13.95)	35.00 (15.75)	36.75 (16.54)
TB112XX24	24 (609.6)	41-3/16 (1046)	37.50 (16.88)	39.18 (17.63)	40.67 (18.36)

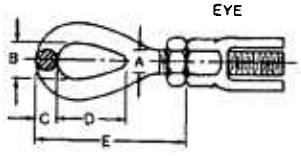
TRANSMISSION CONNECTORS

HARDWARE FITTINGS
FORGED STEEL
TURNBUCKLES (CONTINUED)



DIMENSIONS INCHES (MM)								ULT. STR. RATING—LBS.
A	B	C	D	E	F	G	H	
5/8 (15.88)	1-5/16 (33.34)	1/2 (12.70)	3/4 (19.05)	1/2 (12.70)	1-1/32 (26.16)	3-1/2 (88.90)	1-5/16 (33.34)	17,500 (7,938)
3/4 (19.05)	1-1/2 (38.1)	5/8 (15.88)	15/16 (23.81)	9/16 (14.29)	1-9/32 (32.54)	4-1/8 (104.78)	1-5/8 (41.28)	26,000 (11,793)
7/8 (22.23)	1-3/4 (44.45)	3/4 (19.05)	1-1/8 (28.58)	11/16 (17.46)	1-15/32 (37.31)	4-27/32 (123.03)	1-7/8 (47.63)	36,000 (16,329)
1 (25.4)	2-1/16 (52.8)	7/8 (22.23)	1-3/16 (30.16)	25/32 (19.84)	1-21/32 (42.07)	5-17/32 (140.49)	2-1/8 (53.98)	50,000 (22,680)
1-1/4 (31.75)	2-13/16 (71.44)	1-1/8 (28.58)	1-3/4 (44.45)	1 (25.4)	2-3/32 (53.18)	7-3/16 (182.56)	2-5/8 (66.68)	76,000 (34,473)
1-1/2 (38.10)	2-13/16 (71.44)	1-3/8 (34.93)	2-1/16 (52.8)	1-1/16 (26.99)	2-15/32 (64.29)	7-7/8 (200.03)	3-1/8 (79.38)	107,000 (48,534)

TG-25



DIMENSIONS INCHES (MM)					ULT. STR. RATING—LBS. (KG)
A	B	C	D	E	
5/8 (15.88)	7/8 (22.23)	1/2 (12.70)	1-3/4 (44.45)	3-7/8 (98.43)	17,500 (7,938)
3/4 (19.05)	1 (25.4)	5/8 (15.88)	2-1/8 (53.98)	4-11/16 (119.06)	26,000 (11,793)
7/8 (22.23)	1-1/4 (31.75)	3/4 (19.05)	2-3/8 (60.33)	5-1/4 (133.35)	36,000 (16,329)
1 (25.4)	[illegible]	7/8 (22.23)	3 (76.20)	6-3/8 (161.93)	50,000 (22,680)
[illegible]	1-13/16 [illegible]	1-1/8 (28.58)	3-9/16 (90.49)	7-3/4 (196.85)	76,000 (34,473)
1-1/2	[illegible] (33.98)	1-1/4 (31.75)	4-1/8 (104.78)	8-5/8 (219.08)	107,000 (48,534)

HARDWARE FITTINGS
DUCTILE/STEEL
YOKE PLATE

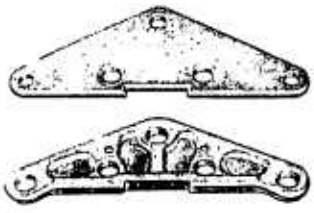
DUCTILE/STEEL
YPD

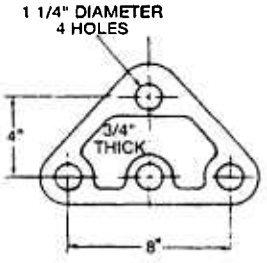
(DELTA CONFIGURATION)

These yoke plates may be used to bundle two conductors in suspension application with a single string of insulators. They also may be used in deadend applications with two strings of insulators and one deadend clamp.

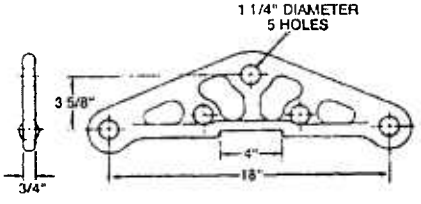
Type YPD may be furnished in a variety of sizes, hole spacings, ultimate strengths. For yokes with corona ring mounting provision, consult factory.

Material: Ductile iron, galvanized or steel galvanized.

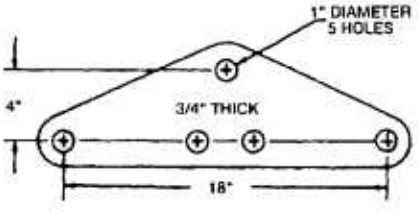




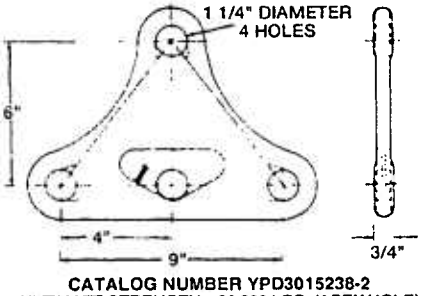
CATALOG NUMBER YPD5024685
ULTIMATE STRENGTH—50,000 LBS. (APEX HOLE)
DUCTILE



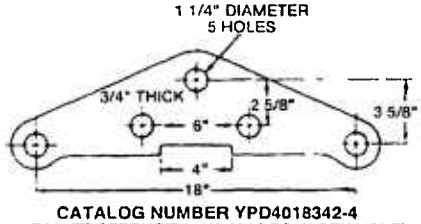
CATALOG NUMBER YPD3018437-3
ULTIMATE STRENGTH—30,000 LBS. (APEX HOLE)
DUCTILE



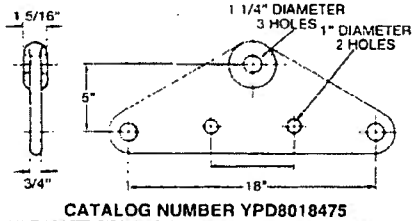
CATALOG NUMBER 971114001
ULTIMATE STRENGTH—72,000 LBS. (APEX HOLE)
STEEL



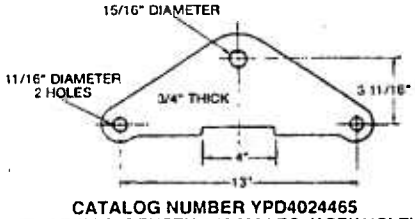
CATALOG NUMBER YPD3015238-2
ULTIMATE STRENGTH—30,000 LBS. (APEX HOLE)
DUCTILE



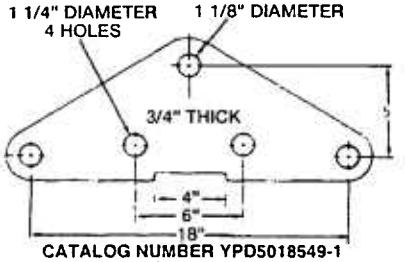
CATALOG NUMBER YPD4018342-4
ULTIMATE STRENGTH—40,000 LBS. (APEX HOLE)
DUCTILE



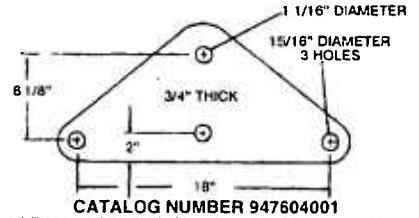
CATALOG NUMBER YPD8018475
ULTIMATE STRENGTH—80,000 LBS. (APEX HOLE)
DUCTILE



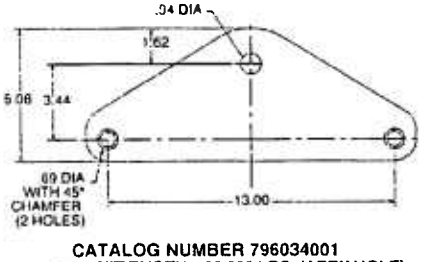
CATALOG NUMBER YPD4024465
ULTIMATE STRENGTH—40,000 LBS. (APEX HOLE)
DUCTILE



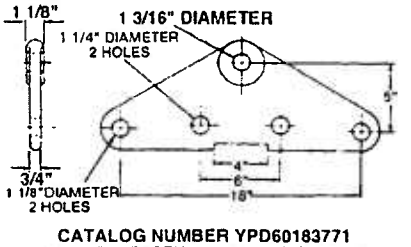
CATALOG NUMBER YPD5018549-1
ULTIMATE STRENGTH—50,000 LBS. (APEX HOLE)
DUCTILE



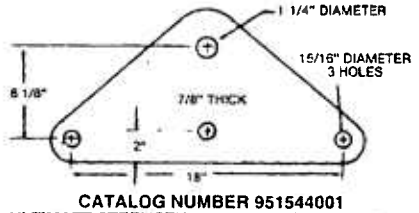
CATALOG NUMBER 947604001
ULTIMATE STRENGTH—80,000 LBS. (APEX HOLE)
STEEL



CATALOG NUMBER 796034001
ULTIMATE STRENGTH—60,000 LBS. (APEX HOLE)
STEEL



CATALOG NUMBER YPD60183771
ULTIMATE STRENGTH—60,000 LBS. (APEX HOLE)
DUCTILE



CATALOG NUMBER 951544001
ULTIMATE STRENGTH—100,000 LBS. (APEX HOLE)
STEEL

HARDWARE FITTINGS
DUCTILE/STEEL
YOKE PLATE

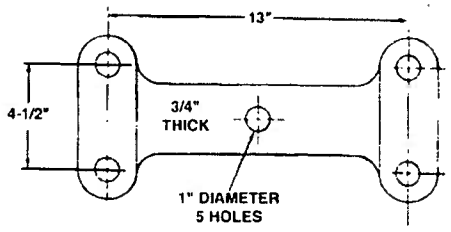
(RECTANGULAR CONFIGURATION)

These yoke plates are used with a double string of insulators to deadend a two conductor bundle.

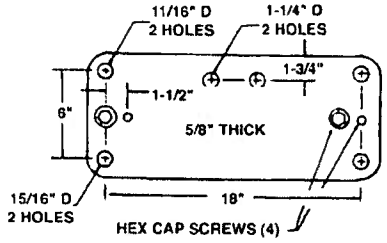
Type YPR yoke plates may be furnished in a variety of sizes, hole spacings, ultimate strengths and provisions for mounting corona rings.

Material: Ductile iron, galvanized or steel galvanized.

DUCTILE/STEEL
YPR

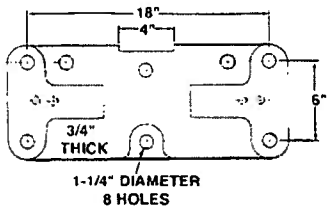


Ductile
CATALOG NUMBER–YPR3024508
ULTIMATE STRENGTH–30,000 LBS.
PER INSULATOR ATTACHMENT HOLE
LIFTING HOLE RATING–10,000 LBS.

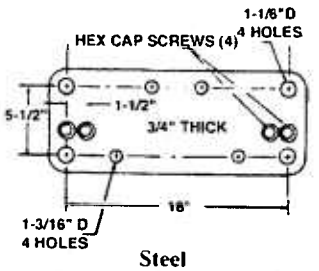


Steel
CATALOG NUMBER–976113002
ULTIMATE STRENGTH–30,000 LBS.
PER INSULATOR ATTACHMENT HOLE

TG-27

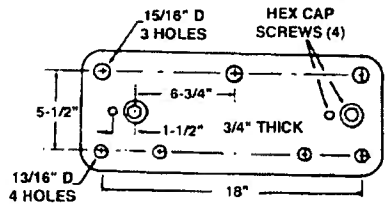


Ductile
CATALOG NUMBER–YPR30187221
ULTIMATE STRENGTH–30,000 LBS.
PER INSULATOR ATTACHMENT HOLE
CONTACT FACTORY FOR LIFTING HOLE RATING

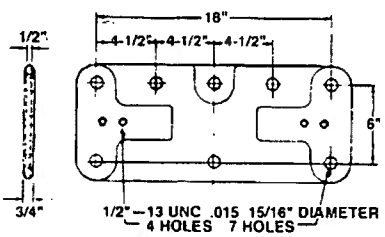


Steel
CATALOG NUMBER–929333002
ULTIMATE STRENGTH–40,000 LBS
PER INSULATOR ATTACHMENT HOLE

Ductile
CATALOG NUMBER–YPR30173512
PER ATTACHMENT HOLE–30,000 LBS.
LIFTING HOLE RATING–30,000 LBS.



Steel
CATALOG NUMBER–950213002
ULTIMATE STRENGTH–50,000 LBS.
PER INSULATOR ATTACHMENT HOLE



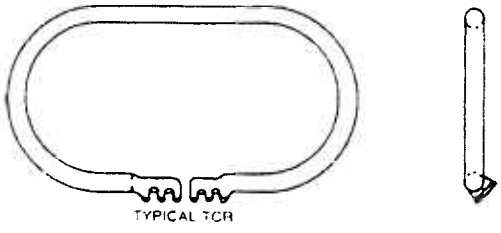
Ductile
CATALOG NUMBER–YPR6019401
ULTIMATE STRENGTH–60,000 LBS.
PER INSULATOR ATTACHMENT HOLE
CONTACT FACTORY FOR LIFTING HOLE RATING

CONTACT FACTORY FOR OTHER SIZES AND VARIATIONS

HARDWARE FITTINGS
ALUMINUM
TRANSMISSION CORONA RINGS

ALUMINUM

TCR



Type TCR corona rings are primarily used on deadend assemblies to grade the lower insulators on a string and shield the associated hot line hardware from corona and RIV. Type TCR corona rings are fabricated in a variety of sizes, shapes and mounting angles, depending on the system voltage and deadend assembly type.

Contact factory, with deadend assembly details, for assistance in specifying a specific TCR ring catalog number.

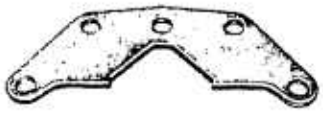
Material: Sandblasted 6061-T1 or 6063-T4 aluminum

TG-28

HARDWARE FITTINGS
DUCTILE/STEEL
YOKE PLATE
(VEE CONFIGURATION)

DUCTILE/STEEL

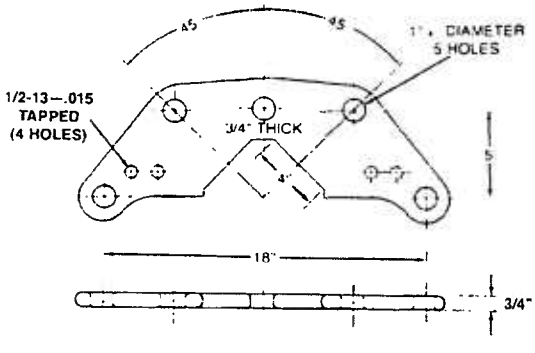
YPV



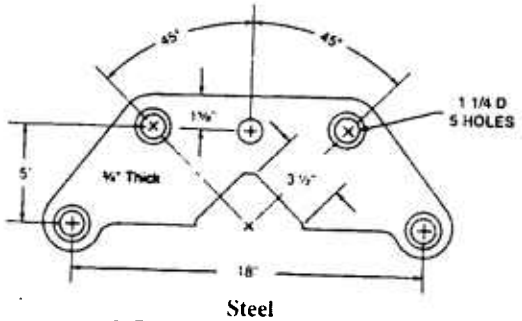
These yoke plates are used with a VEE string of insulators to attach a two conductor bundle.

Type YPV yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths, insulator attachment angles and provisions for mounting corona rings.

Material: Ductile iron, galvanized or steel, galvanized.



Ductile
CATALOG NUMBER–YPV30172591
(with (4) 1/2"-13 holes)
CATALOG NUMBER–YPV30172592
(without (4) 1/2"-13 holes)
ULTIMATE STRENGTH–30,000 LBS. PER INSULATOR
ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING



Steel
CATALOG NUMBER–930064004
ULTIMATE STRENGTH–40,000 LBS.
PER INSULATOR ATTACHMENT HOLE
AT INDICATED ANGLE

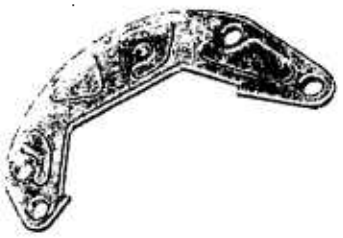
HARDWARE FITTINGS
DUCTILE STEEL
YOKE PLATE
(CRESCENT CONFIGURATION)

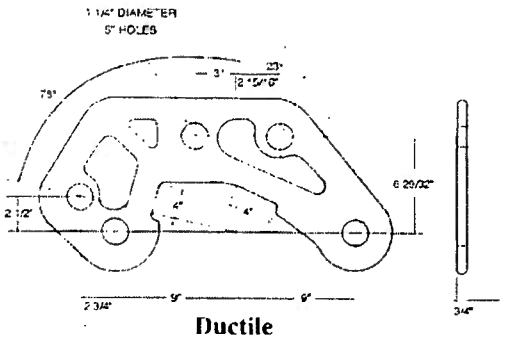
DUCTILE/STEEL
YPC

These yoke plates are used to bundle two conductors with a single and VEE string of insulators and maintain the proper running angle of the line.

Type YPC yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths and insulator attachment angles.

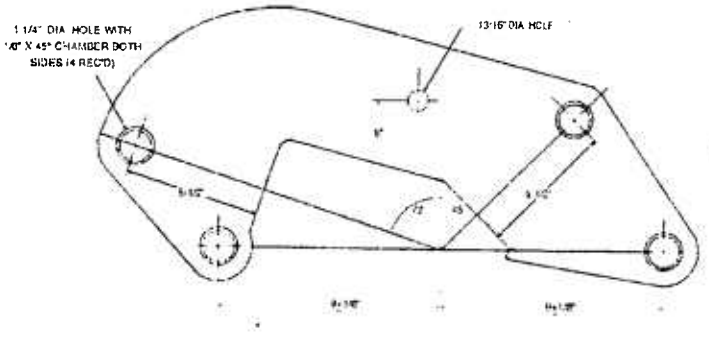
Material: Ductile iron, galvanized or steel, galvanized.





Ductile

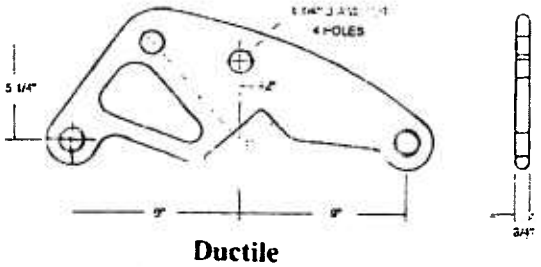
CATALOG NUMBER—YPC30174241
ULTIMATE STRENGTH—30,000 LBS. PER INSULATOR
ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING



Steel

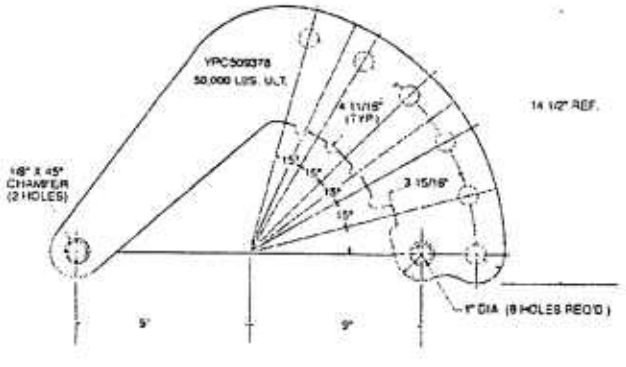
CATALOG NUMBER–945834005
ULTIMATE STRENGTH–50,000 LBS. PER INSULATOR
ATTACHMENT HOLES AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

TG-29



Ductile

CATALOG NUMBER—YPC4024534
ULTIMATE STRENGTH—40,000 LBS. PER INSULATOR
ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

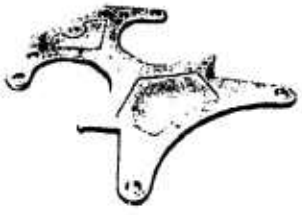


Steel

CATALOG NUMBER–YPC509378
ULTIMATE STRENGTH–50,000 LBS. PER INSULATOR
ATTACHMENT HOLES AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(QUADRUPLE CONFIGURATION)

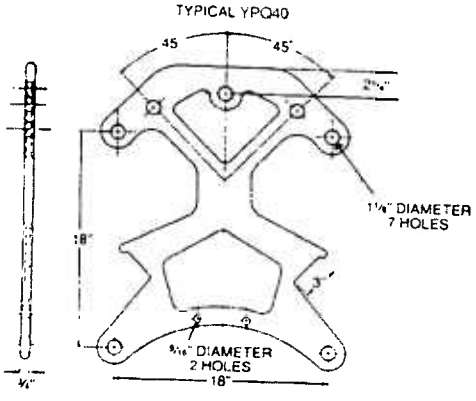
DUCTILE IRON
YPQ



These yoke plates are used to bundle four conductors with a VEE string of insulators.

Type YPQ yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths and insulator attachment angles.

Material: Ductile iron, galvanized.



CATALOG NUMBER—YPQ4023742
ULTIMATE STRENGTH—40,000 LBS. PER INSULATOR ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

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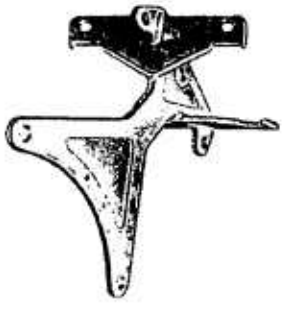
HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(QUADRUPLE-BATWING CONFIGURATION)

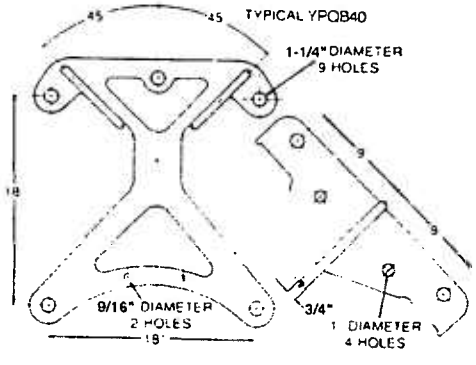
DUCTILE IRON
YPQB



These yoke plates are used to bundle four conductors with a double VEE string of insulators.

Type YPQB yoke plates may be furnished in a variety of sizes, hole spacings, ultimate strengths and insulator attachment angles.

Material: Ductile iron, galvanized.



CATALOG NUMBER—YPQB2523584
ULTIMATE STRENGTH—25,000 LBS. PER INSULATOR ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

CONTACT FACTORY FOR OTHER SIZES AND VARIATIONS

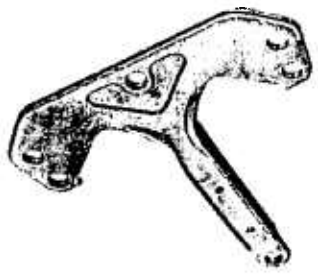
HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(TEE CONFIGURATION)

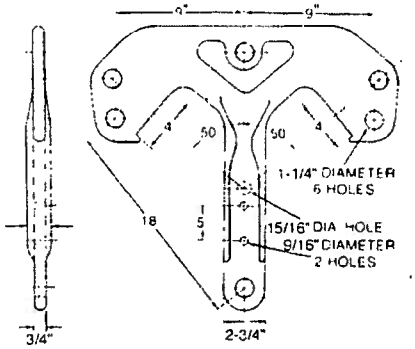
DUCTILE IRON
YPT

These yoke plates are used to bundle three conductors with a VEE string of insulators.

Type YPT yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths, and insulator attachment angles.

Material: Ductile iron, galvanized.





CATALOG NUMBER—YPT40236671
ULTIMATE STRENGTH—40,000 LBS. PER INSULATOR ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

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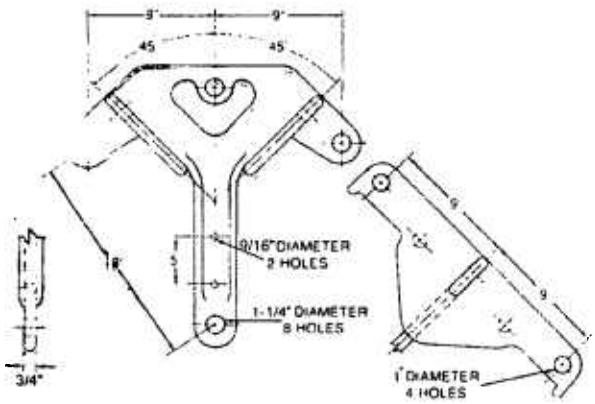
HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(TEE-BATWING CONFIGURATION)

DUCTILE IRON
YPTB

These yoke plates are used to bundle three conductors with a double VEE string of insulators.

Type YPTB yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths, and insulator attachment angles.

Material: Ductile iron, galvanized.

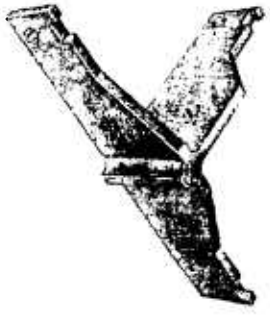


CATALOG NUMBER—YPTB3218474
ULTIMATE STRENGTH—32,000 LBS. PER INSULATOR ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
STEEL
YOKE PLATE
(CROSS CONFIGURATION)

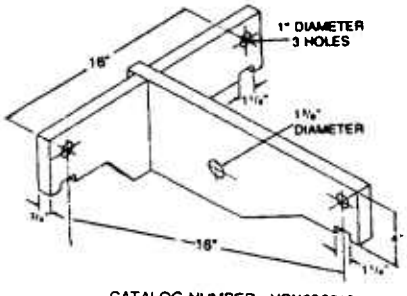
STEEL
YPX



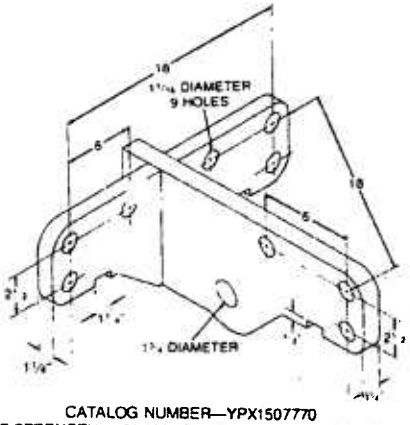
These yoke plates are used with a triple string of insulators to deadend a three conductor bundle. Type YPX yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths, and have the provisions for mounting corona rings

Material: Steel

TG-32



CATALOG NUMBER—YPX906916
ULTIMATE STRENGTH—90,000 LBS. PER TOWER ATTACHMENT HOLE



CATALOG NUMBER—YPX1507770
ULTIMATE STRENGTH—150,000 LBS. PER TOWER ATTACHMENT HOLE

CONTACT FACTORY FOR OTHER SIZES AND VARIATIONS

HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(TENSION-ADJUSTMENT CONFIGURATION)

DUCTILE IRON
YPTA

Type TPTA tension-adjusting yoke plates are used to attach associated deadend hardware and maintain desired line tension. Adjustments are made by varying the assembly attachment point with the use of a CEEL093065 or similar part.

Material: Ductile iron galvanized

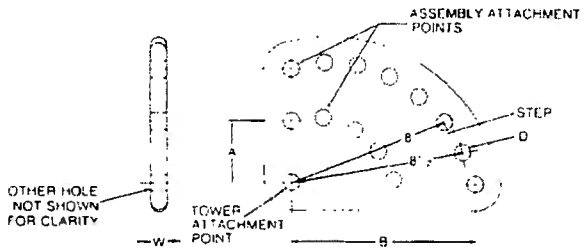


FIG 1

CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	FIG. NO.	DIMENSIONS INCHES (MM)					APPROX. WT. EACH LBS. (KG)
			A	B	D (DIA)	TOTAL ADJUSTMENT	STEP	
YPTA4025052	40,000 (18,144)	2	2-1/2 (63.5)	5 (127.0)	13/16 (20.64)	2-1/2 (63.5)	1/2 (12.70)	6.9 (3.13)

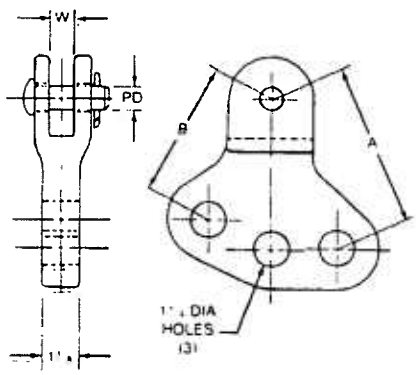
TG-3

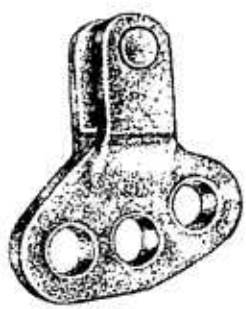
HARDWARE FITTINGS
DUCTILE IRON
YOKE PLATE
(TENSION ADJUSTMENT CLEVIS)

DUCTILE IRON
YPTAC

Type YPTAC tension adjusting yoke plates are used to attach associated deadend hardware and maintain desired line tension. Clevis [illegible] deadend clamps attach directly to yoke and can then be attached to associated hardware.

Material: Body—ductile iron
Clevis Pin—galvanized steel
Cotter Pin—stainless steel





CATALOG NUMBER	ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)							APPROX. WT. EACH LBS. (KG)
		A	B	C	W	PD DIA.	TOTAL ADJUSTMENT	STEP	
YPTAC5024658	50,000 (22,680)	5-1/2 (139.70)	4-1/2 (114.30)	2.0 (50.8)	1 (25.40)	3/4 (19.05)	1 (25.40)	1/2 (12.70)	7.5 (3.40)
YPTAC5012927*	50,000 (22,680)	10-1/4 (260.4)	7-3/4 (196.9)	3-7/16 (87.31)	7/8 (22.22)	3/4 (19.05)	2-1/2 (63.50)	1/2 (12.70)	12.5 (5.68)

* Yoke has 6 adjustment holes.

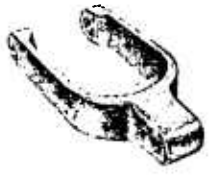
TRANSMISSION CONNECTORS

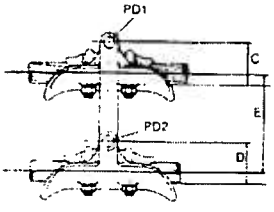
HUBBELL POWER SYSTEMS, INC.

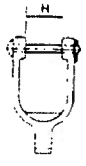
T12

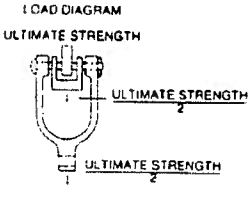
HARDWARE FITTINGS
ALUMINUM
BUNDLING YOKE
(WISHBONE CONFIGURATION)

ALUMINUM
YPW









Type YPW yokes are used to vertically bundle conductors on new or rebuilt lines...consequently, information as to conductor sizes, types of armor rod, if used, conductor spacing, ultimate strengths and existing clamp details must be given at time of ordering. YPW yokes are designed for use with Anderson clamps. Because YPW yokes may be furnished in a variety of sizes, conductor spacing, and ultimate strengths for both low voltage and EHV application, please contact factory for more details.

Material: Yoke Plate—356-T6 aluminum alloy
Clevis Pin—galvanized steel
Cotter Pin—stainless steel

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CATALOG NUMBER	CLAMPING RANGE		ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
	MIN	MAX		C	D	E	H	PD1	PD2	
YPW121189	.70 (17.78)	1.18 (29.97)	12,000 (5,443)	2-1/2 (63.50)	2-1/2 (63.50)	9 (228.60)	2-9/16 (65.09)	5/8 (15.88)	5/8 (15.88)	2.9 (1.32)
YPW3011818	.70 (17.78)	1.18 (29.97)	30,000 (13,608)	2-1/2 (63.50)	2-1/2 (63.50)	18 (457.20)	2-5/8 (69.85)	5/8 (15.88)	5/8 (15.88)	4.5 (2.04)
YPW1513912	.90 (22.86)	1.39 (35.31)	15,000 (6,804)	3 (76.20)	3 (76.20)	12 (304.80)	2-5/8 (69.85)	5/8 (15.88)	5/8 (15.88)	1.8 (.82)
YPW1513918	1.25 (31.75)	1.39 (35.31)	15,000 (6,804)	3 (76.20)	3 (76.20)	18 (457.20)	2-5/8 (69.85)	5/8 (15.88)	5/8 (15.88)	2.0 (.91)
YPW121629	1.10 (27.94)	1.62 (41.15)	12,000 (5,443)	3 (76.20)	3 (76.20)	9 (228.60)	3 (76.20)	5/8 (15.88)	5/8 (15.88)	2.0 (.91)
YPW1516212	1.10 (27.94)	1.62 (41.15)	15,000 (6,804)	3 (76.20)	3 (76.20)	12 (304.80)	2-27/32 (72.23)	5/8 (15.88)	5/8 (15.88)	2.5 (1.13)
YPW151829	1.25 (31.75)	1.82 (46.23)	15,000 (6,804)	3-1/4 (82.55)	3-1/4 (82.55)	9 (228.60)	3-1/8 (79.38)	5/8 (15.88)	5/8 (15.88)	3.3 (1.50)
YPW1518218	1.25 (31.75)	1.82 (46.23)	15,000 (6,804)	3-1/4 (82.55)	3-1/4 (82.55)	18 (457.20)	3-1/8 (79.38)	5/8 (15.88)	5/8 (15.88)	3.65 (1.66)
YPW2518218	1.25 (31.75)	1.82 (46.23)	25,000 (11,340)	3-1/4 (82.55)	3-1/4 (82.55)	18 (457.20)	3-1/4 (82.55)	5/8 (15.88)	5/8 (15.88)	3.9 (1.77)
YPW1520412	1.40 (35.56)	2.04 (51.82)	15,000 (6,804)	3-17/32 (89.69)	3-17/32 (89.69)	12 (304.80)	3-5/16 (84.14)	5/8 (15.88)	5/8 (15.88)	2.9 (1.32)
YPW1525212	2.00 (50.80)	2.52 (64.01)	15,000 (6,804)	4-1/4 (107.95)	4-1/4 (107.95)	12 (304.80)	4-1/4 (107.95)	5/8 (15.88)	5/8 (15.88)	3.4 (1.54)

Add suffix "BNK" for bolts, nuts and keys.
NOTE: YPW—For use with HAS Clamps having clamping ranges listed.

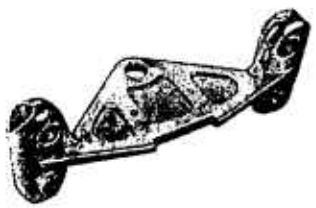
HARDWARE FITTINGS
ALUMINUM
YOKE PLATE
(JUMPER)

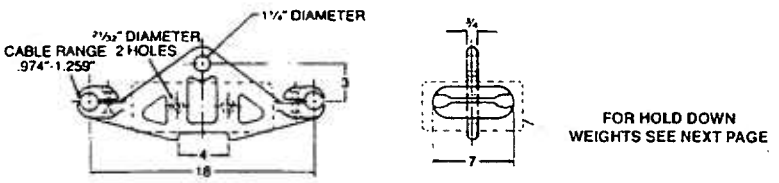
ALUMINUM
YPJ

These jumper yokes are used to bundle two, three, or four conductors with a single string of insulators on a deadend tower. All jumper yokes have the provision for adding hold down weights.

Type YPJ Yoke plates may be furnished in a variety of conductor sizes and configurations.

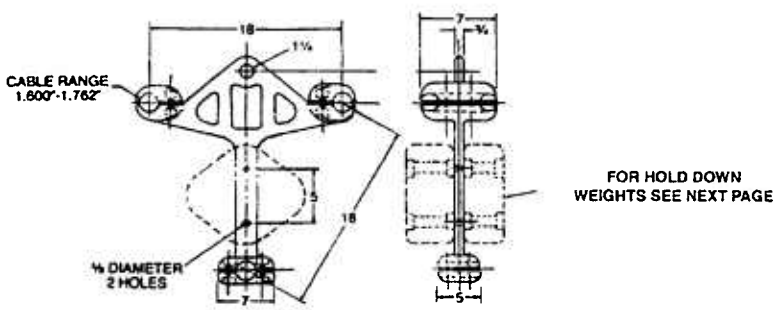
Material: 356-T6 Aluminum Alloy





FOR HOLD DOWN WEIGHTS SEE NEXT PAGE

CATALOG NUMBER—YPJ21018215
ULTIMATE STRENGTH—10,000 LBS. PER INSULATOR ATTACHMENT HOLE



FOR HOLD DOWN WEIGHTS SEE NEXT PAGE

CATALOG NUMBER—YPJ31024414
STRENGTH—10,000 LBS. PER INSULATOR ATTACHMENT HOLE

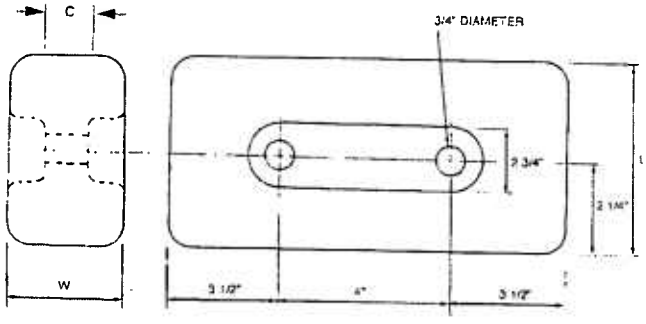
CONTACT FACTORY FOR OTHER SIZES AND VARIATIONS

HARDWARE FITTINGS
CAST IRON
HOLD DOWN WEIGHT
(RECTANGULAR CONFIGURATION)

CAST IRON
HDWR

Rectangular hold down weights may be attached to jumper yokes to add weight to the jumper assembly in various increments.

Material: Cast iron, galvanized



CATALOG NUMBER	DIMENSIONS INCHES (MM)		C	APPROX. WT. EACH LBS. (KG)
	W	L		
HDWR50182041	2-1/2 (63.50)	8-5/8 (219.08)	5/8 (15.88)	50 (22.68)
HDWR75182045	4-3/4 (120.65)	6-7/8 (174.63)	1 (25.40)	75 (34.02)

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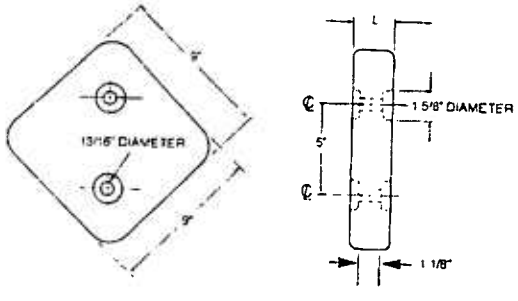
HARDWARE FITTINGS
CAST IRON
HOLD DOWN WEIGHT
(SQUARE CONFIGURATION)

CAST IRON
HDWS

Square hold down weights may be attached to jumper yokes or three conductor T yokes to add weight to the assembly. Square hold down weights can be used in increments of 50 lbs.

Material: Cast iron, galvanized.



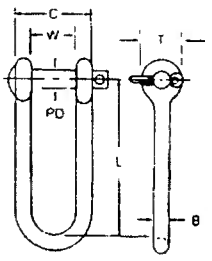
CATALOG NUMBER	DIMENSION INCHES	WT. EACH LBS. (KG)
	L	
HDWS5023648	2-5/8 (66.68)	50 (22.68)

HARDWARE FITTINGS
DUCTILE/STEEL
HOLD DOWN SHACKLE

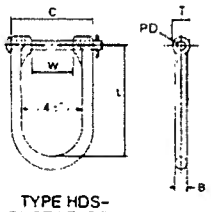
DUCTILE/STEEL

Hold down shackles are attached to suspension clamps to provide an attachment point to hook bolt or eye bolt. The HDWC type circular hold down weights can be attached in the desired increments to provide a means of controlling conductor position by preventing excessive uplift and sway.

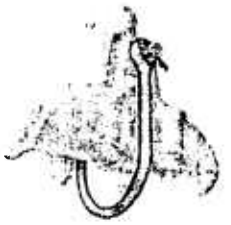
Material: Ductile iron or forged steel
Clevis pin—galvanized steel
Cotter pin—stainless steel



TYPE 86000–
FORGED STEEL



TYPE HDS–
DUCTILE IRON



CATALOG NUMBER		ULTIMATE STRENGTH LBS. (KG)	DIMENSIONS INCHES (MM)						APPROX. WT. EACH LBS. (KG)
WITH CLEVIS PIN AND COTTER PIN	WITH BOLT, NUT, AND COTTER PIN		B	C	L	T	W	PD	
880152000	900112000	10,000 (4,536)	1/2 (12.70)	3-7/8 (98.42)	5-1/16 (128.59)	1-1/4 (31.75)	2-7/8 (73.03)	5/8 (15.88)	1.3 (.59)
880162000	900122000	10,000 (4,536)	1/2 (12.70)	4-1/4 (107.95)	6 (152.40)	1-1/4 (31.75)	3-1/4 (82.55)	5/8 (15.88)	1.4 (0.64)
880172000	900132000	10,000 (4,536)	1/2 (12.70)	4-5/8 (117.47)	5-7/8 (149.23)	1-1/4 (31.75)	3-5/8 (92.08)	5/8 (15.88)	1.4 (0.64)
880182000	900142000	10,000 (4,536)	1/2 (12.70)	5-1/8 (130.17)	5-3/4 (146.05)	1-1/4 (31.75)	4-1/8 (104.77)	5/8 (15.88)	1.4 (0.64)
HDS1024675	HDS1024675BNK	10,000 (4,536)	11/16 (17.49)	5-5/16 (134.44)	7-1/8 (180.98)	1-3/8 (34.93)	3-1/8 (79.38)	5/8 (15.88)	3.10 (1.41)

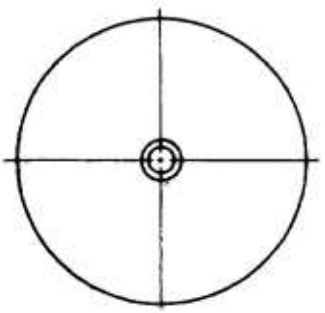
TG-37

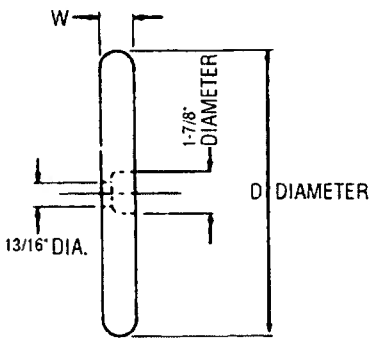
HARDWARE FITTINGS
CAST IRON
HOLD DOWN WEIGHT
(CIRCULAR CONFIGURATION)

CAST IRON
HDWC

Circular hold down weights are suspended below a clamp and used to add weight to a jumper or suspension assembly in 50 lb. increments.

Material: Cast iron, galvanized
Note: For hook bolt see next page.





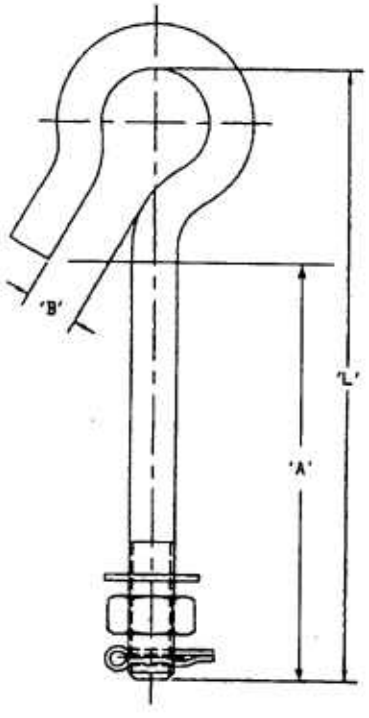
CATALOG NUMBER	DIMENSIONS INCHES (MM)		APPROX. WT. EACH LBS. (KG)
	W	D	
HDWC5023868	1-3/4 (44.45)	12 (304.80)	50 (22.68)

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
STEEL
HOOK BOLT

STEEL
HDWH

Hook bolts for attachment of HDWC circular weights to suspension clamp hold down shackle shown on previous page.



CATALOG NUMBER	DIMENSIONS INCHES (MM)			MAX. NUMBER OF CAT. NO. HDWC-5023868 WEIGHTS
	A	B	L	
HDWH502	6.00 (152)	0.75 (19.1)	9.00 (229)	2
HDWH503	7.50 (191)	0.75 (19.1)	10.50 (267)	3
HDWH504	9.00 (229)	1.00 (25.4)	12.00 (305)	4
HDWH505	11.00 (279)	0.75 (19.1)	14.00 (356)	5
HDWH506	12.00 (305)	1.00 (25.4)	15.00 (381)	6
HDWH507	14.00 (356)	0.75 (19.1)	17.00 (432)	7
HDWH508	15.75 (400)	1.00 (25.4)	18.75 (476)	8

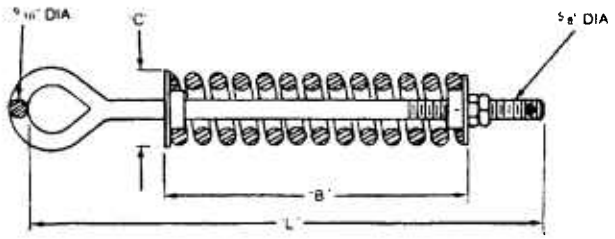
TRANSMISSION CONNECTORS

HARDWARE FITTINGS
STEEL
SPRING BOLT

STEEL
SBA

Spring bolts are used to maintain controlled tension within a span. Associated hardware can be used to connect the assembly to the insulation string and structure.

Material: Spring—Galvanized steel
Eyebolt—Galvanized steel
Bearing Plate—Ductile iron, galvanized
Nuts—Galvanized steel
Cotter Pin—Stainless steel



TG-39

CATALOG NUMBER	DIMENSIONS INCHES (MM)			TENSION RANGE	DEFLECTION RATE (LBS)
	L	B	C		
SBA5831725	17-1/4 (438.15)	9 (228.6)	2 1/2 (63.5)	0-3000 LBS	1500# PER INCH
SBA5861725	17-1/4 (438.15)	11-1/4 (285.75)	3-3/4 (95.25)	0-6000 LBS	3000# PER INCH
SBA5862475	24-3/4 (628.65)	11-1/4 (285.75)	3-3/4 (95.25)	0-6000 LBS	3000# PER INCH

CONTACT FACTORY FOR OTHER LENGTHS AND VARIATIONS

TRANSMISSION CONNECTORS

DEADENDS
BOLTED
QUADRANT STRAIN CLAMP
ALUMINUM

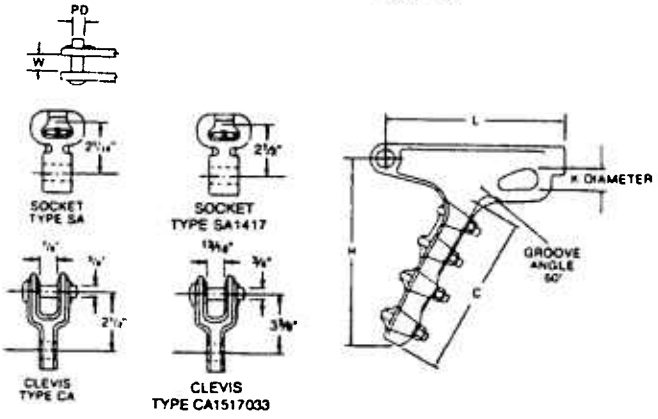
ALUMINUM
SD

TA-1

For high tension transmission line construction with all aluminum, ACSR or aluminum alloy conductor.

Material: Body and Keeper—356-T6 aluminum alloy
Hardware—galvanized steel
Sockets and Clevises—ductile iron, galvanized
Cotter Pin—#302 stainless steel

CATALOG NUMBER	DIMENSIONS INCHES (MM)					
	L	W	H	C	K	PD
SD57	9-1/16 (230.19)	3/4 (19.05)	6-3/4 (171.45)	5-1/8 (130.18)	1-1/4 (31.75)	5/8 (15.88)
SD70	10-1/4 (260.35)	15/16 (23.81)	8-3/8 (212.73)	6-1/2 (165.10)	1-1/4 (31.75)	5/8 (15.88)
SD86	11-1/4 (285.75)	1-1/16 (26.99)	9-5/8 (244.48)	7-3/8 (187.33)	1-1/4 (31.75)	5/8 (15.88)
SD112	13-1/8 (333.38)	1-3/8 (34.93)	11-1/2 (292.1)	8-1/4 (209.6)	1-3/8 (34.33)	3/4 (19.05)
SD130	14 (355.6)	1-7/16 (36.51)	13-1/8 (333.38)	9-1/2 (241.3)	1-1/2 (38.10)	3/4 (19.05)
SD155	15-1/2 (393.70)	2 (50.8)	15-3/4 (400.05)	12-3/8 (314.32)	1-1/2 (38.10)	3/4 (19.05)
SD185	17 (431.80)	1-7/8 (47.63)	18 (457.20)	12-3/8 (314.32)	1-1/2 (38.10)	1 (25.40)



CATALOG NUMBER	FITTING		CLAMPING RANGE			ULTIMATE BODY STRENGTH LBS. (KG)	U-BOLTS		APPROX. WT. EACH LBS. (KG)
	TYPE	CAT. NO.	ACSR	ALUMINUM	INCHES (MM)		NO.	SIZE INCHES (MM)	
SD57N SD57S SD57C	None Socket Clevis	 SA04 CA04	#4-6/1 To 266.8-26/7	#4-7 Str. To 300-37 Str.	.20-.64 (5.08-16.26)	15,000 (6,804)	3	1/2 (12.70)	3.2 (1.45) 4.4 (2.00) 4.8 (2.63)
SD70N SD70S SD70C	None Socket Clevis	-- SA06 CA06	#2-7/1 To 397.5-18/1	#1-7 Str. To 397.5-37 Str.	.30-.75 (7.62-19.05)	20,000 (9,072)	4	1/2 (12.70)	4.7 (2.14) 6.0 (2.72) 6.4 (2.90)
SD86N SD86S SD86C	None Socket Clevis	-- SA07 CA06	#3/0-6/1 To 556-26/7	3/0-19 Str. To 650-61 Str.	.46-.94 (10.16-23.88)	25,000 (11,340)	4	1/2 (12.70)	5.4 (2.45) 6.8 (3.09) 7.1 (3.22)
SD112N SD112S SD112C	None Socket Clevis	-- SA1013 CA1013	#3/0-6/1 To 954-54/7	40-19 Str. To 1033.5-61 Str.	.50-1.20 (12.80-30.48)	30,000 (13,608) 30,000 (13,608) 25,000 (11,340)	5	1/2 (12.70)	8.4 (3.81) 9.9 (4.5) 10.4 (4.73)
SD130N SD130S SD130C	None Socket Clevis	-- SA1013 CA1013	336.4-26/7 To 1272-54/19	397.5-19 Str. To 1431-61 Str.	.70-1.39 (17.78-35.30)	35,000 (15,876) 30,000 (13,608) 25,000 (11,340)	5	5/8 (15.88)	13.2 (6.00) 15.3 (6.95) 15.5 (7.04)
SD155N SD155S SD155C	None Socket Clevis	-- SA1613 CA1613	1,033.5 (36/1) To 1510.5 (54/19)	1,100-91 Str. To 1,700-127 Str.	1.18-1.55 (29.97-38.61)	35,000 (15,876) 30,000 (13,608) 25,000 (11,340)	5	5/8 (15.88)	15.5 (7.00) 17.3 (7.85) 17.3 (7.85)
SD185N SD185S SD185C	None Socket Clevis	-- SA1417 CA1517033	1,192.5 (45/7) To 2,156 (84/19)	1,272-61 Str. To 2,500-127 Str.	1.30-1.85 (33.02-46.99)	50,000 (22,680) 30,000 (13,608) 30,000 (13,608)	5	5/8 (15.88)	21.0 (9.53) 22.7 (10.30) 22.3 (10.11)

NOTES: (1) Recommended torque on U-bolts; 1/2"--480 in.-lbs., 5/8"--720 in.-lbs.
(2) For corona free application, add suffix "CRF." Example, SD130NCRF.
(This includes spherical or acorn type nuts or a combination of both.)
(3) Clamp may be furnished with bolt, nut and cotter pin by adding "BNK" suffix to catalog number.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-16
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

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1. To what ground resistance will the line be constructed?

Response:

See Exhibit E-1.5.1 of the Supplemental Article VII application.

2. State what codes or standards the ground resistance for the tower has to meet.

Response:

See Exhibit E-1.5.1 of the Supplemental Article VII application.

3. Discuss what options are available for grounding the towers to achieve the desired grounding resistance.

Response:

See Exhibit E-1.5.2.2 of the Supplemental Article VII application.

4. How often will the shield wire be grounded to earth?

Response:

See Exhibit E-1.5.1 of the Supplemental Article VII application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-17
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

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1. **If counter poise wires are used on the line, explain to what depth will they be buried and provide any supporting information.**

See Exhibit E-1.5.2.2 of the Supplemental Article VII application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-18
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

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1. **Provide catalog cut sheets of the types of insulators that are under consideration for this transmission line.**

Response:

See attached typical cut sheets of insulators.

2. **Provide the catalogue cut sheets and technical data sheets for the line conductor and shield wire.**

Response:

See attached cut sheets and technical data sheets for typical line conductor and shield wire that are under consideration.

Attachment for Interrogatory
DPS-18.1

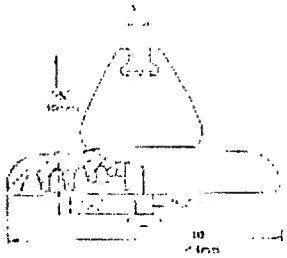
HIGH STRENGTH UNITS

Lapp high strength porcelain suspension insulators are available in 25,000, 30,000, and 40,000 lb. strength ratings to give transmission design engineers the closest possible insulator match for any maximum design load requirement. High strength suspensions are widely used for unusually heavy lines, dead-ending long spans, or for extra factors of safety, particularly in EHV construction.

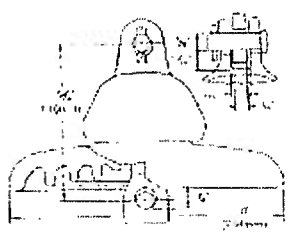
The 25,000 and 30,000 lb. suspension insulators meet ANSI Standards for Class 52-5 and Class 52-6 suspension insulators.

Insulator numbers 61236H and 97503B have a 40,000 lb. strength rating and have gray glaze as standard. Other glazes are available on specification.

25,000 lb. Suspension Insulators

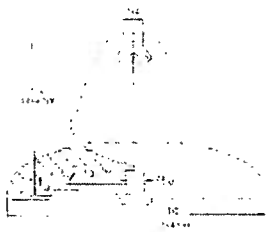


301425-70

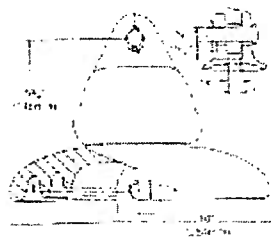


301426-70

30,000 lb. Suspension Insulators



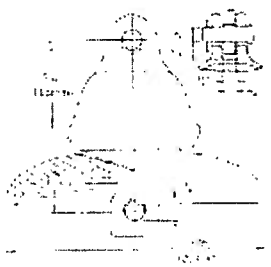
5960A-70



2300-70

40,000 lb. Suspension Insulators

61236H-70



97503-70

Catalog Number	301425-70	301426-70	5960A-70	2300-70	61236H-70	97503-70
Color – No. 70 Grey	301425	301426	5960A	2300	61236H	97503B
Chocolate	301425G	301426G	5960G	2300D	61236	
Charcoal Gray					61236E	
Royal Blue						
ANSI Class	**52-5**	**52-6**	**52-5**	**52-6**	**52-8**	**52-10**
Dimensions						
Leakage Distance, Inches (mm)	12 (305)	12 (305)	11 (279)	11 (279)	11 (279)	11 (279)
Dry Arcing Distance, Inches (mm)	7.75 (197)	7.75 (197)	7.75 (197)	7.75 (197)	7.75 (197)	7.75 (197)
Mechanical Values						
Combined M&E Strength, Lbs. (kN)	25,000 (111)	25,000 (111)	30,000 (133)	30,000 (133)	40,000 (178)	40,000 (178)
Impact Strength, Inch Lbs. (Nm)	90 (10)	90 (10)	90 (10)	90 (10)	100 (11.3)	100 (11.3)
Routine Proof Test Load, Lbs. (kN)	12,500 (55.5)	12,500 (55.5)	15,000 (67)	15,000 (67)	20,000 (89)	20,000 (89)
Time Load Test Value, Lbs. (kN)	15,000 (67)	15,000 (67)	18,000 (80)	18,000 (80)	24,000 (107)	24,000 (107)
Maximum Working Load, Lbs. (kN)	12,500 (55.5)	12,500 (55.5)	15,000 (67)	15,000 (67)	20,000 (89)	20,000 (89)
Electrical Values						
Low Frequency Dry Flashover, kV	90	90	90	90	90	90
Low Frequency Wet Flashover, kV	50	50	50	50	50	50
Impulse Flashover, Positive, kV	125	125	125	125	125	125
Impulse Flashover, Negative, kV	130	130	130	130	130	130
Low Frequency Puncture Voltage, kV	110	110	110	110	110	110
Radio Influence Voltage Data						
Test Voltage rms to Ground, kV	10	10	10	10	10	10
Maximum RIV-Microvolts at 1000 kHz	50	50	50	50	50	50
Packing and Shipping Data						
Net Weight, Each, Lbs. (kg), Approx.	12.5 (5.7)	12.6 (5.7)	14.2 (6.4)	14.0 (6.3)	16.8 (7.6)	17.0 (7.7)
Packed Weight, Each, Lbs. (kg), Approx.	13.2 (6.0)	13.2 (6.0)	14.8 (6.7)	14.7 (6.7)	17.5 (7.9)	17.7 (8.0)
Number in Standard Package	6	6	6	6	6	6
Pallet Weight, Pounds (kg), Approx.	1,620 (734.8)	1,620 (734.8)	1,840 (834.8)	1,820 (825.6)	2,160 (979.8)	2,180 (988.8)
Pallet Quantity	120	120	120	120	120	120

Attachment for Interrogatory
DPS-18.2

ACSR

Aluminum Conductor. Steel Reinforced [1] . Bare

APPLICATIONS

Used as bare overhead transmission cable and as primary and secondary distribution cable. ACSR offers optimal strength for line design. Variable steel core stranding enables desired strength to be achieved without sacrificing ampacity.

SPECIFICATIONS

Southwire's ACSR bare conductor meets or exceeds the following ASTM specifications:

- B-230 Aluminum Wire, 1350-H19 for Electrical Purposes
- B-231 Aluminum Conductors, Concentric-Lay-Stranded
- B-232 Aluminum Conductors, Concentric-Lay-Stranded, Coated Steel Reinforced (ACSR)
- B-341 Aluminum-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)
- B-498 Zinc-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)
- B-802 Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)

CONSTRUCTION

Aluminum alloy 1350-H19 wire stranded about a steel core. Core wire for ACSR is available with class A, B, or C galvanizing, 5% aluminum coated (AZ); or aluminum-clad (AW). Additional corrosion protection is available through the application of grease to the core or infusion of the complete cable with grease.

[1] (AW), see Catalog Section for ACSR/AW.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

ACSR

Code Word	Size (AWG or kcmil)	Strand-ing (Al/Stl)	Diameter (ins.)				Weight Per 1000 ft. (lbs.)			Content (%)		Rated Strength (lbs.)	Resistance OHMS/1000 ft.		Allowable Ampacity+ (Amps)
			Individual Wires		Steel Core	Complete Cable	Al	Stl	Total	Al	Stl		DC @ 20°C	AC @ 75°C	
			Al	Stl											
Scoter	636.0	30/7	.1456	.1456	.4368	1.019	600	395	995	60.35	39.65	30400	.0256	.0325	798
Egret	636	30/19	.1456	.0874	.4368	1.019	600	386	987	60.85	39.15	31500	.0266	.0326	798
Flamingo	666.6	24/7	.1667	.1111	.3333	1	628	230	857	73.21	26.79	23700	.0256	.0315	807
Gannet	666.6	26/7	.1601	.1245	.3736	1.014	628	289	916	68.51	31.49	26400	.0255	.0313	812
Stilt	715.5	24/7	.1727	.1151	.3453	1.036	674	247	920	73.21	26.79	25500	.0239	.0294	844
Starling	715.5	26/7	.1659	.129	.3871	1.051	674	310	984	68.51	31.49	28400	.0238	.0292	849
Redwing	715.5	30/19	.1544	.0927	.4633	1.081	676	435	1110	60.85	39.15	34600	.0236	.0290	859
Coot	795	36/1	.1486	.1486	.1486	1.04	745	58	804	92.72	7.28	16710	.0217	.0268	884
Drake	795	26/7	.1749	.136	.408	1.107	749	344	1093	68.51	31.49	31500	.0214	.0263	907
Tern	795	45/7	.1329	.0886	.2658	1.063	749	146	895	83.67	16.33	22100	.0216	.0269	887
Condor	795	54/7	.1213	.1213	.364	1.092	749	274	1023	73.21	26.79	28200	.0215	.0272	889
Mallard	795	30/19	.1628	.0977	.4884	1.14	751	483	1234	60.86	39.14	38400	.0213	.0261	918
Ruddy	900	45/7	.1414	.0943	.2828	1.131	848	165	1013	83.67	16.33	24400	.0191	.0239	958
Canary	900	54/7	.1291	.1291	.3873	1.162	848	310	1158	73.21	26.79	31900	.0190	.0241	961
Rail	954	45/7	.1456	.0971	.2912	1.165	899	175	1074	83.67	16.33	25900	.0180	.0225	993
Cardinal	954	54/7	.1329	.1329	.3987	1.196	898	329	1227	73.21	26.79	33800	.0179	.0228	996
Ortolan	1033.5	45/7	.1515	.101	.3031	1.212	973	190	1163	83.67	16.33	27700	.0167	.0209	1043
Curlew	1033.5	54/7	.1383	.1383	.415	1.245	973	356	1330	73.21	26.79	36600	.0165	.0211	1047
Bluejay	1113	45/7	.1573	.1048	.3145	1.258	1048	205	1253	83.67	16.33	29800	.0155	.0194	1092
Finch	1113	54/19	.1436	.0861	.4307	1.292	1053	375	1429	73.72	26.28	39100	.0154	.0197	1093
Bunting	1192.5	45/7	.1628	.1085	.3256	1.302	1123	219	1343	83.67	16.33	32000	.0144	.0182	1139
Grackle	1192.5	54/19	.1486	.0892	.4458	1.337	1129	402	1531	73.72	26.28	41900	.0144	.0184	1140
Bittern	1272	45/7	.1681	.1121	.3362	1.345	1198	234	1432	83.67	16.33	34100	.0135	.0171	1184
Pheasant	1272	54/19	.1535	.0921	.4605	1.381	1204	429	1633	73.71	26.29	34600	.0135	.0173	1187
Dipper	1351.5	45/7	.1733	.1155	.3466	1.386	1273	248	1521	83.67	16.33	36200	.0127	.0162	1229
Martin	1351.5	54/19	.1582	.0949	.4746	1.424	1279	456	1735	73.72	26.28	46300	.0127	.0163	1232
Bobolink	1431	45/7	.1783	.1189	.3566	1.427	1348	263	1611	83.67	16.33	38300	.0120	.0153	1272
Lapwing	1590	45/7	.188	.1253	.3759	1.504	1498	292	1790	83.67	16.33	42200	.0108	.0139	1354
Falcon	1590	54/19	.1716	.103	.5148	1.544	1505	536	2041	73.72	26.28	54500	.0108	.0140	1359
Chukar	1780	84/19	.1456	.0874	.4368	1.602	1685	386	2071	81.38	18.65	51000	.0097	.0125	1453
Bluebird	2156	84/19	.1602	.0962	.4808	1.762	2040	468	2508	81.34	18.66	60300	.00801	.0105	1623
Kiwi	2167	72/7	.1735	.1157	.347	1.735	2051	249	2300	89.17	10.82	49800	.00801	.0106	1607

+Conductor temperature of 75°C, ambient temperature 25°C, emissivity 0.5, wind 2 ft./sec., in sun.

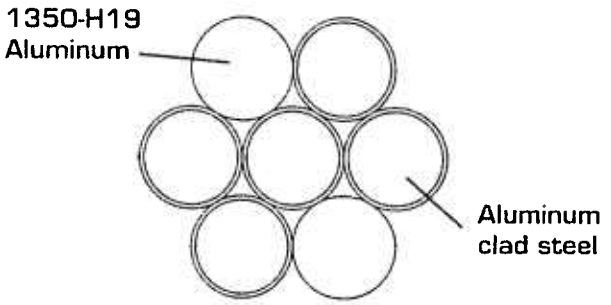
Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

Messenger

Construction

The messenger serves as the support member for a Spacer Cable System. Two constructions of messenger are offered: AWA (Alumoweld-Aluminum) messengers and Alumoweld (AW) messengers. The strands used to manufacture these types of messengers are either all Aluminum Clad steel wires or a combination of Aluminum Clad steel wires and 1350-H19 Aluminum wires.



Features

- High Strength to Weight
- Equivalent Conductivity to Bare Aluminum
- Protects covered conductors from physical damage
- Superior corrosion resistance

Application

The messenger is used to support the Spacer Cable System. Installation of the messenger at the proper tension will result in a system that has a high degree of reliability. The messenger's strength will protect the system from falling trees and branches as well as continue to support the cable during high wind loads and icing conditions.

Specification

ASTM B415
ASTM B416

Southwire Stock #	Description	Hendrix	Equivalent Conductivity	Ampacity *	Overall Diameter (In.)	Alumoweld wire No. x dia.(mils)	Aluminum Wires No. x diam. (mils)	Weight (#/MFT.)	Breaking Strength (lbs.)
61347399	2/0 0052 Alumoweld Messenger	0052 AWA	2/0 Al	280	0.546	5 x 181.9	2 x 181.9	436.3	20,420
61347099	1/0 052 Alumoweld Messenger	052 AWA	1/0 Al	240	0.486	5 x 162.0	2 x 162.0	346.1	17,120
61346999	#2 252 Alumoweld Messenger	252 AWA	#2 Al	180	0.385	5 x 128.5	2 x 128.5	217.7	11,960
61347299	7x#6 AW[illegible]oweld Messenger	7 no. 6 AW	#2 Al	190	0.486	7 x 162.0	-	415.8	22,730
	7x#8 AWG Alumoweld Messenger	7 no. 8 AW	#4 Al	145	0.385	7 x 128.5	-	262.2	15,930

* Ampacity Calculated with a 75°C Conductor Temp., 25°C Ambient Temp., 2 ft./sec wind and sun

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-19
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

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1. **Provide the National Electric Safety Code (NESC) transmission line clearances for the line over roads, rail roads, agricultural lands, abandon roads, seasonal roads, other lines (transmission, distribution and telephone lines), etc.**
Explain your assumptions and provide copies of all work papers.

Response:

See Exhibit E-1.3.1 of the Supplemental Article VII Application and attached calculations.

2. **Provide the NESC design clearances that specify how far the line needs to be from structures and other objects. Include a copy of your work papers, and all assumptions that are made in your calculations**

Response:

The NESC design electrical clearance between the conductor and adjacent structures and other objects in the horizontal direction is 14.1 feet minimum based on the NESC Section 234H3 formula as shown below.

This electrical clearance must be maintained after displacement of the conductor from rest due to wind conditions. The displacement distance of the conductor under wind conditions varies according to span length, conductor sag and temperature and wind conditions in accordance with NESC Section 234A2.

$$D = 3.28\left[\frac{V \cdot PU \cdot a}{500K}\right]^{1.667} bc \quad \text{(ft)}$$

V = 400kV x 1.05 (maximum dc operating voltage to ground)
PU = 2.8
a = 1.15
b = 1.03
c = 1.0
K = 1.15

Also see Exhibit E-1.3.1 in Supplemental Article VII application.

Attachment for Interrogatory
DPS-19.1

NYRI DC PROJECT
NESC VERTICAL CLEARANCE CALCULATIONS

RULE 232. VERTICAL CLEARANCES OF CONDUCTORS ABOVE GROUND, ROADWAY, RAIL OR WATER SURFACES

A2. The maximum conductor temperature for which the line is designed to operate, with no wind displacement.
A3. 0 °C (32 °F), no wind, with radial ice specified in Table 230-1

1. Clearance Above Track Rails or Railroads

		±400 kV
Table 232-1 Basic clearance		26.5 ft
Excess voltage:	22 kV) x 0.4/12=	13.3
		39.8 ft
	adopt:	**40.0 ft**

2. Clearance Above Roads. Str[illegible]ier areas subject to truck traffic

		±400 kV
Table 23[illegible]	[illegible] kV	18.5 ft
Excess [illegible]	[illegible] x 0.4/12=	13.3
[illegible]or survey [illegible]		2.0
		33.8 ft
	adopt:	**34.0 ft**

[illegible]ve [illegible]s, and alleys

		±400 kV
Table 232-1 Basic clear[illegible]		18.5 ft
Excess voltage:	[illegible] x [illegible] -22 kV) x 0.4/12=	13.3
[illegible] errors:		2.0
		33.8 ft
	adopt:	**34.0 ft**

4. Clearance Abo[illegible] Oth[illegible] [illegible]versed [illegible] vehicles, such as cultivated, grazing, forest, orchards, etc

		±400 kV
Tab[illegible]	asic clear[illegible] to	18.5 ft
Excess [illegible]ge:	0 kV -22 kV) x 0.4/12=	13.3
Allowan[illegible]e for sur[illegible]rs:		2.0
		33.8 ft
	adopt:	**34.0 ft**

5. [illegible] [illegible] and ways subject to pedestrian or restricted traffic only

		±400 kV
Table 232-1 Bas[illegible]	22 kV	24.5 ft
Excess voltage:	(4[illegible] kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		29.8 ft
	adopt:	**30.0 ft**

NYRI DC PROJECT
NESC VERTICAL CLEARANCE CALCULATIONS

6. Clearance Above Water areas not suitable for sailboating or where sailboating is prohibited

		±400 kV
Table 232-1 Basic clearance to 22 kV		17.0 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		32.3 ft
	adopt:	**33.0 ft**

7. Clearance Above Water areas suitable for sailboating, including lakes, ponds, reservoirs, rivers, streams and canals with an unobstructed surface area of:

a. Less than 20 acres

		±400 kV
Table 232-1 Basic clearance to 22 kV		20.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		35.8 ft
	adopt:	**36.0 ft**

b. Over 20 to 200 acres

		±400 kV
Table 232-1 Basic clearance to 22 kV		28.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		43.8 ft
	adopt:	**44.0 ft**

c. Over 200 to 2000 acres

		±400 kV
Table 232-1 Basic clearance to 22 kV		34.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		49.8 ft
	adopt:	**50.0 ft**

d. Over 2000 acres

		±400 kV
Table 232-1 Basic clearance to 22 kV		40.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		55.8 ft
	adopt:	**56.0 ft**

8. Established boat ramps and associated rigging areas: areas posted with sign(s) for rigging or launching sail boats:

Clearance aboveground shall be 5 ft greater than in 7. above, for the type of water areas served by the launching site.

NYRI DC PROJECT
NESC VERTICAL CLEARANCE CALCULATIONS

Where conductors run along and within the limits of highways or other road rights-of-way but do not overhang the roadway

9. Clearance Above Roads, streets, or alleys

		±400 kV
Table 232-1 Basic clearance to 22 kV		18.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		33.8 ft
	adopt:	**34.0 ft**

10. Clearance Above Roads where it is unlikely that vehicles will be crossing under the line

		±400 kV
Table 232-1 Basic clearance to 22 kV		16.5 ft
Excess voltage:	(400 kV x 1.05 -22 kV) x 0.4/12=	13.3
Allowance for survey errors:		2.0
		31.8 ft
	adopt:	**32.0 ft**

NYRI DC PROJECT
NESC VERTICAL CROSSING CLEARANCE CALCULATIONS

233. CLEARANCES BETWEEN CONDUCTORS CARRIED ON DIFFERENT SUPPORTING STRUCTURES

C. VERTICAL CLEARANCE

1. **Clearance requirements**
The vertical clearance between any crossing or adjacent conductors carried on different supporting structures shall be not less than that shown in Table 233-1

2. **Voltages exceeding 22 kV**

a. The clearance given in Table 233-1 shall be increased by the sum of the following: For the upper-level conductors between 22 and 470 kV, the clearance shall be increased at the rate of 10mm (0.4 in) per kV in excess of 22 kV
EXCEPTION: For voltages exceeding 98 kV ac to ground or 139 kV dc to ground, clearances less than those required above are permitted for systems with known switching-surge factors. (See Rule 233C3)

3. **Alternate clearances for voltages exceeding 98 kV ac to ground or 139 kV dc to ground**
The clearances specified in Rules 233C1 may be reduced where the higher-voltage circuit has a known switching-surge factor, but shall not be less than the alternate clearance, which is computed by adding the reference height from Rule 233C3a to the electrical component of clearance from Rule Rule 233C3b

a. Reference heights
The reference height shall be selected from Table 233-3
For Supply lines = 0.00 ft
For Communication Lines = 2.00 ft

b. Electrical Component of clearance
The electrical component (D) shall be computed using the following equation:

$$D\ (ft) = 3.28 \times [(V_H \times SF + V_L/\sqrt{3} \times \sqrt{2}) \times a/(500 \times K)]^{(1.667)} \times c \times b$$

CASE 1. ±400 kV DC Open Supply Conductors cross over 46 kV AC Open Supply Conductors

ALTERNATE CLEARANCE RULE 233C3a +233C3b		**NESC RULE 233C1 AND 233C2**	
V_H =	400 kV (Upper cond)	Basic Clearance to 22 kV =	2.0 ft
V_L =	46 kV (Lower cond)		
SF=	2.8	Upper voltage exceeding 22 kV=	12.6 ft
a=	1.15		
b=	1.03	Lower voltage exceeding 22 kV=	0.2 ft
c=	1.2		14.8 ft
K=	1.4		
D=	11.9		
Adopt	**12.0 ft**		

NYRI DC PROJECT
NESC VERTICAL CROSSING CLEARANCE CALCULATIONS

CASE 2. ±400 kV DC Open Supply Conductors cross over 138 kV AC Open Supply Conductors

ALTERNATE CLEARANCE RULE 233C3a +233C3b		**NESC RULE 233C1 AND 233C2**	
V_H =	400 kV (Upper cond)	Basic Clearance to 22 kV =	2.0 ft
V_L =	138 kV (Lower cond)		
SF=	2.8	Upper voltage exceeding 22 kV=	12.6 ft
a=	1.15		
b=	1.03	Lower voltage exceeding 22 kV=	2.1 ft
c=	1.2		16.7 ft
K=	1.4		
D=	13.2		
Adopt	**14.0 ft**		

CASE 3. ±400 kV DC Open Supply Conductors cross over 345 kV AC Open Supply Conductors

ALTERNATE CLEARANCE RULE 233C3a +233C3b		**NESC RULE 233C1 AND 233C2**	
V_H =	400 kV (Upper cond)	Basic Clearance to 22 kV =	2.0 ft
V_L =	345 kV (Lower cond)		
SF=	2.8	Upper voltage exceeding 22 kV=	12.6 ft
a=	1.15		
b=	1.03	Lower voltage exceeding 22 kV=	6.2 ft
c=	1.2		20.8 ft
K=	1.4		
D=	16.6		
Adopt	**18.0 ft**		

CASE 4. ±400 kV DC Open Supply Conductors cross over the shield wire of HV transmission lines

ALTERNATE CLEARANCE RULE 233C3a +233C3b		**NESC RULE 233C1 AND 233C2**	
V_H =	400 kV (Upper cond)	Basic Clearance to 22 kV =	2.0 ft
V_L =	0 kV (Lower cond)		
SF=	2.8	Upper voltage exceeding 22 kV=	12.6 ft
a=	1.15		
b=	1.03	Lower voltage exceeding 22 kV=	0.0 ft
c=	1.2		14.6 ft
K=	1.4		
D=	11.2		
Adopt	**12.0 ft**		

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-20
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel B
Subject:	Design of line

---

1. Provide the Corona Ring designs for the transmission line.

Include a copy of all supporting work papers.

Response:

See attached typical specification sheet on Corona Ring design.

2 Provide an analysis of the line with and without the corona rings for the following:

- **Corona**
- **noise and**
- **radio and television interference**

Response:

Corona rings are typically used as a mitigating measure to control the intense electric field on conductor hardware and insulators such that the ionization of air that creates the corona effect around the insulators and hardware is reduced to an acceptable level. At the time of material procurement NYRI will carefully review proposals from conductor hardware vendors to ensure corona levels are at an acceptable level. Use of corona rings is a standard industry practice.

When the electric field around an energized conductor exceeds the voltage breakdown strength of air, corona will result. Audible noise and radio interference are typical effects of corona.

NYRI will ensure that corona (and therefore noise and radio interference) is controlled by appropriately specifying conductor diameter, a smooth conductor surface and use of

properly designed insulators and hardware without sharp surfaces.

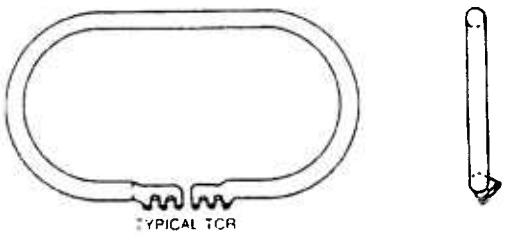
Refer to the Supplemental Article VII, Appendix G for an analysis of the line for corona, noise, and radio and television interference. The line design incorporates corona rings, which based on experience will be necessary and therefore they have been included in this analysis.

Attachment for Interrogatory
DPS-20.1

TRANSMISSION CONNECTORS

HARDWARE FITTINGS
ALUMINUM
TRANSMISSION CORONA RINGS

ALUMINUM
TCR



Type TCR corona rings are primarily used on deadend assemblies to grade the lower insulators on a string and shield the associated hot line hardware from corona and RIV. Type TCR corona rings are fabricated in a variety of sizes, shapes and mounting angles, depending on the system voltage and deadend assembly type.

Contact factory, with deadend assembly details, for assistance in specifying a specific TCR ring catalog number.

Material: Sandblasted 6061-T1 or 6063-T4 aluminum

TG-28

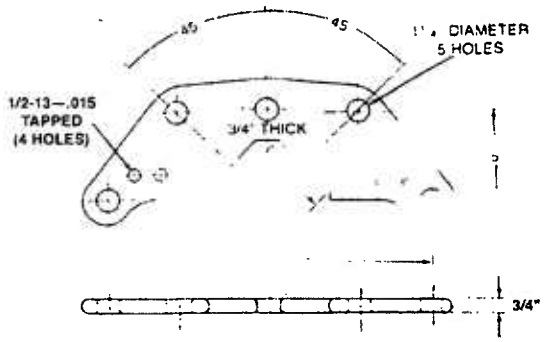
HARDWARE FITTINGS
DUCTILE/STEEL
YOKE PLATE
(VEE CONFIGURATION)

DUCTILE/STEEL
YPV

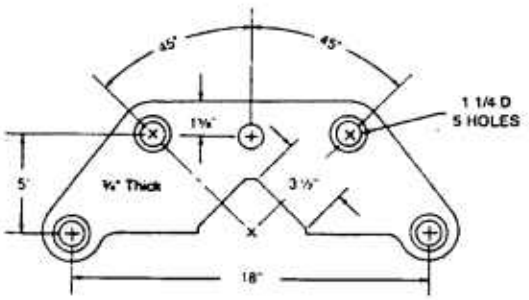
These yoke plates are used with a VEE string of insulators to attach a two conductor bundle.

Type YPV yoke plates may be furnished in a variety of sizes, hole spacing, ultimate strengths, insulator attachment angles and provisions for mounting corona rings.

Material: Ductile iron, galvanized or steel, galvanized.



Ductile
CATALOG NUMBER–YPV30172591
(with (4) 1/2"-13 holes)
CATALOG NUMBER–YPV30172592
(without (4) 1/2"-13 holes)
ULTIMATE STRENGTH–30,000 LBS. PER INSULATOR
ATTACHMENT HOLE AT INDICATED ANGLE
CONTACT FACTORY FOR LIFTING HOLE RATING



Steel
CATALOG NUMBER–930064004
ULTIMATE STRENGTH–40,000 LBS.
PER INSULATOR ATTACHMENT HOLE
AT INDICATED ANGLE

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-21
Requested By: Edward Schrom
Date of Request: October 2, 2006
Reply Date: February 20, 2008
Witness: Panel D
Subject: Design of line

---

1. **Provide engineering drawings to scale for each of the possible transmission structures to be used. Include the dimensions of each structure.**

Response:

See Exhibit E-1, Figs E-1.1.1-1 thru E-1.1.1-9A of the Supplemental Article VII Application.

2. **Provide the technical drawings of all caissons, embedded steel poles, etc showing the dimensions. (feet)**

Response:

See Exhibit E-1, Figs E-1.1.1-10 through E-1.1.1-15 of the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-22
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

---

1. **Provide an engineering drawing of the counter poise system to be installed. Provide a written description of how the system will be installed. Explain how it is connected.**

Response:

See Exhibit E-1.5.2.2, Figs E-1.1.4-2, of the Supplemental Article VII application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-23
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel B
Subject:	Design of line

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1. **Provide a copy of the railroad(s) specification(s) for occupancy in and along Railroad right-of-way.**

Response:

Attached are the construction specifications for occupancy in both railroad properties.

2. **Provide a discussion and technical examples of how NYRI will meet or exceed the railroad(s) right-of-way specifications. Provide copies of all supporting documents.**

Response:

NYRI has obtained specifications and requirements for construction activities on Railroad property from Metro-North, Norfolk Southern, and New York Susquehanna and Western. NYRI has reviewed these specifications and requirements and will develop its detailed construction plans along the railroad to adhere to them. For example, special structural construction equipment, foundation installation plans, and cable installation methods will be considered if necessary to meet working clearances, and the proposed plan and approaches will be provided to the respective Railroads for review and acceptance. Construction plans in these areas will be finalized during the detailed design phase and preparation of the EM&CP.

The construction specifications for the railroad properties are attached.

Attachment for Interrogatory
DPS-23.1

Metro-North Railroad

Attached is the General Procedure for Access to Railroad Property (pages 2 to 3) and Metro-North's specifications for Individuals and Companies working on or adjacent to railroad property (pages 4 to 15, Sections A, B and C).

Section A, of the specifications entails the Sponsor's requirements for work affecting the railroad (pages 5 to 9). This section contains two drawings SK-1, Sheet Piling Adjacent to tracks as shown in Appendix A and drawing SK-2, Lateral Pressure due to Strip Load as shown in Appendix B.

Section B, of the specifications entails the requirements for erection, demolition and other rigging operations over or adjacent to Metro-North's right-of-way (page 10).

Section C, of the specifications entails the Uniform Insurance Standards, Construction Work involving Contractors not working for Metro-North (pages 11 to 15). Note ACORD forms are not acceptable. Metro-North's insurance certificates are provided in Appendix C. Do not change or tamper with Metro North's form.

Section A & B (Revised 2/18/00)
Section C (Revised 1/30/07)
Cert. of Insur. (Revised 1/29/07)

GENERAL PROCEDURE FOR ACCESS TO RAILROAD PROPERTY NY

All outside parties who need to perform construction or maintenance on or adjacent to Metro-North Railroad property must comply with the following:

1) **Permit Application:** Parties requiring an entry permit shall submit a written request to the Assistant Vice President Maintenance of Way defining the location, scope of work and duration of activities on or adjacent to Railroad facilities. Address the letter to:

Assistant Vice President Maintenance of Way
Metro-North Railroad
420 Lexington Avenue, 12th Floor
New York, NY 10017

Execute and return the Entry Permit provided by Metro-North to the Assistant Vice President Maintenance of Way. Applicant shall obtain confirmation of receipt from the above office.

2) **Insurance:** Furnish proof of insurance in a form acceptable to and approved by the Director of MTA Risk and Insurance Management no less than 20 working days prior to the intended start of work (see Section C of this specification) to:

MTA/Metro-North Railroad
Attn: Risk & Insurance Management
2 Broadway, 21st Floor
New York, NY 10004
Tel: (646) 252-1430

Applicant shall obtain confirmation of receipt and approval of the insurance certificate from the Director of MTA Risk and Insurance Management.

3) **Payment:** Upon review of the scope of work provided with the permit application, Metro-North will prepare an estimate of the cost of providing Railroad Protective Personnel and all other expenses related to the project. Supply payment, in full, of Metro-North's estimated cost of Railroad Force Account Services no less than 20 working days prior to the intended start of work. Obtain confirmation of receipt by the Assistant Vice President Maintenance of Way. Since the payment is based on an estimated cost, unexpended funds if any, will be subject to reimbursement. On the contrary, should the actual work exceed the estimated cost, an additional payment shall be submitted to continue Railroad Force Account Services.

4) **Technical Submittals:** Supply construction shop drawings, calculations and supporting documentation in accordance with the a[illegible]uction Management I&C Specifications". Address them to and receive confirmation of receipt by:

Assistant Director Construction Management-I&C Dept.
MTA Metro-North Railroad
420 Lexington Avenue, 11th Floor
New York, NY 10017
Tel: (212) 499-4462 / Fax: (212) 499-4499

Upon receipt of the submittals, allow 10 working days from date of receipt for Metro-North's review of the submittals prior to requesting a conference to schedule that activity.

Once the above requirements have been satisfied, contact the Assistant Director of Construction Management no less than 15 working days prior to the start of work to schedule a pre-construction conference at (212) 499-4462. When a[illegible] in order, the Construction Management Department will schedule Railroad coordination and support services. (See Sections A and B of "Construction Management I & C Specifications"). No work will commence until the applicant receives permission from the designated Railroad Representative at the site to proceed with the work.

Metro-North Railroad

CONSTRUCTION MANAGEMENT SPECIFICATIONS FOR INDIVIDUALS & COMPANIES (I & C) WORKING ON OR ADJACENT RAILROAD PROPERTY

Section A & B (Revised 2/18/00)
Section C (Revised 1/30/07)
Cert. of Insur. (Revised 1/29/07)

SECTION A

SPONSOR REQUIREMENTS FOR WORK AFFECTING THE RAILROAD

Introduction:
There are conditions unique to this operating railroad environment which Metro-North must consider when planning construction activities. Among these are: high voltage third rail and power transmission systems, high speed and silent trains that require long braking distances, buried signal control and communication systems and many more. Metro-North must have absolute cooperation of any sponsor planning construction activities that could interfere with train operations.
The sponsor is the agency or party who has a formal agreement with Metro-North to perform construction or maintenance around the railroad.
The sponsor of the project is ultimately responsible for assuring that its agents, consultants, contractors and sub-contractors fully comply with the specifications contained herein. The term "sponsor" used throughout these specifications shall mean the sponsor, its employees, its agents, consultants, contractors, sub-contractors, etc.
The sponsor shall safeguard the tracks, rolling stock and other equipment and plant of the Railroad from being damaged in any manner and will be held financially responsible for it. He shall not perform any activities around the Railroad until he has executed a formal agreement and complied with Metro-North requirements.

Fouling:
An operating track will be considered fouled when, in the sole opinion of Metro-North, demolition, blasting or construction activity on or adjacent to a main track or controlled siding may interfere with the safe movement of trains at normal speed. A crane, derrick or a similar piece of equipment located on Metro-North right-of-way or on adjacent property shall be considered as fouling the track when the position in which it is working is such that without regard to the manner in which it is intended to carry out the operation, failure or malfunction could cause damage or obstruction within the operating area. Similarly, Metro-North utilities (power, communications and signal lines) will be considered fouled when, in the sole opinion of Metro-North [illegible] operation could damage or interfere with these utility lines.

Track Use:
Metro-North will, at its sole discretion, remove tracks from service and de-activate high voltage traction power facilities to permit certain construction activities that can only be performed at times when Metro-North can schedule this track use. In general, Metro-North can de-activate single tracks at night between the hours of 2:30AM and 5:00AM. Construction activities that require de-activating all tracks of a main line system must be performed on weekend nights at times specified by Metro-North. Requests for additional "track use" will be evaluated subject to operating and maintenance priorities. Requests to de-activate track(s) and/or high voltage power [illegible] must be received and acknowledged by the assigned Metro-North inspector no less than 14 days prior to the scheduled activity. Metro-North will only consider requests for "track time" to facilitate construction activities that have been approved by the Construction Management I & C Department.

Protective Personnel:

Metro-North will furnish flagmen, inspectors, maintenance personnel and similar labor (protective personnel) as required by Metro-North to protect the operation of train traffic during the sponsor's construction activities. The sponsor must obey the instructions from Metro-North flagmen or other representatives on the job site promptly. Failure to follow instructions from Metro-North personnel on the site will lead to withdrawal of Metro-North's entry permit, thus closing the job site to the sponsor and its employees. Metro-North will, at its sole discretion, determine the need for and the availability of protective support personnel. The sponsor must notify the assigned Metro-North inspector no less than 14 calendar days in advance of undertaking an approved construction activity that may require protective personnel. If the sponsor notifies Metro-North less than 14 days in advance, Metro-North may be unable to supply protective personnel and/or Metro-North may incur additional costs in accordance with existing collective bargaining agreements in order to fulfill a request. The cost of protective personnel and any additional penalty costs incurred by Metro-North due to late notification shall be borne by the sponsor. Requests to cancel construction activities and protective personnel must be received and acknowledged by the assigned Metro-North inspector no less than 96 hours (4 days) prior to the start of the scheduled construction activity. Any costs incurred by Metro-North due to late cancellation notice shall be borne by the sponsor.

Metro-North will provide protective forces to the extent possible considering operational and maintenance priorities. Metro-North makes no guarantee that protective personnel will be available to meet the sponsor's preferred schedule. Further, no such work may actually commence until the assigned Metro-North representative affirmatively advises the sponsor that the necessary protective forces are stationed and that he may proceed.

MNR Representation:

All matters requiring Metro-North approval or coordination of construction activities shall be directed to the following:

Assistant Director – Construction Management – I&C Department
Metro-North Commuter Railroad Company
420 Lexington Avenue, 11th Floor
New York, NY 10017.

Preparation:

The sponsor shall obtain written approval of design and construction methods from Metro-North. The sponsor shall submit detailed plans, appurtenant data and calculations prepared by a Professional Engineer licensed in the state where the work will be performed for any operation on or adjacent to Metro-North property prior to the start of work. Metro-North will evaluate the effect of this work on the operating Railroad. The plan shall locate and identify all utilities above and below ground at the work site. The sponsor shall make necessary plan revisions, schedule changes, additions, deletions, etc., at his/her own expense. The sponsor shall remove at his/her own expense any pipe, wire or structural facility installed without Metro-North approval or which deviates from the plan approved by Metro-North.

Under the direction of a Metro-North representative (engineer, inspector) the sponsor shall – at no cost to Metro-North – perform pre and post construction surveys of tracks and structures to establish existing horizontal and vertical clearances. Vertical clearance shall be measured from "top of rail". Horizontal clearance shall be measured from the "centerline of track". The elevations shall reference an established survey benchmark that will remain undisturbed throughout the construction. It may be necessary for the sponsor to monitor movements of tracks and structures on a more frequent basis – monthly, weekly or daily as determined by the Metro-North representative. Copies of the field notes must be delivered to Metro-North on the date the survey was performed.

The sponsor shall obtain appropriate soils/foundation data wherever the project requires excavations, temporary foundation supports, or any other subsurface construction activities. Under the direction of a Metro-North representative (engineer, inspector) the sponsor shall – at no cost to Metro-North – take pre and post construction photographs of the entire work site and track area, two sets of which will be delivered to Metro-North. The photographs shall be gloss prints 8 ins. by 10 ins. in size. They shall also be labeled on their reverse sides. The label shall include project title, Project Identification Number (PIN), Bridge Identification Number (BIN) or contract number, name of sponsor, date and direction photograph was taken. Each photograph shall also be numbered for identification.

Submittals:
All submittals requiring review and approval by Metro-North shall first be reviewed by the sponsor's designated consulting engineer and then submitted to Metro-North to complete the review and approval process. Submittals shall be stamped or written as "Approved", "Approved As Noted", "Revise and Resubmit", or "Rejected" by the sponsor's designated consulting engineer at the conclusion of the review prior to its submission to Metro-North.

Environmental Controls:
The sponsor shall comply with any and all Federal, State and Local laws, regulations and rules governing environmentally controlled substances and construction practices. He shall submit a plan and procedure prepared by a Professional Engineer licensed in the state where the work will be performed for handling and disposal of regulated materials. De-watering operations shall comply with applicable regulatory controls and shall be subject to Metro-North review and approval. The sponsor shall comply with Federal and State regulations for containment, storage and disposal of hazardous/industrial wastes. He shall comply with Metro-North Procedure 50-601, Item "O", Environmental Controls. The sponsor shall indemnify and hold harmless Metro-North from any loss, liability or expense on account of claims which result from the handling, transportation, disposal or abatement of asbestos, asbestos-containing material or asbestos-contaminated materials, lead paint materials, polychlorinatedbiphenols (PCB's) and other environmentally regulated substances and materials in the possession of sponsor or his subcontractors.

Security:
The sponsor shall adhere to M tro-North security practices. He shall identify all sponsor/subcontractor ho have reason to enter a designated security area of Metro-North proper pply a listing of the names of all personnel who have reason to enter Metro property. The list all be updated whenever there is a change in personnel. He shall supply eac with company insignia, which shall be worn on outer garments are on Metro-North property. Sponsor personnel failing to wear identifying insignia shall be removed from the property.

Protective Enclosures:
The sponsor will not store materials or equipment upon the Railroad right-of-way without first obtaining written permission and approval of Metro-North. The sponsor shall secure construction materials and equipment that could be used by vandals to obstruct Railroad operations in a vandal-proof enclosure. The sponsor shall be responsible to protect the work site with fences, barricades, barriers, watchmen or other means necessary to bar access to operating areas via the work site. Fences at a minimum shall be 12-gauge chain link, eight (8) feet in height. Vehicular barriers shall comply with "AASHTO" Standard for design and fastening to structures.

English Language:
The sponsor must furnish an English-speaking supervisor at each job location who is capable of communicating (including translating if necessary) instructions from the flagman or other Metro-North representative to the sponsor's personnel on the job. Such supervisor must remain on the site at all times while work is being performed or any sponsor employees are on or about the Metro-North right-of-way.

Safety:
The Metro-North Safety Department conducts a mandatory orientation class for all sponsor personnel who have reason to enter Metro-North property. Seven- (7) working days advance notice from the sponsor is necessary for class scheduling. Sponsor personnel must present proof of completion of this orientation before entering the property. Sponsor personnel who fail to carry proof of training shall be removed from the property. The sponsor can obtain training material from the Safety Department.
The sponsor shall comply with the requirements of all applicable Federal, State, Local and Metro-North jurisdictions to provide a suitable work environment for workmen and for the general public. He shall prepare and submit a comprehensive "Safety Plan" which will:
Designate a company representative(s) who will prepare and implement a program of compliance.
Supply personal safety equipment for all workmen employed by the sponsor or his contractors and enforce use of this equipment by contract personnel.
Train all employees and subcontract employees with emphasis upon unusual conditions found in the Railroad environment.

The sponsor shall supply "Material Safety Data Sheets" for construction or maintenance materials that could pose a safety, fire, health or other hazard to Metro-North.

Hi-Rail Equipment:
Highway-rail mounted equipment and "work trains" are generally prohibited from use by non-Railroad agencies on Metro-North mainline tracks.
Blasting: Is prohibited on Metro-North property. Metro-North shall determine if any blasting in the vicinity of the Railroad will affect its operations. The sponsor shall submit to Metro-North for approval, plans and specifications of any proposed blasting activities, which could affect Railroad operations.

Temporary Structures:

Shall be necessary at the sole discretion of Metro-North to protect the Railroad or the general public from possible falling debris, paint or other materials, to protect personnel working above the right-of-way, to provide a platform for personnel, materials, and/or equipment and to provide a walkway for the general public. Temporary structures intended as walkways for the general public shall comply with the "New York State Building Code" Specifications and the Americans with Disabilities Act of 1991.

A protective scaffold intended to contain finely broken concrete decking shall be designed for a live load of 200 lbs. per square foot applied uniformly over the entire structure, and a 2 kip concentrated load placed anywhere on the structure. The two loads are not to be applied simultaneously for design purposes. Design of the scaffold intended for any other purpose shall be submitted to Metro-North for approval. The design shall contain details of any construction activities supported or protected by the scaffold. Impact loads or rigging that exceed the capacity of the scaffold shall be subject to the conditions of Section B "Rigging". Wood for protective scaffolding must be fire-retardant. The sponsor must supply Metro-North with certification from the manufacturer or supplier that lumber meets or exceeds the ASTM E-84 fire-retardant specification for exterior application 30-minute duration. Plans and calculations for temporary structures must be submitted to Metro-North for review and approval prior to construction. Further, plans and calculations must be prepared and stamped by a Professional Engineer licensed in the state in which the project is located.

Shoring:

All drawings for temporary sheeting and shoring shall be prepared and stamped by a Registered Professional Engineer (licensed in the state in which the project is located) and shall be accompanied by complete design computations when submitted for approval.

Sheeting shall be required on all excavations where the side of the excavation is intercepted by the Railroad live load influence line. The live load influence line is defined as a line originating at the centerline of the track, bottom of tie and extending out in this plane a distance of 10 feet, then downward at a slope of 1 (vertical) on 1½ (horizontal). Such excavations must be designed to withstand, in addition to all static loads such as structural dead load, soil pressure and hydrostatic pressure, a Railroad live load of Cooper E-80 as defined in the "AREA Manual Section 1-3" or other loading magnitude as may be directed by Metro-North. (See drawing "SK - 1", APPENDIX A).

Interlocking steel sheet [illegible], driven prior to excavation, must be used to protect track stability. The use of [illegible] or similar devices is not acceptable in this area. Soldier piling and lagging will be [illegible] supporting adjacent track(s) only when its use is approved by Metro-North. Consideration for use of soldier piling and lagging will be made if the required penetration of steel sheet piling cannot be obtained and when dry, non-running, stable material will be encountered.

[illegible] forces acting on the sheeting shall be computed as follows:

The active earth pressure due to the weight of the soil shall be computed by the Rankine Theory. The Boussinesq analysis shall be used to determine the lateral pressure caused by the railroad loading. The load on the track shall be taken as a strip load with a width equal to the length of the ties (8' - 6"). The vertical surcharge, q (psf), caused by each axle weight divided by the tie length and the axle spacing (5' - 0"). For an E-80 loading:

$q = 80{,}000 \text{ lbs.} / (8.5' \times 5') = 1882 \text{ psf.}$

The horizontal pressure due to the live load surcharge at any point on the sheet piling wall is Ph and can be calculated by the following:

$Ph = (2q / \pi) (\beta - \sin \beta \cos 2\alpha)$

(See drawing "SK - 2", APPENDIX B).

The allowable stresses for the sheet piling and other steel members (wales, struts, etc.) shall be in accordance with AREA Chapter 15, Parts 1 and 2. These allowable stresses may be increased ten percent (10%) due to the temporary nature of the installations.

Where soil or rock anchors are used, all anchors must be tested. Testing shall be in accordance with industry standards with ten percent (10%) of the anchors "Performance Tested" and all others "Proof tested".

Exploratory trenches, three (3) feet deep and fifteen (15) inches wide in the form of an "H" with outside dimensions matching the outside of sheeting dimensions are to be hand dug, prior to placing and driving steel sheeting, in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled with the backfill compacted immediately. This work must be done in the presence of a Metro-North Inspector.

Cavities adjacent to the sheet piling, created by the driving of the sheet piling, shall be filled with 11/2-inch stone ballast. Any disturbed ballast must be restored and tamped immediately.

Sheet piling shall be cut off at the top of tie during construction. After construction and backfilling has been completed, piling shall be cut off eighteen (18) inches below the existing ground line and left in place.

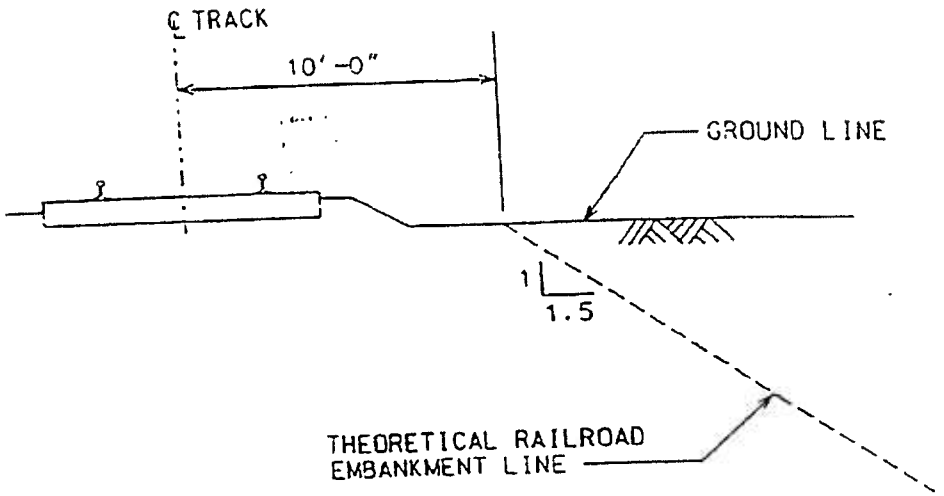
Moreover, sheeting alongside active track systems shall maintain lateral support. Lateral support shall maintain a compacted stone ballast shoulder level with the top of tie for at least two (2) feet from the end of tie supported by a slope no steeper than one (1) vertical to two (2) horizontal.

Timber sheeting left in place shall be treated with wood preservative in accordance with the American Wood Preservers Association Standards for timber in contact with soil.

Any excavation adjacent to track shall be covered and ramped and provided with barricades as required by Metro-North. A lighted walkway with a handrail must be provided adjacent to the track for any excavation within ten (10) feet of the centerline.

Final backfilling of the excavation shall be as required by Metro-North

DWG. SK - 1
(2/18/00)



REQUIREMENTS FOR TEMPORARY SHEET PILING ADJACENT TO TRACK

1. STEEL SHEET PILING FOR TRACK SUPPORT IS NOT REQUIRED FOR EXCAVATION OUTSIDE THE THEORETICAL RAILROAD EMBANKMENT LINE. SHORING IN ACCORDANCE WITH OSHA REQUIREMENTS SHALL BE USED IN THIS AREA.

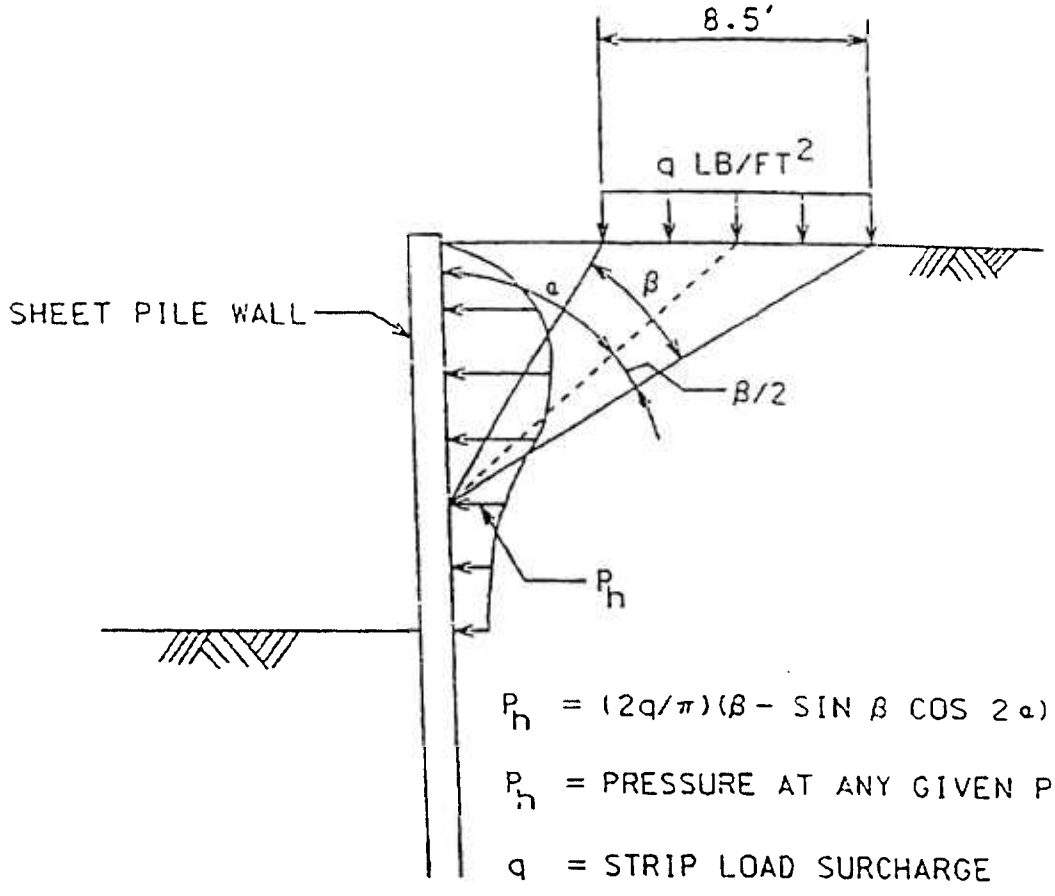
2. STEEL SHEET PILING, DRIVEN PRIOR TO EXCAVATION, IS REQUIRED WHEN EXCAVATION IS WITHIN THE THEORETICAL RAILROAD EMBANKMENT LINE.

3. ALL [illegible] PILING IS TO BE DESIGNED FOR AN E-80 LOADING. BOUSSINESQ ANALYSIS IS TO BE USED TO DETERMINE THE LATERAL [illegible]SSURE CAUSED BY THE RAILROAD LOADING.

DWG. SK - 2

(2/18/00)

LATERAL PRESSURE DIAGRAM



$P_h = (2q/\pi)(\beta - \sin\beta \cos 2\alpha)$

P_h = PRESSURE AT ANY GIVEN POINT

q = STRIP LOAD SURCHARGE

α = ANGLE IN DEGREES

β = ANGLE IN RADIANS

LATERAL PRESSURE DUE TO STRIP LOAD

SECTION B

REQUIREMENT FOR ERECTION, DEMOLITION, AND OTHER RIGGING OPERATIONS OVER OR ADJACENT TO METRO-NORTH RIGHT-OF-WAY

The sponsor must furnish scaled plans with supporting calculations in order to obtain written approval prior to the start of any rigging operation over or adjacent to the Metro-North right-of-way as follows:

Plan view depicting locations of cranes, boom length and rigging operating radii, with delivery or disposal vehicle weight and locations shown.

Crane rating sheets showing cranes to be adequate for 150% of the lift based on the manufacturers recommended capacity. Crane and boom nomenclature shall be indicated. Include manufacturer's operating booklet and recommended data for special applications such as barge mounted equipment, partial outrigger extensions, boom and jib configurations, counterweights, etc.

Plans and computations showing weight of pick. Supply manufacturers weight data, certified weights, shop drawings, etc. to verify load calculations. Include weight of rigging equipment. Show in a table format on the plan a "Crane Lifting Schedule" of each crane pick as shown below:

CRANE LIFTING SCHEDULE								
Piece No. ----	Piece Weight kips	Rigging Weight kips	Block Weight Kips	Maximum Weight Kips	Maximum Radius feet	Boom Length feet	Crane Capacity Kips	Factor of Safety: 1.5 or greater
1	X	X	X	X	Y	Y	X	Z

Location plan and profile showing obstructions, crane tail swing, and outrigger dunnage indicating that the proposed swing is possible. A profile of overhead utility lines or obstructions demonstrating that the rigging operation is possible. Computations and plans demonstrating that soils or foundations for equipment and temporary structures are adequate and able to protect subsurface utilities and structures.

Plans and calculations showing locations and structural adequacy of mats, barges, embankments, supporting structures, planking, or special decking as may be required by Metro-North.

Written statement from crane owner giving date of last crane condition and safety inspection and the results of said inspection. Include copy of current inspection certificate by an inspection agency (e.g. NY City Cranes & Derricks).

Data sheet listing number, type, size, arrangement and capacity of slings, shackles, spreader bars, or other co[illegible] Copies of catalog or information sheets of specialized equi[illegible]

A complete procedure indicating the order of lifts and repositioning or rehitching of the crane or cran[illegible] or shall supply engineered plans and calculations for partial pre-cutting of [illegible] members for demolition operations.

Temporary support of any components or intermediate states including bolting data shall be shown.

A time schedule of each stage or lift, as well as a schedule for the entire lifting procedure.

All plans and calculations submitted to Metro-North as required above shall be stamped by a Professional Engineer licensed in the state where the work will be performed.

In general, unless otherwise directed by Metro-North, operations directly over or adjacent to the operating right-of-way which foul the operating area, or which in the event of a failure could fall across the operating area will be performed between approximately 2:30AM and 5:00AM. Operations involving a track and power outage across all tracks may be performed only on weekends – at times specified by Metro-North.

The sponsor and engineer shall locate and mark the exact crane location in the field at least two working days prior to the intended operation. He shall verify the radii and clearances for critical picks, and he shall certify the stability of the foundation for crane outriggers and supports. Any deviation from this plan must be reviewed and approved by the sponsor's engineer prior to resubmission to the Metro-North Engineer for review and approval prior to the date that the work will be scheduled.

SECTION C

UNIFORM INSURANCE STANDARDS
CONSTRUCTION WORK INVOLVING CONTRACTORS NOT WORKING FOR METRO-NORTH COMMUTER RAILROAD COMPANY

The Contractor shall procure, at its sole cost and expense, and shall maintain in force at all times during the term of this Agreement, except for products and completed operations coverage, which must be maintained for at least three years following completion of the contract, policies of insurance as herein below set forth, written by companies with an A.M. Best Company rating of A-/"VII" or better, and approved by the Metro-North Railroad/MTA and shall deliver evidence of such policies. These policies must: (i) be written in accordance with the requirements of the paragraphs below, as applicable; (ii) be endorsed in form acceptable to include a provision that the policy will not be canceled, materially changed, or not renewed without at least thirty (30) days prior written notice to the Metro-North Railroad c/o MTA Risk and Insurance Management Department - Standards, Enforcement & Claims Unit, 2 Broadway – 21st floor, New York, NY 10004 by Certified Mail, return receipt requested; and (iii) state or be endorsed to provide that the coverage afforded under the contractor's policies shall apply on a primary and not on an excess or contributing basis with any policies which may be available to the Metro-North Railroad/MTA, and also that the contractor's policies, primary and excess, must be exhausted before implicating any Metro-North Railroad/MTA policy available. (iv) In addition, contractor's policies shall state or be endorsed to provide that, if a subcontractor's policy contains any provision that may adversely affect whether contractor's policies are primary and must be exhausted before implicating any Metro-North Railroad/MTA policy available, contractor's and subcontractor's policies shall nevertheless be primary and must be exhausted before implicating any Metro-North Railroad/MTA policy available. Except as otherwise provided herein, policies written on a "claims-made" basis are not acceptable. At least two (2) weeks prior to the expiration of the policies, contractor shall endeavor to provide evidence of renewal or replacement policies of insurance with terms and limits no less favorable than the expiring policies. If any deductible or retention is applicable, such deductible and/or retention shall not exceed $100,000 unless such increased deductible or retention is approved by Metro-North Railroad/MTA. The Contractor shall be responsible for all claim expense and loss payments within the deductible or *self-*insured retention. The insurance monetary limits required herein may be met through the combined use of the insured's primary and umbrella/excess policies.

Workers' compensation Insurance (including Employer's Liability Insurance with limits of not less than $2,000,000.00) meeting the statutory limits of New York State. Such insurance shall fully comply with the Worker's Compensation law(s) of the state(s) in which operations or work related to this project is to be performed.

Commercial General Liability Insurance (I.S.O. 2001 Form or equivalent approved by Metro-North Railroad in the Contractor's name with limits of liability in the amount of $1,000,000 for each occurrence on a combined single limit basis for injuries to persons (including death) and damage to property, $2,000,000 General Aggregate and $2,000,000 in the Aggregate in respect to Products/Completed Operations. Such policy should be written on an occurrence form and shall include:

- Contractual coverage for liability assumed by the Contractor;

- Personal and Advertising Injury Coverage
- Products-Completed Operations;
- Independent Contractors Coverage;
- "XCU" coverage (Explosion, Collapse, and Underground Hazards) where necessary;
- Contractual Liability Exclusion, applicable to construction or demolition operations to be performed within 50 feet of railroad tracks, must be voided, where necessary;
- Coverage for claims for bodily injury asserted by an employee of an additional insured and any Employer Liability Exclusion which may otherwise operate to exclude such coverage shall be voided in this respect; and
- Additional Insured Endorsement (I.S.O. Form CG 20 10 1185 version or equivalent approved by the Metro-North Railroad) naming the following entities and their subsidiaries and affiliates as follows:

All Contracts:
Metro-North Commuter Railroad & Metropolitan Transportation Authority

Contracts involving Grand Central Terminal:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC & Connecticut Department of Transportation

Contracts involving the Hudson Line:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC, Connecticut Department of Transportation, National Railroad Passenger Corporation (Amtrak), Consolidated Rail Corporation, CSX Transportation, Inc. & New York Central Lines LLC, and Delaware & Hudson Railway Company, Inc.

Contracts involving the Harlem Line:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC, Connecticut Department of Transportation, Consolidated Rail Corporation, and CSX Transportation, Inc. & New York Central Lines LLC.

Contracts involving the West of Hudson Lines:
(including Port Jervis Line, Pascack Valley Line, and Piermont Branch)
New Jersey Transit Rail Operations, Inc., Consolidated Rail Corporation, and CSX Transportation, Inc. & New York Central Lines LLC., and Norfolk Southern Railway & Pennsylvania Lines LLC.

Railroad Protective Liability Insurance (ISO-RIMA or equivalent form approved by the Railroad), covering the work to be performed at the designated job site and affording protection

for damages arising out of bodily injuries or death, injury to or destruction of property, including damage to the insureds own property and conforming to the following:

- The limit of liability shall be $2,000,000.00 for each occurrence. If the policy is subject to an aggregate limit, replacement insurance will be required if it is likely such aggregate will be exceeded.

- Evidence of Railroad Protective Liability Insurance must be provided in the form of the Original Policy or a detailed Binder pending issuance of the Original Policy.

- Depending on the territory where the Work is to be performed, the following additional entities must be included as named insureds on the Railroad Protective Liability Insurance Policy:

All Contracts:
Metro-North Commuter Railroad & Metropolitan Transportation Authority

Contracts involving Grand Central Terminal:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC & Connecticut Department of Transportation

Contracts involving the Hudson Line:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC, Connecticut Department of Transportation, National Railroad Passenger Corporation (Amtrak), Consolidated Rail Corporation, CSX Transportation, Inc. & New York Central Lines LLC, and Delaware & Hudson Railway Company, Inc.

Contracts involving the Harlem Line:
Midtown TDR Ventures, LLC, Midtown Trackage Ventures, LLC, Connecticut Department of Transportation, Consolidated Rail Corporation, and CSX Transportation, Inc. & New York Central Lines LLC.

Contracts involving the West of Hudson Lines:
(including Port Jervis Line, Pascack Valley Line, and Piermont Branch)
New Jersey Transit Rail Operations, Inc., Consolidated Rail Corporation, and CSX Transportation, Inc. & New York Central Lines LLC., and Norfolk Southern Railway & Pennsylvania Lines LLC

Business Automobile Insurance Policy (I.S.O. Form CA 00 01 07 97 or equivalent acceptable to the Railroad) in the Contractor's name with limits of liability in the amount of $1,000,000.00 each accident for claims for bodily injuries (including death) to persons and for damage to property arising out of the ownership, maintenance or use of any owned, hired or non-owned motor vehicle. The policy shall be extended to include employees of any insured acting in the scope of their employment.

Environmental Liability Requirements

A. ***Contractor's Pollution Liability*** - In the case of a contract involving environmentally regulated substances or hazardous material exposure(s), the

Contractor shall provide Contractor's Pollution Liability Insurance with respect to the work and activities of the Contractor or its Subcontractors, including but not limited to handling, transporting or disposing of any Hazardous Substances and/or environmentally regulated materials and any sudden and/or non-sudden pollution or impairment of the environment, including clean-up costs and defense. This insurance shall name the following entities as additional insured's: Metro-North Railroad and the Metropolitan Transportation Authority (MTA) including its subsidiaries and affiliates under this policy (or policies) and shall have limits of liability of not less than $5 million. The Contractor shall comply with all federal, state, and/or local laws, rules and regulations and shall obtain any additional coverages required by federal, state, or local government agencies. The Contractor's Pollution Liability Insurance shall be in effect from the time Metro-North Railroad permits the work relating to the Hazardous Substances or other environmentally regulated substances and materials to begin through the completion of the work.

i. This insurance may be supplied by the Subcontractor performing the Work, if the Contractor is not performing any of the relevant work and provided the Contractor and Metro-North Railroad**/the Metropolitan Transportation Authority including its subsidiaries and affiliates are listed as *"additional insureds."***

ii. The Contractor or its Sub-contractor performing the Work, shall obtain all permits, licenses and other forms or documentation, which are required and forward them to the Project Engineer. The insurance shall be submitted to MTA Risk and Insurance Management Department pursuant to requirements referenced in the Insurance Article.

iii. In the event that the Contractor or its Subcontractors transports from the Site hazardous substances or any other environmentally regulated substance that requires a governmentally regulated manifest, the **CA 9948** and the **MCS-90 Endorsements** shall be attached to the auto liability policy and furnished on a primary basis with limits of liability of not less than $5,000,000 providing coverage for bodily injury or property damage including liability for environmental restoration resulting from negligence in the operation, maintenance or use of any motor vehicle involved in the transportation of Hazardous Substances or any other environmentally regulated substance as required pursuant to any federal, state or local laws, rules and regulations. **A copy of each endorsement CA9948 and MCS-90 shall be submitted for review as part of the insurance submission.**

iv. If coverage is not provided with a stand alone policy, a letter signed by an authorized agent is required, a sample copy of which is provided.

v. Any additional insurance policies necessary to obtain required permits or otherwise comply with applicable law, ordinances or regulations regarding the performance of the work.

B. Pollution Legal Liability (Non-Owned Disposal Site Liability) Insurance. If the project activities include the disposal of waste or other hazardous substance from the work site, the Contractor shall maintain or cause to be maintained this

insurance. The Contractor must provide a certificate of insurance to Metro-North Railroad listing the disposal facility as an insured location. Metro-North Railroad and Metropolitan Transportation Authority are to be named as additional insureds on these policies with limits of liability of not less than **FIVE MILLION DOLLARS ($5,000,000)** per occurrence.

If coverage is not provided under a stand alone policy, the "Non-Owned Disposal Site endorsement must be referenced on the insurance certificate and a copy thereof submitted with the insurance.

Metro-North may, at its discretion, procure, provide and thereafter maintain in effect during the life of this project for and in behalf of Metro-North any and all force account insurance deemed necessary by Metro-North. The provision of such insurance shall not be deemed a limitation on any liability of sponsor arising under the terms of the Entry Permit. The premium paid by Metro-North for sponsor in accordance with the provisions of the Entry Permit shall reimburse such force account insurance coverage.

Any notice to be served on Metro-North pursuant to this SECTION C – UNIFORM INSURANCE STANDARDS shall be delivered by hand against a receipt or by U.S. Certified Mail, Return Receipt Requested, postage pre-paid, addressed as follows:

MTA Risk & Insurance Management/Metro-North Railroad
2 Broadway
21st Floor
New York, NY 10004

The Contractor shall furnish evidence of all policies before any work is started to the Metro-North Railroad c/o MTA Risk & Insurance Management - Standards Enforcement & Claims Unit. Certificates of Insurance may be supplied as evidence of policies of all policies, except the Railroad Protective Liability Policy. **The Railroad Protective Liability Insurance Policy** must be provided in the form of the **Original Policy**. A detailed Insurance Binder may be provided **ACORD** or **Manuscript Form,** pending issuance of the Original Policy. **The Original Policy must be submitted to MTA RIM within 30 days of the Binder Approval.**

The Agency reserves the right to request evidence of all other policies. If requested by the Agency, the Contractor shall deliver to the Agency within forty-five (45) days of the request a copy of such policies, certified by the insurance carrier as being true and complete. If a Certificate of Insurance is submitted it must: (1) be provided on the Metro-North Railroad Certificate of Insurance Form; (2) be signed by an authorized representative of the insurance carrier or producer authorized; (3) disclose any deductible, self-insured retention, aggregate limits or exclusions to the policy that materially change the coverage; (4) indicate the Additional Insureds and Named Insureds as required herein; (5) reference the Contract by number on the face of the certificate; and (6) expressly reference the inclusion of all required endorsements.

If, at any time during the period of this Contract insurance as required is not in effect, or proof thereof is not provided to the Metro-North Railroad, the Metro-North Railroad shall have the options to: (i) direct the Contractor to suspend work with no additional cost or extension of time due on account thereof; or (ii) treat such failure as an Event of Default.

METRO-NORTH RAILROAD COMPANY
INDEMNITEES (Additional and/or Named Insureds)

NEW YORK STATE

GCT/PAT (MTA/MN Property)

Metro-North Commuter Railroad Company, MTA, Midtown Trackage Ventures, LLC and Midtown TDR Ventures, LLC (Collectively "Midtown"), Connecticut Department of Transportation (CDOT

Hudson Line (MTA/MN Property)

Metro-North Commuter Railroad Company, MTA, Midtown Trackage Ventures, LLC and Midtown TDR Ventures, LLC (Collectively "Midtown"), Connecticut Department of Transportation (CDOT), National Railroad Passenger Corporation (Amtrak), Consolidated Rail Corporation (Conrail), CSX Transportation, Inc. (CSX) & New York Central Lines LLC, and Delaware & Hudson Railway Company, Inc. (D&H).

Harlem Lines (MTA/MN Property)

Metro-North Commuter Railroad Company, MTA, Midtown Trackage Ventures, LLC and Midtown TDR Ventures, LLC (Collectively "Midtown"), Connecticut Department of Transportation (CDOT), Consolidated Rail Corporation (Conrail), CSX Transportation, Inc. (CSX) & New York Central Lines LLC.

Beacon Line (MTA/MN Property)

Metro-North Commuter Railroad Company, MTA, Connecticut Department of Transportation (CDOT), Housatonic Railroad Company.

New Haven Line - New York Side (MTA Property)

Metro-North Commuter Railroad Company, MTA, Connecticut Department of Transportation (CDOT), National Railroad Passenger Corporation (Amtrak), Consolidated Rail Corporation (Conrail), CSX Transportation, Inc. (CSX) & New York Central Lines LLC, and Providence & Worcester Railroad Company.

Piermont Branch – Pascack Valley Line - New York (MN -Track/NJT-Train)

Metro-North Commuter Railroad Company, MTA, NJ Transit Rail Operations, Inc. (NJT), Norfolk Southern Railway & Pennsylvania Lines LLC.

West of Hudson-Port Jervis Line- New York (MN-Parking/Norfolk Southern-Track/NJT-Train)

Metro-North Commuter Railroad Company, MTA, NJ Transit Rail Operations, Inc. (NJT), Consolidated Rail Corporation, Norfolk Southern Railway & Pennsylvania Lines LLC.

CONNECTICUT

New Haven - Main Line (CDOT Property)

Metro-North Commuter Railroad Company, MTA, CDOT, Consolidated Rail Corporation (Conrail), National Railroad Passenger Corporation (Amtrak), Housatonic Railroad Company (Housatonic), Providence & Worcester Railroad (P&W), CSX Transportation, Inc. (CSX) & New York Central Lines, LLC.

New Canaan (CDOT Property)

Metro-North Commuter Railroad Company, MTA, CDOT, Consolidated Rail Corporation (Conrail), National Railroad Passenger Corporation (Amtrak), Housatonic Railroad Company (Housatonic), Providence & Worcester Railroad (P&W), CSX Transportation, Inc. (CSX) & New York Central Lines, LLC.

Danbury Branch (CDOT Property)

Metro-North Commuter Railroad Company, MTA, CDOT, Consolidated Rail Corporation (Conrail), National Railroad Passenger Corporation (Amtrak), Housatonic Railroad Company (Housatonic), Providence & Worcester Railroad (P&W), CSX Transportation, Inc. (CSX) & New York Central Lines, LLC.

Waterbury Branch (South of Derby JCT, MP 0 to MP 9)

Metro-North Commuter Railroad Company, MTA, CDOT, Consolidated Rail Corporation (Conrail), National Railroad Passenger Corporation (Amtrak), Housatonic Railroad Company (Housatonic), Providence & Worcester Railroad (P&W), CSX Transportation, Inc. (CSX) and New York Central Lines, LLC.

Waterbury Branch (North of Derby JCT, MP 9 to MP27)

Metro-North Commuter Railroad Company, MTA, CDOT.

For All Insurance Questions Contact:

Richard Webster

(646) 252-1430
rwebster@mtahq.org

Metro-North Railroad

CERTIFICATE OF INSURANCE

AGREEMENT or CONTRACT #:	AGREEMENT or CONTRACT Name / Description:

PRODUCER: ADDRESS: PHONE NUMBER:	CERTIFICATE ISSUANCE DATE:	RIM SYSTEM #

INSURED:	CO LTR	COMPANIES AFFORDING COVERAGE
	A	
	B	
	C	
CERTIFICATE HOLDER: Metro-North Railroad / MTA Attn: Risk & Insurance Management Standards, Enforcement and Claims Unit 2 Broadway, 21st Floor New York, New York 10004	D	
	E	
	F	
	G	

COVERAGES (See Notes 1 and 2)

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	EFFECTIVE DATE	EXPIRATION DATE	LIMITS	
	GENERAL LIABILITY (Check all that apply): ☐ Comprehensive Form ☐ Undergrnd Expl.& Collapse Haz. ☐ Products/Completed Oper. ☐ Contractual ☐ Independent Contractors ☐ Broad Form Property Dam. ☐ Personal Injury ☐ Deductible $ _____				BODILY INJURY OCC.	$
					BODILY INJURY AGG.	$
					PROPERTY DAMAGE OCC.	$
					BI & PD COMBINED OCC.	$
					BI & PD COMBINED AGG.	$
					PERSONAL INJURY AGG.	$
	AUTOMOBILE LIABILITY (Check all that apply): ☐ Any Auto ☐ Owned Autos ☐ Hired Autos ☐ Non-owned Autos				BODILY INJURY (Per Person)	$
					BODILY INJURY (Per Accident)	$
					PROPERTY DAMAGE	$
					BODILY INJURY & PROPERTY DAMAGE COMBINED	$
	EXCESS LIABILITY (Check all that apply): ☐ Umbrella Form ☐ Other Than Umbrella Form				BODILY INJURY (Per Person)	$
					BODILY INJURY (Per Accident)	$
	WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY				☐ STATUTORY LIMITS	
					EMPLOYER'S LIABILITY	$
	BUILDER'S RISK (See Note 3)				FULL CONTRACT VALUE	
	PROFESSIONAL LIABILITY ☐ Deductible $_____					
	OTHER					
	OTHER					

RAILROAD PROTECTIVE LIABILITY Insurance is NOT ACCEPTED on Certificate of Insurance forms – Provide detailed BINDER and/or POLICY.

CERTIFICATE OF INSURANCE (Continued) Page 2

ADDITIONAL INSUREDS (See Note 4)
(Check all that apply):

- ☐ Metro-North Commuter Railroad Company
- ☐ Metropolitan Transportation Authority, including its subsidiaries and affiliates
- ☐ Connecticut Department of Transportation
- ☐ Midtown Trackage Ventures LLC
- ☐ Midtown TDR Ventures LLC
- ☐ Consolidated Rail Corporation
- ☐ National Railroad Passenger Corp. (Amtrak)
- ☐ NJ Transit Rail Operations Inc.
- ☐ CSX Transportation Inc. & New York Central Lines LLC
- ☐ Delaware & Hudson Railway Company, Inc.
- ☐ Norfolk Southern Railway Company & Pennsylvania Lines LLC
- ☐ Housatonic Railroad Company
- ☐ Providence & Worcester Railroad Company
- ☐

NAMED INSUREDS (BUILDER'S RISK INS. - See Note 4)
(Check all that apply):

- ☐ Metro-North Commuter Railroad Company
- ☐ Metropolitan Transportation Authority, including its subsidiaries and affiliates
- ☐ Connecticut Department of Transportation
- ☐ Midtown Trackage Ventures LLC
- ☐ Midtown TDR Ventures LLC
- ☐ Consolidated Rail Corporation
- ☐ National Railroad Passenger Corp. (Amtrak)
- ☐ NJ Transit Rail Operations Inc.
- ☐ CSX Transportation Inc. & New York Central Lines LLC
- ☐ Delaware & Hudson Railway Company, Inc.
- ☐ Norfolk Southern Railway Company & Pennsylvania Lines LLC
- ☐ Housatonic Railroad Company
- ☐ Providence & Worcester Railroad Company
- ☐

NOTE 1:
The subscribing insurance company(s), authorized to do business in the State of New York, certifies that insurance of the kinds and types and for limits of liability herein stated, covering the Contract herein designated, has been procured by and furnished on behalf of the insured Contractor and is in full force and effect for the period listed on the front of this Certificate of Insurance. In addition, the subscribing insurance company(s) certifies that the insurance limits for General Liability Insurance are not amended by deductible clauses of any nature except as has been disclosed to and approved by Metro-North; and that coverage is afforded for the insured Contractor's obligations under that provision of the contract providing for indemnification of the Indemnified Parties, including Metro-North, named therein. Any exclusion applying to construction or demolition operations on or within fifty (50) feet of a railroad has been voided; and any employer liability exclusion which may otherwise operate to exclude claims for bodily injury asserted by an employee of an additional insured shall be voided.

NOTE 2:
The subscribing company(s) agrees that no policy referred to herein shall be changed or canceled until thirty (30) days written notice has been given to: MTA Risk and Insurance Management, 2 Broadway, 21st Floor, New York, NY 10004, Attention: Standards Enforcements and Claims Unit.

NOTE 3:
Builder's Risk Insurance includes Metro-North Commuter Railroad Company and Metropolitan Transportation Authority, (and where contractually required, Connecticut Department of Transportation and/or Midtown TDR Ventures, LLC.) as Named Insureds as their interests may appear.

NOTE 4:
All references to Named Insureds and Additional Insureds include those entities' directors, officers, employees, partners, agents, subsidiaries and affiliates.

NOTE 5:
This certificate is issued to the certificate holder in consideration of the agreement entered into with the Named Insured. It is understood and agreed that the certificate holder relies on the certificate as a basis for continuing such agreement/s with the Named Insured.

AUTHORIZED INSURER/PRODUCER _____

BY _____
(signature)

TITLE _____

STATE OF)

COUNTY OF)

_____ day of _____ 20____, before me personally came _____, to

Me known who being duly sworn, did depose and say that he/she resides in _____,

and that he/she is the _____ of the corporation described in and described in and which executed the foregoing Certificate of Insurance, that he/she is fully authorized to execute the foregoing Certificate of Insurance

_____
(Notary Public)

EXHIBIT E

GRANTOR REQUIREMENTS FOR ENGINEERING AND CONSTRUCTION ON RAILWAY PROPERTY

Table of Contents

1 - DEFINITIONS

Those capitalized terms in this Exhibit E not otherwise defined in the main body of the Agreement shall have the meaning ascribed to them herein.

A. Railway – The New York, Susquehanna and Western Railway Corporation.

B. Consultant – The design firm and qualified individuals representing the design firm employed by the Grantee to provide the survey, plans, and construction specifications.

C. Plans – The Preliminary Plans, the Plan and/or the Approved Plans, as the context requires.

D. Project – The work with respect to the Transmission System proposed by the Grantee and described by the Plans.

E. Railway's Engineer – The qualified individual and/or firm employed by the Grantor to provide coordination, monitoring, instruction, guidelines and inspection of the Project construction on behalf of the Railway.

F. Contractor – The company or individual contracted by the Grantee to accomplish the work indicated by the Plans.

G. Flagman – The qualified Railway employee(s) designated to protect the Consultant's employees, contractors and representatives from Railway's operational activities and to protect the Railway and Railway facilities from Project-related activities.

2 - SCOPE

The requirements of this Exhibit E cover the concept, survey, design, plans, safety and permit requirements for engineering and the construction of the Project on Grantor's property. Where the terms of this Exhibit E conflict with the terms of the remainder of the Agreement, if at all, the Agreement shall control.

3 – GENERAL INSTRUCTIONS

A. Safety

(i) Grantee shall ensure that its employees and the employees of Consultant, Contractor and any subcontractors, vendors, suppliers, etc., wear while on or about Grantor's property appropriate head and eye protection. Appropriate hearing

protection shall be required in areas with excessive noise and as instructed by the Flagman or other Railway official.

(ii) Suitable protective clothing and footwear shall be worn while on Railway property. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen. Tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip-on type boots are prohibited. Hard sole, lace up footwear, zippered boots or boots cinched up with straps which fit snugly about the ankle is adequate. Steel-toed safety boots are recommended. All clothing and protective equipment must be in good condition and properly fitted.

(iii) Grantee shall ensure that Consultant and Contractor observe the safety provisions of applicable laws and building and construction codes.

(iv) Anyone working on Grantor's property found to be under the influence of alcohol or other intoxicant, narcotic or hallucinogenic drug, or in possession of such intoxicant or drug, shall be dismissed from the property by Grantee and not allowed to return.

(v) When anyone on Grantor's property is injured, Grantee shall ensure that arrangements for emergency medical assistance are made, if needed, and that Railway's Engineer is notified of such incident by the quickest method of communication available.

(vi) No one shall be allowed within fifteen feet (15') of the centerline of the nearest track without specific authorization of the Flagman.

(vii) No one shall be allowed to cross tracks without specific authorization of the Flagman.

(viii) All persons working near track while train is passing are to look out for dragging bands, chain, and protruding or shifted cargo.

(ix) No one shall be allowed to pass between, over, or under rail cars.

(x) No steel or metallic chain or measuring tape shall be allowed to cross or touch rails without the authorization of the Flagman.

(xi) Materials shall be placed on tracks without the approval of the Railway's Engineer.

(xii) No trucks or other equipment shall touch the ballast line of the track without specific permission of the Flagman.

B. Working on Grantor Right of Way and Flag Protection

(i) Grantee shall ensure that Contractor requires that its employees, agents and subcontractors be trained in all applicable provisions of Railway's Roadway Worker Protection Program as required by FRA WORKPLACE SAFETY RULES, 49 CFR Part 214.

(ii) Grantee shall ensure that Consultant and Contractor obtain permission and right of entry from Railway prior to entering upon Grantor's property for surveying, inspection, construction or any other activity.

(iii)Railway will provide flag protection at Grantee's expense. Grantee agrees that all its employees, consultants, contractors, subcontractors, agents, suppliers, and other individuals allowed onto Railway property shall strictly observe flagging directions given by the Flagman. Failure of the Flagman to provide direction will not relieve the Grantee from any of its indemnification commitments in the Contract.

(iv)Grantee shall ensure that Consultant's or Contractor's action(s) do not interfere with normal train operations. Grantee shall ensure that Consultant and Contractor provide at least five (5) days in advance of the applicable period a weekly and monthly forecast (by days of the week) of activities while on Grantor's property.

(v) Railway may limit allowable work periods when working on or near operating tracks and may provide a schedule of allowable work periods. Such schedules may change due to changes in Railway operations. Grantor shall act in a commercially reasonable manner in scheduling the allowable work periods. No claim by Grantee, Consultant or Contractor against the Railway will be allowed for delay caused by the Railway's train operations.

4 – ENGINEERING STUDIES

A. Due to space constraints, it appears that Project installation on the RW Route would require utilization of vertically stacked parallel lines. Studies on effects of vertically stacked parallel lines are required as set forth in Section 5.02.

B. Grantee shall prepare, for Railway's review, studies that address the effects of vertically stacked parallel HVDC lines on human health and safety as well as its effect on Railway's communication, signal and positive train control equipment and systems.

5 - DESIGN GUIDELINES

A. Route Design

In addition to Grantee's normal criteria, the design of the Project route should include the following criteria relative to Grantor's property and Railway's operations:

(i) Safety and security of the Transmission System
(ii) Maintenance and restoration considerations
(iii) Safety during construction and maintenance

B. Railway Signal and Communication Lines

(i) Grantee shall ensure that neither Consultant nor Contractor locate, mark or tamper with any Railway signal or communication lines. Such work shall only be done by a qualified Railway employee. This provision does not apply to locating above ground structures.

(ii) Grantee shall ensure that Consultant and/or Contractor obtain(s) permission from other railroads to locate, mark or tamper with their signal and communication lines.

C. Status Reports

Consultant and Contractor will provide monthly status reports to Railway indicating work accomplished and work proposed for the following report period.

D. Buried Project Components

(i) Buried Project components will be installed with a minimum cover of forty-eight inches (48") from the top of the conduit to the ground surface when trenching or plowing parallel to track structure.

(ii) Minimum cover shall be sixty-six inches (66") from the top of casing to the bottom of rail when crossing beneath a railroad track when trench, open cut or standard jack e[illegible]ations are utilized.

(iii) Minimum [illegible] cased directional bore at track crossings all locations shall be ten feet (10').

(iv) Trenching will not be allowed on an embankment or excavation slope or within two feet (2') of the top edge of such slope.

(v) Minimum horizontal distance from the centerline of the track to the nearest edge of a directional bore shall be twenty-five feet (25') unless approved in writing by Grantor.

(vi) A minimum separation of five feet (5') shall be maintained between the Project and any existing underground facilities where possible except for Railway drainage culverts. Greater minimum separations may be required as directed by the Railway or

Railway's Engineer. Separations less than five feet (5') must be approved, in writing, by the Railway prior to installation of the plant. Trenching, boring and/or digging within three feet (3') of Railway's underground facilities is prohibited.

(vii) Minimum separation from bottom of plow trench to top of Railroad drainage pipe or culvert shall be twenty-four inches (24") unless a greater separation is required by Railway's Engineer.

(viii) Backfill and compaction will be required for trenching operations, for plowing operations, around excavations for vaults, handholes, manholes and other structures, and where deemed necessary by the Railway's Engineer.

(ix) All earth backfills shall be made in uniform layers of not more than six inches (6") thick after compaction. Each layer shall be free from mud, snow, ice, or excessive (standing) water when a subsequent layer is placed. Rock may be placed in compacted layers of not more than twenty-four inches (24") thick.

(x) Backfill shall be formed with suitable materials.

(xi) Organic material such as brush, stumps, roots and trees or other perishable items shall not be placed in backfill.

(xii) All fill layers shall be compacted to ninety-five percent (95%) of maximum density per Standard Proctor in accordance with AASHTO T99, or ninety percent (90%) of maximum density per Modified Proctor in accordance with AASHTO T180.

(xiii) All excavated areas, fill areas, and areas disturbed to obtain backfill material shall be repaired, seeded mulched to the satisfaction to Railway's Engineer.

(xiv) At all at-grade crossing signals and wayside signal locations, the Project route will not be plowed or buried between any signal case or signal mast and the near rail. Standard practice will be to route the conduit around all such locations unless Railway approves otherwise.

(xv) No blasting will be allowed on Grantor's property without written approval of the Railway. Such blasting, if allowed, shall be done in accordance with Railway's blasting specifications, which will be furnished by Railway when needed.

E. Above-Ground Project Components

(i) Poles or any other structures or supports shall be located as close to the outer edges of the RW Route as possible.

(ii) No structure or part thereof shall be located closer than twenty-five feet (25') horizontal from the centerline of the near track, except that the wires may be

located a minimum of ten feet (10') horizontal from the track when the vertical clearance is fifty-two feet (52') or greater, unless approved in writing by the Grantor.

(iii) Poles or other structures shall not be located on slopes/embankments of the Railway roadbed section.

(iv) The minimum clearance between the top of the high rail to bottom of sag of the bottom wire at 65 degrees F shall be fifty-two feet (52') at track crossings.

(v) Foundations of any structures shall not lie within three feet (3') of Railway's underground facilities.

6 – PLANS, DRAWINGS AND SPECIFICATIONS

A. Drawing/Plan Requirements

(i) Drawings shall be prepared using CADD system compatible to MicroStation or AutoCadd.

(ii) Drawings shall be furnished by the Consultant to the Railway on sheets with dimensions of 11" x 17".

(iii) Scale of the Plans shall be such that it is clear and can be easily read, typically 1"=100', but in no case less than 1"=100'.

(iv) Profiles of alignment may be required depending on local conditions and permitting requirements.

(v) The Plans shall include but not be limited to the following:

1. All tracks and Route located by centerline.
2. Proposed Project alignment.
3. Size and type of cables and structures
4. Location of proposed poles, towers, vaults, manholes, handholes and pull boxes by station and distance from track centerline.
5. Method of installation (aerial, plowing, trenching, jack & bore, and directional bore) and location by station of beginning and ending point.
6. Railway mileposts shown at both ends of each drawing indicated to the 0.1 mile
7. [illegible]lic and private indicating names of public roads.
8. Right of way lines and property lines.
9. Existing underground and overhead utilities.
10. Railway signal and communication facilities (provided that Grantor shall be responsible for locating and marking underground signal and communication facilities).
11. Overpasses and underpasses of Railway with such indication thereof.

12. Indication of type of railroad crossings.
13. Road crossing details including appurtenances, dimensions and road names.
14. Necessary construction details.
15. Existing fiber optic lines and appurtenances.
16. Horizontal distances from facilities to centerline of track.
17. Legend of symbology (symbology must be consistent for entire Project).
18. North arrow.
19. Name of each city, county and state as appropriate.
20. Respective railroad valuation map number for each sheet of the Plans (such information to be provided to Grantee by Grantor for incorporation into Plans).
21. Date of drawing.
22. Scale of drawing.

Drawings will read from left to right with lower milepost to left and higher milepost to right.

(vi) Grantor acknowledges that Plans and other materials supplied by Grantee may not have been prepared as real estate title maps, and that the property lines, right-of-way lines and other information may not be accurate or correct. Grantor further acknowledges that the absence of markers or monuments on such maps or on or about the RW Route indicating the presence of subterranean facilities or other occupations does not constitute a warranty or representation by Grantee that none exist.

(vii) Stationing will begin at 0+00 at each milepost and increase to next milepost. Match line will be placed at each milepost with equality station noted for ending station of previous mile equal to 0+00 of new mile. Alignment stationing shall be based off the centerline of the nearest track.

(viii) Terminal points with direction arrows shall be placed on each end of each Plan sheet. Such terminal points shall be the railroad location nearest the beginning and end of the Project.

(ix) All sheets of the Plans shall contain the following notes:

1. Grantee shall be responsible to have all public and private utilities located and marked prior to construction.

2. Railway shall be responsible for locating and marking underground signal and communication facilities.

3. Railway requirement <u>not</u> to disturb railroad slopes supercedes <u>all</u> dimensions shown on the Plans.

4. Contractor shall field verify depth of all under track drainage culverts prior to trenching or plowing above culvert. A twenty-four inch

(24") separation between closest extremities of culvert and buried Project components is required.

5. For buried Project components, Railway requirement to trench behind railroad signal equipment shall apply where feasible. Where such trenching is not feasible, directional bores will be required with entry and exit points located at a distance greater than thirty feet (30') from any above-ground facility. A minimum depth requirement of ten feet (10') shall apply to all bores that pass beneath railroad signal equipment.

B. Plan Sets

(i) A minimum of seven (7) sets of the Plans shall be furnished to the Railway at its Atlanta office.

(ii) Sets shall be bound in segments no greater than 50 miles.

C. Erosion and Sediment Control

The Plans shall include details of allowable erosion and sediment control devices and shall indicate locations of such devices in connection with the Project.

D. Governmental Regulations

All governmental requirements regarding environmental issues must be determined by the Consultant and indicated on the Plans.

E. Construction Specifications

Grantee will provide or have provided to Railway seven (7) sets of construction specifications specific to the Project and prepared in accordance with the requirements of the general specifications.

F. As-Built Plans

Grantee will provide or have provided to Railway five (5) sets of as-built plans along with the computer file reflecting actual construction measurements and field conditions within one hundred and eighty (180) days following completion of the Project.

7 - PERMITS

A. General

Grantee shall be responsible for producing and providing all drawings and other requirements as needed for all permits.

B. Governmental and Agency Permitting

Governmental permitting, where required, shall be the responsibility of Grantee.

C. Private Property

Permission from private property owners or users to enter, encroach, occupy, disturb or in any way require use of such private property or private facilities for the survey, planning or design of the Project shall be the responsibility of Grantee.

8 -CONSTRUCTION REQUIREMENTS

A. Insurance

The provisions of Sections 10.03 and 10.04 of the Agreement shall govern.

B. Construction Procedures

(i) Grantee shall ensure that Contractor plans its work, in coordination with Railway supervision and/or the Railway's Engineer, so as to complete the Project as quickly as possible without interference to other contractors or to Railway's operations.

(ii) Grantee shall ensure that Contractor provides to Railway a written, overlapping, two-week construction schedule on a weekly basis. When starting a new job or new segment, the Contractor shall provide the schedule one (1) week in advance of segment/job start up. The schedule is required to properly manage the Project. The schedule is to be used to ensure safe operations, and for planning work in advance so that proper coordination can be accomplished with Railway's Engineer as well as Railway's Transportation, Signal, and Maintenance of Way Departments. The schedule will enable all parties involved to ensure that all activities are properly coordinated and planned sufficiently ahead of the construction so that minimum delays to construction are encountered due to insufficient planning or poor communication. Information that shall be included in the schedule provided to the Railway's Engineer includes Contractor's planned area of operation, proposed actions, and hours of operation for the upcoming period. Any changes to the schedule shall be provided to the Railway's Engineer. At the Railway's Engineer's request, Contractor shall provide method of construction, including sequence and detail. The schedule shall contain sufficient detail to facilitate discussion and planning for the following period.

(iii) Grantee shall ensure that Contractor attends a weekly planning meeting scheduled and held by the Railway's Engineer in which Contractor shall furnish all attendees with the two-week construction schedule. Attendees from the Railway's Engineer include, but are not limited to, the Project Director (meeting facilitator) and

the Segment Project Managers. Those expected to attend the meeting representing the Contractors shall include the Project Manager, the Safety Officer, and the Segment Construction Managers. Representatives of the Railway, as well as representatives from utility companies with a vested interest in the Project, may also be present at the meeting. The meeting will be consistently held on the same day/same time, unless attendees are otherwise notified of a change in meeting schedule one week in advance by the Project Director or a designated member of the Railway's Engineer. The meeting will be centrally located to the Project. The agenda shall be open to discuss all matters related to Project staffing, scheduling, productivity, planning, environmental, and railway safety issues. In addition to discussion concerning the two-week schedule, the Contractor should be in a position to discuss the activities of the previous period.

(iv) Grantee shall ensure that Contractor maintains adequate supervision on all phases/locations of the Project to ensure job efficiency and appropriate quality assurance. At the Railway's Engineer's request, Grantee shall ensure that Contractor increases supervision to the extent and at locations designated by the Railway's Engineer.

(v) Grantee (including its agents) must ensure that all federal, state, and local environmental laws, regulations and ordinances are adhered to during Project construction.

(vi) Grantee shall procure, at its expense and in a timely manner, all permits, licenses, surveys, inspections, certificates and authorizations, of any description, that may be necessary for the construction of the Project. The Contractor shall furnish the Railway's Engineer all certificates of inspection for any part of the work for which a certificate is required.

(vii) Grantee shall ensure that Contractor establishes and maintain at an accessible location adjacent to the work site a field office(s) from which its operations shall be directed.

(viii) At Grantor's expense, Railway's Engineer shall have a separate field office(s) in close proximity to Contractor's field office.

C. Equipment and Materials

(i) Grantee shall ensure that Contractor provides security for its equipment and material against theft and vandalism. Grantor shall not be liable for any such equipment or material lost, stolen or missing from the Project site(s).

Transportation of equipment, material and labor to and from the Project site(s) shall be the responsibility of the Contractor.

D. Ingress and Egress

(i) Grantee shall be responsible for ingress and egress from the work site(s) for all personnel, equipment, materials, etc. in connection with the Project.

(ii) Grantee shall be responsible for all permits and temporary construction measures required for such ingress and egress.

(iii) All parties associated with the Project shall be allowed to use such ingress and egress obtained by Grantee at no additional expense.

(iv) Any damage caused or arising from by such ingress and egress to the Project site(s) shall be repaired and/or restored by the Contractor to a condition satisfactory to the entity allowing such ingress and egress.

(v) All damage to any public or private roadway caused by Grantee or its agents in connection with the Project shall be repaired by Grantee to the satisfaction of the owner or the applicable governmental agency.

E. Railway Facilities

Grantee shall be responsible for all repair costs associated with track, signal, communication or other facilty damage due to Contractor activities. Any track repair required will be performed by Railway.

F. Explosives

The use of explosives is prohibited except where approved in advance by the Grantor [as per 5.D.(xv) above].

G. Underground Utilities

(i) Grantee shall be responsible for locating underground utilities and maintaining required clearances therefrom.

(ii) Grantee shall notify all underground utilities and owners of other underground facilities that could be affected by the Project construction. The notification shall be made through the applicable local one-call agency, along with any individual notices needed to insure that all existing agencies' facilities are located. Grantee shall provide Railway with a record of all notifications.

(iii) Grantee shall ensure that Contractor does not proceed with the work in the vicinity of underground utilities and facilities until such utilities have actually been located by the appropriate one-call agency or the utility company itself and approval is received from the affected party and procedures and actions required by affected parties are complied with.

(iv) Grantee shall provide or have provided to the Railway's Engineer all information and verification that such calls have been made and that utilities have been located on the Project site(s).

(v) Grantee shall provide or have provided to Railway's Engineer drawing of all utilities prior to any work being done in the vicinity of such utilities. Drawings shall indicate plan and profile information for the utilities in addition of type and size of pipes, material handled by the utility and the distance to existing facilities such as track centerline, roadways, other utilities, etc.

(vi) Grantee shall ensure that Contractor exposes (potholes) all utilities in the vicinity of the running line of proposed underground construction.

(vii) Grantee is responsible for acquiring permits/paying fees associated with potholing utilities within public right of ways, and Grantee is also responsible for paying applicable public or private agency charges for their services/assistance in locating their utilities in the vicinity of the running line.

(viii) Any underground utilities damaged by Contractor's activities shall be removed, repaired, replaced or otherwise remedied by Grantee as required by the applicable utility and/or governmental authority. All contamination of the affected area(s) resulting from the Grantee's activities, or the activities of the Grantee's contractors or representatives, and cleanup resulting from such damage shall be the responsibility of Grantee.

H. Permits

(i) Grantee shall be responsible for all governmental or agency permits that may be required for the Project.

(ii) Grantee shall obtain permission from all private property owners for any work on or use of such private property.

(iii) Grantee shall ensure that Contractor abides by all restrictions and requirements of all permits, whether obtained by Grantee or any other party.

(iv) When additional working space is necessary for excavation across rivers or for the operation of Contractor's equipment beyond Grantor's property, Grantee will be responsible for procuring such working space.

I. Field Engineering and Staking

(i) Grantee shall be responsible for staking the running line, handholes, any drainage work or alterations, and for any grading or other work that may be required.

(ii) Staking shall indicate the Project stationing as indicated on the Plans and shall indicate the type of installation being performed at the staked location.

J. Daily Cleanup

(i) Grantee shall ensure that Contractor cleans the Project site(s) daily.

(ii) Railway reserves the right to employ a separate contractor, at Grantee's expense, to clean Project sites if such sites are not consistently kept clean to the satisfaction of Railway and the property owner, if applicable.

K. Safety Compliance

Failure of any individual to fully comply with the safety requirements and/or Flagman's instructions may result in such individual's and Contractor's dismissal from Grantor's property.

L. Railroad Flagging

(i) Railway will determine railroad flagging requirements for the Project and, at Grantee's expense, will provide Flagmen for Contractor as needed for activities on the RW Route. Grantor will work closely with Grantee so as to facilitate and expedite construction.

(ii) Grantee shall ensure that Contractor follows all instructions of the Flagman and complies with all safety requirements of Railway.

M. Erosion and Sediment Control

(i) Grantee shall ensure that Contractor complies with all federal, state, and local erosion and sediment control laws, ordinances and regulations applicable to the Project work.

(ii) Grantee shall ensure that Contractor adheres to all erosion and sediment control requirements and procedures described in any erosion and sediment control plan(s) governing the Project work, as directed by the Railway's Engineer, and/or as required by any governmental agency having authority in connection with erosion and sediment control measures.

(iii) Grantee shall ensure that Contractor will, prior to commencement of land disturbing activities, implement and maintain, until construction activity ceases and permanent stabilization is achieved, required erosion and sediment control measures.

N. Clearing and Grubbing

(i) Any vegetation or objects that require preservation and protection that lie within the areas proposed to be cleared will be designated by the Railway's Engineer.

(ii) Grantee shall ensure that Contractor performs its work in full compliance with all federal, state and local statutes, laws, ordinances, regulations, rules and codes.

(iii) Grantee shall ensure that, before clearing operations begin, Contractor installs temporary and permanent erosion and sediment control measures as shown on the Plans or as directed by the Railway's Engineer.

(iv) In the event of excessive clearing beyond what is needed for the Contractor to perform the Project work, Grantee shall be responsible for all related re-landscaping.

(v) Grantee shall ensure that items cleared, grubbed and not used as brush barriers are removed or demolished and disposed of by the Contractor in accordance with governmental ordinance or law.

O. Barricades

(i) Grantee shall ensure that Contractor provides and places barricades around any and all open pits and trenches.

(ii) No excavation will be permitted to remain open overnight.

(iii) All barricades will have flashing lights, and barricade tape will be used to rope off all excavation areas.

P. Trench Construction

(i) Hand trenching will be required in areas within two feet (2') or less of signal or communication cables or facilities or as directed by the Railway's Engineer.

(ii) Hand tr[illegible] may be required in other areas where the Railway's Engineer dete[illegible]s that machine trenching, plowing or other method of conduit installation is not f[illegible]

[illegible]s shall be excavated such that minimum cover over conduit(s) will [illegible]ty-eight inches (48").

(iv) The bottom of any trench shall be graded uniformly with no cover [illegible]mension less than the minimum forty-eight inches (48").

Q. Directional Boring

(i) Directional bores shall be done only with the approval of the Railway's Engineer.

(ii) Directional bores shall be at a minimum horizontal distance of twenty feet (20') from the centerline of the track as measured perpendicularly to the closest edge of the bore.

(iii) Depth of cased directional bores shall be a minimum of ten feet (10') below the bottom of tie when crossing under tracks as measured vertically therefrom. Such depth shall remain until reaching a distance of twenty feet (20') from each side of the centerline of the track as measured perpendicularly or radially therefrom.

(iv) Holes made by boring shall not be more that four inches (4") larger than the outside diameter of the pipe being installed.

(v) Grantee shall ensure that any voids that develop in connection with the boring operations are repaired by the Contractor at its expense to the satisfaction of the Railway and jurisdictional authority of the area affected.

(vi) Grantee shall ensure that, before drilling, the Contractor verifies that all utility companies and/or the utility "one call' service has been contacted and that they have marked and located all such existing underground facilities. Grantee shall ensure that Contractor positively locates, exposes, and stakes all existing lines, cables, and other underground facilities which are located within twenty feet (20') of the designed drilled path. Grantee shall ensure that Contractor modifies drilling practices and downhole assemblies as necessary to prevent damage to existing facilities.

(vii) Grantee shall ensure that Contractor at all times provides and maintains instrumentation which will document and accurately locate the pilot hole, measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. **If at any time there is a loss of instrument signal, the boring is to be stopped immediately until the signal is restored.** Railway will have access to these documents and instruments along with their readings at all times.

(viii) The composition of all drilling fluids proposed for use shall be submitted to Railway for approval prior to start of work. No fluid will be approved or utilized that does not comply with permit requirements and environmental regulations.

(ix) Grantee shall be responsible for obtaining, transporting and storing any water required for the drilling fluids.

(x) Grantee shall ensure that Contractor maximizes recirculation of drilling fluid surface returns and that Contractor provides solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse. Railway may specify standards for solids control and cleaning equipment performance or for treatment of excess drilling fluid and drilled spoil.

(xi) Directional drilling fluids and drill cuttings shall be contained in the drilling pits and surrounded by a silt fence. Disposal of drilling fluids and drill cuttings shall be the responsibility of Grantee and shall not be discharged into any waterbody or wetland. After the directional boring is complete, the drilling

fluids/cuttings are to be hauled to an authorized off-site disposal area selected by Grantee and shall be in compliance with all environmental regulations and permit requirements.

(xii) Grantee shall ensure that Contractor and all subcontractors performing work comply with all legal, regulatory and contract provisions. Grantee shall ensure that Contractor establishes a procedure under which all Contractor personnel, as well as subcontractor personnel, involved in any aspect of directional drilling operations be specifically advised of the legal, regulatory and contract provisions which prohibit unpermitted discharges and require proper waste disposal. This procedure shall provide that instruction is proved initially and repeated weekly as long as directional drilling operations are occurring on the project. Should there be any Contractor and/or subcontractor violations that result in penalties levied against Railway and/or Grantor, Grantee shall indemnify Railway and/or Grantor therefrom.

(xiii) Grantee shall ensure that Contractor employs its best efforts to maintain full annular circulation of drilling fluids and minimize drilling fluid returns at locations other than the entry and exit points. Grantee shall ensure that, in the event that annular circulation is lost, Contractor takes steps to restore circulation. If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers and collected using pumps as practical. If the amount of the surface return is not great enough to allow practical collection, the affected area will be diluted with fresh water and the fluid will be contained with hand placed barriers and collection sumps. If the amount of surface return exceeds that which can be contained and collected using barriers or sumps, drilling operations will be suspended until surface return volumes can be brought under control.

(xiv) Only that amount of water necessary to cool the boring head may be utilized for boring operation (i.e., no water jetting or use of excess water will be permitted).

(xv) In the event of a **"frac-out" within the limits of Railway's roadbed, the boring operation will cease immediately and Railway will be called for an inspection. Work will not resume until authorized by Railway.**

(xvi) All failed bores shall be reported to Railway for inspection prior to subsequent attempts.

(xvii) In the event any pipe has been placed underground and the bore fails, such pipe shall be cut and left in place. All voids shall be grouted.

R. Track Crossings

(i) Steel casing pipe shall be used for installation located beneath railroad tracks.

(ii) Directional bore depths for casing and conduit shall be a minimum of ten feet (10') below bottom of cross ties to top of the casing pipe or top of the highest conduit for all tracks.

S. Conduit Cover and Separations

(i) Minimum cover for all conduit shall be forty-eight inches (48") from top of the conduit to ground surface for unobstructed plowing and trenching.

(ii) Minimum cover under railroad tracks shall be sixty-six inches (66") from the base of the rail to the top of the steel casing for jack and bore installations.

(iii) Minimum cover under croplands shall be forty-eight inches (48") from the ground surface to the top of the conduit.

(iv) Minimum cover under any waterway shall be ten feet (10') from the lowest point in the waterway to the top of the steel casing. Grantee shall ensure that Contractor installs the conduit underneath the bed of the stream, river or watercourse at such depth that shall prevent scouring action to the conduit by flow of the water.

(v) Unless otherwise specified or instructed by the owner or governing authority, minimum cover under track and roadside ditches shall be forty-eight inches (48") from lowest point in ditch to top of conduit.

(vi) Unless otherwise specified by the owner or governing authority, minimum cover under roadway surfaces shall be sixty inches (60") from the roadway surface to top of conduit.

(vii) Minimum separation between the nearest extremities of a gas line pipe and the steel casing for the transmission conduit line shall be five feet (5') unless otherwise approved in writing from the Railway's Engineer.

(viii) Minimum separation between the nearest points of the conduit to any utility other that a gas line shall be two feet (2').

(ix) Minimum separation between the conduit running line and any underground electrical line shall be two feet (2').

T. Fences and Gates

(i) When necessary and required by the Project work, construction fences will be cut and temporary gates installed in a manner acceptable to the Railway's Engineer.

(ii) Grantee shall ensure that Contractor submits a plan for any proposed temporary fence gate to Railway for approval at every location necessary for passage of equipment and for performance of the Project work. Openings shall not extend beyond the boundary of the RW Route, and Grantee shall obtain permission from the property and fence owner.

(iii) Grantee shall ensure that Contractor complies with all restrictions and requirements of the property and fence owner, including any repairs or replacement. All repairs shall restore the fence to the original or better condition.

(iv) Proper bracing of the fence shall be done prior to making the gate opening. Fence wire tautness will be maintained.

(v) All livestock shall be prevented from entering or leaving through the gate opening, and, if necessary, Grantee shall ensure that Contractor provides a watchman for such purposes.

(vi) Gates shall be maintained in good condition and in accordance with the Railway's Engineer's instructions until the fence is permanently repaired.

U. Damage to Existing Facilities

Grantee shall be responsible to restore or repair all properties damaged or caused to be damaged during construction to the satisfaction of the property owner, public agency and/or Railway. Such damage includes, but is not limited to, public and private roads, structures, utilities, environmental degradation, real estate and other items.

V. Seeding and Mulching

(i) Grantee shall ensure that Contractor seeds and mulches all areas disturbed during Project work. Such seeding and mulching work shall include without limitation preparation of the seed bed, placement of the seed, application of fertilizer and lime and mulching.

(ii) Unless treated otherwise, Grantee shall be responsible for seeding and mulching earth slopes and surfaces constructed within the RW Route; other areas designated in an [illegible]able erosion and sediment control plan; and any other areas desi[illegible] [illegible] engineer.

W. Final Cleanup

(i) Upon completion of the Project, Grantee shall ensure that Contractor cleans the RW Route of all remaining construction materials, scrap, rubbish, etc., resulting from the Project work.

(ii) Such materials shall be disposed of by Grantee at its expense and in accordance with all applicable laws and regulations and to the satisfaction of any impacted property owners.

(iii) **Burial of materials on Grantor's property is strictly prohibited.**

(iv) Sanitary wastes shall not be discharged into any waterways or streambeds. Grantee shall ensure that Contractor provides refuse containers and sanitary chemical retention or other approved toilets, convenient to principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations.

(v) Non-combustible wastes such as conductor, ceramic or metal scrap shall be hauled away and disposed in accordance with all applicable regulatory requirements.

(vi) Combustible wastes such as packaging material shall be hauled away and disposed in accordance with all applicable regulatory requirements. Burning will not be allowed unless approved by the Railway's Engineer. Grantee shall ensure that Contractor acquires all governmental permits for burning before such activities take place. Grantee shall be responsible for all damage caused by such burning activities, including without limitation any permit violations.

(vii) Grantee shall ensure that Contractor removes its equipment from the RW Route in a timely manner.

X. Testing

Grantee will notify Grantor in writing at least twenty-one (21) days before the Transmission System is proposed to be placed in service. Prior to placing the Transmission System in service and after any approved mitigation measures, as determined in Section 5.02 (ii), have been implemented, joint tests involving the energized and fully loaded Transmission System and involving both Grantor and Grantee will be conducted on Railway's C&S Systems, including without limitation wayside signals and grade crossing warning devices and Railway's communication system, including VHF radio and UHF radio, to determine if the energized Transmission System is causing interference with Grantor's C&S Systems. If then or at any time thereafter the Transmission System causes degradation of the railroad-operations-related signal, communications or other electronic facilities of Grantor or its affiliates or subsidiaries, or endangers the personnel of Grantor or anyone else entitled to be on Grantor's property, through inductive or electrostatic interference or otherwise, Grantee, at the request of Grantor, and at Grantee's expense, will modify the Transmission System to the satisfaction of Grantor so as to eliminate such degradation or danger. Such modification may include, without limiting the generality of the foregoing, providing additional shielding, filters, reactances or any other corrective measure deemed necessary or desirable. The most cost effective solution may be alterations to both the Grantee's Transmission System and the Grantor's C&S Systems, in which case Grantee and Grantor shall examine the suitability of such modifications to the C&S Systems as well. Should Grantor agree to such modifications then upon agreement of Grantor and Grantee to the nature and timing of such modifications, Grantor shall make such changes to its C&S Systems and Grantee shall reimburse such costs to Grantor within 180 days of both completion of said changes and written notification with supporting documentation by

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-24
Requested By: Edward Schrom
Date of Request: October 2, 2006
Reply Date: February 20, 2008
Witness: Panel B
Subject: Design of line

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1. **Provide the study assumptions that were used in the Electro Magnetic Field and electrostatic studies conducted by NYRI. Provide a copy of all work papers.**

Response:

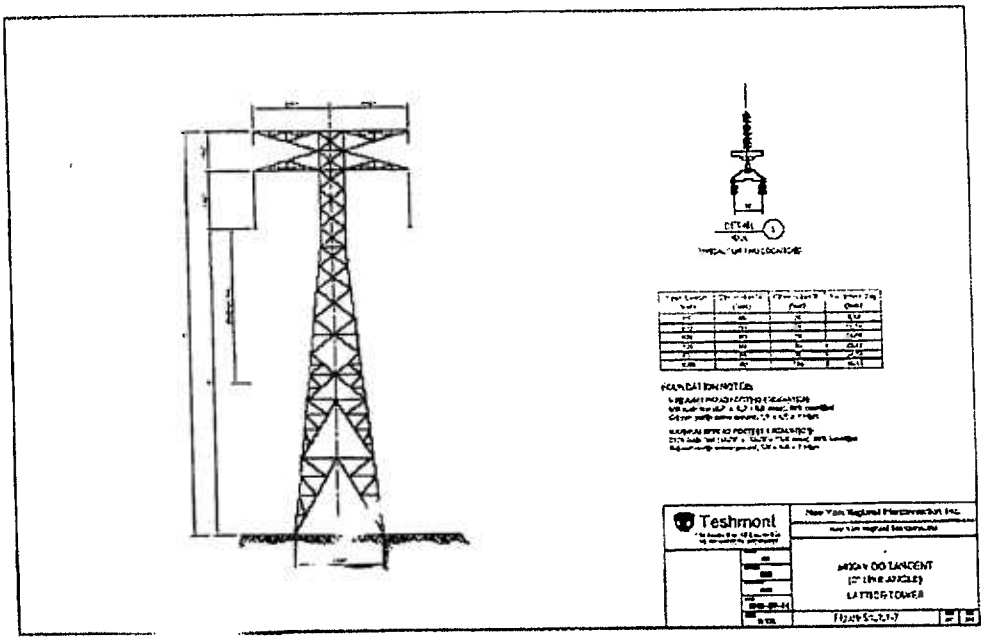
The study assumptions for the calculation of dc parameters are contained in the report "New York Regional Interconnection: Electric and Magnetic Fields, Ions, Audible Noise, and Radio Noise" (November, 2007) and specific input values are provided in the attached file: Input Files- Re NYRI Electric and Magnetic Fields Ions Audible Noise and Radio Noise - November 2007.

The study assumptions for the calculation of the ac parameters are also contained in the above referenced report and the specific input values are found in Appendix B of the report and in the attached file.

Attachment for Interrogatory
DPS-24.1

Input data files used for calculation of dc parameters in the report "New York Regional Interconnection: Electromagnetic Fields" May 30, 2006.

Horizontal DC line configuration –

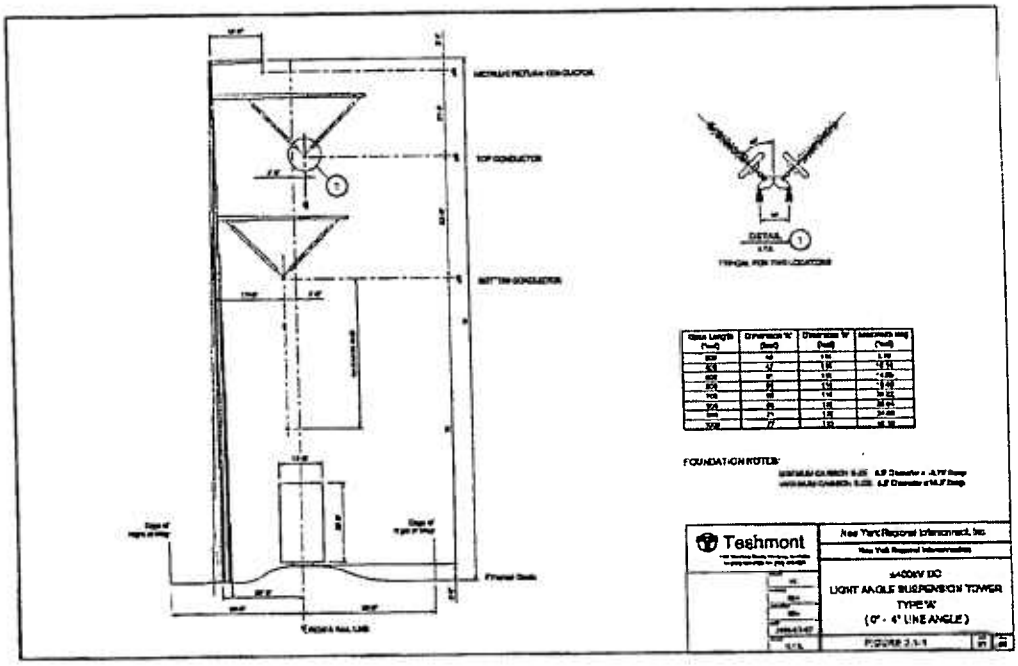


Report Figure 1. Typical horizontal configuration of dc line on overhead steel tangent towers.

DC input file ACDCHORZ used for calculation of dc parameters:

```
DCHORZ +/-400 kV DC Horizontal Configuration (Bipolor with Positive on right) 1200MW load
1 1 1 1 1 1 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 3
 1  0  -400.0  -1500.0    0.0 2 0  -20.0  46.0   6.78   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  0   400.0   1500.0    0.0 2 0   20.0  46.0   6.78   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  2     0.0     0.0    0.0 1 0  -20.0  67.0   4.52   300.0     0.0
BLUEBIRD
1.7620   0.00 0.0430 0.0480 0.3440 3.7500e+07
1
 3.28  5.0  3.28    100.0  3.28  3.28    984.0
  100.0    150.0 0.500000 0 60.0
70.3  29.8
67.8  33.6
65.3  41.1
67.3  50.9
71.3  59.1
70.0  67.4
71.8  71.4
71.8  69.6
73.5  62.9
70.8  50.3
70.8  39.9
70.8  33.2
 0.0  1000.0  2 0
-250.0   -55.0    5.0
 -50.0    50.0    1.0
  55.0   250.0    5.0
20.0  20.0  20.0  20.0  20.0
2.00  2.00  1  1  0.100  0.100  1.000  1.000  2.00  2.00  1.00 0500
0
0
```

Vertical DC line configuration (within NYS&W ROW)

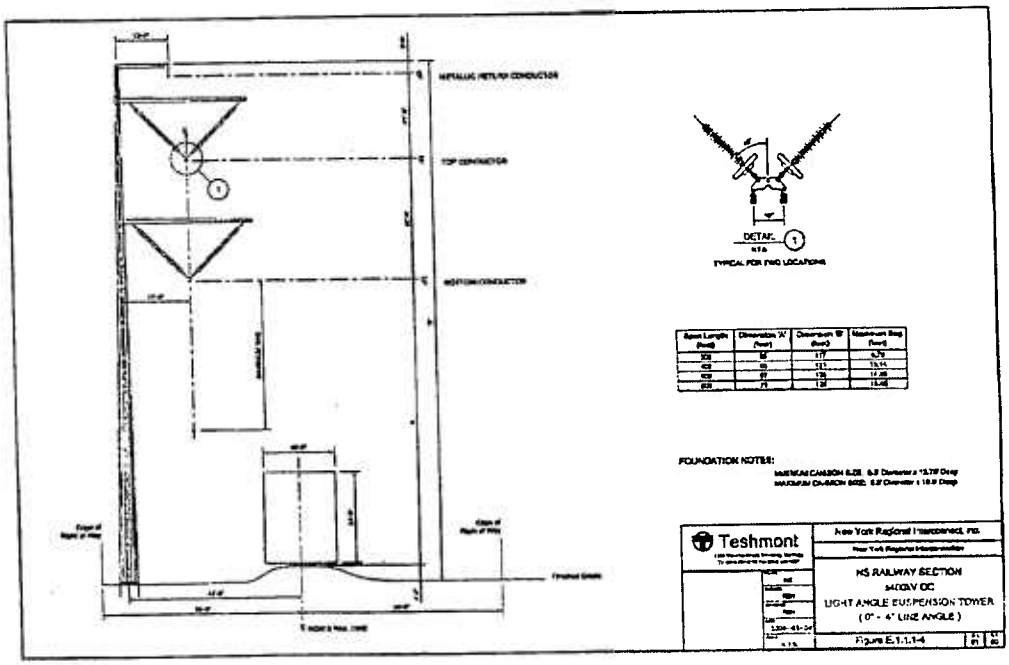


Report Figure 2. Typical vertical configuration of dc line on steel poles within the NYS&W right-of-way.

DC input file ACDCV0R0 used for calculation of dc parameters:

```
DCVERT0 +/-400 kV DC Vertical Configuration (Bipolor with Positive on Top) 1200MVA
1 1 1 1 1 1 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 3
 1  0  -400.0  -1500.0    0.0 2 0   17.0  46.0   6.7   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  0   400.0   1500.0    0.0 2 0   23.0  76.0   6.7   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  2     0.0     0.0    0.0 1 0   13.0  97.0   4.5   300.0     0.0
BLUEBIRD
1.7620   0.00 0.0430 0.0480 0.3440 3.7500e+07
1
 3.28  5.0  3.28    100.0  3.28  3.28    984.0
  100.0    150.0 0.500000 0 60.0
70.3  29.8
67.8  33.6
65.3  41.1
67.3  50.9
71.3  59.1
70.0  67.4
71.8  71.4
71.8  69.6
73.5  62.9
70.8  50.3
70.8  39.9
70.8  33.2
 0.0  1000.0  2 0
-250.0   -55.0    5.0
 -50.0    50.0    1.0
  55.0   250.0    5.0
20.0  20.0  20.0  20.0  20.0
2.00  2.00  1  1  0.100  0.100  1.000  1.000  2.00  2.00  1.00 0500
0
0
```

Vertical DC line configuration (within NS/MetroNorth)

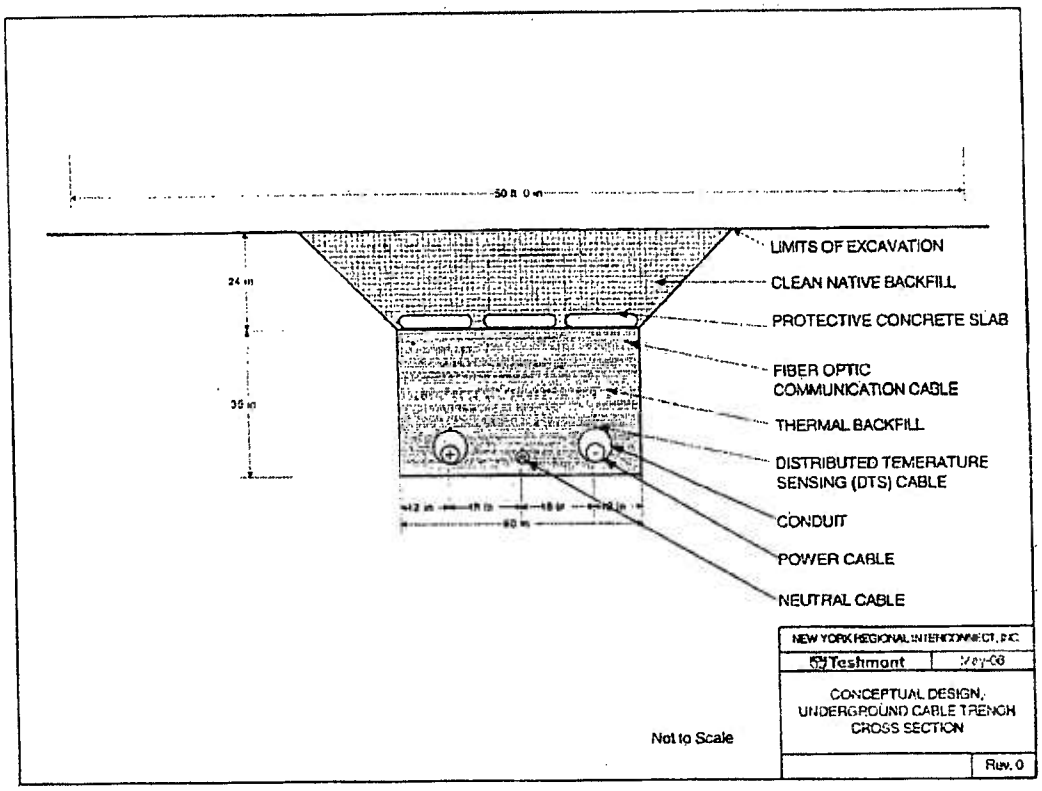


Report Figure A-1. Typical vertical configuration of dc line on steel poles within the NS/MetroNorth right-of-way.

DC input file ACDCV100 used for calculation of dc parameters:

```
DCVR00 +/-400 kV DC Vert Config Alt 1 25/52 (Bipolor Positive on Top)
1 1 1 1 1 1 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 3
 1  0  -400.0  -1500.0    0.0 2 0   17.0  59.0   6.7   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  0   400.0   1500.0    0.0 2 0   17.0  89.0   6.7   300.0     0.0
BLUEBIRD
1.7620  18.00 0.0430 0.0480 0.3440 3.7500e+07
 1  2    0.0     .0.0    0.0 1 0   13.0 110.0   4.5   300.0     0.0
BLUEBIRD
1.7620   0.00 0.0430 0.0480 0.3440 3.7500e+07
1
 3.28  5.0  3.28    100.0  3.28  3.28    984.0
  100.0    150.0 0.500000 0 60.0
70.3  29.8
67.8  33.6
65.3  41.1
67.3  50.9
71.3  59.1
70.0  67.4
71.8  71.4
71.8  69.6
73.5  62.9
70.8  50.3
70.8  39.9
70.8  33.2
 0.0  1000.0  2 0
-250.0   -55.0    5.0
 -50.0    50.0    1.0
  55.0   250.0    5.0
20.0  20.0  20.0  20.0  20.0
2.00  2.00  1  1  0.100  0.100  1.000  1.000  2.00  2.00  1.00 0500
0
0
```

Underground DC cable configuration



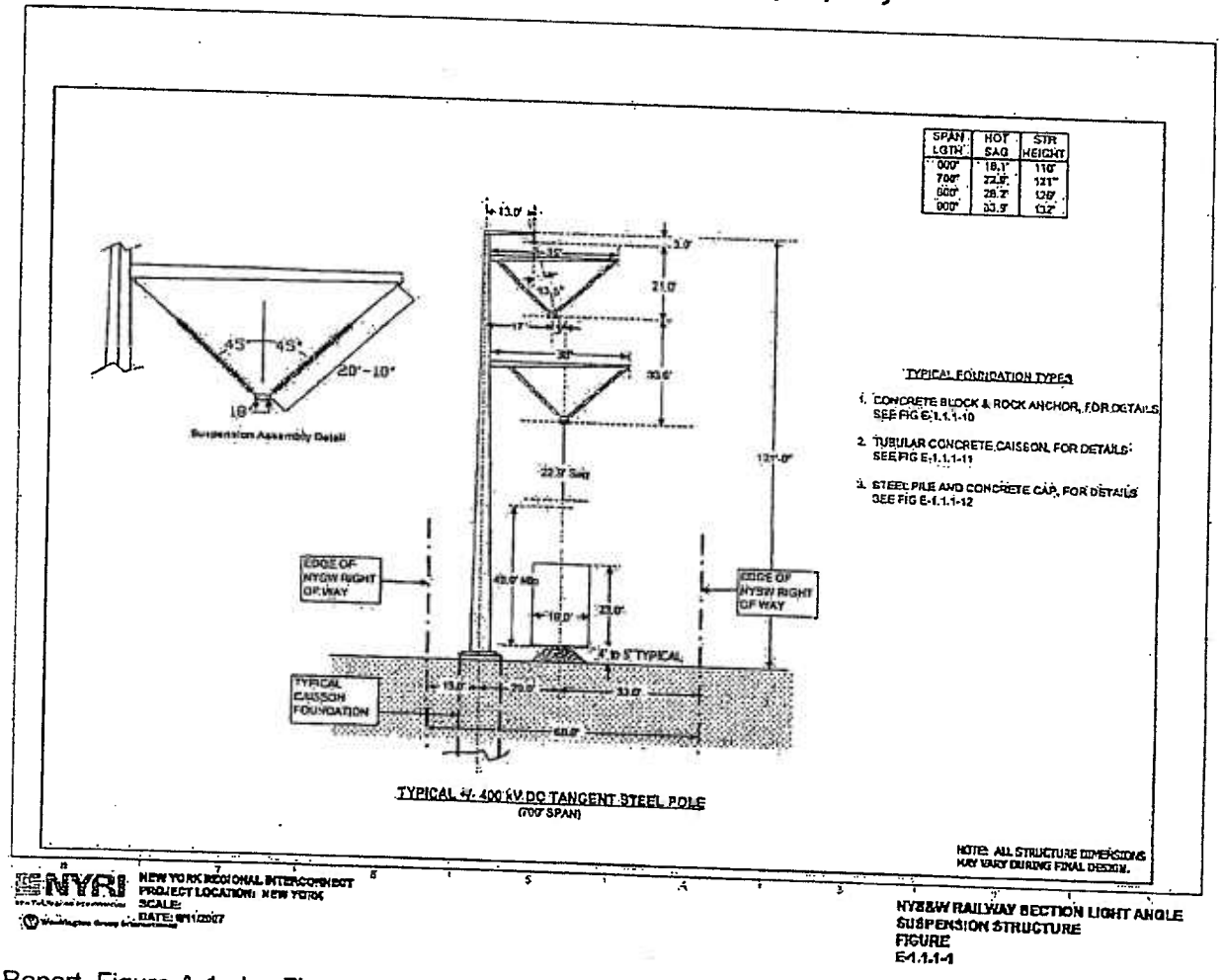
Report Figure 3. Proposed configuration of dc line as constructed underneath the Mongaup Valley Wildlife Management Area.

DC input file UG-Bfild used for calculation of dc parameters:

Bundle *	X Feet *	Y *	# Conductor *	Cable Diameter Inches *	Spacing *	Voltage *	Phase *	Current Amps *
1	-1.5	-4.20	1	4.5	0	-400.0	0	-1500.0
2	+1.5	-4.20	1	4.5	0	+400.0	0	+1500.0

Input data files used for calculation of dc parameters in the report "New York Regional Interconnection: Electric and Magnetic Fields, Ions, Audible Noise, and Radio Noise" November, 2007.

Vertical DC line configuration within NYS&W property –

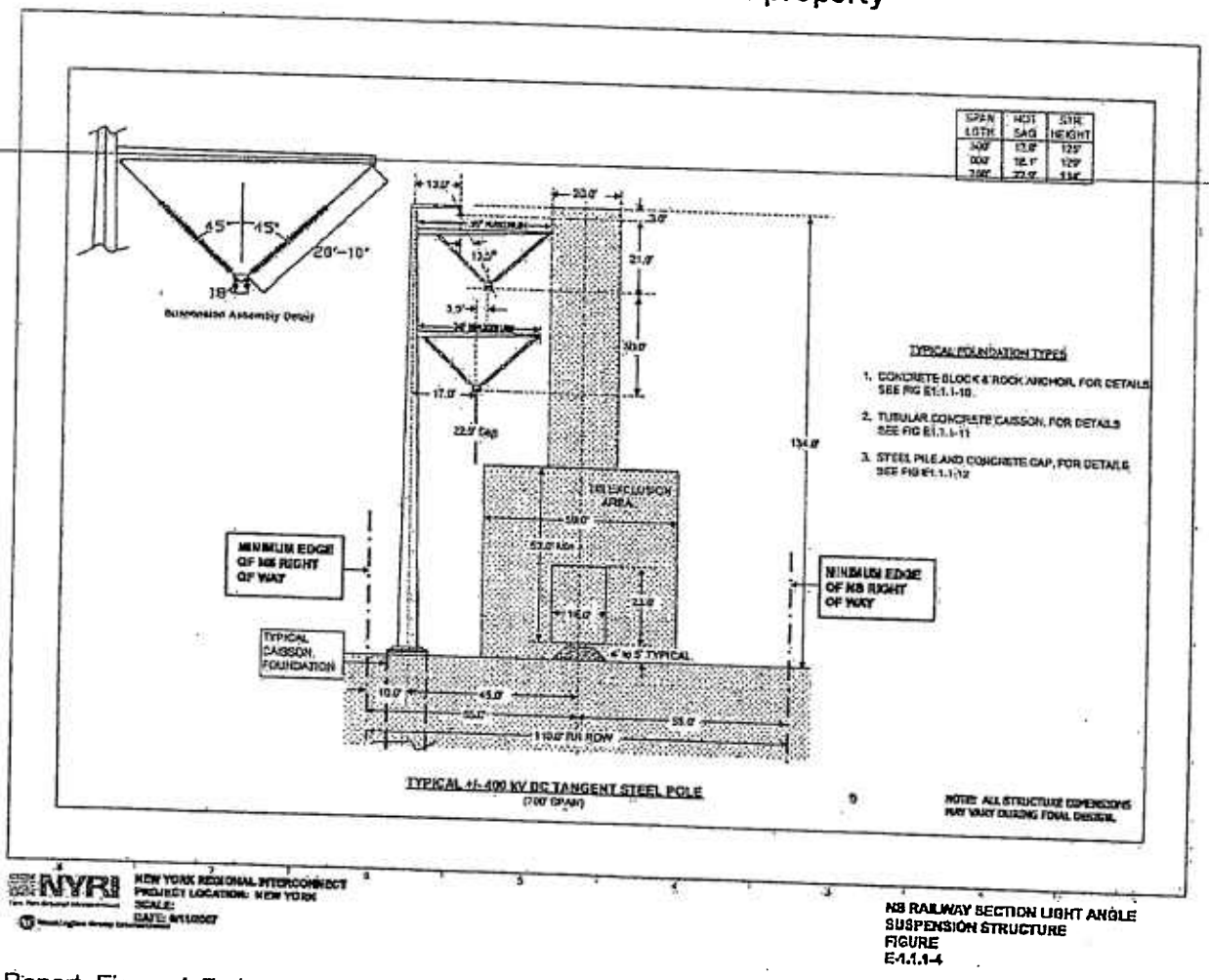


Report Figure A-1 also Figure 5 (ACF04).

DC input file ACF04 used for calculation of dc parameters associated with Figure A-1:

```
F04 +/-400kV 1200MVA Vertical Bipolar with + on top Fig 4 04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
3
1  0  400.00  1500.00  0.00  2  0  17.00  108.00  33.90  900.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  -400.00  -1500.00  0.00  2  0  20.00  78.00  33.90  900.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  13.00  129.00  24.43  900.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  280.00  5.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Vertical DC line configuration within NS&MN property –

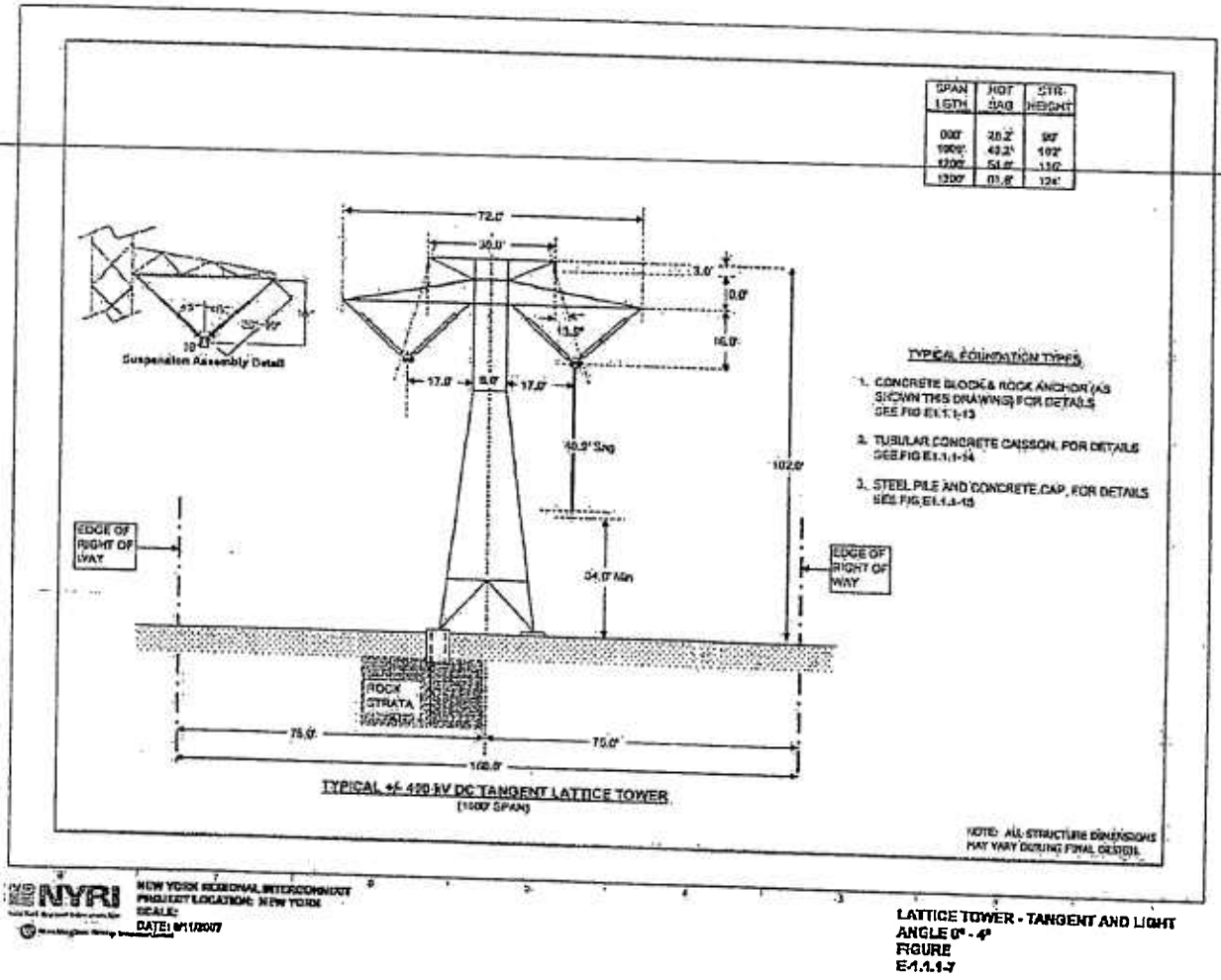


Report Figure A-7 also Figure 6 (ACF04A).

DC input file ACF04A used for calculation of dc parameters associated with Figure A-7:

```
F04A +/-400kV 1200MVA Vertical Bipolar with + on top Fig 4A 04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
3
1 0 400.00 1500.00 0.00 2 0 20.00 110.00 22.90 700.00 0.00
BLUEBIRD
1.7600 18.00 0.0430 0.0480 0.3440 37500000.0000
1 0 -400.00 -1500.00 0.00 2 0 17.00 80.00 22.90 700.00 0.00
BLUEBIRD
1.7600 18.00 0.0430 0.0480 0.3440 37500000.0000
1 2 0.00 0.00 0.00 1 0 13.00 131.00 17.18 700.00 0.00
BLUEBIRD
1.7600 0.00 0.0430 0.0480 0.3440 37500000.0000
1
3.28 5.00 3.28 100.00 3.28 3.28 800.00
100.00 350.00 0.5000 0 60.00
70.30 29.84
67.80 33.62
65.30 41.18
67.30 50.90
71.30 59.18
70.00 67.46
71.80 71.42
71.80 69.62
73.50 62.96
70.80 50.36
70.80 39.92
70.80 33.26
0.00 1000.00 2 0
-250.00 -40.00 5.00
-39.00 75.00 1.00
80.00 280.00 5.00
20.00 20.00 20.00 20.00 20.00
2.00 2.00 1 1 0.1000 0.1000 1.0000 1.0000 2.00 2.00 1.00 0500
0
0
```

Horizontal DC line configuration on lattice tower –

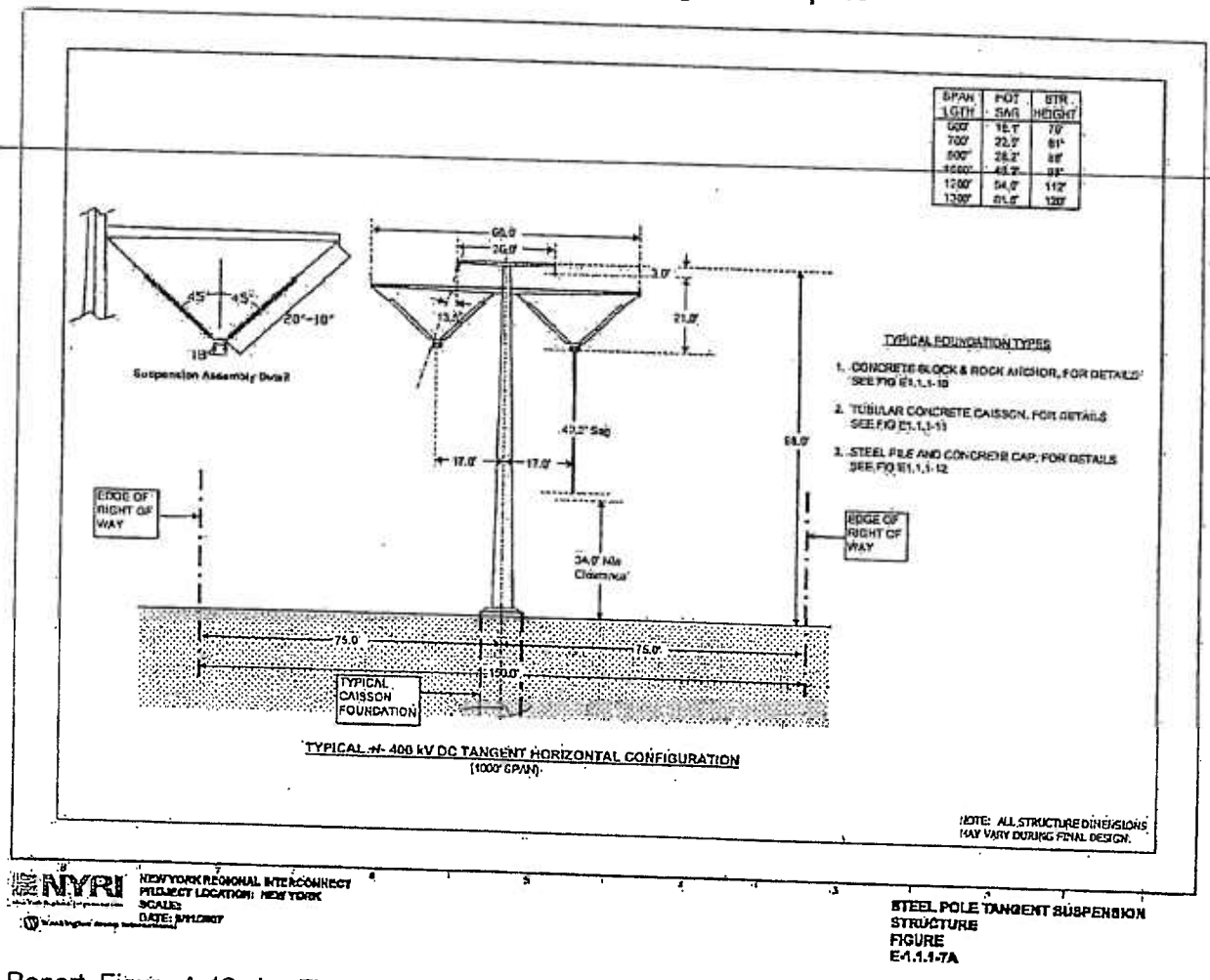


Report Figure A-13 also Figure 3 (ACF10).

DC input file ACF10 used for calculation of dc parameters associated with Figure A-13:

```
F10 +/-400kV 1200MVA Horizontal Bipolar with + on right Fig 10   04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
4
1  0  -400.00  -1500.00  0.00  2  0  -21.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  21.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -15.00  99.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  15.00  99.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  280.00  5.00
20.00  20.00  [illegible]  00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Horizontal DC line configuration on single steel pole –



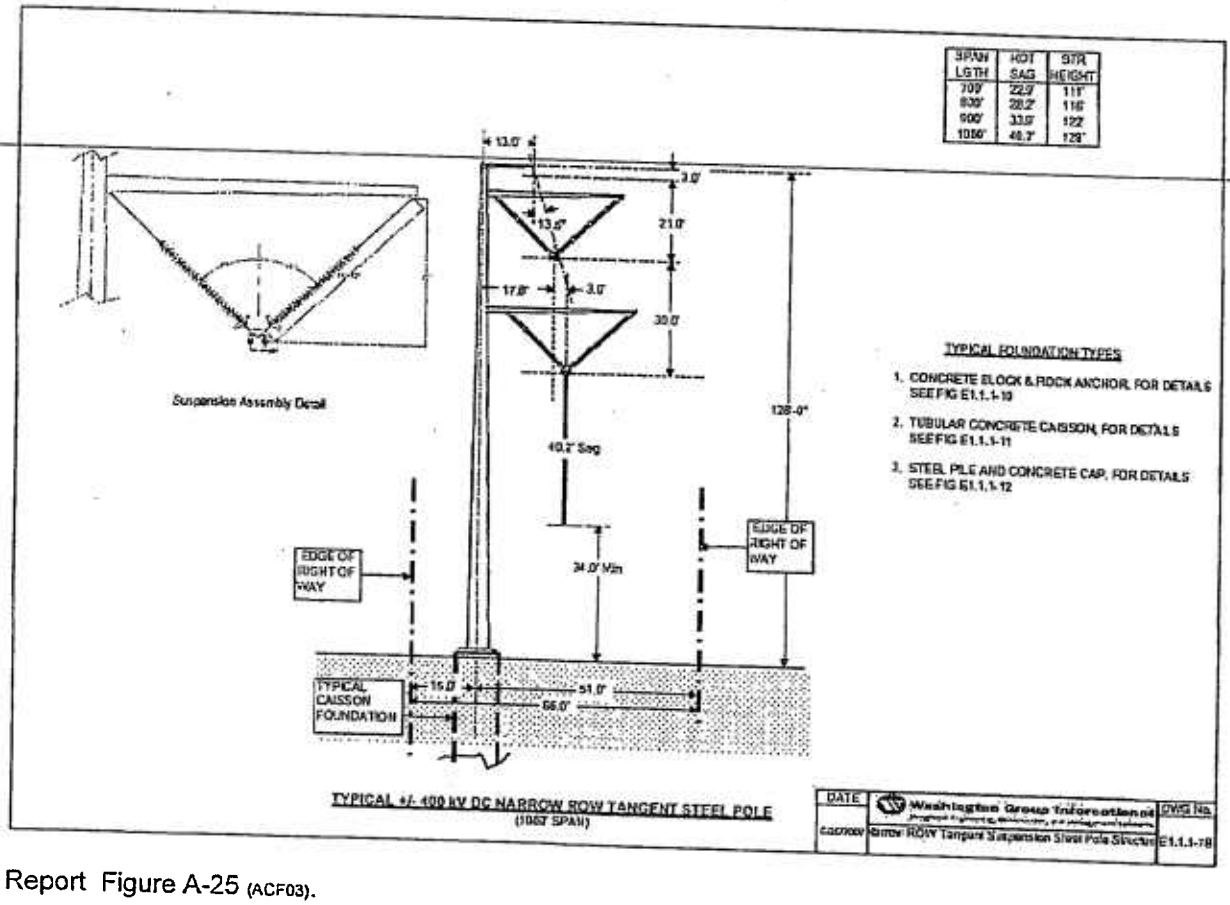
STEEL POLE TANGENT SUSPENSION STRUCTURE
FIGURE
E-1.1.1-7A

Report Figure A-19 also Figure 4 (ACF06).

DC input file ACF06 used for calculation of dc parameters associated with Figure A-19:

```
F06 +/-400kV 1200MVA Horizontal Bipolar with + on right Fig 6   04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
4
1  0  -400.00  -1500.00  0.00  2  0  -17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -13.00  95.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  13.00  95.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  280.00  5.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0  1.0000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Vertical DC line configuration on single steel pole –

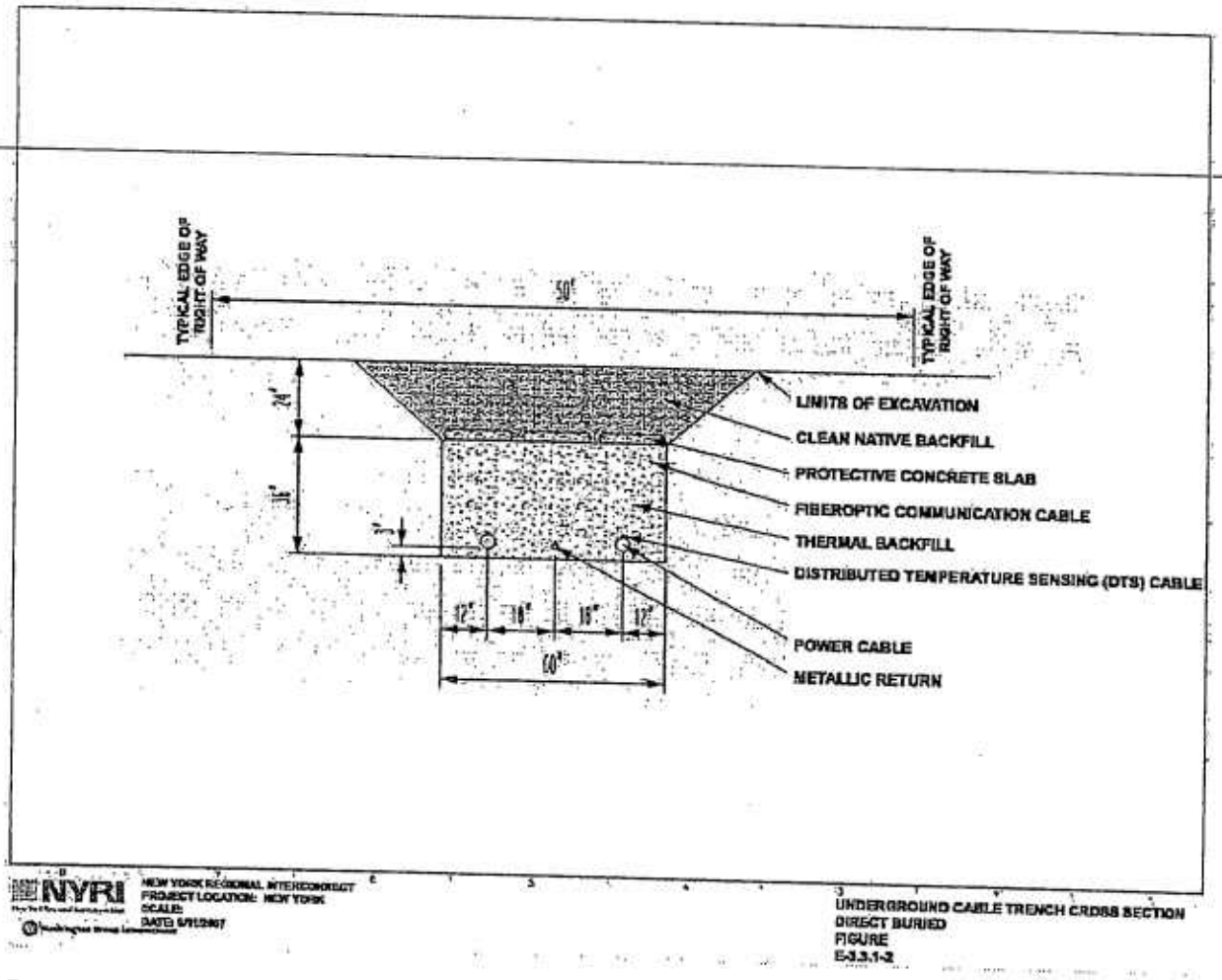


Report Figure A-25 (ACF03).

DC input file ACF03 used for calculation of dc parameters associated with Figure A-25:

```
F03 +/-400kV 1200MVA Vertical Bipolar with + on top Fig 3 04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
3
1  0  400.00  1500.00  0.00  2  0  17.00  104.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  -400.00  -1500.00  0.00  2  0  20.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  13.00  125.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  280.00  5.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.100      .000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Underground configuration of dc line –

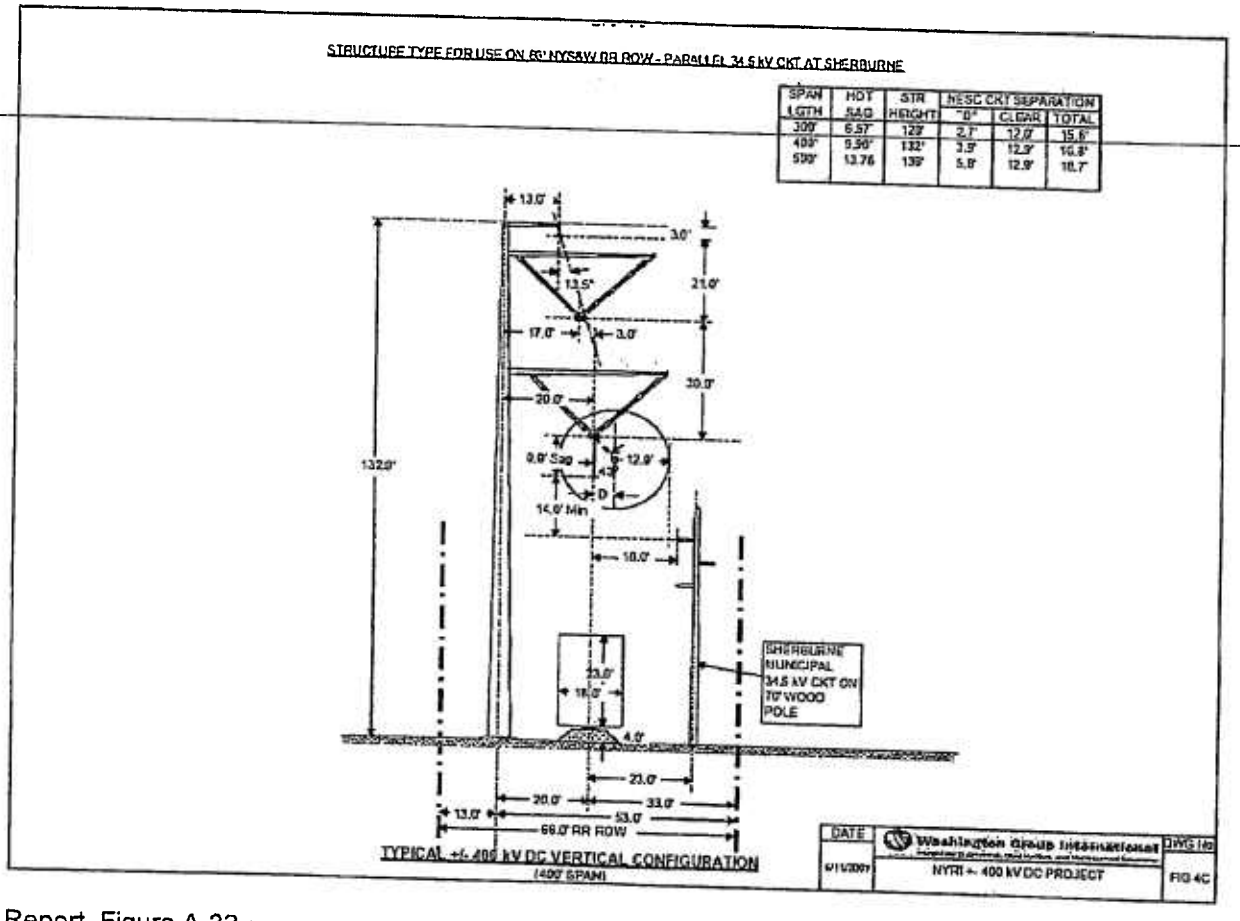


Report Figure A-31 (UG-331-2).

DC input file UG-331-2 used for calculation of dc UG parameters associated with Figure A-31:

Bundle * *	X Feet *	Y Feet *	# Conductor *	Cable Diameter inches	Spacing * *	Voltage * *	Phase * *	Current Amps *
1	-1.5	-4.53	1	4.5	0	-400.0	0	-1500.0
2	+1.5	-4.53	1	4.5	0	+400.0	0	+1500.0

Vertical DC line configuration on single steel pole within the NYS&W property with adjacent ac 34.5kV line –

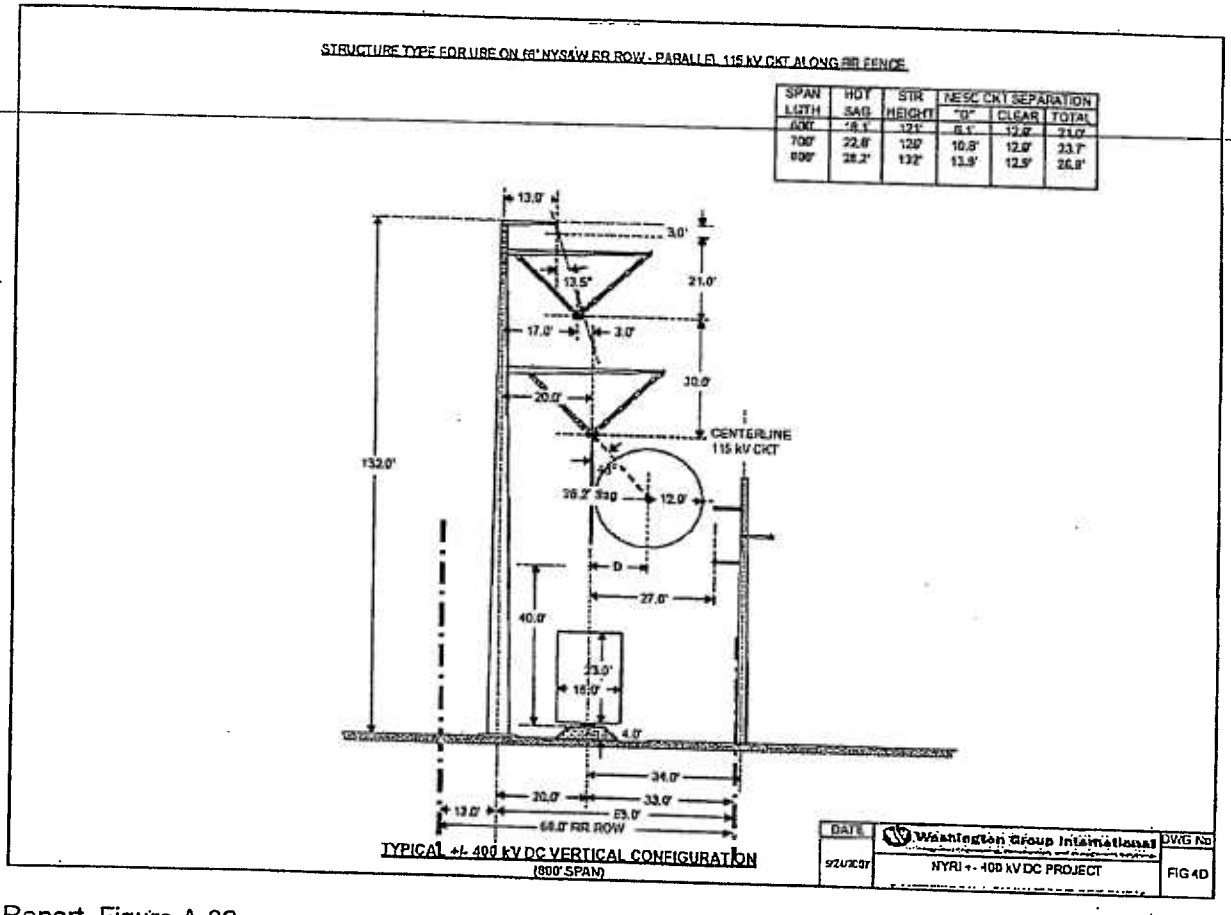


Report Figure A-33 (ACF04C).

DC input file ACF04C used for calculation of dc parameters associated with Figure A-33:

```
F04C +/-400kV 1200MVA  Vertical Bipolar with + on top  with 34.5kV AC distribut
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
7
1  0  400.00  1500.00  0.00  2  0  17.00  104.00  9.90  400.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  -400.00  -1500.00  0.00  2  0  20.00  74.00  9.90  400.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  13.00  125.00  7.43  400.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
2  1  34.50  250.00  0.00  1  0  38.00  45.00  5.00  150.00  0.00
WAXWING
0.6100  18.00  0.3470  0.3470  0.4770  37500000.0000
2  2  34.50  250.00  240.00  1  0  48.00  40.00  5.00  150.00  0.00
WAXWING
0.6100  18.00  0.3470  0.3470  0.4770  37500000.0000
2  3  34.50  250.00  120.00  1  0  38.00  35.00  5.00  150.00  0.00
WAXWING
0.6100  18.00  0.3470  0.3470  0.4770  37500000.0000
2  0  0.00  0.00  0.00  1  0  43.00  50.00  3.30  150.00  0.00
3/8EHS
0.3600  18.00  6.7400  6.9300  1.4400  5500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  200.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00
      280.00  5.00
20.00    0  20.00  20.00  20.00
      .00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
```

Vertical DC line configuration on single steel pole within the NYS&W property with adjacent ac 115kV line –

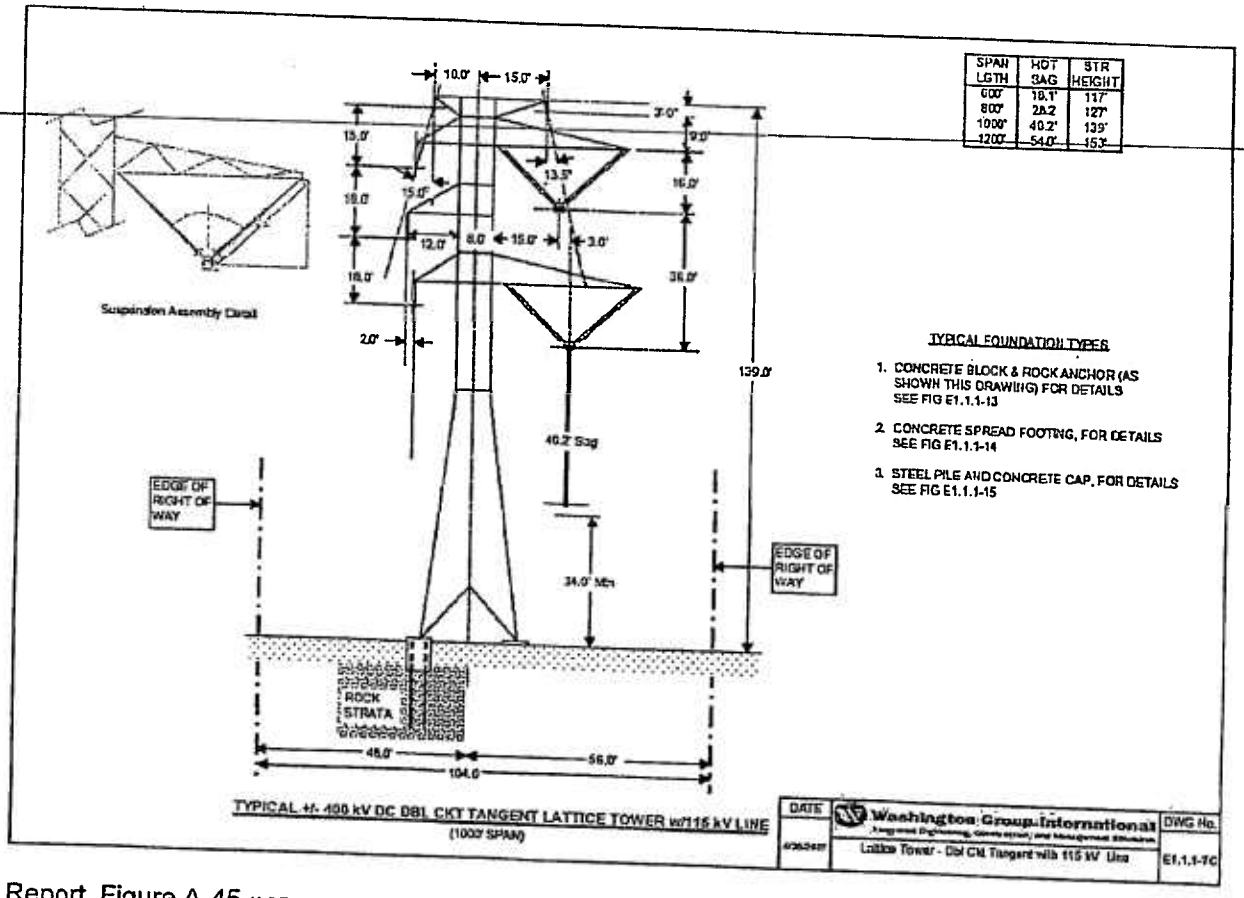


Report Figure A-39 (ACF04D).

DC input file ACF04D used for calculation of dc parameters associated with Figure A-39:

```
F04D +/-400kV 1200MVA Vertical Bipolar with + on top with 115kV AC GVT adjac
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
7
1  0  400.00  1500.00  0.00  2  0  17.00  104.00  28.20  800.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  -400.00  -1500.00  0.00  2  0  20.00  74.00  28.20  800.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  13.00  125.00  21.20  800.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
2  1  115.00  500.00  0.00  1  0  47.00  76.00  23.00  800.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  2  115.00  500.00  240.00  1  0  61.00  68.00  23.00  800.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  3  115.00  500.00  120.00  1  0  47.00  60.00  23.00  800.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  0  0.00  0.00  0.00  1  0  54.00  69.50  14.60  800.00  0.00
3/8HS
0.3600  0.00  6.5100  6.7500  1.5000  5500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  400.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.[illegible]
0.[illegible]
          [illegible]0.00  5.00
-39.00  75.[illegible]
[illegible]  [illegible]  [illegible]  3.00
[illegible]0.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Vertical dc line configuration on double circuit lattice tower with 115 kV ac line on opposite side –



Report Figure A-45 (ACF12).

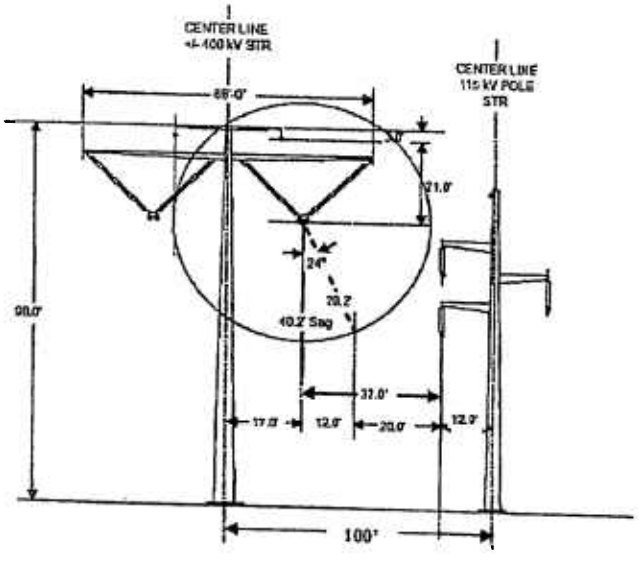
DC input file ACF12 used for calculation of dc parameters associated with Figure A-45:

```
F12 AC circuit to left of 400 kV DC vertical line    Fig 12    04/17/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
7
1  0  400.00  1500.00  0.00  2  0  19.00  111.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  -400.00  -1500.00  0.00  2  0  22.00  75.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
2  1  115.00  500.00  0.00  1  0  -14.00  129.00  37.00  1000.00  0.00
TERN
1.0600  18.00  0.1170  0.1190  0.4060  37500000.0000
2  2  115.00  500.00  240.00  1  0  -16.00  103.00  37.00  1000.00  0.00
TERN
1.0600  18.00  0.1170  0.1190  0.4060  37500000.0000
2  3  115.00  500.00  120.00  1  0  -14.00  77.00  37.00  1000.00  0.00
TERN
1.0600  18.00  0.1170  0.1190  0.4060  37500000.0000
2  0  0.00  0.00  0.00  1  0  -10.00  136.00  24.66  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
2  2  0.00  0.00  0.00  1  0  15.00  136.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  100.00  0  2  0
-80.00  -80.00  10.00
-75.00  75.00  1.00
-250.00  10.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Horizontal dc line configuration on single steel pole with adjacent delta configuration ac 115 kV line –

FIG 11

SPAN LGTH	STR HGT	HOT SAG	COND SPAC	STR SPAC
600'	68'	10.0'	24'	53'
700'	76'	18.1'	26'	55'
800'	86'	28.2'	28'	57'
1000'	98'	40.2'	32'	61'
1200'	112'	54.0'	37'	66'



TYPICAL +/- 400 kV DC SPACING TO SINGLE POLE 115 kV CKT
(1000' SPAN)

DATE	Washington Group International	DWG No
4/17/2007	(PRELIMINARY FOR INTERNAL USE ONLY)	FIG 11

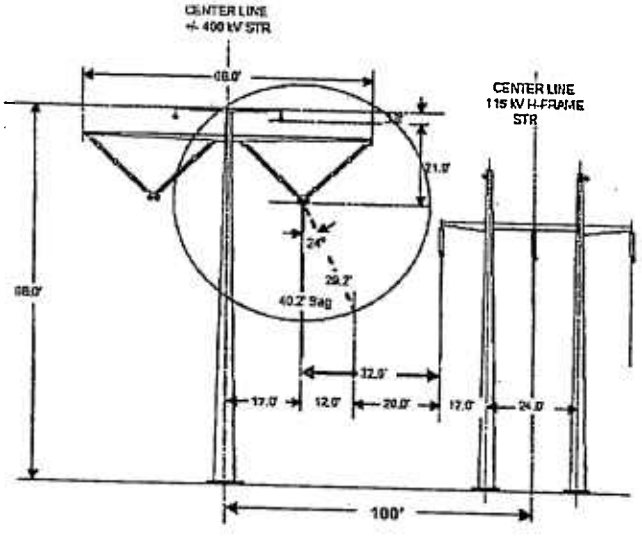
Report Figure A-51 (ACF11).

DC input file ACF11 used for calculation of dc parameters associated with Figure A-51:

```
F11 +/-400kV 1200MVA Horizontal Bipolar with + on right (see Fig 6) Fig 11
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
8
1  0  -400.00  -1500.00  0.00  2  0  -17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -13.00  95.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  13.00  95.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
2  1  115.00  1000.00  0.00  1  0  88.00  66.00  22.00  700.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  2  115.00  1000.00  240.00  1  0  112.00  58.00  22.00  700.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  3  115.00  1000.00  120.00  1  0  88.00  50.00  22.00  700.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  0  0.00  0.00  0.00  1  0  100.00  85.00  14.60  700.00  0.00
3/8HS
0.3600  0.00  6.5100  6.7500  1.5000  5500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  [illegible]
[illegible]  75.00  1.00
[illegible]  280.00  5.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Horizontal dc line configuration on single steel pole with adjacent horizontal ac 115 kV line –

SPAN LGTH	STR HGT	HOT SAG	COND SPAC	STR SPAC
600'	68'	10.0'	24'	65'
700'	76'	18.1'	26'	67'
800'	86'	28.2'	28'	69'
1000'	98'	40.2'	32'	73'
1200'	112'	54.0'	37'	78'



TYPICAL +/- 400 kV DC SPACING TO H-FRAME 115 kV CKT
(1000' SPAN)

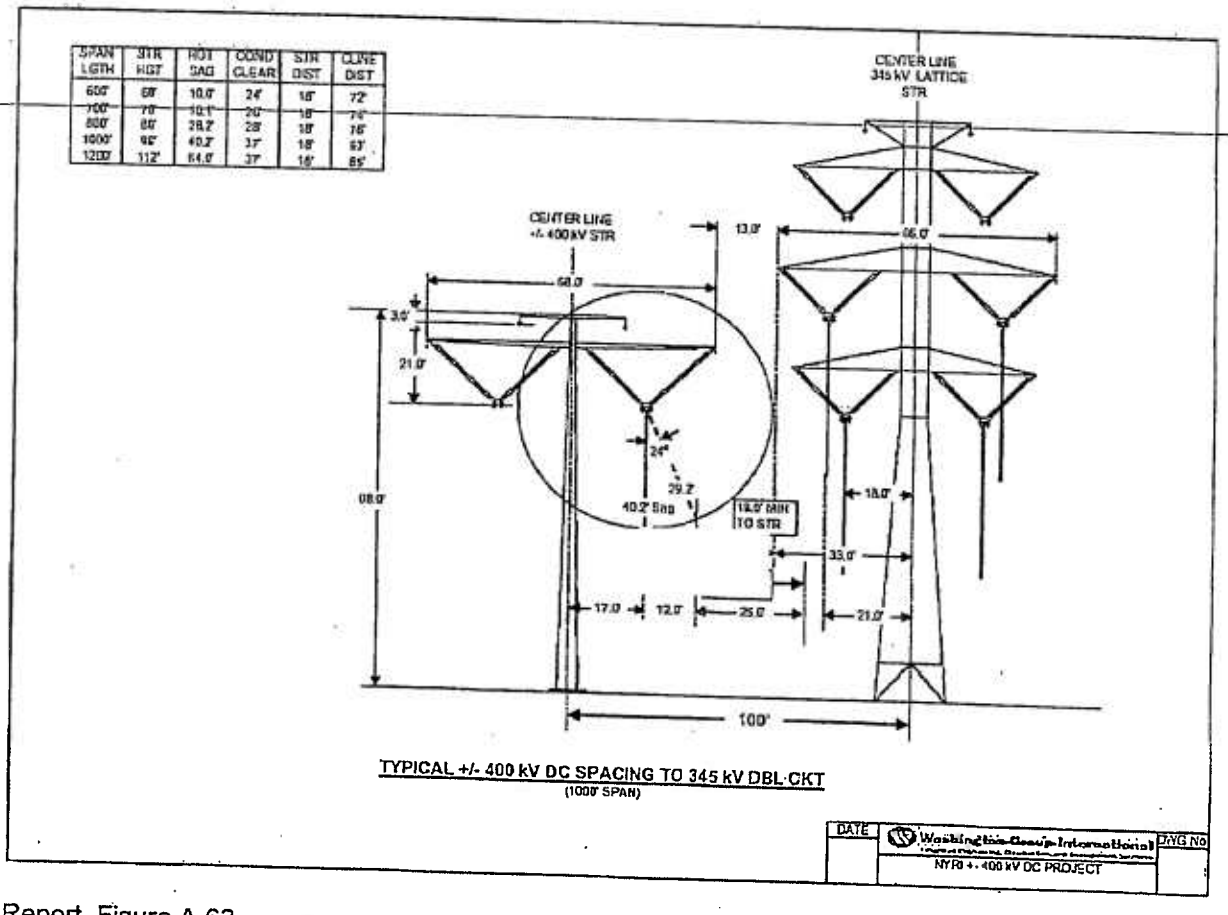
DATE | Washington Group International | DWG No
NYPA +- 400 kV DC PROJECT

Report Figure A-57 (ACF11A).

DC input file ACF11A used for calculation of dc parameters associated with Figure A-57:

```
F11A +/-400kV 1200MVA Horizontal Bipolar with + on right (see Fig 6) Fig 11a
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
9
1  0  -400.00  -1500.00  0.00  2  0  -17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -13.00  95.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  13.00  95.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
2  1  115.00  1000.00  0.00  1  0  76.00  65.00  35.00  1000.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  2  115.00  1000.00  240.00  1  0  100.00  65.00  35.00  1000.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  3  115.00  1000.00  120.00  1  0  124.00  65.00  35.00  1000.00  0.00
TERN
1.0600  0.00  0.1170  0.1190  0.4060  37500000.0000
2  0  0.00  0.00  0.00  1  0  87.00  80.00  24.60  1000.00  0.00
3/8HS
0.3600  0.00  6.5100  6.7500  1.5000  5500000.0000
2  0  0.00  0.00  0.00  1  0  113.00  80.00  24.60  1000.00  0.00
3/8HS
0.3600  0.00  6.5100  6.7500  1.5000  5500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  [illegible]
[illegible]  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Horizontal dc line configuration on single steel pole with adjacent double circuit ac 345 kV line –



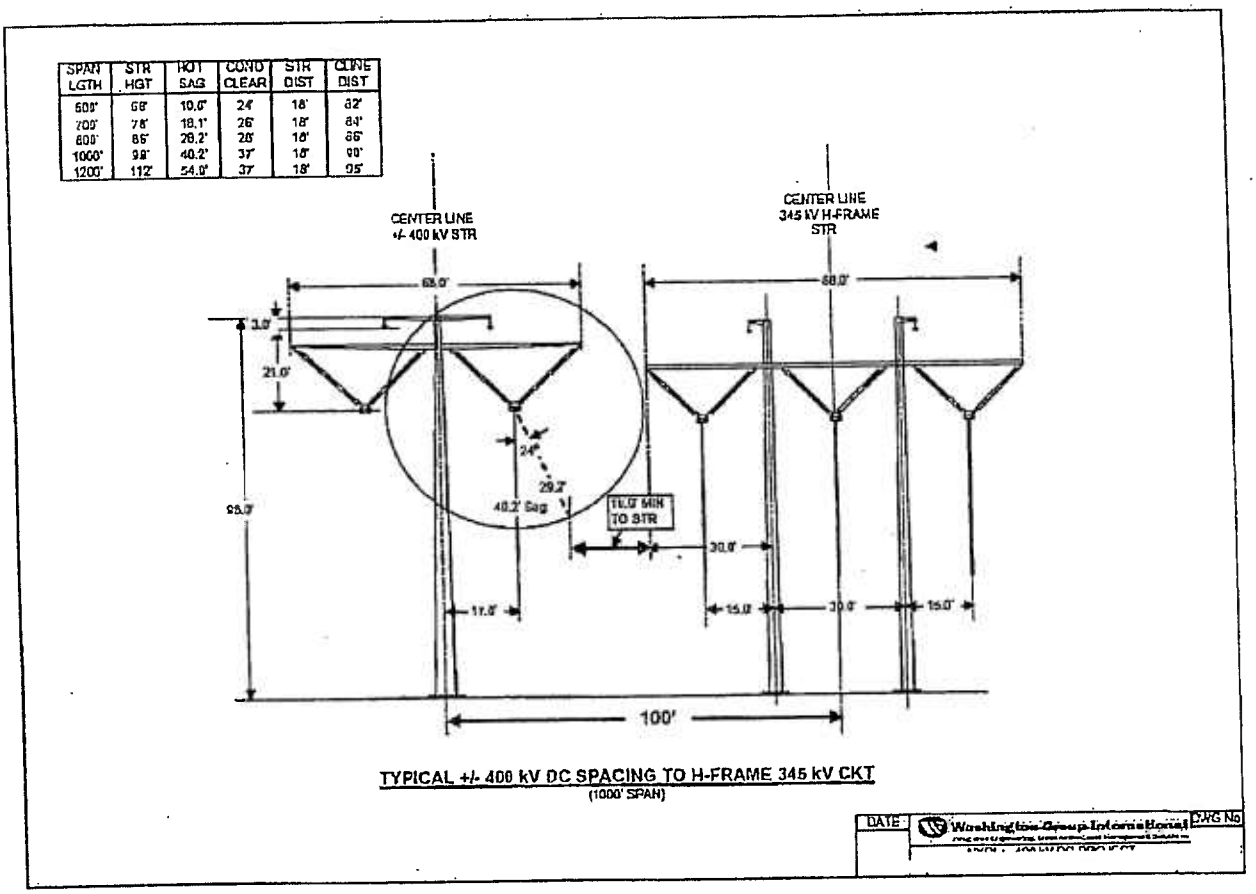
Report Figure A-63 (ACF11B).

DC input file ACF11B used for calculation of dc parameters associated with Figure A-63:

```
F11B +/-400kV 1200MVA Horizontal Bipolar with + on right Fig 11b with adj dbcr
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
12
1  0  -400.00  -1500.00  0.00  2  0  -17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -13.00  95.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  13.00  95.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
2  1  345.00  1000.00  0.00  2  0  82.00  122.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  2  345.00  1000.00  240.00  2  0  79.00  96.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  3  345.00  1000.00  120.00  2  0  82.00  70.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
3  1  345.00  1000.00  0.00  2  0  118.00  122.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
3  2  345.00  1000.00  240.00  2  0  121.00  96.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
3  3  345.00  1000.00  120.00  2  0  118.00  70.00  40.20  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  0  0.00  0.00  0.00  1  0  87.00  143.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
3  0  0.00  0.00  0.00  1  0  113.00  143.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
```

71.80 69.62
73.50 62.96
70.80 50.36
70.80 39.92
70.80 33.26
0.00 1000.00 2 0
-250.00 -20.00 5.00
-20.00 105.00 1.00
110.00 240.00 5.00
20.00 20.00 20.00 20.00 20.00
2.00 2.00 1 1 0.1000 0.1000 1.0000 1.0000 2.00 2.00 1.00 0500
0
0

Horizontal dc line configuration on single steel pole with adjacent horizontal ac 345 kV line –

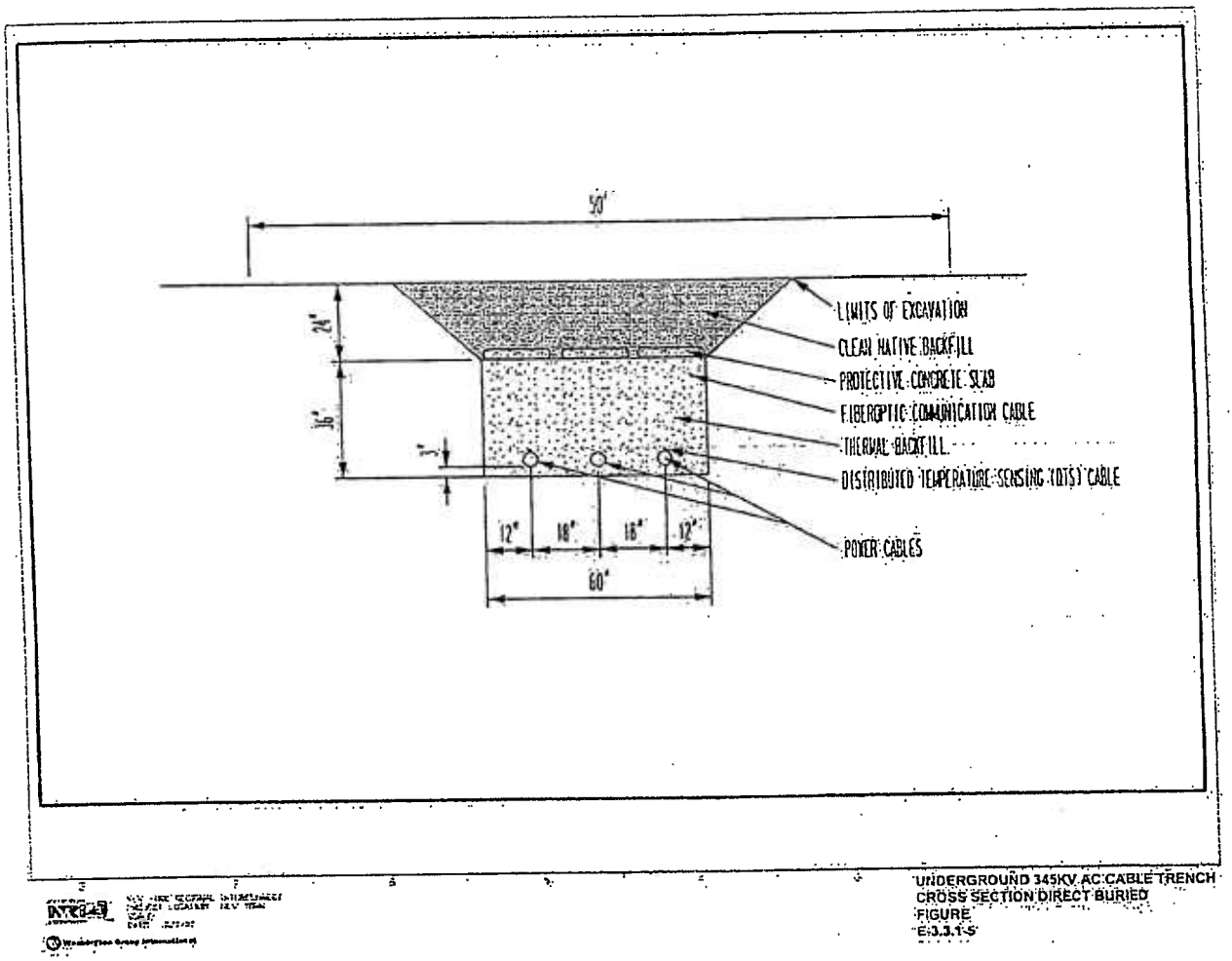


Report Figure A-69 (ACF11C).

DC input file ACF11C used for calculation of dc parameters associated with Figure A-69:

```
F11C +/-400kV 1200MVA Horizontal Bipolar with + on right (see Fig 6) Fig 11c
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
9
1  0  -400.00  -1500.00  0.00  2  0  -17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  0  400.00  1500.00  0.00  2  0  17.00  74.00  40.20  1000.00  0.00
BLUEBIRD
1.7600  18.00  0.0430  0.0480  0.3440  37500000.0000
1  2  0.00  0.00  0.00  1  0  -13.00  95.00  30.15  1000.00  0.00
BLUEBIRD
1.7600  0.00  0.0430  0.0480  0.3440  37500000.0000
1  0  0.00  0.00  0.00  1  0  13.00  95.00  26.80  1000.00  0.00
7#5AW
0.5500  0.00  1.2170  1.2400  0.7070  37500000.0000
2  1  345.00  1000.00  0.00  2  0  70.00  70.00  35.00  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  2  345.00  1000.00  240.00  2  0  100.00  70.00  35.00  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  3  345.00  1000.00  120.00  2  0  130.00  70.00  35.00  1000.00  0.00
GRACKLE
1.3400  18.00  0.0780  0.0800  0.3760  37500000.0000
2  0  0.00  0.00  0.00  1  0  82.00  95.00  23.32  1000.00  0.00
7/16EHS
0.4400  0.00  4.6100  4.7400  1.2800  5500000.0000
2  0  0.00  0.00  0.00  1  0  118.00  95.00  23.32  1000.00  0.00
7/16EHS
0.4400  0.00  4.6100  4.7400  1.2800  5500000.0000
1
3.28  5.00  3.28  100.00  3.28  3.28  800.00
100.00  500.00  0.5000  0  60.00
70.30  29.84
67.80  33.62
65.30  41.18
67.30  50.90
71.30  59.18
70.00  67.46
71.80  71.42
71.80  69.62
73.50  62.96
70.80  50.36
70.80  39.92
70.80  33.26
0.00  1000.00  2  0
-250.00  -40.00  5.00
-39.00  75.00  1.00
80.00  280.00  5.00
20.00  20.00  20.00  20.00  20.00
2.00  2.00  1  1  0.1000  0.1000  1.0000  1.0000  2.00  2.00  1.00  0500
0
0
```

Underground 345-kV ac cable trench configuration for use as tie-lines between ac substations and dc converter stations. –

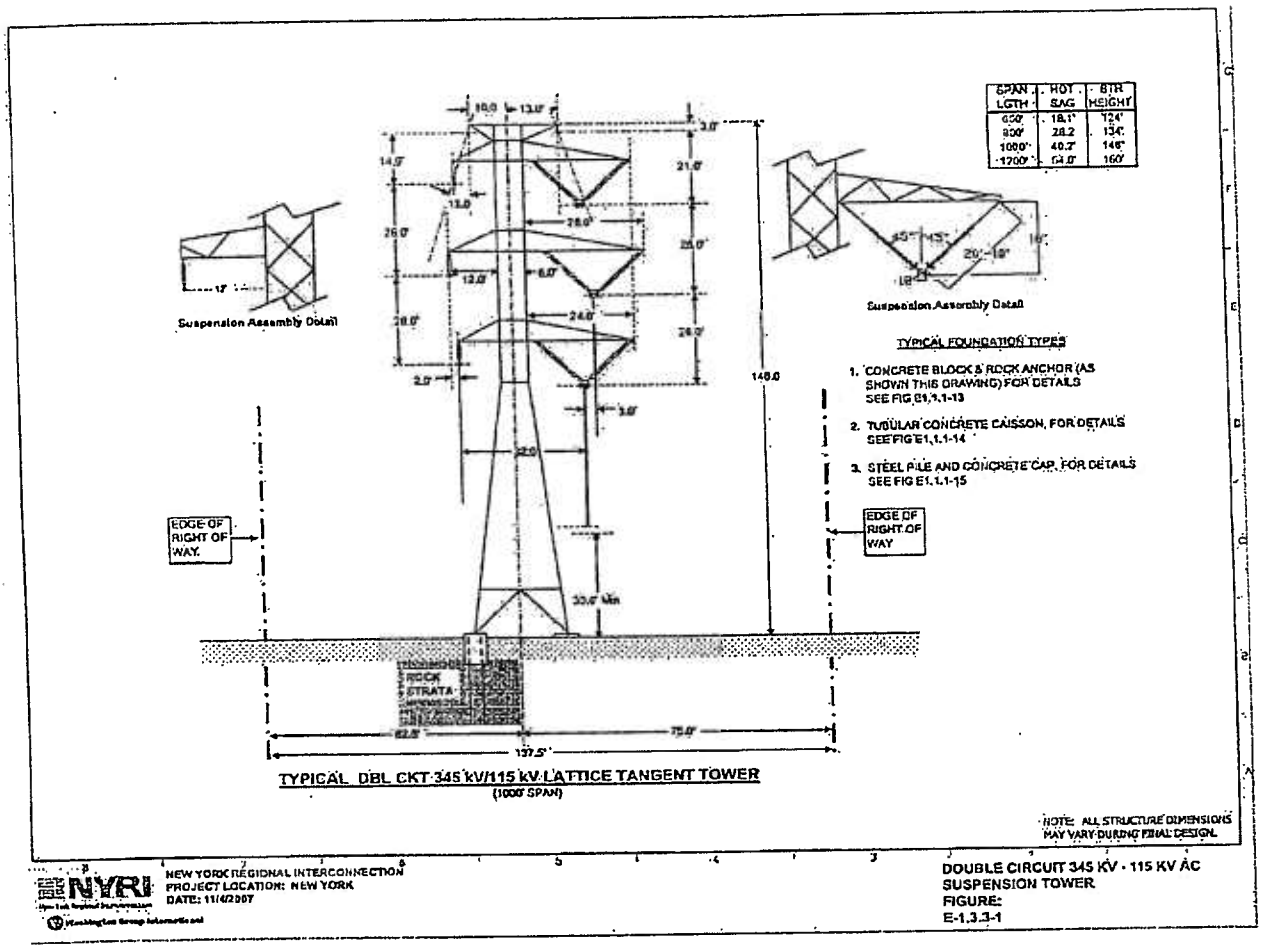


Report Figure 9 UG configuration associated with plot Figure B-1(UG-331-5).

AC input file UG-331-5 used for calculation of ac parameters associated with UG ac cable configuration of Figure 9 and plot of Figure B-1:

Bundle * *	X Feet *	Y Feet *	# Conductor *	Cable Diameter inches	Spacing * *	Voltage * *	Phase * *	Current Amps *
1	-1.5	-4.53	1	4.5	0	209.15	0	2310
2	0.0	-4.53	1	4.5	0	209.15	240	2310
3	+1.5	-4.53	1	4.5	0	209.15	120	2310

Double circuit lattice tower with existing 115-kV and proposed 345-kV ac lines. –



Report Figure B-2 (ACF12A).

AC input file ACF12A used for calculation of ac parameters associated with Figure B-2:

```
F12A AC double circuit 115/345   Fig 12a   11/04/07
1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
8
1  1  120.75  1040.00  0.00  1  0  -14.00  129.00  40.20  1000.00  0.00
TERN
1.0600 0.00 0.1170 0.1190 0.4060 37500000.0000
1  2  120.75  1040.00  240.00  1  0  -16.00  103.00  40.20  1000.00  0.00
TERN
1.0600 0.00 0.1170 0.1190 0.4060 37500000.0000
1  3  120.75  1040.00  120.00  1  0  -14.00  77.00  40.20  1000.00  0.00
TERN
1.0600 0.00 0.1170 0.1190 0.4060 37500000.0000
2  3  362.25  3416.00  120.00  2  0  18.00  122.00  40.20  1000.00  0.00
GRACKLE
1.3400 18.00 0.0780 0.0800 0.3760 37500000.0000
2  2  362.25  3416.00  240.00  2  0  21.00  96.00  40.20  1000.00  0.00
GRACKLE
1.3400 18.00 0.0780 0.0800 0.3760 37500000.0000
2  1  362.25  3416.00  0.00  2  0  18.00  70.00  40.20  1000.00  0.00
GRACKLE
1.3400 18.00 0.0780 0.0800 0.3760 37500000.0000
2  0  0.00  0.00  0.00  1  0  -10.00  143.00  26.67  1000.00  0.00
7/16EHS
0.4400 0.00 4.6100 4.7400 1.2800 5500000.0000
2  0  0.00  0.00  0.00  1  0  13.00  143.00  26.67  1000.00  0.00
7/16EHS
0.4400 0.00 4.6100 4.7400 1.2800 5500000.0000
1
3.28 5.00 3.28 100.00 3.28 3.28 800.00
100.00 500.00 0.5000 0 60.00
70.30 29.84
67.80 33.62
65.30 41.18
67.30 50.90
71.30 59.18
70.00 67.46
71.80 71.42
71.80 69.62
73.50 62.96
70.80 50.36
70.80 39.92
70.80 33.26
0.00 1000.00 2 0
-250.00  -80.00  10.00
-75.00  75.00  1.00
80.00  250.00  10.00
20.00 20.00 20.00 20.00 20.00
2.00 2.00 1 1 0.1000 0.1000 1.0000 1.0000 2.00 2.00 1.00 0500
0
0
```

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-25
Requested By: Edward Schrom
Date of Request: October 2, 2006
Reply Date: February 20, 2008
Witness: Panel B
Subject: Design of line

---

1. Provide a copy of all filings and requests made of the rail roads.

Response: NYRI made no formal filings with the Rail Roads. All information requests of the Railroad's were made informally. The requests for information were generally on the following subject matters.

- Access agreement with ESS for the purpose of the Bog Turtle Study
- Request for Valuation Maps
- Joint Occupancy information
- Railroad Signal Information
- Standard Construction requirements for contractors from Metro North
- EPRI Handbook from NYS&W.
- NYS&W Hi-Rail Review.
- Requests for technical meetings and discussions

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-26
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D
Subject:	Design of line

---

1. If the line were to be used in a mono pole operation, provide a technical description of how the current would be returned. Describe any short comings of using this return method.

Response:

See Exhibit E-2.2.3 of the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-27
Requested By:	Edward Schrom
Date of Request:	October 2, 2006
Reply Date:	February 20, 2008
Witness:	Panel D and E
Subject:	Design of line

---

1. **If the transmission line (or any portion thereof) is installed under ground what will NYRI's requirement be regarding vegetation growth over the cables.**

Response:

See Exhibit 4, Section 4.4.3 of the Article VII Application.

2. **What will the requirement be to insure that trees and other large root growing species will be kept away from the under ground cable.**

Response:

See Exhibit 4, Section 4.4.3 of the Article VII Application.

3. **For each of the tapes, dielectric material, etc used in the underground cable, provide the electrical characteristics of the materials.**

Response:

The details of a cable manufacture's specifications of construction methods, and properties of the materials used for high voltage underground cables are considered by the manufacturers to be proprietary trade secrets, and are only provided by manufacturers after an order has been placed, and only under the protection of confidentiality agreements. The cables required for the NYRI project will be custom designed to meet the specific ambient and soil conditions along the final route alignment, details that will not be available until the project enters the detailed design stage.

4. **Provide an engineering drawing of the cross section of the cable, indicating the thicknesses of the dielectric and conductive medium.**

Response:

See Exhibit E-3.2.1, Fig E-3.2.1-1 of the Supplemental Article VII Application.

5. **Provide the trade names of each material and the manufacturer of each material.**

See Response to DPS-27.3 above.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-28
Requested By: Edward Schrom
Date of Request: November 6, 2006
Reply Date: February 20, 2008
Witness: Panel D
Subject: Design of line

---

1. **Provide the lightning design for the transmission towers that are to be considered for this project.**

   Explain your answer and provide a copy of your work papers.

Response:

The project will apply a conservative design goal of achieving less than one lightning induced outage per 100 miles per year. The preliminary lightning protection design for the overhead transmission line is described in Exhibit E-1 section E-1.3.1 based on experience. Detailed shielding calculations will be carried out to finalize the required shielding angles of protection during detailed design, when the necessary dimensional data is developed for the various configurations of transmission line structures, following industry practice.

2. **Provide the catalogue cut sheets and technical specification for the lightning arrestors to be used for the HVDC line.**

Response:

See attached typical cut sheets and technical specifications for Porcelain Surge Arrester 3EP.

3. **Provide the catalogue cut sheets and technical specifications for the line switches to be used on the HVDC line.**

See attached typical cut sheet and the document titled *3AQ Technical Data-Rated Current*.

4. **What are the emergency ratings of the transmission line?**

Explain your answer.

Response:

See Exhibit E-1.3 of the Supplemental Article VII Application.

5. **What is the conductor temperature at this rating?**

Response:

See Exhibit E-1.3 of the Supplemental Article VII Application.

6. **Provide a detailed design mechanical analysis of each transmission line structure to be used. Provide the design requirements that each component must meet and the applicable standard for each component. Provide copies of all supporting documents and work papers.**

Response:

As described in Exhibit E-1 section E-1.3.2 all structures will be designed to meet or exceed the NESC loading conditions indicated. However, a detailed design mechanical analysis of each transmission structure will not be undertaken until the final design phase of the project, which will include structure procurement.

During the structure procurement process, structure drawings with clearances, load cases, and load schedules (including load tree diagrams) will be developed and included as an integral part of the specifications for the procurement of the transmission line structures. Following award of the purchase order, the vendor will develop and provide detailed structural design calculations and drawings for review and approval. Following approval the vendor will then develop shop detail drawings that will be used for fabrication. These drawings will also be reviewed and approved.

Thus, it will not be until the vendor is well into the detailed engineering design process that calculations and drawings will be available that provide the detailed design analysis and requirements for each structure and its components.

The structure procurement specifications will incorporate the following industry standards for lattice steel towers and steel poles:

- ANSI C2 National Electrical Safety Code (NESC) -latest edition

- ASCE Manual No. 74 - Guidelines for Transmission Lines Structural Loading
- ASCE Manual No. 10-97 - Design of Lattice Steel Transmission Structures
- ASCE Manual No. 48-05 - Design of Steel Transmission Pole Structures
- ASCE 72 - Design of Steel Transmission Pole Structures
- ASCE 7 - Minimum Design Loads for Buildings and other Structures
- AISC Steel Construction Manual 13th Edition
- ASTM A36 - Standard Specification for Structural Steel
- ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A143 - Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
- ASTM A441 - Standard Specification for High Strength Low-Alloy Structural Maganese Vanadium Steel
- ASTM A572 - Standard Specification for High Strength Low-Alloy Columbian-Vanadium Structurals Steels
- ASTM A633 - Standard Specification for Normalized High Strength Low-Alloy Structural Steel Plates
- AWS D1.1 - Structural Welding Code Steel
- NEMA TT-1 - Taperes Tubular Steel Structures
- Uniform Building Code

7. **Provide a table of loadings assumed on the structure: wind, snow, ice, etc. Provide copies of all supporting documents and work papers.**

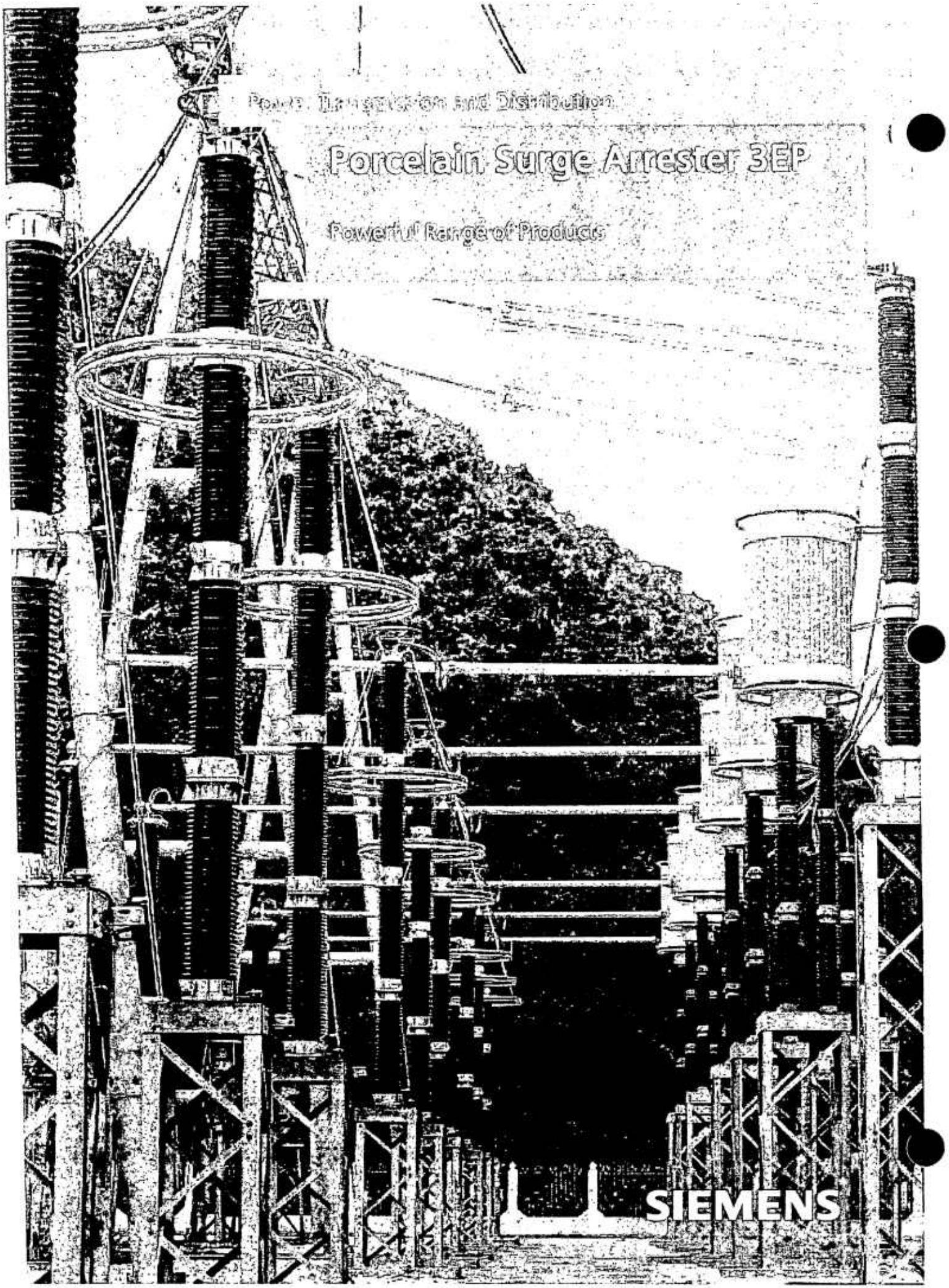
Response:

See Exhibit E-1.3.2 of the Supplemental Article VII Application and industry standards in Response 28.6 above.

8. **Provide an advantage/disadvantage analysis of each structure type.**

See Exhibit E-1.3.2 of the Supplemental Article VII Application.

Attachment for Interrogatory
DPS-28.2


Power Transmission and Distribution
Porcelain Surge Arrester 3EP
Powerful Range of Products
SIEMENS

One Goal – 2 Different Designs

3EP porcelain housed surge arresters

Experience is most essential, when it comes to reliability in medium and high voltage applications. Since 1929 Siemens have been manufacturing high voltage surge arresters with porcelain housing – for standard and specialised applications. Our permanent research and development and the concerted know how in our factory give our 3EP surge arresters a leading edge in over voltage protection. The cost-effectiveness of our products is underscored by uncompromising quality ensuring the long service life and reliability of each application.
In general, our arresters are used to protect high voltage equipment in substations, e. g. transformers, High Voltage Direct Current (HVDC) systems or all kinds of compensation systems for electric power networks.
However, apart from the area of standard applications, Siemens can offer customized surge arresters for virtually any application (see diagram 1) from 12 kV up to 800 kV. Furthermore, our surge arresters have been designed to meet the requirements of a wide range of common installation environments, from artic cold climate to the heat of the desert and the dampness of tropical climates.

Advantages of 3EP surge arresters

- Excellent over voltage protection with large worldwide experience
- Very high bending moment of up to 34.000 Nm
- For Networks with short circuit currents of up to 100 kA
- Brown or grey porcelain designs
- Maximum protection in case of overload through directional pressure relief device
- Due to the excellent sealing system we have decades of trouble-free service life without failures or ingress of moistures

The following tables show a selection of our 3EP standard porcelain surge arresters. For other options/specifications just contact us or your nearest Siemens partner. We can supply arresters with higher rated voltages and continuous operating voltages, with higher or lower residual voltages, with longer or smaller creepage distances. Basically we can procure the 3EP4 up to rated voltage of 288 kV adequate for networks up to 362 kV, the 3EP2 up to 468kV adequate for networks up to 550 kV and the 3EP3 up to 612 kV adequate for networks up to 800 kV.

To find the right arrester just follow the color codes
3EP4
3EP2
3EP3

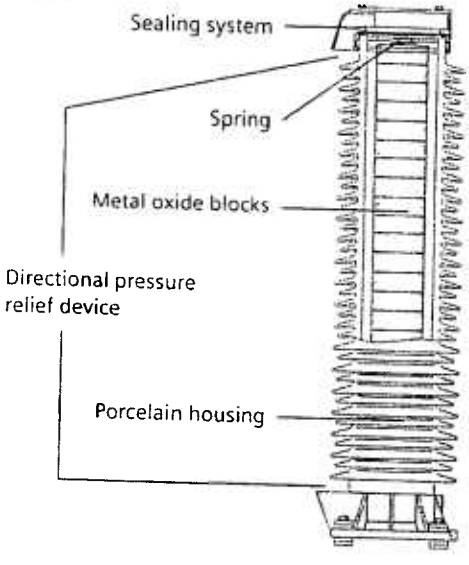


Table 2

Highest voltage for equipment	Standard lightning impulse withstand voltage	Rated voltage	Continuous operating voltage	Line discharge class	Long duration current 2 ms	Maximum values of the residual voltages at discharge currents of the following impulses						Arrester type
U_m [kV]	BIL min [kV]	U_r [kV]	U_c [kV]	LD-Cl	[A]	8/20 µs 5 kA [kV]	8/20 µs 10 kA [kV]	8/20 µs 20 kA [kV]	30/60 µs 0.5 kA [kV]	30/60 µs 1 kA [kV]	30/60 µs 2 kA [kV]	
72.5 with solidly earthed neutral	325	54	43	2	500	133	143	160	110	114	120	3EP4 054 – 1 P D 2 1 – 1 xxx
	325	54	43	3	850	122	130	144	104	107	112	3EP4 054 – 2 P D 3 1 – 1 xxx
	325	60	48	2	500	148	159	178	122	127	134	3EP4 060 – 1 P D 2 1 – 1 xxx
	325	60	48	2	850	130	138	153	110	113	119	3EP4 060 – 2 P D 2 1 – 1 xxx
	325	60	48	2	850	130	138	153	110	113	119	3EP2 060 – 2 P D 2 1 – 1 xxx
	325	60	48	3	850	135	144	160	115	118	124	3EP4 060 – 2 P D 3 1 – 1 xxx
	325	60	48	3	850	135	144	160	115	118	124	3EP2 060 – 2 P D 3 1 – 1 xxx
	325	66	52	2	500	163	175	196	135	140	147	3EP4 066 – 1 P D 2 1 – 1 xxx
	325	66	52	2	850	143	152	169	122	125	131	3EP4 066 – 2 P D 2 1 – 1 xxx
	325	66	52	2	850	143	152	169	122	125	131	3EP2 066 – 2 P D 2 1 – 1 xxx
	325	66	52	3	850	149	158	175	126	130	136	3EP4 066 – 2 P D 3 1 – 1 xxx
	325	66	52	3	850	149	158	175	126	130	136	3EP2 066 – 2 P D 3 1 – 1 xxx
	325	72	57	2	500	178	191	214	147	153	160	3EP4 072 – 1 P D 2 1 – 1 xxx
	325	72	57	3	850	163	173	192	138	142	149	3EP4 072 – 2 P D 3 1 – 1 xxx
Neutral-ground arresters U_m [kV]												
72.5	325	30	24	2	500	74	80	90	62	64	67	3EP4 030 – 1 S C 2 1 – 1 xxx
	325	30	24	3	850	68	72	80	58	59	62	3EP4 030 – 2 S C 3 1 – 1 xxx

1) According to IEC 60099-4 those values are measured on individual housing unit

Choose the Appropriate Arrester

In just four steps you can choose the right surge arrester.

1. First step choose the type 3EP4, 3EP2 or 3EP3 from diagram 1.
2. Second step verify the maximum technical data with table 1.
3. Third step choose the surge arrester with table 2.
4. Fourth step select the suitable installation and grounding and complete the order number with table 3.

Diagram 1

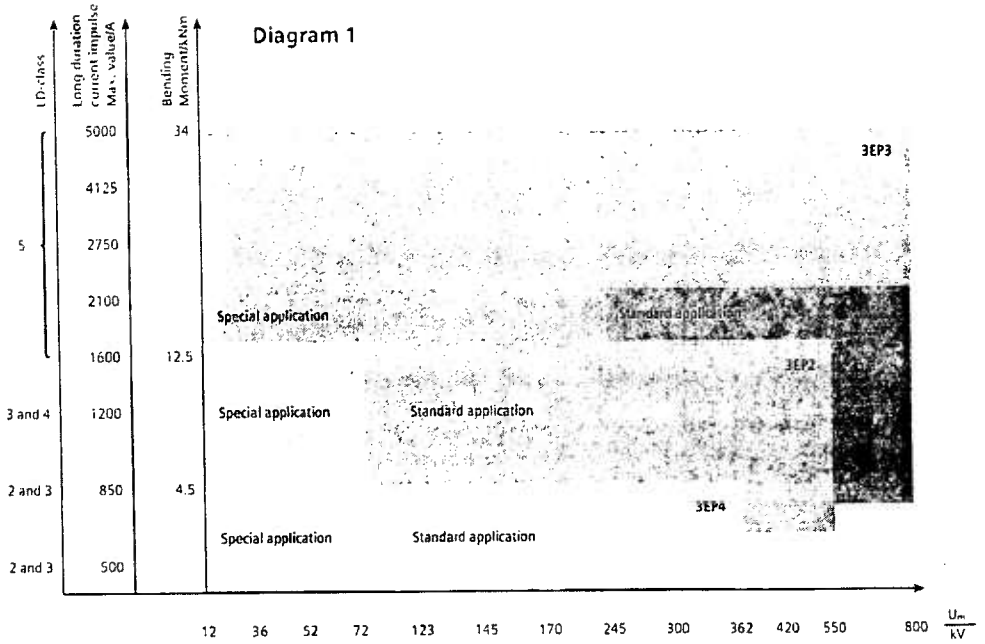


Table 1

Maximum values		3EP4	3EP2	3EP3
Nominal system voltage U_n	kV	345	500	765
Highest voltage for equipment U_m	kV	362	550	800
Maximum rated voltage U_r	kV	288	468	612
Maximum nominal discharge current I_n	kA	10	20	20
Maximum line discharge class		3	5	5
Maximum energy absorption capability	kJ/kVr	8	13	25
Maximum long duration current impulse	A	850	1600	6500
Rated short-circuit current	kA	65	65	100
Maximum permissible service load	kNm	4.5	12.5	25

Height (H)	Number of units	Housing insulation		Creepage distance	Top load dynamic	Alternating or normal sheds	Grading ring diameter (D)	Weight	Figure	TOV diagram
		Lightning impulse withstand voltage 1.2/50 µs[1]	Power frequency withstand voltage 1 min., wet[1]							
[mm]		[kV]	[kV]	[mm]	[N]		[mm]	[kg]		
1050	1	484	196	2490	4300	N	-	44	41	2
1050	1	484	196	2490	4300	N	-	44	41	2
1050	1	484		2490	4300	N	-	44	41	2
1050	1	484	196	2490	4300	N	-	44	41	3
1235	1	574	218	2595	10100	N	-	74	21	3
1050	1	484	196	2490	4300	N	-	44	41	2
1235	1	574	218	2595	10100	N	-	74	21	3
1050	1	484	196	2490	4300	N	-	45	41	2
1050	1	484	196	2490	4300	N	-	45	41	3
1235	1	574	218	2595	10100	N	-	75	21	3
1050	1	484	196	2490	4300	N	-	45	41	2
1235	1	574	218	2595	10100	N	-	75	21	3
1050	1	484	196	2490	4300	N	-	45	41	2
1050	1	484	196	2490	4300	N	-	45	41	2
555	1	206	83	980	8100	N	-	24	41	2
555	1	206	83	980	8100	N	-	24	41	2

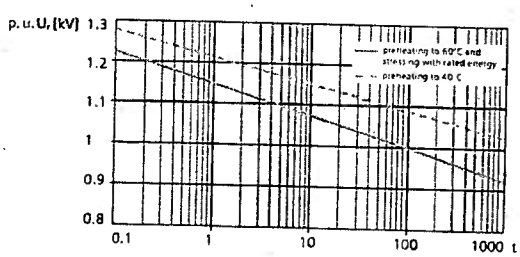
Highest voltage for equipment	Standard lightning impulse withstand voltage	Rated voltage	Continuous operating voltage	Line discharge class	Long duration current 2 ms	Maximum values of the residual voltages at discharge currents of the following impulses						Arrester type
U_m [kV]	BIL min [kV]	U_r [kV]	U_c [kV]	LD-Cl	[A]	8/20 µs 5 kA [kV]	8/20 µs 10 kA [kV]	8/20 µs 20 kA [kV]	30/60 µs 0.5 kA [kV]	30/60 µs 1 kA [kV]	30/60 µs 2 kA [kV]	
123	450	96	76	2	500	196	254	284	196	203	213	3EP4 096 – 1 P E 2 1 – 1 xxx
with solidly earthed neutral	450	96	76	2	850	208	221	245	177	181	190	3EP4 096 – 2 P E 2 1 – 1 xxx
	450	96	76	2	850	208	221	245	177	181	190	3EP2 096 – 2 P F 2 1 – 1 xxx
	450	96	76	3	850	216	230	255	184	189	198	3EP4 096 – 2 P E 3 1 – 1 xxx
	450	96	76	3	850	216	230	255	184	189	198	3EP2 096 – 2 P F 3 1 – 1 xxx
	450	102	81	2	500	251	270	302	208	216	227	3EP4 102 – 1 P E 2 1 – 1 xxx
	450	102	81	3	850	230	245	272	196	201	211	3EP4 102 – 2 P E 3 1 – 1 xxx
	450	108	86	2	500	266	286	320	202	229	240	3EP4 108 – 1 P E 2 1 – 1 xxx
	450	108	86	3	850	243	259	287	207	212	223	3EP4 108 – 2 P E 3 1 – 1 xxx
	450	111	88	3	850	250	266	295	213	218	229	3EP4 111 – 2 P E 3 1 – 1 xxx
Resonant earthed	550	156	124	2	850	337	359	398	287	294	309	3EP4 156 – 2 P F 2 1 – 1 xxx
Neutral-ground arresters U_m [kV]												
123	450	51	40	2	500	126	135	151	104	108	113	3EP4 051 – 1 S D 2 1 – 1 xxx
Resonant earthed	550	90	72	2	850	195	207	230	166	170	178	3EP4 090 – 2 S D 2 1 – 1 xxx
Resonant earthed	550	96	76	2	850	208	221	245	177	181	190	3EP4 096 – 2 S E 2 1 – 1 xxx
145	550	111	88	2	500	273	294	329	226	235	247	3EP4 111 – 1 P E 2 1 – 1 xxx
with solidly earthed neutral	550	111	88	2	850	240	255	283	204	209	219	3EP4 111 – 2 P E 2 1 – 1 xxx
	550	111	88	2	850	240	255	283	204	209	219	3EP2 111 – 2 P D 2 1 – 2 xxx
	550	111	88	3	850	250	266	295	213	218	229	3EP4 111 – 2 P E 3 1 – 1 xxx
	550	111	88	3	850	250	266	295	213	218	229	3EP2 111 – 2 P G 3 1 – 2 xxx
	550	120	96	2	500	296	318	356	245	254	267	3EP4 120 – 1 P F 2 1 – 1 xxx
	550	120	96	2	850	259	276	306	221	226	237	3EP2 120 – 2 P G 2 1 – 2 xxx
	550	120	96	3	850	271	288	320	230	236	248	3EP4 120 – 2 P F 3 1 – 1 xxx
	550	120	96	3	850	271	288	320	230	236	248	3EP2 120 – 2 P G 3 1 – 2 xxx
	550	126	100	3	850	284	302	335	242	248	260	3EP4 126 – 2 P F 3 1 – 1 xxx
	550	132	105	3	850	298	317	352	254	260	273	3EP4 132 – 2 P F 3 1 – 1 xxx
	550	144	115	2	850	311	331	367	265	271	285	3EP4 144 – 2 P F 2 1 – 1 xxx
	550	144	115	3	850	325	346	384	277	284	298	3EP4 144 – 2 P F 3 1 – 1 xxx
Neutral-ground arresters U_m [kV]												
145	550	60	48	2	500	148	159	178	122	127	134	3EP4 060 – 1 S D 2 1 – 1 xxx
170	650	138	110	2	500	340	366	410	282	293	307	3EP4 138 – 1 P D 2 2 – 1 xxx
with solidly earthed neutral	650	138	110	2	850	298	317	352	254	260	273	3EP4 138 – 2 P D 2 2 – 1 xxx
	650	138	110	2	850	298	317	352	254	260	273	3EP2 138 – 2 P D 2 2 – 1 xxx
	650	138	110	3	850	311	331	367	265	271	285	3EP4 138 – 2 P D 3 2 – 1 xxx
	650	138	110	3	850	311	331	367	265	271	285	3EP2 138 – 2 P D 3 2 – 1 xxx
	650	144	115	2	500	355	382	428	294	306	321	3EP4 144 – 1 P D 2 2 – 1 xxx
	650	144	115	2	850	311	331	367	265	271	285	3EP2 144 – 2 P D 2 2 – 1 xxx
	650	144	115	3	850	325	346	384	277	284	298	3EP4 144 – 2 P D 3 2 – 1 xxx
	650	144	115	3	850	325	346	384	277	284	298	3EP2 144 – 2 P D 3 2 – 1 xxx
	650	144	115	3	850	325	346	384	277	284	298	3EP4 144 – 2 P D 3 2 – 1 xxx
	650	150	120	3	850	338	360	400	288	295	310	3EP4 150 – 2 P D 3 2 – 1 xxx
Neutral-ground arresters U_m [kV]												
170	650	69	55	2	500	170	183	205	141	146	154	3EP4 069 – 1 S D 2 1 – 1 xxx
245	850	192	153	2	500	473	509	570	392	407	428	3EP4 192 – 1 P E 2 2 – 1 xxx
with solidly earthed neutral	850	192	153	2	850	415	442	491	354	362	380	3EP4 192 – 2 P E 2 2 – 1 xxx
	850	192	153	3	850	433	461	512	369	378	396	3EP4 192 – 2 P E 3 2 – 1 xxx
	850	192	153	3	850	433	461	512	369	378	396	3EP2 192 – 2 P F 3 2 – 1 xxx
	850	192	153	4	1200	424	451	496	365	374	392	3EP2 192 – 3 P F 4 2 – 1 xxx
	850	198	158	2	500	488	525	588	404	420	441	3EP4 198 – 1 P E 2 2 – 1 xxx
	850	198	158	2	850	428	455	505	364	373	391	3EP4 198 – 2 P E 2 2 – 1 xxx
	850	198	158	3	850	447	475	527	380	390	409	3EP4 198 – 2 P E 3 2 – 1 xxx
	850	198	158	3	850	447	475	527	380	390	409	3EP2 198 – 2 P F 3 2 – 1 xxx
	850	198	158	4	1200	437	465	512	377	386	405	3EP2 198 – 3 P F 4 2 – 1 xxx
	850	228	182	3	850	514	547	607	438	449	470	3EP4 228 – 2 P E 3 2 – 1 xxx
	850	228	182	3	850	514	547	607	438	449	470	3EP2 228 – 2 P F 3 2 – 1 xxx
Neutral-ground arresters U_m [kV]												
245	850	102	81	2	500	251	270	302	208	216	227	3EP4 102 – 1 S D 2 1 – 1 xxx

1) According to IEC 60099-4 these values are measured on individual housing unit

Height (H)	Number of units	Housing insulation		Creepage distance	Top load-dynamic	Alternating or non-alternating shed	Grading ring diameter (D)	Weight		TOW diagram
		Lightning impulse withstand voltage 1.2/50 µs[1]	Power frequency withstand voltage 1 min., wet[1]							
[mm]		[kV]	[kV]	[mm]	[N]		[mm]	[kg]		
1315	1	658	267	3405	3400	N	–	60	41	2
1315	1	658	267	3405	3400	N	–	60	41	3
1465	1	708	488	3190	8500	N	–	88	21	3
1315	1	658	267	3405	3400	N	–	60	41	2
1465	1	708	488	3190	8500	N	–	88	21	2
1315	1	658	267	3405	3400	N	–	60	41	2
1315	1	658	267	3405	3400	N	–	60	41	2
1315	1	658	267	3405	3400	N	–	60	41	2
1315	1	658	267	3405	3400	N	–	60	41	2
1315	1	658	267	3405	3400	N	–	69	41	2
1460	1	722	293	3835	3000	N	–	75	41	3
1050	1	484	196	2490	4300	N	–	44	41	2
1050	1	484	196	2490	4300	N	–	50	41	3
1315	1	658	267	3405	3400	N	–	60	41	3
1315	1	658	267	3835	3000	N	–	66	41	2
1315	1	658	267	3835	3000	N	–	69	41	3
1235	1	574	218	4035	7700	A	–	82	21	3
1315	1	658	267	3835	3000	N	–	70	41	2
1235	1	574	218	4035	7700	A	–	83	21	2
1460	1	722	293	3835	3000	N	–	67	41	2
1620	1	798	303	4035	7700	A	–	84	21	3
1460	1	722	293	3835	3000	N	–	71	41	2
1620	1	798	303	4035	7700	A	–	84	21	2
1460	1	722	293	3835	3000	N	–	72	41	2
1460	1	722	293	3835	3000	N	–	73	41	2
1460	1	722	293	3835	3000	N	–	74	41	3
1460	1	722	293	3835	3000	N	–	74	41	2
1050	1	484	196	2490	4300	N	–	44	41	2
2100	2	968	392	4980	2100	N	800	96	42	2
2100	2	968	392	4980	2100	N	800	96	42	3
2470	2	1148	436	5190	5100	N	800	154	22	3
2100	2	968	392	4980	2100	N	800	96	42	2
2470	2	1148	436	5190	5100	N	800	154	22	2
2100	2	968	392	4980	2100	N	800	96	42	2
2470	2	1148	436	5190	5100	N	800	154	22	3
2100	2	968	392	4980	2100	N	800	96	42	2
2470	2	1148	436	5190	5100	N	800	154	22	2
2100	2	968	392	4980	2100	N	800	96	42	2
2100	2	968	392	4980	2100	N	800	96	42	2
1050	1	484	196	2490	4300	N	–	45	41	2
2630	2	1316	534	6810	1700	N	800	132	42	2
2630	2	1316	534	6810	1700	N	800	132	42	3
2630	2	1316	534	6810	1700	N	800	132	42	2
2930	2	1415	537	6380	4300	N	1000	191	22	2
2930	2	1415	537	6380	4300	N	1000	191	22	2
3280	2	1592	585	9350	10400	A	1200	455	22	2
2630	2	1316	534	6810	1700	N	800	132	42	2
2630	2	1316	534	6810	1700	N	800	132	42	3
2630	2	1316	534	6810	1700	N	800	132	42	2
2930	2	1415	537	6380	4300	N	1000	191	22	2
2930	2	1415	537	6380	4300	N	1000	191	22	2
3280	2	1592	585	9350	10400	A	1200	456	32	2
2630	2	1316	534	6810	1700	N	1000	148	42	2
2930	2	1415	537	6380	4300	N	1000	278	22	2
1050	1	484	184	2490	4300	N	–	52	41	2

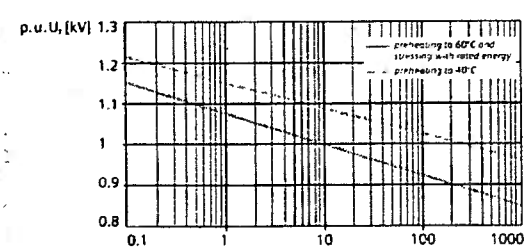
Highest voltage for equipment	Standard lightning impulse withstand voltage	Rated voltage	Continuous operating voltage	Line discharge class	Long duration current 2 ms	Maximum values of the residual voltages at discharge currents of the following impulses						Arrester type
U_m [kV]	BIL min [kV]	U_r [kV]	U_c [kV]	LD-Cl	[A]	8/20 µs 5 kA [kV]	8/20 µs 10 kA [kV]	8/20 µs 20 kA [kV]	30/60 µs 0.5 kA [kV]	30/60 µs 1 kA [kV]	30/60 µs 2 kA [kV]	
300 with solidly earthed neutral	850	228	182	2	500	562	604	676	465	483	507	3EP4 228 – 1 P F 2 2 – 1 xxx
	850	228	182	2	850	487	524	582	419	430	451	3EP4 228 – 2 P F 2 2 – 1 xxx
	850	228	182	3	850	509	547	607	438	449	470	3EP4 228 – 2 P F 3 2 – 1 xxx
	850	228	182	3	850	509	547	607	438	449	470	3EP2 228 – 2 P G 3 2 – 2 xxx
	850	228	182	4	1200	498	536	590	434	445	466	3EP2 228 – 3 P G 4 2 – 2 xxx
	850	228	182	4	1200	498	536	590	434	445	466	3EP3 228 – 3 P H 4 2 – 2 xxx
	950	240	192	2	500	591	636	712	490	509	534	3EP4 240 – 1 P F 2 2 – 1 xxx
	850	240	192	2	850	513	552	613	442	522	547	3EP4 240 – 2 P F 2 2 – 1 xxx
	850	240	192	3	850	536	576	639	461	472	495	3EP4 240 – 2 P F 3 2 – 1 xxx
	850	240	192	3	850	536	576	639	461	472	495	3EP2 240 – 2 P G 3 2 – 2 xxx
	850	240	192	4	1200	525	564	620	457	468	491	3EP2 240 – 3 P G 4 2 – 2 xxx
	850	240	192	4	1200	525	564	620	457	468	491	3EP3 240 – 3 P H 4 2 – 2 xxx
Neutral-ground arresters U_m [kV]												
300	850	120	96	2	500	296	318	356	245	254	267	3EP4 120 – 1 S F 2 1 – 1 xxx
362 with solidly earthed neutral	950	276	220	3	850	622	662	735	530	543	569	3EP2 276 – 2 P F 3 3 – 1 xxx
	950	276	220	4	1200	610	649	714	526	539	565	3EP2 276 – 3 P F 4 3 – 1 xxx
	950	276	220	4	1200	610	649	714	526	539	565	3EP3 276 – 3 P H 4 2 – 2 xxx
	1050	288	230	3	850	650	691	767	553	567	594	3EP2 288 – 2 P F 3 3 – 1 xxx
	1050	288	230	4	1200	636	677	745	548	562	589	3EP2 288 – 3 P F 4 3 – 1 xxx
	1050	288	230	4	1200	636	677	745	548	562	589	3EP3 288 – 3 P H 4 2 – 2 xxx
	1175	360	288	2	850	778	828	919	662	679	712	3EP2 360 – 2 P F 2 3 – 1 xxx
Neutral-ground arresters U_m [kV]												
362	950	147	117	2	500	363	390	437	300	312	328	3EP4 147 – 1 S F 2 1 – 1 xxx
420 with solidly earthed neutral	1175	336	268	3	850	758	806	895	645	661	693	3EP2 336 – 2 P D 3 4 – 2 xxx
	1175	336	268	4	1200	742	790	869	704	656	687	3EP2 336 – 3 P D 4 4 – 2 xxx
	1175	336	268	5	1600	734	773	843	634	657	680	3EP2 336 – 4 P D 5 4 – 2 xxx
	1175	336	268	4	1200	742	790	869	640	656	687	3EP3 336 – 3 P H 4 2 – 2 xxx
	1175	336	268	5	1600	734	773	843	634	657	680	3EP3 336 – 4 P H 5 2 – 2 xxx
	1300	360	288	3	850	812	864	959	691	708	743	3EP2 360 – 2 P D 3 4 – 2 xxx
	1300	360	288	4	1200	795	846	931	685	702	736	3EP2 360 – 3 P D 4 4 – 2 xxx
	1175	360	288	5	1600	787	828	903	679	704	729	3EP2 360 – 4 P D 5 4 – 2 xxx
	1300	360	288	4	1200	795	846	931	685	702	736	3EP3 360 – 3 P H 4 2 – 2 xxx
	1175	360	288	5	1600	787	828	903	679	704	729	3EP3 360 – 4 P H 5 2 – 2 xxx
Neutral-ground arresters U_m [kV]												
420	1175	168	134	3	850	379	403	447	322	330	347	3EP2 168 – 2 S G 3 1 – 1 xxx
550 with solidly earthed neutral	1425	420	330	4	1200	875	931	1028	740	773	810	3EP2 336 – 3 P H 4 2 – 2 xxx
	1300	396	316	5	1600	864	911	998	747	774	802	3EP3 396 – 4 P H 5 2 – 2 xxx
	1425	420	336	4	1200	883	938	1037	742	759	778	3EP3 396 – 3 P H 4 2 – 2 xxx
	1300	396	316	5	1600	872	918	1001	739	760	778	3EP3 396 – 4 P H 5 2 – 2 xxx
	1300	396	316	5	1600	872	918	1001	739	760	778	3EP3 396 – 4 P H 5 2 – 2 xxx
	1425	420	336	4	1200	846	890	961	748	765	782	3EP3 396 – 3 P H 4 2 – 2 xxx
	1425	420	336	5	1600	928	987	1086	799	819	839	3EP3 420 – 4 P H 5 2 – 2 xxx
	1425	420	336	5	1600	918	966	1053	792	811	830	3EP3 420 – 4 P H 5 2 – 2 xxx
	1425	420	336	5	1600	890	937	1032	787	806	824	3EP3 420 – 5 P H 5 3 – 2 xxx
	1550	444	355	5	1600	970	1021	1113	837	858	878	3EP3 444 – 4 P H 5 3 – 2 xxx
	1425	444	355	5	1600	941	990	1069	832	851	871	3EP3 444 – 5 P H 5 3 – 2 xxx
800 with solidly earthed neutral	1800	570	456	5	2400	1207	1271	1383	1063	1093	1121	3EP3 570 – 5 P H 5 4 – 2 xxx
	1950	588	470	5	2400	1245	1311	1426	1101	1122	1151	3EP3 588 – 5 P H 5 4 – 2 xxx
	1950	588	470	5	2400	1254	1331	1447	1118	1145	1169	3EP3 588 – 5 P H 5 4 – 2 xxx
	1950	612	489	5	2400	1237	1305	1420	1097	1124	1149	3EP3 612 – 5 P H 5 4 – 2 xxx

1) According to IEC 60099-4 these values are measured on individual housing unit



Temporary Over Voltage (TOV) diagram 2

Height (H)	Number of units	Housing insulation		Creepage distance	Top load dynamic	Alternating or normal sheds	Grading ring diameter (D)	Weight	Figure	TOV diagram
		Lightning impulse withstand voltage 1.2/50 µs[1]	Switching impulse withstand voltage (SIL)[1]							
[mm]		[kV]	[kV]	[mm]	[N]		[mm]	[kg]		
2920	2	1444	996	7670	1500	N	1000	148	42	2
2920	2	1444	996	7670	1500	N	1000	148	42	3
2920	2	1444	996	7670	1500	N	1000	148	42	2
3240	2	1595	1100	8070	3900	A	1000	278	22	2
3240	2	1595	1100	8070	3900	A	1000	278	22	2
3280	2	1542	1064	9350	10400	A	1200	472	32	2
2920	2	1444	996	7670	1500	N	1000	149	22	2
2920	2	1444	996	7670	1500	N	1000	149	22	3
2920	2	1444	996	7670	1500	N	1000	149	42	2
3240	2	1595	1100	8070	3900	A	1000	280	22	2
3240	2	1595	1100	8070	3900	A	1000	280	22	2
3280	2	1542	1064	9350	10400	A	1200	474	32	2
1460	1	722	498	3835	3000	N	-	62	41	2
4395	3	2123	1464	9570	2800	N	1800	277	23	2
4395	3	2123	1464	9570	2800	N	1800	291	23	2
3280	2	1542	1064	9350	10400	A	1200	482	32	2
4395	3	2123	1464	9570	2800	N	1800	277	23	2
4395	3	2123	1464	9570	2800	N	1800	294	23	2
3280	2	1542	1064	9350	10400	A	1200	484	32	2
4395	3	2123	1464	9570	2800	N	1800	443	23	3
1460	1	722	498	3835	3000	N	-	97	41	2
4940	4	2297	1584	11740	2500	A	1800	402	24	2
4940	4	2297	1584	11740	2500	A	1800	419	24	2
4940	4	2297	1584	11740	2500	A	1800	438	24	2
3740	2	1810	1248	11030	9100	A	1200	551	32	2
3740	2	1810	1248	11030	9100	A	1200	568	32	2
4940	4	2297	1584	11740	2500	A	1800	405	24	2
4940	4	2297	1584	11740	2500	A	1800	422	24	2
4940	4	2297	1584	11740	2500	A	1800	443	24	2
3740	2	1810	1248	11030	9100	A	1200	557	32	2
3740	2	1810	1248	11030	9100	A	1200	575	32	2
1620	1	798	550	3605	7700	N	-	109	21	2
4930	3	2315	1598	14025	6900	A	1800	703	33	2
4930	3	2315	1598	14025	6900	A	1800	722	33	2
4930	3	2315	1598	14025	6900	A	1800	745	33	2
4930	3	2315	1598	14025	6900	A	1800	706	33	2
4930	3	2315	1598	14025	6900	A	1800	724	33	2
4930	3	2315	1598	14025	6900	A	1800	735	33	2
4930	3	2315	1598	14025	6900	A	1800	709	33	2
4930	3	2315	1598	14025	6900	A	1800	731	33	2
4930	3	2315	1598	14025	6900	A	1800	701	33	2
4930	3	2315	1598	14025	6900	A	1800	735	33	2
4930	3	2315	1598	14025	6900	A	1800	705	33	2
7430	5	3620	2498	22060	4500	A	2200	1186	34	2
7430	5	3620	2498	22060	4500	A	2200	1198	34	2
7430	5	3620	2498	22060	4500	A	2200	1198	34	2
7430	5	3620	2498	22060	4500	A	2200	1200	34	2



Temporary Over Voltage (TOV) diagram 3

Housings

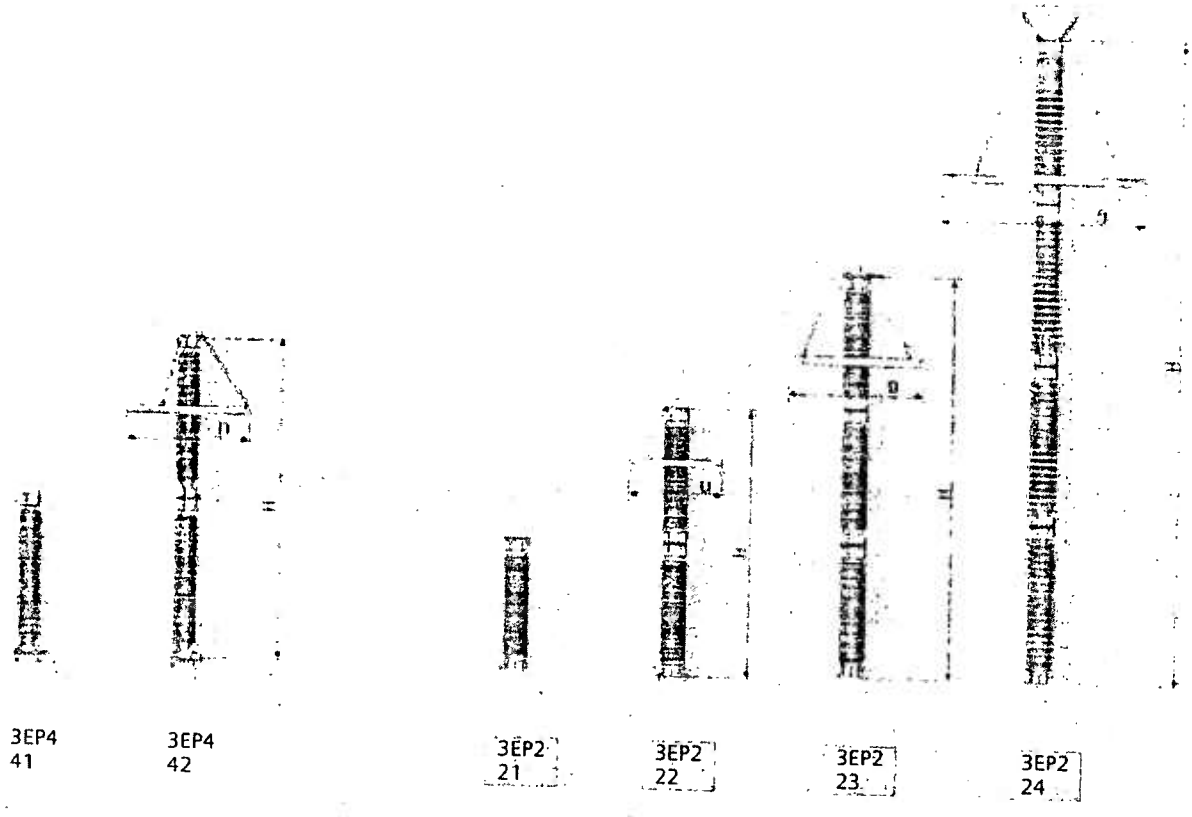
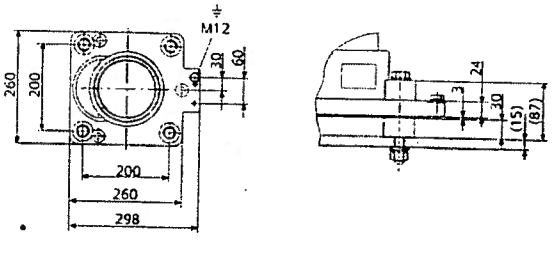
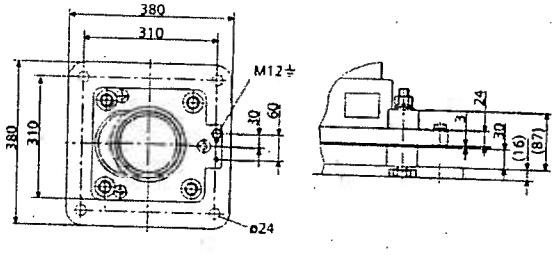


Figure 3EP4 41 | 3EP4 42 | 3EP2 21 | 3EP2 22 | 3EP2 23 | 3EP2 24

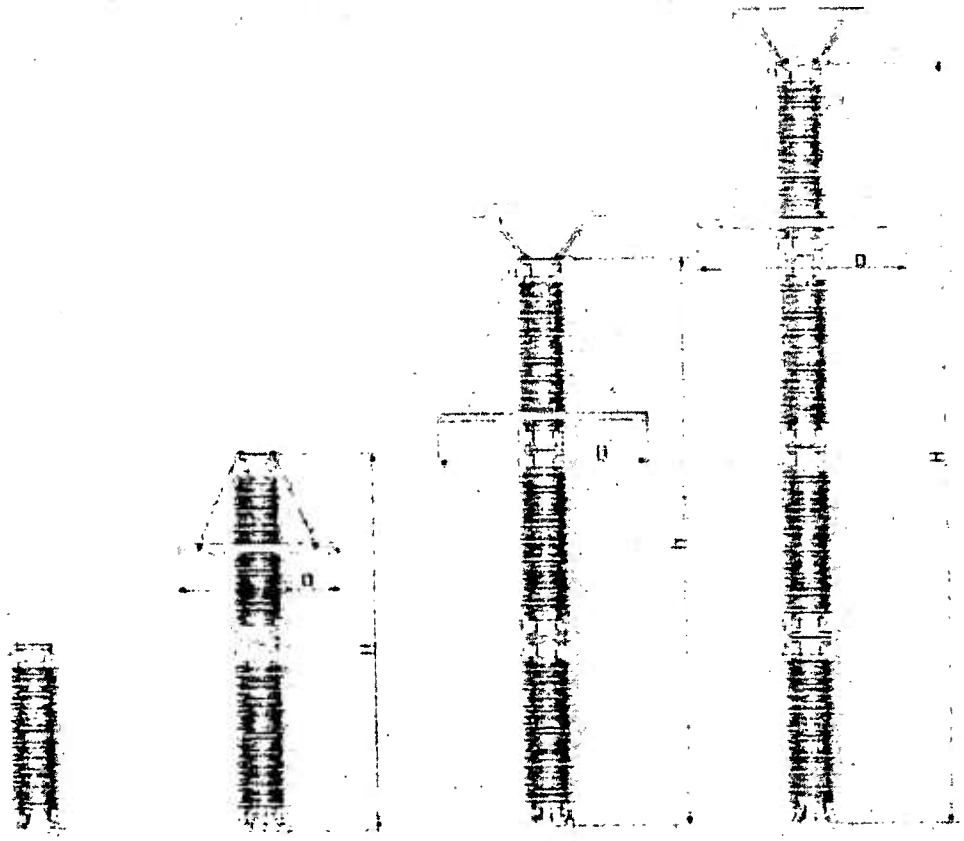
Installation and Grounding 3EP4

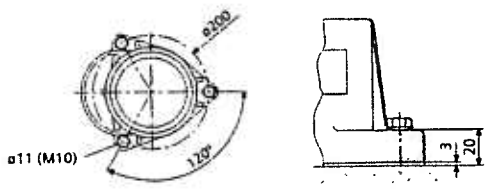


4 mounting holes 200 x 200 mm for insulated installation

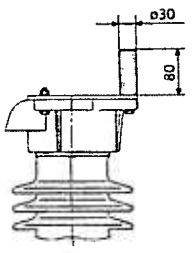


4 mounting holes 310 x 310 mm for insulated installation

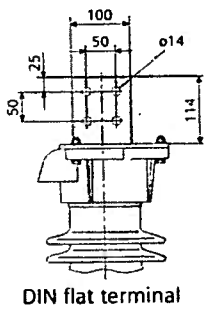




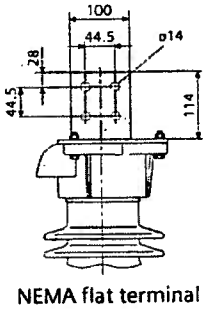
3 mounting holes bolt circle 200 mm for directly grounded intstallation



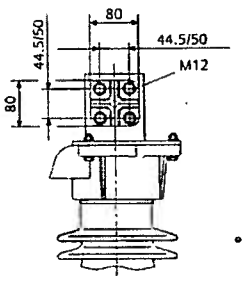
Bolt terminal



DIN flat terminal

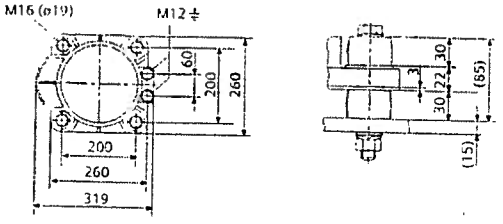


NEMA flat terminal

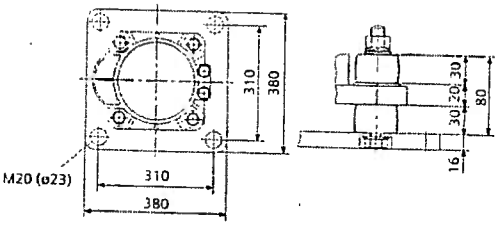


Additional cable clamp for flat terminal

Installation and Grounding 3EP2

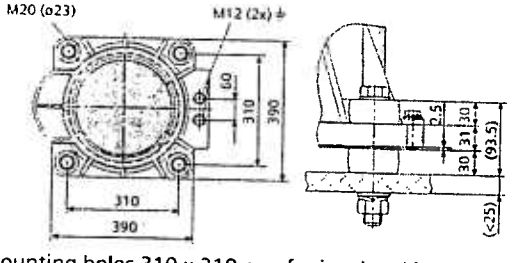


4 mounting holes 200 x 200 mm for insulated installation

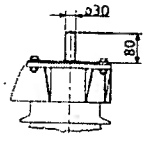


4 mounting holes 310 x 310 mm for insulated installation

Installation and Grounding 3EP3

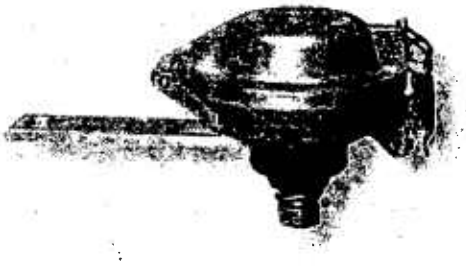


4 mounting holes 310 x 310 mm for insulated installation



Bolt terminal

Control Devices for Surge Arrester

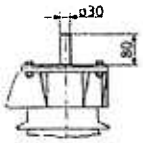


These control devices can be connected to all shown surge arresters in this catalogue.

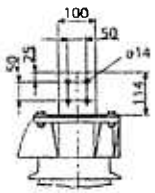
Control spark gap

To estimate the current that flows through the surge arrester in case of an overvoltage and to count the surges

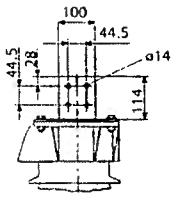
Order number: 3EX6040



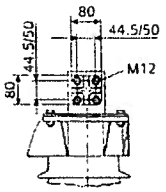
Bolt terminal



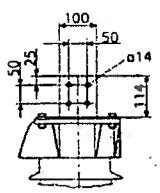
DIN flat terminal



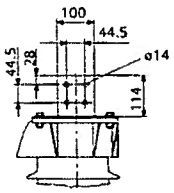
NEMA flat terminal



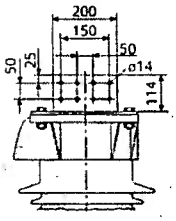
Additional cable clamp
for flat terminal



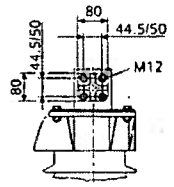
DIN flat terminal



NEMA flat terminal



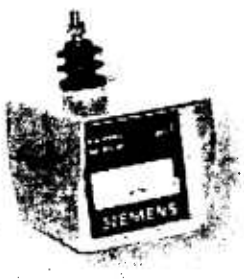
Double flat terminal



Additional cable clamp
for flat terminal

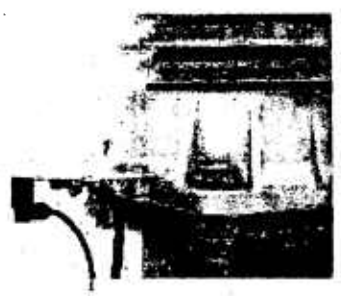
Surge counter

Order number: 3EX5030



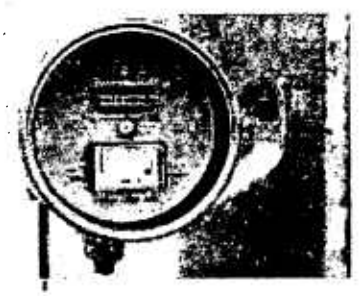
Surge counter with leakage current meter

Order number: 3EX5050



Sensor

Order number: 3EX5060



Display

Order number: 3EX5062

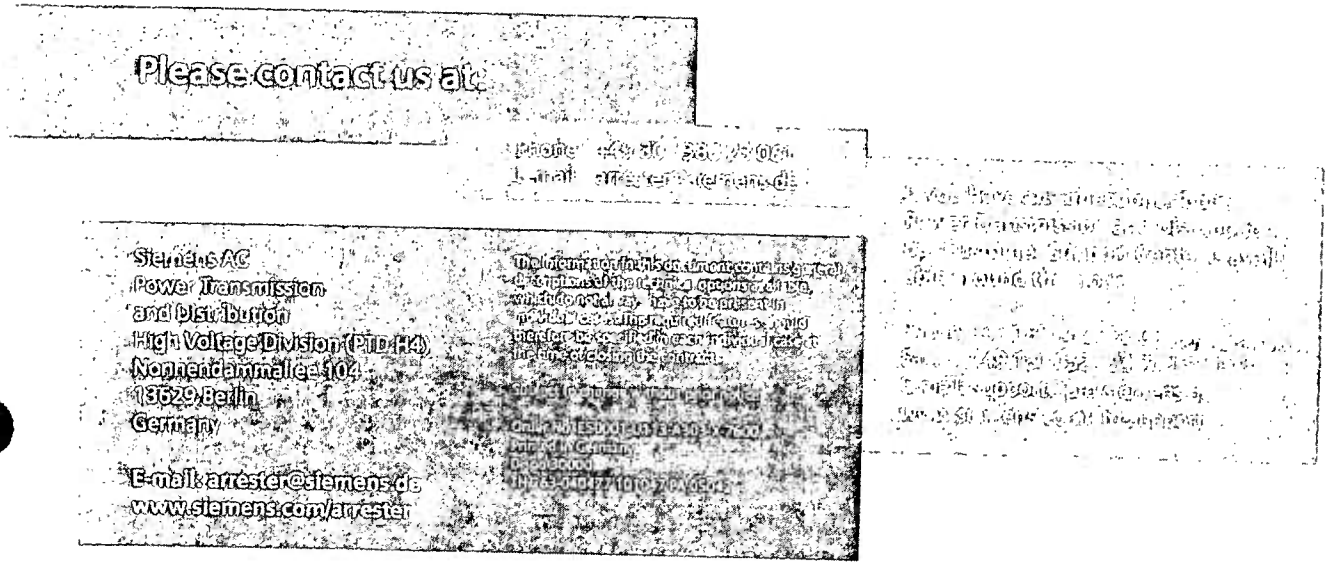
Up to 200 m

Surge counter with leakage current meter remote indication

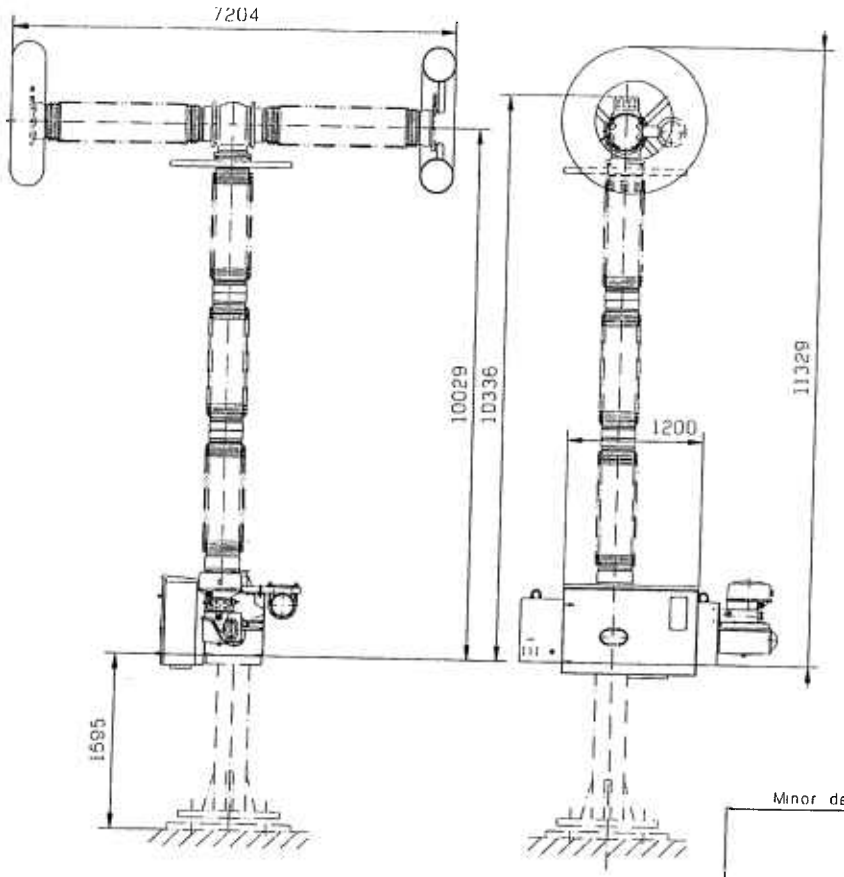
Table 3

Order number	(for example)	3	E	P	4	120	2	P	F	3	1	-	1	D	A	1
Porcelain housed surge arrester	(for example)	3	E	P												
Surge arrester model																
Bending moment 4.5 kNm					4											
Bending moment 12.5 kNm					2											
Bending moment 34 kNm					3											
Rated voltage in kV																
Long duration current		(for example)				120										
500 A							1									
850 A							2									
1200 A							3									
1600 A							4									
2100 A							5									
Application																
Phase surge arrester								P								
Neutral point surge arrester								S								
Tertiary winding surge arrester								T								
Housing size of single unit					(for example)				F							
Line discharge class																
LD 2										2						
LD 3										3						
LD 4										4						
LD 5										5						
Number of units																
1 unit											1					
2 units											2					
3 units											3					
4 units											4					
-												-				
Form of sheds and colour of porcelain																
Normal sheds, brown porcelain													1			
Alternating sheds, brown porcelain													2			
Normal sheds, grey porcelain													3			
Alternating sheds, grey porcelain													4			
High-voltage terminal																
Metal plate (connection with cable eye)														A		
Bolt 30 mm diameter, 70 mm long; stainless steel														B		
Bolt 30 mm diameter, 70 mm long; hot-dip galvanized steel														C		
Bolt 30 mm diameter, 80 mm long; stainless steel														D		
Bolt 30 mm diameter, 100 mm long; stainless steel														E		
Bolt 36 mm diameter, 80 mm long; stainless steel														F		
Bolt 40 mm diameter, 80 mm long; stainless steel														G		
Bolt 40 mm diameter, 100 mm long; stainless steel														H		
Bolt 40 mm diameter, 120 mm long; stainless steel														J		
DIN flat 100 mm x 100 mm hot-dip galvanized steel														K		
DIN Flat 100 mm x 100 mm hot-dip galvanized steel, 20 mm thick														L		
DIN Flat 200 mm x 100 mm hot-dip galvanized steel														M		
NEMA Flat 100 mm x 100 mm hot-dip galvanized steel														N		
NEMA Flat 100 mm x 100 mm copper														S		
NEMA Flat 100 mm x 100 mm aluminum														U		
Name plate																
German/Englisch (standard)															A	
French															B	
Czech															C	
Slovene															D	
Russian															E	
Spanish															F	
Portuguese															G	
ANSI															H	
Brazil															T	
Mounting																
Not insulated; only for 3EP4																0
Insulated (Standard)																1
4 hole, insulated, 200 mm x 200 mm, M16; only for 3EP4																2
4 hole, insulated, 310 mm x 310 mm, M20; only for 3EP4 and 3EP2																3

The top row in table 3 shows an example of the build-up of our order numbers. The items in dark yellow are customer specific variables.



Attachment for Interrogatory
DPS-28.3



Minor deviations from the dimensions and data stated are permissible.

Index	Remark	A.c.	Date

First issue	Current update	special dimensional drawing	CAD-drawing
29.03.2006	Date	Single-Pole Circuit Breaker	
RADDATZ	Handed by	800kV DC BYPASS	
	Checked		
	Section leader		
	Released		
	H 322-1 / 21286	t. type 3AQ2 ES DC	type

Siemens AG	3HM 427 07915	B01 -
Power Transmission and Distribution High Voltage	Format/type Product no. Serial no. Version	Sheet no. Index
	Replacement for	Superseded by

High Voltage

3AQ
Technical Data - Rated Current

Type		3AQ1	3AQ2
Rated voltage	[kV]	72.5/123/145/170/245	362/420/550/800
Rated frequency	[Hz]	50; 60	
Rated current	[A]	3150, 4000/40 °C	3150, 4000/40 °C
Rated short-circuit breaking current	[kA]	40	50
Operating temperatures	[°C]	– 30 to +50	– 30 to +46
Transient recovery voltage under terminal fault conditions acc. to		VDE, IEC	
Rated making current	[kA]	100	125
Rated short-circuit duration	[s]	3	
Operating sequence	(IEC) (ANSI)	O - 0.3 s - CO - 3min - CO CO - 15s - CO	

High Voltage

3AQ1
Technical Data - Dielectrical Data

Type		[kV]	72.5	123	145	170	245
Rated power frequency withstand voltage (eff)	– to earth [kV] – across contact gap [kV] – between phases [kV]		140	230	275	325	460
Rated lightning impulse withstand voltage (1.2/50 µs):	– to earth [kV] – across contact gap [kV] – between phases [kV]		325	550	650	750	1050
Clearance:	– to earth [mm] – across contact gap [mm] – between phases [mm]		1010 3075 3625	1360 3075 3625	1360 3625 3625	1510 4250 4250	2200 1900 2460
Min. creepage distance	– to earth [mm] – across contact gap [mm]		3075 3625	3075 3625	3625 3625	4250 4250	6150 6125
Specif. creepage distance	– to earth	[mm/kV]	50.0	29.5	25.0	25.0	25.0

High Voltage

3AQ2
Technical Data - Dielectrical Data

Type		[kV]	245	300	362	420
Rated power frequency withstand voltage (eff)	– to earth	[kV]	460	380	450	520
	– across contact gap	[kV]		435	520	610
	– between phases	[kV]		380	450	520
Rated lightning impulse withstand voltage (1.2/50 µs):	– to earth	[kV]	1050	1050	1175	1425
	– across contact gap	[kV]				
	– between phases	[kV]				
Clearance	– to earth	[mm]	4200	2750	2750	3400
	– across contact gap	[mm]	2000	2400	2700	3200
	– between phases	[mm]	2140	2700	≥3100	≥3600
Min. creepage distance	– to earth	[mm]	6150	7875	7875	10375
	– across contact gap	[mm]	6070	7650	9050	10500
Specif. creepage distance	– to earth	[mm/kV]	25.5	25.5	25.0	25.5

High Voltage

Technical Data - Mechanical Data

Type		3AQ1		3AQ2	
Tripping device		Normal	Fast	Normal	Fast
Minimum command duration	[ms]	40	40	40	40
Closing time	[ms]	95±5	95±5	95±5	95±5
Opening time	[ms]	36±4	25±3	36±4	25±3
Arcing time	[ms]	≤21	≤21	≤21	≤21
Break time/Interrupting time	[ms]	≤60	≤49	≤60	≤49
Close-open time	[ms]	65 ±10	63±12	65±10	65±10
Dead time	[ms]	≥300	≥300	≥300	≥300

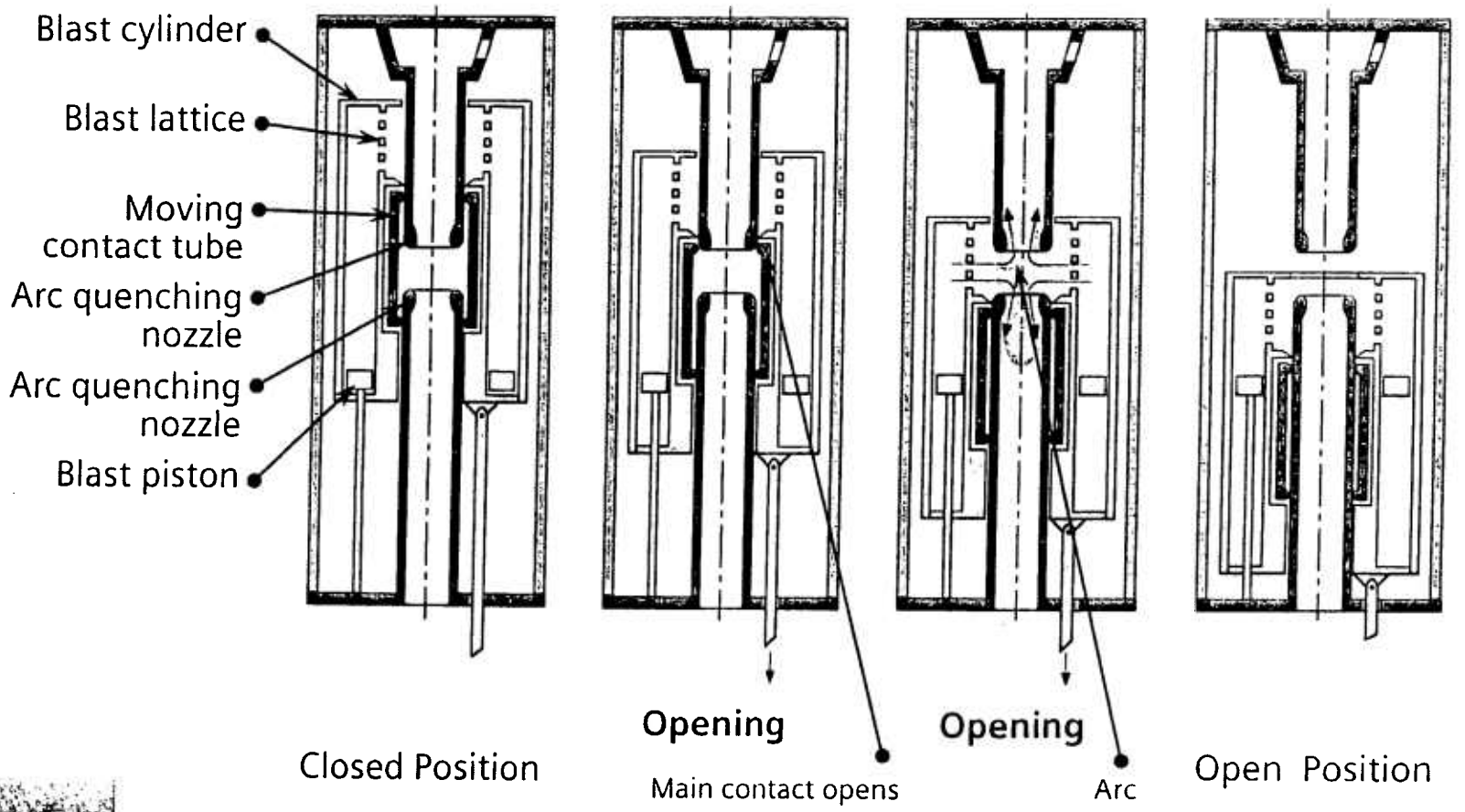
High Voltage

Technical Data - Arc-quenching Medium SF_6

Type		3AQ1	3AQ2
Weight per breaker	[kg]	8.1 . . . 17.1	17.1 . . . 21.4
Volume per breaker	[l]	176 . . . 370	370 . . . 464
Nominal pressure (at 20 °C)	[bar]	6	6
Filter material per pol	[kg]	1.5	2.25
Values for Gauge pressure at 20 °C			
Alarm "Loss of SF_6"	[bar]	5.2	5.2
General lockout SF_6	[bar]	5.0	5.0
Minimum gas pressure for mechanical operating	[bar]	3.0	3.0

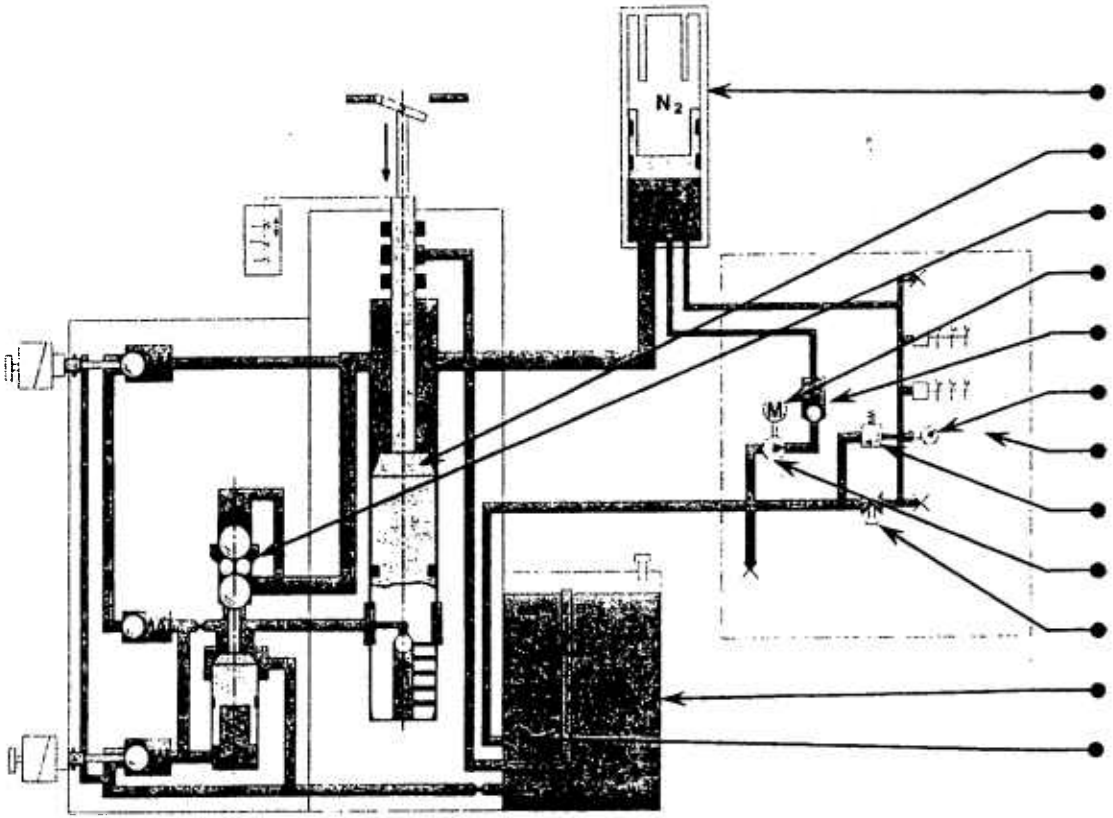
High Voltage

Puffer Device Interrupter Unit
The quenching Principle



High Voltage

Hydraulic Operating Mechanism
Open Position

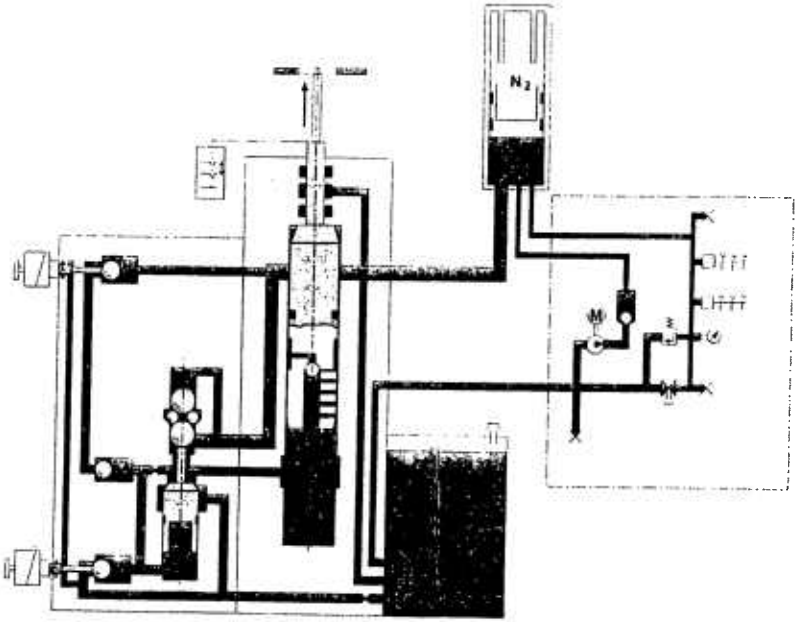


- Hydraulic storage cylinder
- Differential piston
- Main valve
- Motor
- Non-return valve
- Pressure gauge
- Pressure monitor
- Safety valve
- Oil pump
- Pressure release valve
- Oil tank
- Filter

Y1 Closing solenoid

High Voltage

Hydraulic Operating Mechanism
Closed Position



Y2

Y2 Trip solenoid

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-29
Requested By: Edward Schrom
Date of Request: November 6, 2006
Reply Date: February 20, 2008
Witness: Panel C
Subject: Evaluation of HVDC Project

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1. **In the draft report for "Economic Evaluation of the NYRI HVDC Project":**
a. The report states "…the transmission system identified no fatal system performance issues…".(page 6.1) Provide copies of the sources, studies that support that conclusion. Provide copies of all supporting work papers and indicate on what pages the documents support the conclusions.

Response:

This report has been eliminated and the CRA report in Appendix U has been substituted in its place.

2. **Provide the supporting documentation and studies that support the conclusions in Appendix P table 5-1 on page 5.10 for the NYRI HVDC line. Include the pages in those documents which support the conclusions.**

Response:

This report has been eliminated and the CRA report in Appendix U has been substituted in its place.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-30
Requested By:	Edward Schrom
Date of Request:	November 6, 2006
Reply Date:	February 20, 2008
Witness:	Panel B
Subject:	Electromagnetic Field report

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1. Provide copies of all work paper and supporting documentation that was used in compiling the report. Include copies of the instruction books for all computer programs used in making the calculations.

Response:

The work paper and supporting documentation has been provided in response to DPS 24.1 and 30.2. No instruction books are available for the computational programs applied to the input data provided in response to DPS 24.1

2. Provide copies of all reference materials used in compiling the report.

Response:

Copies of all available reference materials have been provided on the enclosed CD.

Attachment for Interrogatory
DPS-30.2 (on CD)

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-31
Requested By: Edward Schrom
Date of Request: November 6, 2006
Reply Date: February 20, 2008
Witness: Panel D
Subject: Underground cable installation

Provide a detailed cost estimate break down for the installation of a 3 mile section of underground cable through:

a. Rock- granite
b. sand
c. shale

provide the supporting work papers for all assumptions, estimates, time, machines, workers, cable costs, transportation, termination structures, etc.

Response:

See attached calculations *NYRI-400 kV HVDC T/L UNDERGROUND Cost Comparisons, Trenching through Sand, Shale and Rock Rough Order of Magnitude (ROM) Cost Estimate.*

Attachment for Interrogatory
DPS-31

NYRI - 400 kV HVDC T/L UNDERGROUND Cost Comparison, Trenching through Sand, Shale and Rock
Rough Order of Magnitude (ROM) Cost Estimate

Cable Type: MIND (mass-impregnated, non-draining paper insulated) Type Underground Direct Buried Cable

Scenario Description: Underground route for approximately 3 miles.
The estimate basis is to compare a 3 mile route length through Rock, Sand and Shale

	Ratings
HVDC Voltage:	400 kV
Type: Bi-Polar	
Transmission Capacity:	1,200 MW
Cable: 2000 kcmil MIND	
No. of cond/per pole	1
No. of Cond for Bipolar (incl return cond)	3
Transmission Cap./pole	600 MW
Ampacity/pole (=per cond)	1,500 A

Congested Areas:

	Unit	Qty		
Circuit Length 3 miles	ft	15,840		
	mi	3.0		
Trench (Concr): 3 ftD x 5 ftW	0.56 cy/ft	8,800 cy.		
Trench (Excav.): 6 ftD x 7 ftW	1.56 cy/ft	24,640 cy.		
Backfill (Thermal) 3 ftD x 2 ftW	0.22 cy/ft	3,520		
	Unit Prices	**Qty**	**Cost**	
Cable, 1/c 2000 kcmil CU MIND	212 $/cable.ft	47,520	10,080,000	Based on $700/meter / 3 cond "bundle")
Terminations	30,000 $/Ea	6	180,000	
Splices	91 $/ft	47,520	4,320,000	Based on $300/meter (600 m segments)
Grounding Cable #4/0 Cu	2.00 $/ft	31,680	63,360	
PVC Duct, 8 in Sch.40	16.00 $/ft	0	0	Direct Buried
Miscellaneous--Special Tools/spares	30%		4,393,008	based on relative XLPE Cost x 2 = MIND Splice
	Subtotal Material:		**19,036,368**	Cable, Splices, Term & Grounding

Civil Installation: Ref Civil Est Sheet					Diff
Shale	192 $/ft		3,040,183	Shale	100%
Sand	211 $/ft		3,349,197	Sand	110%
Rock	448 $/ft		7,102,102	Rock	234%
	Subtotal Civil Installation:		**see above**		
Cable Installation+Testing	600,000 $/setups	13	7,800,000	based on 600m segments	
Cable Terminating	45,000 $/Ea	6	270,000		
Splicing	45,000 $/Ea	40	1,800,000	based on 600m segments	
	Subtotal Cable Installation:		**9,870,000**	Cable, Splices, Term & Grounding	

Summary:

			Trench in Shale	Trench in Sand	Trench in Rock
A.	**Total Materials and Transportation**		**$19,036,368**	**$19,036,368**	**$19,036,368**
B.	**Labor - Civil Construction and Installation**		**$12,910,183**	**$13,219,197**	**$16,972,102**
	- includes labor and equipment for construction, including site prep (e.g., ROW access, cleaning and restoration) activities				
	Direct Cost Labor + Material		**$31,946,551**	**$32,255,565**	**$36,008,470**
C.	**Route Surveys**				
	Lidar and Ground Survey				
	$25,000 per mile		**$75,000**	**$75,000**	**$75,000**
D.	**Engineering and Inspection**				
	- includes Engineering, Procurement, and Construction Management (including Inspection) Services				
		8%	**$2,555,724**	**$2,555,724**	**$2,555,724**
E.	**Administrative Overhead**				
	- Owner Administration Costs		**by owner**		
	- Contractor(s)/Vendor(s) Administrative Overhead		**part of A, B, C and D above**		
F.	**Contingency**	20%	**$6,915,455**	**$6,977,258**	**$7,727,839**
	Total Cost for 3 miles (A+B+C+D+E+F)		**$41,492,731**	**$41,863,547**	**$46,367,033**
			100%	101%	112%

Note: Above excludes Land and Right-of-Way Acquisition Costs, Permitting Costs, Finance Costs including Interest During Construction, Fees for Legal Services and other any other Services not listed.

1. Total Cable System Costs

Trench in Shale	Cost/ mi	13,830,910	100%
Trench in Sand	Cost/ mi	13,954,516	101%
Trench in Rock	Cost/ mi	15,455,678	112%

2. Civil Only Costs

Trench in Shale	Cost/ mi	1,345,759	100%
Trench in Sand	Cost/ mi	1,479,253	110%
Trench in Rock	Cost/ mi	3,100,508	230%

Washington

WASHINGTON GROUP INTERNATIONAL

ESTIMATING WORKSHEET

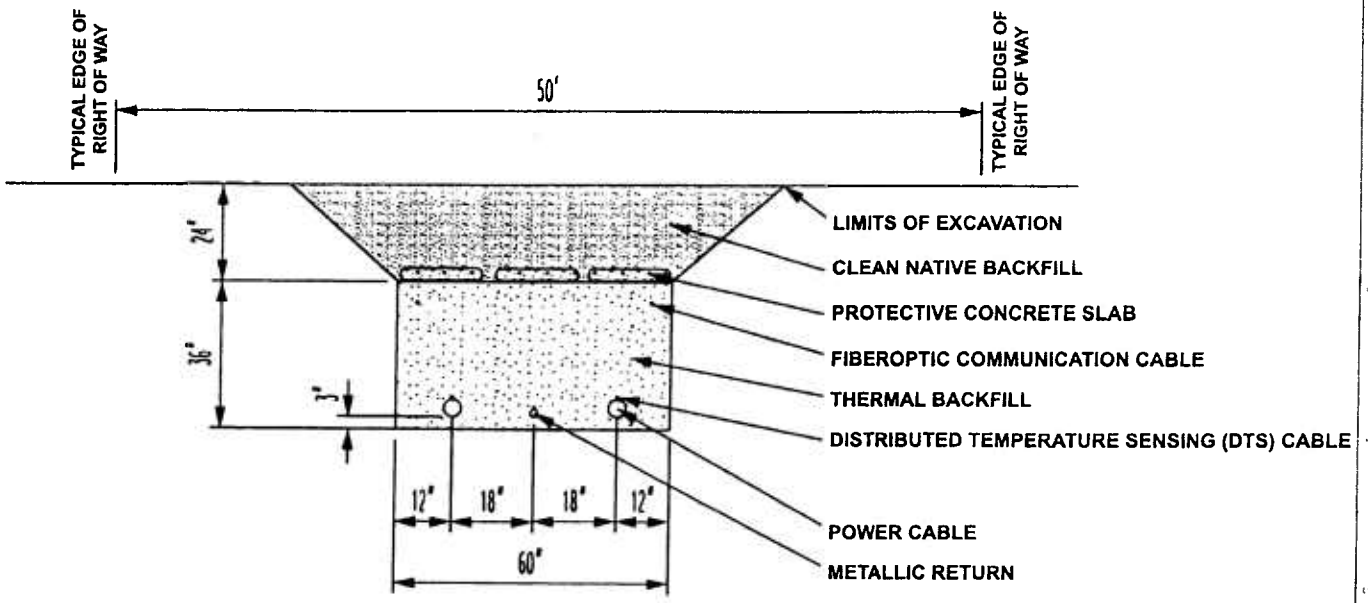
DATE: October-07
REV NO:

CLIENT:
PROJECT: NY REGIONAL INTERCONNECT
JOB NO.: 29038
PROJECT TYPE (Note 1): UNDERGROUND CABLE TRENCH
TRANSMISSION

DESCRIPTION / TASK: UNDERGROUND CABLE TRENCH
AREA: CONCEPTUAL ESTIMATE

CONSTRUCTION START DATE: N/A
CONSTRUCTION END DATE: N/A
CONTRACT DURATION (MO'S): N/A
CRAFT LABOR (MHS): N/A

TYPE	SEQ	DESCRIPTION	QTY	UN	LABOR UN	MH	WAGE	TOTAL	MATERIAL UN	MATERIAL TOTAL	EQUIP RENTAL UN	EQUIP RENTAL TOTAL	SUBCONTRACT UN	SUBCONTRACT TOTAL	TOTAL	UNIT COST
		TRENCH - SHALE	3	MI												
		SILT FENCING	31680	LF	0.05	1584	40.14	63,589	0.34	10,771					74,360	2.35
		CLEARING	18	AC	35.00	636	47.26	30,075			61.77	39,308			69,383	3,816.08
		RIPPING ROCK	17,013	CY	0.25	4253	47.26	201,017			45.00	191,400			392,417	23.07
		LOAD SPOIL	17,013	CY	0.05	851	47.26	40,203			45.00	38,260			78,463	4.61
		GEOTEXTILE FABRIC	44,000	SY	0.01	440	44.89	19,751	1.00	44,000	10.14	4,462			68,213	1.55
		CONCRETE SLAB	660	CY	4.00	2640	45.23	119,411	125.00	82,500	2.00	5,280			207,191	313.93
		THERMAL BACKFILL	8,800	CY	0.15	1320	47.26	62,384	24.00	211,200	37.61	49,645			323,230	36.73
		BACKFILL	8,213	CY	0.15	1232	47.26	58,225	19.00	156,053	37.61	46,336			260,614	31.73
		RESTORE SITE	88,000	SY	0.05	4400	47.26	207,948	1.00	88,000	37.61	165,484			461,432	5.24
		HAUL & DISPOSAL	17,013	CY	0.30	5104	41.69	212,790			66.25	338,140			550,930	32.38
		PREMIUM TIME	1	LS				101,539							101,539	101,539.28
		SUB TOTAL				**22,460**		**1,116,932**		**592,525**		**878,335**			**2,587,791**	
		SMALL TOOLS SUPPLIES	1	LS				55,847							55,847	
		CONTRACTOR OVERHEAD PROFIT 15%	1	LS				175,917		88,879		131,750			396,546	
		CONTINGENCY 20%	1	LS				269,739		136,281		202,017			excluded	
		TYPE 01 TOTAL	**15840**	**LF**		**22,460**		**1,618,435**		**817,684**		**1,212,102**			**3,040,183**	**$192**
		TRENCH - SAND	3	MI												
		SILT FENCING	31680	LF	0.05	1584	40.14	63,589	0.34	10,771					74,360	2.35
		CLEARING	18	AC	35.00	636	47.26	30,075			61.77	39,308			69,383	3,816.08
		SHEETING WOOD DRIVE EXTRACT	85,040	SF	0.15	14256	41.05	585,143	2.00	190,080	18.00	270,864			1,046,087	11.01
		EXCAVATE	17,013	CY	0.06	1021	47.26	48,244			37.61	38,392			86,636	5.09
		LOAD SPOIL	17,013	CY	0.05	851	47.26	40,203			45.00	38,260			78,463	4.61
		GEOTEXTILE FABRIC	44,000	SY	0.01	440	44.89	19,751	1.00	44,000	10.14	4,462			68,213	1.55
		CONCRETE SLAB	660	CY	4.00	2640	45.23	119,411	125.00	82,500	2.00	5,280			207,191	313.93
		THERMAL BACKFILL	8800	CY	0.15	1320	47.26	62,384	24.00	211,200	37.61	49,645			323,230	36.73
		NATIVE BACKFILL	8,213	CY	0.15	1232	47.26	58,225			37.61	46,336			104,561	12.73
		RESTORE SITE	88000	SY	0.05	4400	47.26	207,948	1.00	88,000	37.61	165,484			461,432	5.24
		HAUL & DISPOSAL	8,800	CY	0.20	1760	41.69	73,376			66.25	116,600			189,976	21.59
		PREMIUM TIME	1	LS				130,635							130,635	130,634.91
		SUB TOTAL				**30,140**		**1,439,184**		**626,551**		**774,651**			**2,840,386**	
		SMALL TOOLS SUPPLIES	1	LS				71,959							71,959	
		CONTRACTOR OVERHEAD PROFIT 15%	1	LS				226,671		93,983		116,198			436,852	
		CONTINGENCY 20%	1	LS				347,563		144,107		178,170			excluded	
		TYPE 01 TOTAL	**15840**	**LF**		**30,140**		**2,085,378**		**864,641**		**1,069,018**			**3,349,197**	**$211**
		TRENCH - ROCK	3	MI												
		SILT FENCING	31680	LF	0.05	1584	40.14	63,589	0.34	10,771					74,360	2.35
		CLEARING	18	AC	35.00	636	47.26	30,075			61.77	39,308			69,383	3,816.08
		DRILL & BLAST ROCK TRENCH	17,013	CY	2.00	34027	57.36	1,951,813			50.00	1,701,333			3,653,146	214.72
		LOAD SPOIL	17,013	CY	0.05	851	47.26	40,203			45.00	38,260			78,463	4.61
		GEOTEXTILE FABRIC	44,000	SY	0.01	440	44.89	19,751	1.00	44,000	10.14	4,462			68,213	1.55
		CONCRETE SLAB	660	CY	4.00	2640	45.23	119,411	125.00	82,500	2.00	5,280			207,191	313.93
		THERMAL BACKFILL	8,800	CY	0.15	1320	47.26	62,384	24.00	211,200	37.61	49,645			323,230	36.73
		BACKFILL	8,213	CY	0.15	1232	47.26	58,225	19.00	156,053	37.61	46,336			260,614	31.73
		RESTORE SITE	88,000	SY	0.05	4400	47.26	207,948	1.00	88,000	37.61	165,484			461,432	5.24
		HAUL & DISPOSAL	17,013	CY	0.30	5104	41.69	212,790			66.25	338,140			550,930	32.38
		PREMIUM TIME	1	LS				276,619							276,619	276,618.83
		SUB TOTAL				**52,234**		**3,042,808**		**592,525**		**2,388,268**			**6,023,601**	
		SMALL TOOLS SUPPLIES	1	LS				152,140							152,140	
		CONTRACTOR OVERHEAD PROFIT 15%	1	LS				479,242		88,879		358,240			926,361	
		CONTINGENCY 20%	1	LS				734,838		136,281		549,302			excluded	
		TYPE 01 TOTAL	**15840**	**LF**		**52,234**		**4,409,029**		**817,684**		**3,295,810**			**7,102,102**	**$448**



NYRI
New York Regional Interconnection
Washington Group International

NEW YORK REGIONAL INTERCONNECT
PROJECT LOCATION: NEW YORK
SCALE:
DATE: 9/11/2007

UNDERGROUND CABLE TRENCH CROSS SECTION
DIRECT BURIED
FIGURE
E-3.3.1-2

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-32
Requested By: Edward Schrom
Date of Request: November 6, 2006
Reply Date: February 20, 2008
Witness: Panel C and Panel D
Subject: Substation Design

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1. **Provide an engineering drawing showing all the major components in the substation. Provide a copy for both the Northern and Southern termini.**

Response:

See Exhibit E-2, Fig E-2.2.1-1,2,3,5,6, Fig E-2.2.2-1 of the Supplemental Article VII Application.

2. **Provide the number of reactors to be placed in the filter yard and provide the ambient noise levels they will be designed for. Supply copies of all supporting information.**

Response:

See Appendix Q, Noise Report of the Supplemental Article VII Application. The quantity of reactors will be finalized during the final design phase of the project.

3. **Provide the design specs for the reactors and the specific standards that they must be designed to. Supply copies of all supporting information.**

Response:

Project specific design specifications for the reactors will be developed during the final design phase of the project. The specifications will include the project specific design requirements, applicable results of the NYISO Facilities Study and the following industry standards for power reactors:

- IEEE 1277 - Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission IEEE

- C57.16 - Standard Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors

4. What are the applicant's plans for fire protection inside the substation? Supply copies of all supporting documents.

Response:

Plans for fire protection inside the substation are described in Exhibit E-2.2.6 of the Supplemental Article VII Application and are based on industry accepted practice.

Project specific design specifications for fire protection will be developed during the final design phase of the project. The specifications will incorporate the industry standards and federal regulations identified in Section E-2.2.6 and any local code requirements.

5. Provide the dimensions of the valve hall building.

Response:

See Exhibit E-2.2.1 of the Supplemental Article VII Application.

6. What are the required clearances between the building and the valves? Supply copies of all supporting documents.

Response:

The distance between the converter valve and its surroundings is determined considering the following factors:

- Overvoltage switching factor.
- Valve hall dimensions and adjacent live parts and grounded structures.
- Corona shield with respect adjacent structure or live parts.
- Compliance with the NESC (Ref: NESC Table 124.1)

Considering the manufacturer's design data available at this stage of the project, the following minimum phase to ground clearances, based on an estimated 1.8 overvoltage factor (Ngamsanroaj et al., 2006; Kiessling et al., 2003; Padiyar, 1990) have been derived from the NESC Table 124.1 as shown on the attached graph:

- Horizontal Clearance ..... 16'- 9.6"
- Vertical Clearance..... 11'- 3.8"
- Guard to Live Parts..... 8'-3.6"

During the detailed design phase of the project the converter design dimensions will be confirmed and optimized based on industry practice, to meet or exceed NESC requirements.

References:

Kiessling, Nefzger, Nolasco and Kaintzyk. 2003. Overhead Power Lines - Planning, Design, Construction. Springer-Verlag Berkin Heidelberg, New York.

Ngamsanroaj,K., S Chimklai, and W Tayati. 2006. Comparison of Field and Simulation Switching Overvoltages. The Manitoba HVDC Research Centre Journal. Spring.

Padiyar, K.R. 1990. HVDC Power Transmission Systems, Technology and System Interactions. New Age Publishers, ISBN 8122401023

7. What are the applicant's plans for spare valves?

Response:

The current project spares strategy is to keep in stock the valve system components and auxiliary equipment recommended by the valve manufacturer as necessary to minimize downtime, and to follow the manufacturer's recommended maintenance and operation practices. This includes in particular thyristors and other critical valve components.

As some spare parts may be stored for years without being used; the storage conditions will be such that degrading of spare parts is minimized. An updated spare parts lists will be kept and contractual arrangements will be in place for the supply of spare parts.

8. What are the applicant's plans for redundancy in the valve system in the event a valve becomes inoperable?

Response:

The converter valve system consists of the thyristor assemblies and auxiliary systems for control and cooling.

The valve system design incorporates sufficient redundant components and maintenance intervals to minimize the probability that any single valve will be inoperable. In the unlikely event that a valve becomes inoperable it is replaced with a spare valve.

Generally the valve manufacturer designs the redundancy requirements within the valve system and determines the number of redundant thyristors and other components based on the predicted failure rates in order to assure that a converter can operate between scheduled maintenance periods without interruption.

9. What is the outage time expected for the replacement of a valve? Supply copies of all supporting documents.

Response:

It should be noted that the valve hall will be designed so that the maintenance of valves and auxiliary equipment on one pole can be performed while the other pole continues operating. Approximately, a 24-hour period is required for the maintenance of each pole, which includes the replacement of any failed components. For additional information also see DPS #32.8 above and the attached excerpts from the NORNED KABEL HVDC Project RAM Report(Stromme, 1998).

References:

Stromme, B. 1998. NORNED KABEL HVDC Project RAM - Study Phase 2, Document No. N 126 JA2/16-R, Rev 01, April 15, 1998.

10. What are the applicant's plans for fire walls or barriers between major pieces of equipment? Supply copies of all supporting documents.

Response:

Plans for fire walls between major pieces of equipment in the converter stations are described in Exhibit E-2.2.6 of the Supplemental Article VII Application and are based on industry accepted practice.

Project specific design specifications for fire walls will be developed during the final design phase of the project. The specifications will incorporate the industry standards identified in section E-2.2.6.

11. Provide a one line operating diagram showing the transformer connections and major components in the stations. Supply copies of all supporting documents.

Response:

The DC system one line diagram, which shows the transformers and major components in the converter stations is provided in

Exhibit E-2 figures E-2.1-1 and E-2.1-2 of the Supplemental Article VII Application.

These figures are preliminary based on configurations employed by representative existing bipolar converter stations. Supporting information and documentation will be developed as necessary design details become available during detailed system engineering and design of the project.

12. **Provide a diagram of the control system and describe how it works. Provide copies of all supporting manuals and documentation.**

Response:

See attached plans, *Typical Protection Functions, Structure of Control and Protection System, Typical Station Protection Block Diagram* and *Typical Station Control Hierarchy.*

13. **Provide copies of all agreements that have been signed between the applicant and Niagara Mohawk Power Corporation, New York Power Authority, Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc, Orange & Rockland Utilities, Inc, New York State Electric and Gas Corporation, and Rochester Gas and Electric Corporation. Provide any and all updates through out the case.**

Response:

See attached copies.

14. **Provide copies of all agreements that have been signed between the applicant and the New York Independent System Operator. Provide any and all updates through out the case.**

Response:

See attached copies.

15. **Provide copies of all agreements that have been signed between the applicant and PJM Interconnection and New England Independent System Operator. Provide any and all updates through out the case.**

Response:

The Project has not executed any agreements with PJM Interconnection and the New England Independent System Operator.

16. **Provide a list of the harmonics the applicant expects to have to filter for. Provide copies of all supporting documentation.**

Response:

DC HARMONICS

The DC filter will be designed to avoid harmonic voltages on the 400 kV DC side of the HVDC Converter from superimposing on the AC side of the system. The harmonic characteristics are:

- The DC harmonics are multiples of 12 (ex 12th, 24th, 36th, 48th, etc.).
- The amplitude of these harmonics will decrease as the harmonic increases.
- The highest expected harmonics generated on the DC side are the 12th and 24th harmonics.
- The DC filters for the NYRI project will be designed to minimize the total harmonic effect to a safe range of 0.5 Amps in balanced bipolar operation and up to 1 Amp in monopolar operation.
- Smoothing reactors will be provided to reduce DC voltage ripple to a low level according to standard practice for this type of application of DC converter stations.
- The level of ripple on the DC line will be determined during the analytical phase of detailed design; however, it is anticipated that a ripple level below 1 % is achievable using active components.

AC SYSTEM HARMONICS

The AC filter will be designed to avoid harmonics primarily by switching operation of the filter capacitor banks. The harmonic characteristics are:

- The AC side generated harmonics are odd multiples of 12 ±1 (ex 11th, 13th, 23rd, 25th, 35th, 37th, etc.).
- The amplitude of these harmonics will decrease as the harmonic increases.
- The highest expected AC harmonics generated are the 11th and 13th harmonics. Therefore, the AC filter design for the NYRI project will include high pass and branch tuned filters for the above harmonics.
- The critical frequency range will be determined during the analytical phase of detailed design; however, it is anticipated that active ac filter will be required on whole multiples of the fundamental frequency of 60 Hz in the frequency domain range of 300-3000 Hz.

17. **In the application, the General Electric study provides an interconnect cost for connecting to Edic Substation.**

Provide the source of the number and all backup work papers that go in to that estimate.

Response:

The subject GE Report has been superseded in the current Article VII Supplement by additional study reports. The Article VII Supplement contains an updated estimate of the interconnection cost estimate for the proposed interconnection at the Edic Substation in the System Reliability Impact Study Report located in Appendix H, Section 10. The source of the estimate was National Grid. The attached document is the work papers and back up that National Grid supplied NYRI.

18. **In the application, the General Electric study provides an interconnect cost for connecting to Rock Tavern Substation. Provide the source of the number and all backup work papers that go in to that estimate.**

Response:

The subject GE Report has been superseded in the current Article VII Supplement by additional study reports. The Article VII Supplement contains an updated estimate of the interconnection cost estimate for the proposed interconnection at the Rock Tavern Substation in the System Reliability Impact Study Report located in Appendix H, Section 10. The source of the estimate was Central Hudson Gas and Electric Company, the interconnecting Transmission Owner. The attached spread sheet is the information furnished as work papers from Central Hudson.

19. **Provide the type of cooling that will be used for the valve hall. Describe what type of cooling medium that will be used.**

Response:

See Exhibit E-2.2.4 of the Supplemental Article VII Application.

20. **Provide the MSDS sheets for the cooling medium to be used and explain any hazard associated with the medium.**

Response:

See attached MSDS for ethylene glycol.

21. **Provide an engineering drawing of the type of lighting protection the applicant will use in the substation. Explain the philosophy that was used in designing the**

lightning protection and supply copies of all supporting documents.

Response:

See Exhibit E-2.2.1 of the Supplemental Article VII Application for the plan for direct stroke lightning protection for the converter stations. Engineering drawings and supporting documentation will be developed during the detailed engineering and design of the project.

22. Provide the standards to which the substation ground grid will be designed and provide copies of all supporting information.

Response:

See Exhibit E-2.2.1 of the Supplemental Article VII Application for the standard. Engineering drawings and supporting documentation will be developed during the detailed engineering and design of the project.

23. Discuss what precautions or measures will be taken near switches or places where an operator will stand to perform an operation. Provide copies of all supporting information.

Response:

NYRI will employ generally accepted design practices and safety measures to ensure switch operator safety. All practices and measures will conform to the National Electrical Safety Code® (NESC®), the IEEE standard 80 (IEEE Guide for Safety in AC Substation Grounding) and IEEE standard 81 (Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System).

Switch Grounding Platforms: The station ground grid will be designed to ensure touch and step potential voltages are at an acceptable level and meet codes and standards. However, since the operation of a switch places the operator directly at risk if a fault occurs, an additional precaution is employed to reduce the risk of electric shock. A switch grounding platform will be placed at each switch location. The switch grounding platform will be connected to the switch operating handle and the ground grid to minimize the voltage between the switch operator's hands and feet in the event of a fault at the switch during manual operation.

Station Fence Grounding: The grounding of the station fence is critical because the fence is generally accessible to the public. The station grounding system will be designed to ensure that the touch potential on both sides of the fence is within the calculated acceptable upper limit of ground fault current with body weight of 50 kg as defined in the IEEE standard 80.

The station fence will be connected to the main station ground grid by means of an outer grid conductor installed a minimum of three feet outside the station fence.

The fence will be connected to the outer grid conductor at all corner posts and at line posts every 40 to 50 feet. The gateposts will be securely bonded to the adjacent fence. For gates installed with an outward swing, the ground grid and outer conductor will be extended a minimum of three feet past the maximum swing of the gate.

24. Provide the catalogue cut sheets for the circuit breakers that will be used in the Northern and Southern termini substations. Include the interrupting ratings. Provide copies of all supporting information.

Response:

See attached circuit breaker cut sheets.

Attachment for Interrogatory
DPS-32.6

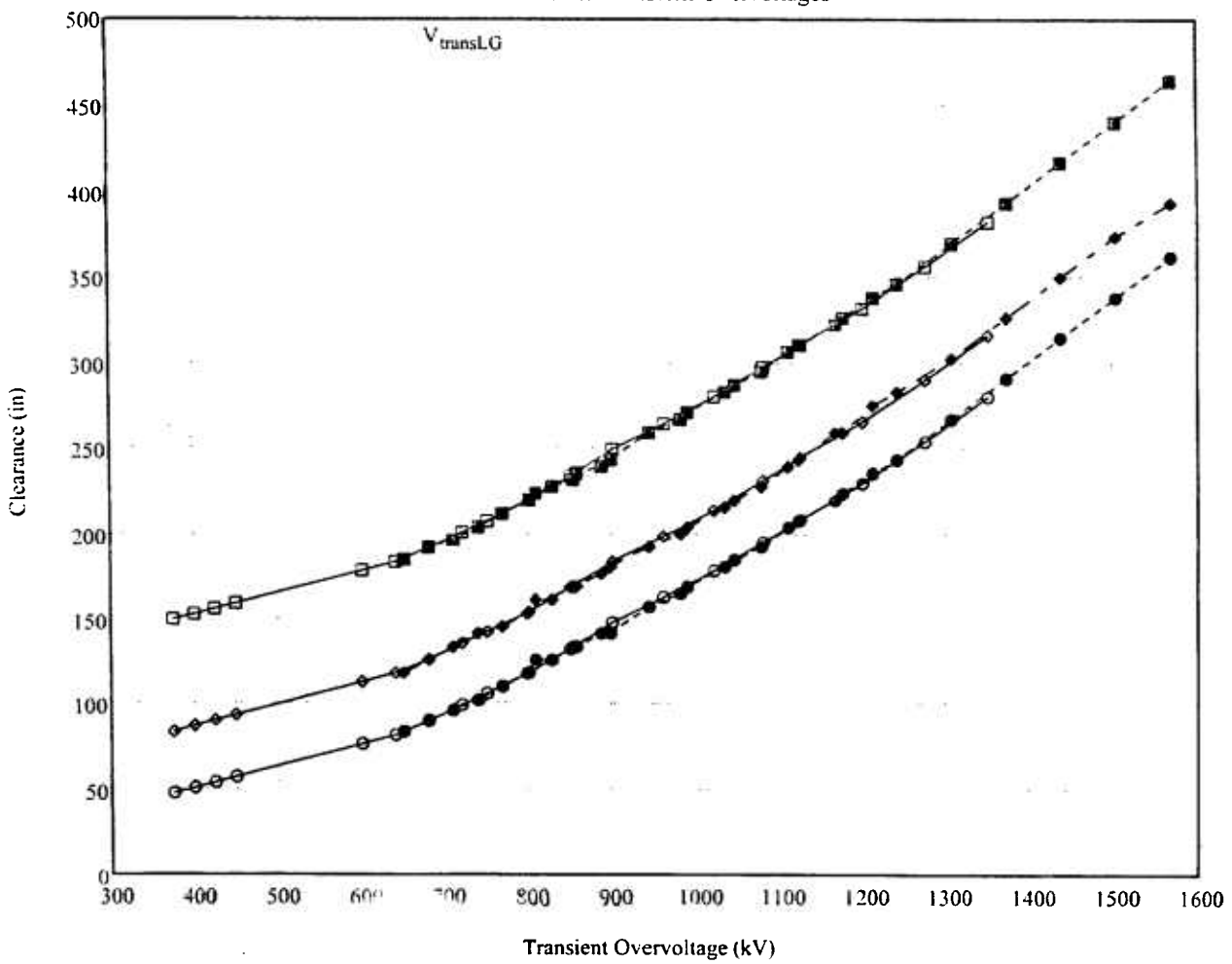
SYSTEM DATA

$Vnom_{LG} := 400kV$ Voltage phase to ground

$TOF_{HVDC} := 1.8$ Voltage phase to ground

$Vtrans_{LG} := Vnom_{LG} \cdot TOF_{HVDC}$ $Vtrans_{LG} = 720\,kV$

Clearances vs. Transient Overvoltages



HVDC Horizontal Clearance Based on Transient Overvoltage

HVAC Horizontal Clearance Based on Switching Surge Factor

HVDC Vertical Clearance Based on Transient Overvoltage

HVAC Vertical Clearance Based on Switching Surge Factor

HVDC Guard to Live Parts based on Transient Overvoltage

HVAC Guard to Live Part Clearances based on Sw. Surge

Horizontal_Clearance = 201.575 in

Vertical_Clearance = 135.827 in

Guard_to_Live_Parts = 99.606 in

Table 124-1—
PART D — High voltage direct current (based on transient overvoltage)

Column 1	Column A	Column B	Column 2		Column 3		Column 4	
Maximum design voltage conductor to ground	Transient overvoltage per unit ③	Transient overvoltage line to grnd ④	Vertical clearance of unguarded parts ①		Horizontal clearance of unguarded parts ①		Clearance guard to live parts ①	
kV		kV	ft	in	ft	in	ft	in
250	1.5 or below	375	12	6	7	0	4	0
250	1.6	400	12	9	7	3	4	3
250	1.7	425	13	0	7	7	4	6
250	1.8	450	13	3	7	10	4	9
400	1.5 or below	600	14	11	9	5	6	5
400	1.6	640	15	4	9	10	6	10
400	1.7	680	16	0	10	6	7	6
400	1.8	720	16	10	11	4	8	4
500	1.5 or below	750	17	4	11	11	8	10
500	1.6	800	18	4	12	10	9	11
500	1.7	850	19	7	14	1	11	1
500	1.8	900	20	10	15	4	12	4
600	1.5 or below	900	20	10	15	4	12	4
600	1.6	960	22	1	16	7	13	7
600	1.7	1020	23	5	17	11	14	11
600	1.8	1080	24	10	19	4	16	4
750	1.5 or below	1125	25	11	20	5	17	5
750	1.6	1200	27	8	22	2	19	2
750	1.7	1275	29	9	24	3	21	3
750	1.8	1350	31	11	26	5	23	5

① Interpolate for intermediate values. The clearances in column 4 of this table are solely for guidance in installing guards without definite engineering design and are not to be considered as a requirement for such engineering design. For example, the clearances in the tables above are not intended to refer to the clearances between live parts and the walls of the cells, compartments, or similar enclosing structures. They do not apply to the clearances between bus bars and supporting structures nor to clearances between the blade of a disconnecting switch and its base. However, where surge-protective devices are applied to protect the live parts, the vertical clearances, column 2 of Table 124-1 Part A may be reduced provided the clearance is not less than 8.5 ft plus the electrical clearance between energized parts and ground as limited by the surge-protective devices.

② Clearances shall satisfy either switching-surge or BIL duty requirements, whichever are greater.

③ Switching-surge factor—an expression of the maximum switching-surge crest voltage in terms of the maximum operating line-to-neutral crest voltage of the power system.

④ The values of columns A, B, and C are power system design factors that shall correlate with selected clearances. Adequate data to support these design factors should be available.

⑤ The selection of station BIL shall be coordinated with surge-protective devices when BIL is used to determine clearance. BIL—basic impulse insulation level—for definition and application, see IEEE Std 1313-1993.

Attachment for Interrogatory
DPS-32.9

The annual preventive maintenance used in this study is based on the current practice at Sandy Pond converter station in the New England HVDC scheme. The reasons are that the station is relatively new, (1993) the layout is seemingly equivalent to the proposed NorNed scheme and the team has a straightforward maintenance plan. The main principles at Sandy Pond are:

1. All maintenance in the a.c. and d.c. yard is performed in one 48-hour period each year. Special maintenance by manufacturers is performed within the same period. A single crew is working 12 hours each day.
2. Maintenance of valves and auxiliary equipment in the valve hall is performed in a separate period, and with the other pole operating. A 24-hour period is required for each pole.

Sandy Pond represent a full bipole scheme. The same maintenance procedure is assumed for the NorNed 2x12-pulse valve design. Also, considering the 2x6-pulse valve design, the same a.c. and d.c. yard scheduled maintenance outage duration is assumed. Maintenance in the valve hall is carried out within one 24-hour period, the construction being simplified compared to the full bipole scheme. Energy unavailability due to scheduled maintenance is therefore 0.82% whether the 2x12 pulse or 2x6 pulse valve design is selected.

Valves

The converter valve consists of the valve assembly itself and the associated auxiliary system. In modern thyristor valve design the number of redundant thyristors is matched against the predicted failure rate in order to assure that a converter can operate between scheduled maintenance periods without interruption. The valve assembly itself should therefore be very reliable. Based on Skagerrak, Fennoskan, Kontiskan, New England and Hokkaido-Honshu the following is calculated for forced outages (Cigre ref. note 7 on page 52):

Valve assembly, failure rate and duration

- Frequency : 0.17 [1/year]
- Duration : 2.23 [hours]

The said outage frequency of 0.17 is not particularly low, and implies that the design goal of a fully redundant valve assembly not yet has been accomplished. Similarly, the unscheduled maintenance due to errors in valve assembly becomes:

Valve assembly, unscheduled maintenance rate and duration

- Frequency : 0.29 [1/year]
- Duration : 1.65 [hours]

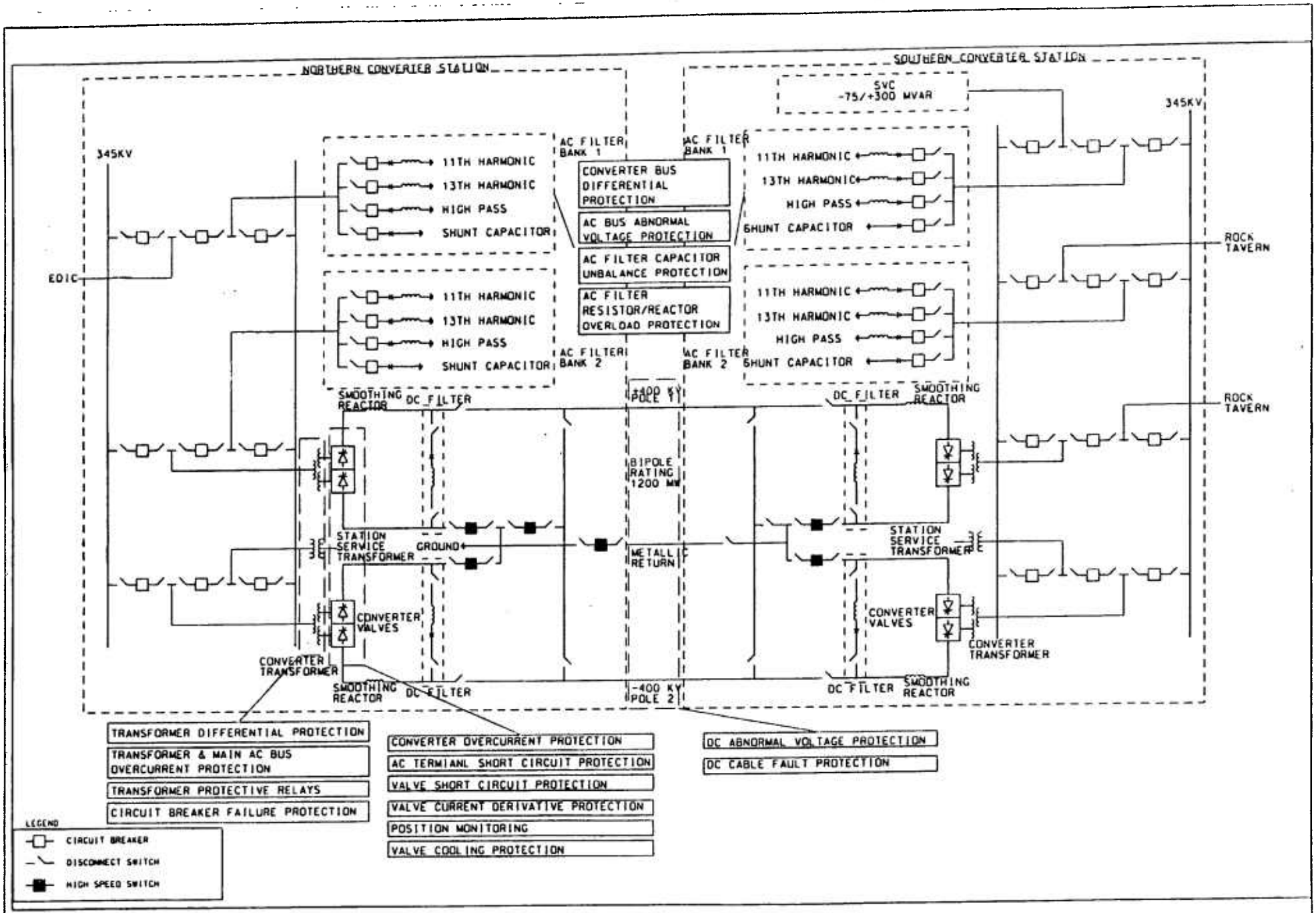
These figures are based on a total of 100 valve years from 1989 to 1994, and should represent state-of-the-art in the design of valves.

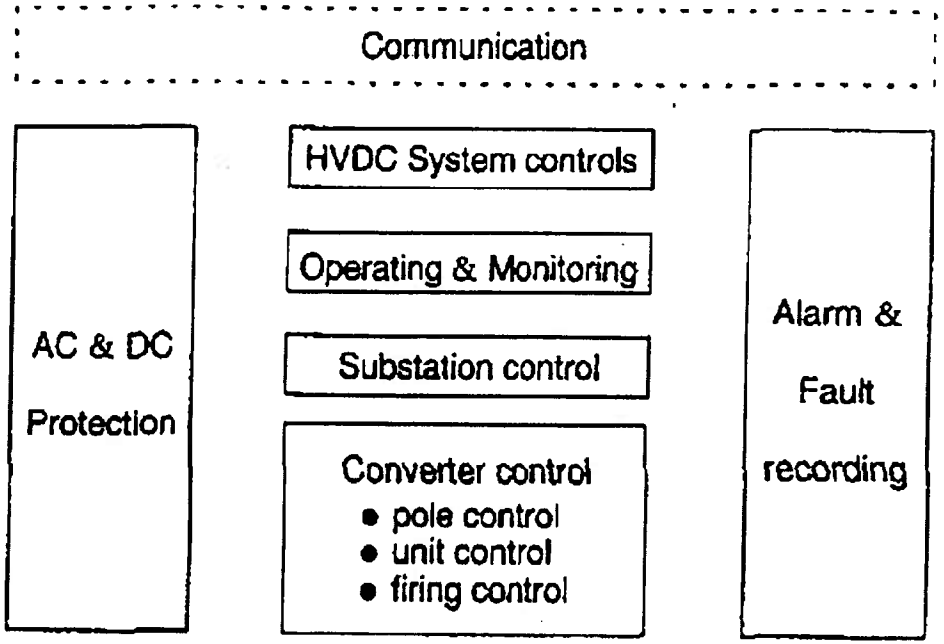
Most HVDC schemes have fully redundant back-up systems for valve control and sometimes also for auxiliary equipment. This normally allows repair activities to be deferred to non-critical hours. This possibility to plan whatever action is necessary is also reflected in the reduced outage duration for this kind of errors. Based on the detailed information we have, the following rate and duration are found:

Valve auxiliary equipment & controls, trip rate and duration

- Frequency : 0.14 [1/year]
- Duration : 0.16 [hours]

Attachment for Interrogatory
DPS-32.12

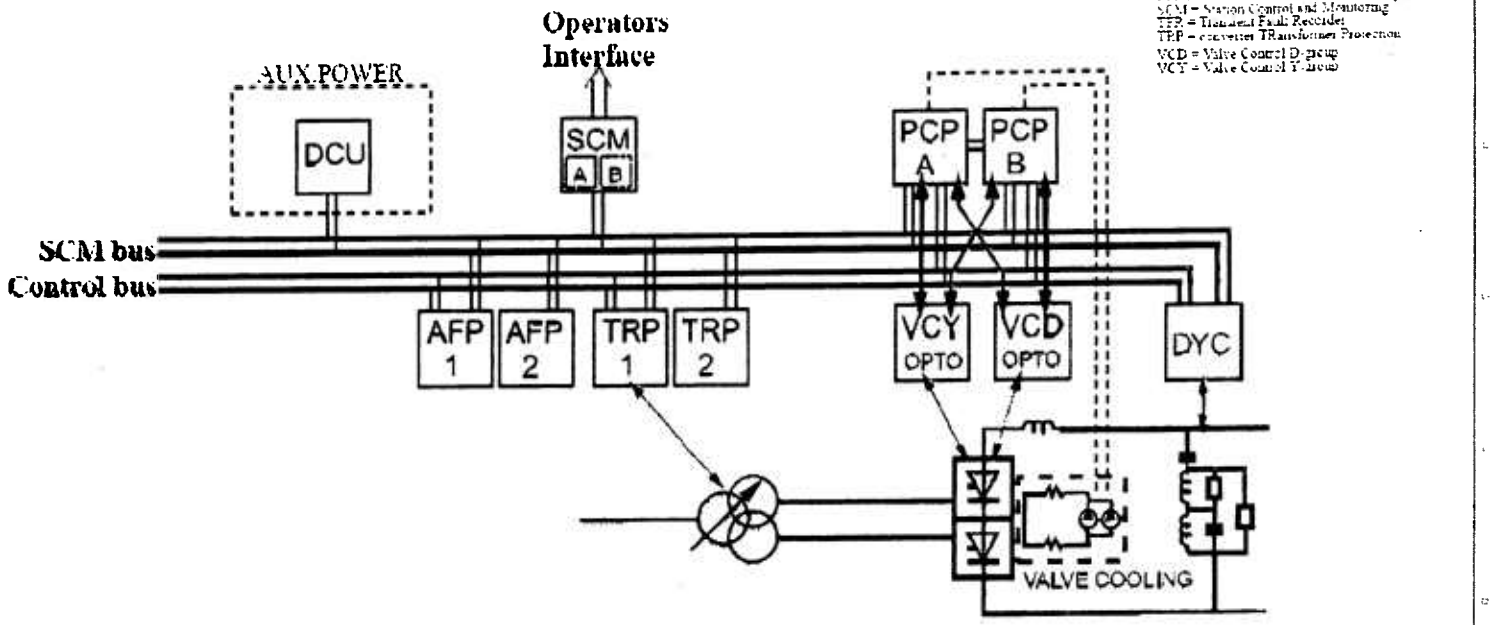

NORTHERN CONVERTER STATION
SOUTHERN CONVERTER STATION
345KV
EDIC
11TH HARMONIC
13TH HARMONIC
HIGH PASS
SHUNT CAPACITOR
AC FILTER BANK 1
AC FILTER BANK 2
CONVERTER BUS DIFFERENTIAL PROTECTION
AC BUS ABNORMAL VOLTAGE PROTECTION
AC FILTER CAPACITOR UNBALANCE PROTECTION
AC FILTER RESISTOR/REACTOR OVERLOAD PROTECTION
SVC
-75/+300 MVAR
ROCK TAVERN
SMOOTHING REACTOR
DC FILTER
+400 KV POLE 1
-400 KV POLE 2
BIPOLE RATING 1200 MW
STATION SERVICE TRANSFORMER
GROUND
METALLIC RETURN
CONVERTER VALVES
CONVERTER TRANSFORMER
TRANSFORMER DIFFERENTIAL PROTECTION
TRANSFORMER & MAIN AC BUS OVERCURRENT PROTECTION
TRANSFORMER PROTECTIVE RELAYS
CIRCUIT BREAKER FAILURE PROTECTION
CONVERTER OVERCURRENT PROTECTION
AC TERMIANL SHORT CIRCUIT PROTECTION
VALVE SHORT CIRCUIT PROTECTION
VALVE CURRENT DERIVATIVE PROTECTION
POSITION MONITORING
VALVE COOLING PROTECTION
DC ABNORMAL VOLTAGE PROTECTION
DC CABLE FAULT PROTECTION
LEGEND
CIRCUIT BREAKER
DISCONNECT SWITCH
HIGH SPEED SWITCH



NYRI
NEW YORK REGIONAL INTERCONNECTION
PROJECT LOCATION: NEW YORK
DATE: 10/29/2007
Washington Group International

STRUCTURE OF CONTROL & PROTECTION SYSTEM

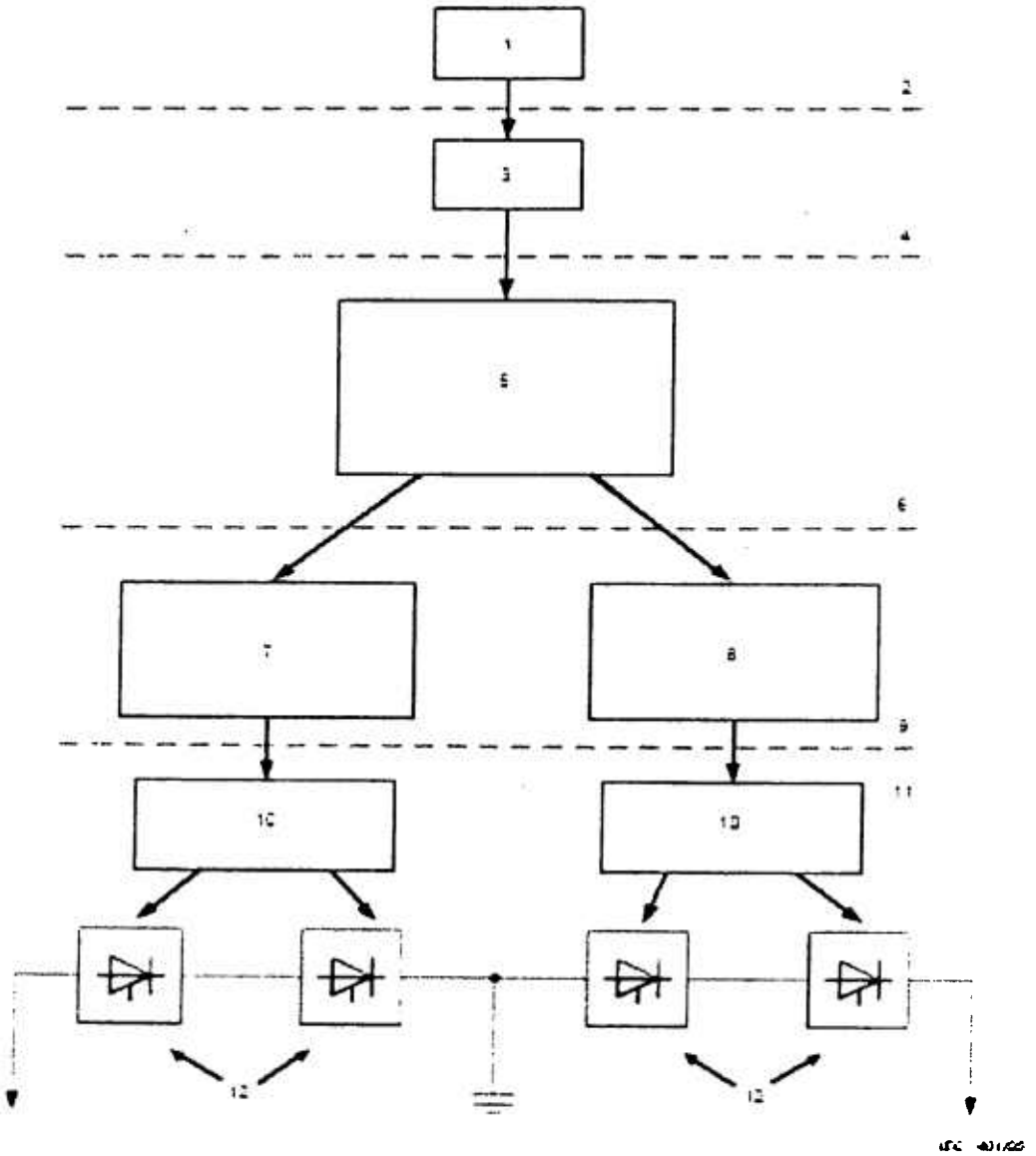
DPS 32.12



NEW YORK REGIONAL INTERCONNECTION
PROJECT LOCATION: NEW YORK
DATE: 10/29/2007

TYPICAL STATION PROTECTION BLOCK DIAGRAM

DPS 32.12



Key

1 Integrated a.c./d.c. system control
2 AC/DC system level
3 HVDC system/master control
4 Area level (or local substation level)
5 Bipole/substation control (substation sequencing, substation power control, substation power capability calculator reactive power control, a.c. voltage control)
6 HVDC substation (bipole level)
7 Pole 1 (d.c protection, pole sequencing, pole power control, tap changer control, pole power capability calculator)
8 Pole 2 (d.c protection pole sequencing, pole power control, tap changer control, pole power capability calculator)
9 HVDC substation (pole level)
10 Valve base electronics (thyristor firing control, thyristor status reporting, thyristor protection)
11 Converter unit level
12 Converters

Attachment for Interrogatory
DPS-32.13

CONFIDENTIALITY AGREEMENT

This Confidentiality Agreement, made and entered into as of this ____ day of _____, 2007 by and between _____ ("Transmission Owner" or "TO") and New York Regional Interconnect, Inc. ("NYRI" and, collectively with the TO, "the Parties"), WITNESSETH THAT:

WHEREAS, NYRI has filed an application with the New York State Public Service Commission ("the PSC") seeking authority to construct a High Voltage Direct Current Transmission Line ("the HVDC Line") in or immediately adjacent to certain rights-of-way used by the TO for their electric transmission lines and other facilities ("the TO Facilities"); and

WHEREAS, the Parties desire to exchange certain confidential and commercially sensitive information with respect to the HVDC Line and TO Facilities in an effort to ensure that the plans for the design, construction and operation of the HVDC Line approved by the PSC will not adversely impact TO Facilities; and

WHEREAS, the Parties are willing to disclose such information to each other only pursuant to the terms of this Confidentiality Agreement.

NOW THEREFORE, the Parties hereto agree as follows:

1. NYRI may designate any information concerning the design, construction and/or operation of the HVDC Line, and Transmission Owner may designate any information concerning the design, construction and/or operation of TO Facilities, as "Confidential Information" protected from disclosure by this Agreement. When such Confidential Information is provided in written form, the first page of each document containing such Confidential Information shall be stamped or labeled "Confidential Information" or words of similar import. When information is provided orally, the Party disclosing such information shall provide written notice to the other Parties that the information disclosed in that conversation is Confidential Information protected under this Agreement within five (5) business days of the date on which such oral communication took place. All copies of such Confidential Information or any part thereof and all written or recorded materials prepared by any Party or Permitted Recipient (as defined below) containing such Confidential Information or any part thereof shall also constitute Confidential Information protected under this Agreement.

2. Notwithstanding the foregoing, Confidential Information shall not include information which: (i) was known by the Party receiving such information ("the Recipient") or any of its employees, officers, directors, consultants, advisors or agents (collectively, the "Recipient Parties") prior to disclosure by the disclosing Party; (ii) was or becomes publicly available other than as a result of a disclosure by a Recipient Party; (iii) was or becomes available to a Recipient Party on a non-confidential basis from a source other than the disclosing Party or its advisors provided that such source is not bound by a confidentiality agreement with the disclosing Party; or (iv) consists of analyses, compilations, studies or other documents developed by Recipient or Recipient Parties that do not reveal such Confidential Information or any part

thereof.

3. Each Recipient, on behalf of itself and all of its Permitted Recipients, agrees to keep all Confidential Information confidential, and will not, without the prior written consent of the disclosing Party or as otherwise required by law or judicial order, disclose said Confidential Information to any third parties, in whole or in part. Each Recipient further agrees that it and its Permitted Recipients will use the Confidential Information only in connection with evaluating, negotiating and implementing an agreement among the Parties concerning the design, construction and operation of NYRI's HVDC Line ("the Permitted Purpose").

4. Each Recipient shall be permitted to disclose the Confidential Information to those affiliates, officers, employees, agents, consultants, and advisors who have a need to know the Confidential Information for the Permitted Purpose, who are informed by Recipient of the confidential nature of the Confidential Information, and who agree to be bound by this Agreement ("Permitted Recipients"). Each Recipient will be responsible for any breach of any provision of this Agreement by its Permitted Recipients.

5. Should any Party receive a discovery request or demand received in PSC Case 06-T-0680 or any other proceeding before the PSC or the Federal Energy Regulatory Commission or any Court having jurisdiction seeking disclosure of all or any part of the Confidential Information provided to such party pursuant to this Agreement: (a) the Party receiving such discovery request shall provide notice and a copy thereof to the Party whose Confidential Information is the subject of that discovery request within two days of the receipt of such request; and (b), the Parties shall negotiate and submit to the requesting or demanding agency or court a mutually acceptable Protective Order to apply to such Confidential Information. The Parties further agree to cooperate fully with each other in taking any and all actions, including making any and all filings with the PSC, to minimize the extent of any disclosure of such Confidential Information.

6. All Confidential Information will be destroyed, or at disclosing Party's option, returned to the disclosing Party without retaining any copies thereof promptly upon a determination by any Party that the Permitted Purpose cannot be achieved.

7. The Parties acknowledge and agree that any breach or threatened breach of the terms of this Agreement regarding the treatment of Confidential Information may result in irreparable damage to the Party whose Confidential Information is or may be disclosed for which there can be no adequate remedy at law. Therefore, the Parties agree that in the event of any breach of this Agreement by any Party or any Permitted Recipient or by any third party to whom any Party or Permitted Recipient makes Confidential Information available, the Party whose Confidential Information is or may be disclosed in violation of this Agreement will be entitled, in addition to any other rights and remedies available to it, to injunctive relief requiring the immediate return of all Confidential Information in the possession of any Party, Permitted Recipient or any such third party, and enjoining any Party, Permitted Recipient and/or any third parties to which Confidential Information has been made available from using Confidential Information in violation of this Agreement, without the need to show or prove that it has

sustained or will sustain any actual damages.

8. The Parties acknowledge that no Party makes any express or implied representation or warranty as to the accuracy or completeness of any Confidential Information disclosed pursuant to this Agreement, and each Party expressly disclaims any and all liability that may be based on the Confidential Information or any errors therein or omissions therefrom.

9. This Agreement sets forth the entire agreement between the Parties with respect to the subject matter hereof and cancels and supersedes any prior understandings, explanations and agreements among the Parties with respect to the subject matter hereof. There are no terms, conditions, understandings or collateral agreements, express or implied, between the Parties with respect to the subject matter of this Agreement other than as expressly set forth in this Agreement.

10. This Agreement shall not be modified, except in a written document signed by all Parties. When required by the context of this Agreement, the singular shall include the plural. No provision of this Agreement shall be interpreted for or against any Party because that Party or its legal representative drafted such provision.

11. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to any conflict of laws principles. In the event of any suit, action or proceeding relating to this Agreement, the parties hereby unconditionally consent to submit to jurisdiction in a state or Federal court located in New York.

12. Notices and correspondence relating to this Agreement, including without limitation written notice that Confidential Information has been communicated orally as provided in section 1 of this Agreement, shall be provided to the following individuals or to such other individuals as each Party may hereafter designate in a written notice served on the other Parties in accordance with the requirements of this section 13.

For New York Regional Interconnect, Inc.:

Leonard H. Singer, Esq.
Couch White LLP
540 Broadway
P.O. Box 22222
Albany, New York 12201

For Central Hudson Gas & Electric Corporation:
(Transmission Owner)

Robert J. Glasser
Thompson Hine LLP
335 Madison Avenue
New York, New York 10017-4611

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

New York Regional Interconnect, Inc.

By:_____
Title: PRESIDENT
Date: MAY 22, 2007

_____
(Transmission Owner)

By:_____
Title:_____
Date:_____

SUPPORT SERVICES AGREEMENT

THIS AGREEMENT, made and entered into effective the _____ day of April, 2007, is by and between _____ ("TO"); and New York Regional Interconnect Inc. ("NYRI," and collectively with TO, "the Parties"), a transportation corporation organized and existing under the laws of the State of New York with its principal place of business at 100 State Street, Albany, New York 12207, witnesseth that:

WHEREAS, in connection with NYRI's application to the New York Public Service Commission ("the PSC") in Case 06-T-0650 to construct a High Voltage Transmission Line from Marcy, New York to Rock Tavern, New York ("the Project"), NYRI has requested the TO to provide: (i) Information and (ii) services to assist NYRI in locating, understanding and presenting the Information, which services may include travel, analysis, attendance at meetings, provision of written information or verbal discussions, as well as attorneys fees incurred in connection therewith and which may be provided by the TO or by consultants employed by the TO ("Support Services"); and

WHEREAS, NYRI acknowledges that the TO is in the business of owning and operating Transmission Facilities , and not of providing Support Services or other consulting services to third parties; and

WHEREAS, NYRI also acknowledges that the TO has intervened in in Case 06-T-0650 to rpotect the TO's interests; and

WHEREAS, NYRI further acknowledges that the TO is willing to provide Information and Support Services to NYRI, solely as an accommodation to NYRI and subject to the terms and conditions set forth hereafter.

NOW, THEREFORE, in consideration of the covenants hereinafter contained and with the intent to be mutually bound hereby, the Parties, through their duly authorized representatives, agree as follows:

1. **Supply of Information and Support Services.** From time to time, as requested by NYRI in writing and as mutually agreed to by the TO, the TO agrees to provide Information and related Support Services in connection with the Project. NYRI understands and agrees that the TO, in its sole discretion, may decline to provide Information or Support Services which it determines to involve the disclosure of privileged or sensitive information, or may choose to provide Information in redacted form and/or under the provisions of the attached Confidentiality Agreement. NYRI understands and agrees that any Information and/or related Support Services provided by the TO pursuant to this Agreement do not necessarily represent the position that the TO may desire to take in any administrative or judicial proceeding. . NYRI agrees that it will not describe or represent that any Information and/or related Support Services provided by the TO pursuant to this Agreement represents the position of the TO. NYRI understands and agrees that the TO, by entering into this

Agreement and/or by providing any Information or related Support Services is not waiving, and fully reserves, its rights to take any position in any administrative or judicial proceeding.

2. **Ownership of Information.** The Information shall at all times remain the sole property of the TO. Except for Information publicly disclosed before any court or administrative tribunal, the Information may be confidential and proprietary to the TO or contain valuable intellectual property rights belonging to the TO. Disclosed Information that is confidential and proprietary will be so designated by the TO.

3. **Authorized Uses.** The Information and Support Services are to be used by NYRI solely for the limited purpose of its activities in connection with the Project ("Permitted Use"), and are not to be used for any other purpose. No other use is authorized. In particular, no rights and no licenses to any intellectual property rights are granted or implied by the disclosure of Information or provision of Support Services to NYRI. The provisions of this Section 3 shall survive expiration or termination of this Support Services Agreement.

4. **Confidentiality.** The Parties recognize that in the provision of the Support Services, the TO may provide confidential or proprietary information to NYRI and that NYRI may provide confidential or proprietary information to the TO. All confidential or proprietary information provided by the TO to NYRI or NYRI to the TO pursuant to this Support Services Agreement shall be subject to and in all respects governed by the Confidentiality Agreement between the Parties dated _____("the Confidentiality Agreement"), a copy of which is attached to this Support Services Agreement and incorporated herein by reference. The provisions of the Confidentiality Agreement shall survive expiration or termination of this Support Services Agreement.

5. **Return of Confidential Information.** Upon the request of the TO, and in any event upon the expiration of this Support Services Agreement, as specified in Section 7, "Term," or upon the termination of this Support Services Agreement, pursuant to Section 8, "Termination," and notwithstanding any provision of the Confidentiality Agreement, NYRI shall immediately return to the TO any and all confidential Information and Support Services, along with any and all copies and excerpts thereof; destroy any electronic records containing confidential Information and Support Services; and certify in writing that the foregoing, including the destruction of electronic records, have taken place.

6. **Fees and Payment.** The charge for copies of Information shall be $ 0.25 cents per page. Charges for Support Services provided by employees of the TO at any time during the Term of this Agreement, including locating or identifying documents for copying, shall be determined using the then-prevailing salary (or hourly, if applicable) rates of the TO's employees providing support services ("Rate"), to which shall be added a fringe benefit loading amount compensatory for TO benefit programs provided to such employees ("Benefits") . (Said Rate and Benefits are hereinafter referred to collectively as the "Employee Reimbursement Rate") The Employee Reimbursement Rate shall be multiplied by the number of hours worked by each employee of the TO in providing Support Services to determine the amount of charges for Support Services by employees of the TO to be reimbursed by NYRI. In addition, NYRI shall also reimburse the TO for the full costs, without mark-

up of any consultants employed by the TO to provide Support Services under this agreement , as well as any reasonable travel costs actually incurred in providing such services. Payment of all charges shall be due in full within thirty (30) days of submission of an invoice. NYRI shall not be required to pay for any Support Services that it has not requested in writing Invoices shall include, at a minimum, the Employee Reimbursement Rate of any of the TO's employees that provided Support Services, the number of hours worked by such employees to perform any requested Support Services, a brief description of the work performed, copies of invoices of any consultants employed by the TO to provide Support Services and copies of invoices associated with any other expenses. Payment shall be transmitted as specified in the invoice. In the event of late payment or nonpayment, the TO shall have all rights and remedies set forth in this Support Services Agreement, or at law or in equity, including termination of this Support Services Agreement. At NYRI's request, TO shall provide NYRI with a non binding estimate of expected Charges for Support Services requested by NYRI pursuant to this Agreement.

7. **Term.** This Support Services Agreement shall apply to services rendered during the period from the date first written above until the termination by the PSC of Case 06-T-0650.

8. **Termination.** This Support Services Agreement may be terminated for convenience or for cause by any party upon not less than five (5) days written notice to the other parties. Except as otherwise provided in this Support Services Agreement in connection with liabilities owed by NYRI to the TO, no party shall be entitled to direct, incidental or consequential damages for termination. No amount shall be paid by any party for termination costs, except for any sums owed in connection with Information or Support Services provided by the TO prior to the termination date or for any other sums, costs, or expenses, whether presently or in the future, owed or reimbursable to the TO as provided in this Support Services Agreement. Within seven (7) days of the termination date, the TO's shall submit their final invoices for charges due and owing for Information provided and Support Services performed up to the date of termination. NYRI agrees to remit payment for such charges as provided in Section 6, "Fees and Payment" above.

9. **Exclusion of Warranties and Guarantees. THE TO MAKES NO WARRANTY, GUARANTEE, PROMISE, OR REPRESENTATION, EXPRESS OR IMPLIED (INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), WITH REGARD TO THE ACCURACY, COMPLETENESS, USEFULNESS, TIMELINESS, OR SUITABILITY OF ANY INFORMATION OR SUPPORT SERVICES, OR THAT THE USE OF ANY INFORMATION OR SUPPORT SERVICE WILL NOT INFRINGE OR VIOLATE THIRD-PARTY RIGHTS. NO WARRANTIES OF ANY KIND, WHETHER STATUTORY, WRITTEN, ORAL, OR IMPLIED (INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE FOR A PARTICULAR PURPOSE), SHALL APPLY TO THE INFORMATION OR SUPPORT SERVICES. THESE PROVISIONS SHALL GOVERN OVER ANY CONTRARY VERBAL STATEMENTS OR LANGUAGE APPEARING IN ANY WRITTEN DOCUMENTS, INCLUDING THIS SUPPORT SERVICES AGREEMENT.**

10. Indemnification. NYRI agrees to indemnify, defend, and hold harmless the TO, its owners, affiliates, subsidiaries, officers, directors, managers, employees, agents or attorneys, as well as the assigns of any of the foregoing (collectively referred to herein as "Affiliates") against any and all claims, losses, injuries, damages, liabilities, suits, charges, causes of actions, costs or expenses of whatever nature (including legal costs and attorneys fees) caused by, arising out of or related to NYRI's disclosure or use of the Information or Support Services, or the provision of Information or Support Services by the TO or its Affiliates, whether or not the same are due, in whole or in part, to the negligence of the TO or its Affiliates. NYRI further agrees that it is responsible for any and all costs and expenses (including legal costs and attorneys fees) incurred by the TO to enforce the provisions of this Section 10. The provisions of this Section 10 shall apply notwithstanding any other provisions of this Support Services Agreement and shall survive expiration or termination thereof.

11. Liability Limitations. NYRI agrees that the TO and its Affiliates shall have no liability for any and all claims, losses, injuries, damages, liabilities, suits, charges, causes of actions, costs or expenses of whatever nature caused by, arising out of or related to NYRI's disclosure or use of the Information or Support Services, or the provision of Information or Support Services by the TO or its Affiliates, whether or not the same are due, in whole or in part, to the negligence of the TO or their Affiliates. NYRI hereby waives and releases, for itself and its heirs, successors, assigns, and representatives, any and all such liabilities and rights of recovery against the TO or its Affiliates, whether presently known or unknown; and assumes sole risk of any other claims, losses, injuries, damages, liabilities, suits, charges, causes of actions, costs or expenses of whatever nature, whether presently known or unknown.

12. No Assignment. This Support Services Agreement shall not be assigned by NYRI without the consent of TO, such consent not to be unreasonably withheld..

13. No Third-Party Beneficiary. The Parties have no intent, and do not create, any third-party rights or interests in this Support Services Agreement or in the Information or Support Services provided hereunder.

14. Amendment and Waiver. This Support Services Agreement shall not be superseded or modified, except in a writing signed by the Parties. This Support Services Agreement, or any provision hereof, cannot be modified, waived, or amended except in a writing signed by both Parties.

15. Notices. Any legal or contractual notices required to be sent to either party shall be deemed duly sent when mailed to the intended party's designated representative, as follows:

For NYRI:

Leonard H. Singer, Esq.
Couch White LLP
540 Broadway

P.O. Box 22222
Albany, New York 12201

For TO: Central Hudson Gas & Electric Corporation

Robert J. Glasser Thompson Hine LLP
335 Madison Avenue
New York, New York 10017-4611

16. Choice of Law. This Support Services Agreement shall be construed and interpreted in accordance with and under the laws of the State of New York, without regard to those laws determined by application of New York's choice of law principles. Venue in any action or proceeding shall be in the State of New York, County of Albany.

17. Severability. To the extent that any provision of this Support Services Agreement shall be held to be invalid, illegal or unenforceable, it shall be severed from this document without affecting the validity, legality or enforceability of the remaining provisions hereof.

18. Integration and Merger. The Parties agree that there are no understandings, promises, agreements, or representations, expressed or implied, related to the subject matter hereof, except as stated in this Support Services Agreement. This Support Services Agreement supersedes and merges all prior discussions and understandings, and constitutes the entire agreement between the parties regarding the subject matter hereof.

IN WITNESS WHEREOF, the Parties, having set forth the foregoing terms and conditions to govern this Support Services Agreement and the actions and liabilities of the Parties related thereto, and having agreed to be bound by the terms and conditions hereof, designate the following duly authorized representatives to execute this Support Services Agreement.

NEW YORK REGIONAL INTERCONNECT INC.

By: _____
(signature)

Name: RICHARD MUDDIMAN
(printed)

Title: PRESIDENT

Date: MAY 22, 2007

Transmission Owner

By: _____
(signature)

Name: _____
(printed)

Title: _____

Date: _____

SUPPORT SERVICES AGREEMENT

THIS AGREEMENT, made and entered into effective as of the 12 day of July, 2007 (the "Effective Date"), by and between New York State Electric & Gas Corporation, a corporation organized and existing under the laws of the State of New York ("NYSEG") and New York Regional Interconnect Inc. ("NYRI"), a transportation corporation organized and existing under the laws of the State of New York with its principal place of business at 100 State Street, Albany, New York 12207. (NYSEG and NYRI may be collectively referred to herein as the "Parties" or individually as a "Party.")

WITNESSETH:

WHEREAS, in connection with NYRI's application to the New York Public Service Commission ("the PSC") in Case 06-T-0650 to construct a High Voltage Transmission Line from Marcy, New York to Rock Tavern, New York ("the Project"), NYRI has requested NYSEG to provide: (i) information and (ii) services to assist NYRI in locating, understanding, and presenting the Information, which services may include travel, analysis, attendance at meetings, provision of written information or verbal discussions, as well as attorneys fees incurred in connection therewith and which may be provided by the NYSEG or by contractors or consultants employed by the NYSEG ("Support Services"); and

WHEREAS, NYRI acknowledges that NYSEG is in the business of owning and maintaining facilities for the transmission and distribution of electric energy and natural gas to wholesale and retail customers , and not of providing Support Services or other consulting services to third parties; and

WHEREAS, NYRI further acknowledges that NYSEG is willing to provide Information and Support Services to NYRI, solely as an accommodation to NYRI and subject to the terms and conditions set forth hereafter.

NOW, THEREFORE, in consideration of the covenants hereinafter contained and with the intent to be mutually bound hereby, the Parties, through their duly authorized representatives, agree as follows:

1. **Supply of Information and Support Services.** (a) From time to time, as requested by NYRI in accordance with the procedures specified in subsection 1(b), below, NYSEG agrees to provide Information and related Support Services in connection with the Project in accordance with and subject to the terms of this Agreement. NYRI understands and agrees that NYSEG, in its sole discretion, may decline to provide Information or Support Services due to scheduling conflicts, manpower shortages, or the need to address higher priority projects on NYSEG's transmission or distribution system, and/or when furnishing Information may require disclosure of privileged or sensitive information. NYSEG may choose, in its discretion, to provide confidential information in

redacted form; all exchanges of information between NYSEG and NYRI shall be governed by the provisions of the attached Confidentiality Agreement (defined below).

(b) NYRI shall issue a written service request to NYSEG when NYRI requires Information and/or Support Services pursuant to this Agreement, designating the Information required, the timing of the request, and, if Support Services are required, a description of the scope and deliverables related to such Support Services. Upon receipt of such written service request and on the condition that NYSEG is able and willing to provide the Information and Support Services requested by NYRI, NYSEG shall issue to NYRI a quote designating the price for such Information or Services expressed as either a fixed price quote or an estimate, including an estimate of any out-of-pocket costs and expenses associated with such service request. NYSEG shall begin to provide the Information and/or Support Services described in the written service request upon execution of such request by both Parties. NYSEG shall not be obligated to provide Support Services unless embodied in a written service request executed by authorized representatives of both NYSEG and NYRI.

(c) Notwithstanding anything to the contrary contained in this Agreement or in any service request issued pursuant to this Agreement, NYRI shall pay NYSEG for all Information provided and Support Services performed by NYSEG hereunder in response to any request, verbal or written, for Information or Services made by NYRI, including but not limited to all costs or expenses incurred by NYSEG in connection with such request(s).

2. **Ownership of Information.** The Information shall at all times remain the sole property of NYSEG.

3. **Authorized Uses.** The Information and Support Services are to be used by NYRI solely for the limited purpose of its activities in connection with the Project ("Permitted Use"), and are not to be used for any other purpose. No other use is authorized. In particular, no rights and no licenses to any intellectual property rights are granted or implied by the disclosure of Information or provision of Support Services to NYRI. The provisions of this Section 3 shall survive expiration or termination of this Support Services Agreement.

4. **Confidentiality.** All information provided by NYSEG to NYRI or NYRI to NYSEG pursuant to this Support Services Agreement shall be subject to and in all respects governed by the Confidentiality Agreement between the Parties executed simultaneously herewith ("the Confidentiality Agreement"), a copy of which is attached to this Support Services Agreement and incorporated herein by reference. The provisions of the Confidentiality Agreement shall survive expiration or termination of this Support Services Agreement for a period of three (3) years.

5. **Return of Confidential Information.** Upon NYSEG's request, and in any event upon the expiration of this Support Services Agreement, as specified in Section 7, "Term," or upon the [illegible] Support Services Agreement, pursuant to Section 8, "Termination," and notwithstanding any provision of the Confidentiality Agreement, NYRI shall immediately return to

NYSEG any and all Information, data, and other materials provided by NYSEG in connection with Support Services, along with any and all copies and excerpts thereof; shall destroy any electronic records containing Confidential Information or any other data or information furnished by NYSEG in connection with Support Services; and shall certify in writing that the foregoing, including the destruction of electronic records, have taken place.

6. **Fees and Payment.** NYRI shall pay NYSEG for all Information and Support Services provided by NYSEG in accordance with the terms of this Agreement and any subsequently issued service request executed in accordance with the procedures specified in Section 1 of this Agreement. NYRI and NYSEG agree that quotes or estimates for specific service requests shall be calculated as follows: (a) NYRI shall pay NYSEG for copies of Information at the rate of $0.25 cents per page; charges for maps or other materials requiring use of specialty scanning or other equipment shall be charged at a rate equal to or less than the rate available from a commercial copy or print shop, plus a ten percent (10%) administrative overhead charge; and (b) NYSEG's labor rate shall equal its then-prevailing fully-loaded hourly or salary rate for the job title performing the work, inclusive of all NYSEG and/or Energy East benefit and overhead loaders. In addition, NYRI shall reimburse NYSEG for (i) all travel, hotel, mileage, meals, and related expenses incurred by NYSEG personnel, consultants, or contractors in providing the Information and/or performing the Support Services pursuant to a service request, and (ii) NYSEG's actual out-of-pocket costs incurred in connection with providing the Information and/or performing the Support Services pursuant to a service request, without mark-up, including all labor and related charges for consultants, contractors, materials, equipment, and usage charges.

NYSEG shall have the right to require pre-payment of all or any portion of fees and expenses associated with Information and/or Support Services requested by NYRI in any subsequently executed service request. Payment of all charges and expenses shall be due in full within thirty (30) days of NYSEG's submission of an invoice. Invoices for Information or Support Services priced on a time and materials basis in the applicable service request shall include, at a minimum, the applicable labor rate of any NYSEG employees that provide Support Services, the number of hours worked by such employees to perform any requested Support Services, a brief description of the work performed, copies of invoices of any consultants employed by NYSEG to provide Support Services and copies of invoices associated with any other expenses. Payment shall be transmitted as specified in the invoice. NYSEG shall credit pre-paid amounts against invoiced labor charges in connection with Support Services priced on a time-and-materials basis. In the event of late payment or nonpayment, NYSEG shall have all rights and remedies set forth in this Support Services Agreement, or at law or in equity, including termination of this Support Services Agreement and/or assessment of late charges at the highest rate of interest allowed by law. At NYRI's request made in accordance with this Agreement, NYSEG shall provide NYRI with a non-binding estimate of expected labor charges for Support Services priced on a time-and-materials basis pursuant to the applicable service request.

7. **Term.** This Support Services Agreement shall apply to services rendered during the period from the date first written above until the termination by the PSC of Case 06-T-0650, but not exceeding three (3) years from the Effective Date.

8. **Termination.** Either party may terminate this Support Services Agreement and any or all service requests issued pursuant to this Agreement on not less than five (5) days written notice to the other Party issued in accordance with this Agreement. Except as otherwise provided in this Support Services Agreement in connection with liabilities owed by NYRI to NYSEG, no party shall be entitled to direct, incidental or consequential damages as a result of termination of this Agreement or any service requests. No amount shall be paid by any Party as termination costs upon termination of this Agreement or any service request(s), except that NYRI shall pay NYSEG for any Support Services performed or Information provided by NYSEG up to the effective termination date at the rate specified in the applicable service request or at NYSEG's then-applicable time-and-materials rate, including all out-of-pocket costs incurred by NYSEG in connection with this Agreement up the effective date of termination. Within sixty (60) days following the effective termination date,NYSEG shall submit its final invoice(s) for charges, fees, and expenses due and owing for Information provided and Support Services performed up to the effective termination date and NYRI agrees to remit payment for such charges as provided in Section 6, "Fees and Payment" above. NYSEG's failure or inability to submit a final invoice within the sixty (60) day period referenced in the preceding sentence, shall not excuse, or serve as a defense against, NYRI's obligation to pay NYSEG for all charges, fees, and expenses due and owing to NYSEG for Information provided and Support Services performed pursuant to this Agreement. NYRI's payment obligations in this Agreement shall survive termination or expiration of this Agreement until paid in full.

9. **Exclusion of Warranties and Guarantees.** **NYSEG MAKES NO WARRANTY, GUARANTEE, PROMISE, OR REPRESENTATION, EXPRESS OR IMPLIED (INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), WITH REGARD TO THE ACCURACY, COMPLETENESS, USEFULNESS, TIMELINESS, OR SUITABILITY OF ANY INFORMATION OR SUPPORT SERVICES, OR THAT THE USE OF ANY INFORMATION OR SUPPORT SERVICE WILL NOT INFRINGE OR VIOLATE THIRD-PARTY RIGHTS. NO WARRANTIES OF ANY KIND, WHETHER STATUTORY, WRITTEN, ORAL, OR IMPLIED (INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE FOR A PARTICULAR PURPOSE), SHALL APPLY TO THE INFORMATION OR SUPPORT SERVICES. THESE PROVISIONS SHALL GOVERN OVER ANY CONTRARY VERBAL STATEMENTS OR LANGUAGE APPEARING IN ANY WRITTEN DOCUMENTS, INCLUDING THIS SUPPORT SERVICES AGREEMENT** OR ANY SUBSEQUENTLY ISSUED SERVICE REQUEST.

10. **Indemnification.** NYRI agrees to indemnify, defend, and hold harmless the NYSEG, its shareholders, affiliates, subsidiaries, officers, directors, managers, employees, agents or attorneys, contractors, and consultants as well as the assigns of any of the foregoing (collectively referred to herein as "Affiliates") against any and all claims, losses, injuries, damages, liabilities, suits, charges,

causes of actions, costs or expenses of whatever nature (including legal costs and attorneys fees) caused by, arising out of or related to NYRI's disclosure or use of the Information or Support Services, or the provision of Information or Support Services by NYSEG or its Affiliates, whether or not the same are due, in whole or in part, to the negligence of NYSEG or its Affiliates. NYRI further agrees that it is responsible for any and all costs and expenses (including legal costs and attorneys fees) incurred by NYSEG to enforce the provisions of this Section 10. The provisions of this Section 10 shall apply notwithstanding any other provisions of this Support Services Agreement and shall survive expiration or termination thereof.

11. **Liability Limitations.** NYRI agrees that NYSEG and its Affiliates shall not be liable to NYRI for any and all claims, losses, injuries, damages, liabilities, suits, charges, causes of actions, costs or expenses of whatever nature caused by, arising out of or related to NYRI's disclosure or use of the Information or Support Services, or the provision of Information or Support Services by NYSEG or its Affiliates, whether or not the same are due, in whole or in part, to the negligence of NYSEG or its Affiliates. NYRI hereby waives and releases, for itself and its heirs, successors, assigns, and representatives, any and all such liabilities and rights of recovery against NYSEG or its Affiliates, whether presently known or unknown; and assumes sole risk of any other claims, losses, injuries, damages, liabilities, suits, charges, causes of actions, costs or expenses of whatever nature, whether presently known or unknown.

12. **No Assignment.** This Support Services Agreement shall not be assigned by NYRI without the consent of NYSEG, such consent not to be unreasonably withheld..

13. **No Third-Party Beneficiary.** The Parties have no intent, and do not create, any third-party rights or interests in this Support Services Agreement or in the Information or Support Services provided hereunder.

14. **Amendment and Waiver.** This Support Services Agreement shall not be superseded or modified, except in a writing signed by the Parties. This Support Services Agreement, or any provision hereof, cannot be modified, waived, or amended except in a writing signed by both Parties.

15. **Notices.** Any legal or contractual notices required to be sent to either party shall be deemed duly sent when mailed to the intended party's designated representative, as follows:

For NYRI:

Leonard H. Singer, Esq.
Couch White LLP
540 Broadway
P.O. Box 22222
Albany, New York 12201

For NYSEG:

MARK V. DOLAN
MANAGING ATTORNEY
18 LINK DRIVE, PO BOX 5224
BINGHAMTON, NY 13902-5224

16. **Choice of Law.** This Support Services Agreement shall be construed and interpreted in accordance with and under the laws of the State of New York, without regard to those laws determined by application of New York's choice of law principles. Venue in any action or proceeding shall be in the State of New York, County of Albany.

17. **Severability.** To the extent that any provision of this Support Services Agreement shall be held to be invalid, illegal or unenforceable, it shall be severed from this document without affecting the validity, legality or enforceability of the remaining provisions hereof.

18. **Integration and Merger.** The Parties agree that there are no understandings, promises, agreements, or representations, expressed or implied, related to the subject matter hereof, except as stated in this Support Services Agreement. This Support Services Agreement supersedes and merges all prior discussions and understandings, and constitutes the entire agreement between the parties regarding the subject matter hereof.

IN WITNESS WHEREOF, the Parties, having set forth the foregoing terms and conditions to govern this Support Services Agreement and the actions and liabilities of the Parties related thereto, and having agreed to be bound by the terms and conditions hereof, designate the following duly authorized representatives to execute this Support Services Agreement.

STATE ELECTRIC & GAS CORP.
NEW YORK ~~REGIONAL INTERCONNECT INC.~~

By: Laura S. Conkling
(signature)

Name: LAURA S. CONKLING
(printed)

Title: VICE PRESIDENT, TECHNICAL SERVICES

Date: JULY 12, 2007

REGIONAL INTERCONNECT INC.
NEW YORK ~~STATE ELECTRIC & GAS CORPORATION~~

By: Chris L. Thompson
(signature)

Name: CHRIS L. THOMPSON
(printed)

Title: V.P.

Date: July 11, 2007

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CONFIDENTIALITY AGREEMENT

This CONFIDENTIALITY AGREEMENT ("Agreement"), dated as of July __, 2007, is between New York State Electric & Gas Corporation, a New York corporation ("NYSEG"), and New York Regional Interconnect Inc., a New York corporation ("NYRI") (Each a "Party" and collectively the "Parties").

W I T N E S S E T H:

WHEREAS, NYSEG and NYRI are parties to a Support Services Agreement whereby NYSEG agrees to provide NYRI with certain Information and Support Services (as defined in the Support Services Agreement) requested by NYRI in connection with NYRI's construction of a proposed high voltage transmission line from Marcy, New York to Rock Tavern, New York (the "Project"); and

WHEREAS, to enable NYSEG to supply NYRI with Information and Support Services related to the Project, it will be necessary for NYSEG, on the one hand, or NYRI, on the other (the "Furnishing Party"), to furnish the other Party (the "Receiving Party,") certain information concerning the Furnishing Party's business, finances, and technical data, proposals, and\or the Project; and

WHEREAS, the Parties wish to protect the confidentiality of the Confidential Information (as hereinafter defined) and to limit the manner in which the Receiving Party may use such Confidential Information.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. Except as provided in Paragraph 2 hereof, the term "Confidential Information" is defined as any and all information concerning the business, assets, finances, proposals, and operations of the Furnishing Party or its affiliate(s) (defined below), as well as any and all information relating to the Project, that has been or may in the future be disclosed to the Receiving Party, where such information is noted as "Confidential" and communicated in oral, written (including electronic) or other form. As used herein, the term "affiliate" means any person or entity controlling, controlled by, or under common control with a Party hereto through majority stock, or other ownership interest, direct or indirect.

2. Confidential Information shall not include information that (i) is or hereafter becomes (but not in violation of this Agreement) known to the general public; (ii) was already known to the Receiving Party at the time it was disclosed to the Receiving Party by the Furnishing Party; (iii) is disclosed to the Receiving Party by an independent third party which the Receiving Party has a reasonable belief has a right to make such disclosure; or (iv) is independently developed by or for the Receiving Party without reliance upon the information disclosed by the Furnishing Party.

3. Subject to Paragraph 5, the Receiving Party shall not disclose Confidential Information to any person without the prior written consent of the Furnishing Party, except that the Receiving Party shall be entitled to disclose such Confidential Information without the Furnishing Party's prior consent to (i) directors, officers, and employees of itself and its affiliates, and (ii) accountants, financial, legal, and engineering advisors, agents, and representatives of the persons specified in (i) (collectively, "Project Personnel"), to the extent such Project Personnel have a need to know such Confidential Information to assist the Receiving Party in the evaluation of the Confidential Information for the purposes specified in this Agreement. The Receiving Party shall cause any Project Personnel described in (i) and (ii) to be bound by the conditions stated herein.

4. The Receiving Party shall use at least the same degree of care that it uses to protect its own confidential information (but not less than a reasonable degree of care) to prevent access by unauthorized persons to Confidential Information and shall inform its Project Personnel of the Confidential Information and be responsible for their compliance with the terms of this Agreement. Neither the Receiving Party nor any Project Personnel shall use Confidential Information other than for purposes of providing Information and\or Support Services relating to the Project (as such terms are defined in the Support Services Agreement of even date herewith).

5. In the event the Receiving Party is required under compulsion of legal or regulatory process to disclose Confidential Information, the Receiving Party (i) shall promptly give the Furnishing Party written notice of such requirement to disclose and (ii) unless required by applicable federal, state, or local law, rule, or regulation, a court or administrative order, or other legal process, shall refrain from disclosing such Confidential Information until the Furnishing Party, in the exercise of reasonable diligence, shall have had an opportunity to challenge the requirement or to seek an appropriate protective order or other appropriate remedy. The Receiving Party agrees not to oppose reasonable actions by the Furnishing Party to challenge disclosure of the Confidential Information. If Confidential Information is required to be disclosed, such disclosure shall be made solely for the required purpose and shall be limited to that portion of the Confidential Information that the Receiving Party is legally required to disclose in the judgment of the Receiving Party's counsel. In such event, the Receiving Party shall use reasonable efforts to have the Confidential Information so disclosed treated confidentially by the entity to which such disclosure is made.

6. The term of this Agreement shall be coterminous with the term of the Support Services Agreement, provided that the confidentiality and use restrictions of this Agreement shall remain in effect for a period of three (3) years from the expiration or termination of this Agreement or the Support Services Agreement.

7. Upon the written request of the Furnishing Party, the Receiving Party shall, within thirty (30) days thereof, return any originals or original copies of Confidential Information and shall destroy or return to the Furnishing Party any copies,

extracts, summaries, or other reproductions, in whole or in part, of such Confidential Information in its possession and in the possession of the Project Personnel to whom it was disclosed by the Receiving Party (excluding computer archival and backup tapes or files). Within thirty (30) days after written request of the Furnishing Party, an officer of the Receiving Party shall certify in writing that all Confidential Information in the possession of the Receiving Party and the Project Personnel, including all copies, extracts, summaries, and reproductions thereof (but excluding computer archival and backup tapes or files), in whole or in part, were either returned to the Furnishing Party or destroyed by the Receiving Party. Notwithstanding the foregoing, if any Confidential Information is incorporated into presentation information provided to the management of the Receiving Party or its affiliates, such presentation material may be retained by the Receiving Party or such affiliates subject to the terms of this Agreement. Notwithstanding the return or destruction of the Confidential Information, the Receiving Party and its Project Personnel will continue to be bound by their obligations of confidentiality and other obligations under this Agreement, subject to the terms of Paragraph 6 hereof.

8. The Furnishing Party hereby represents and warrants that it has the right and authority to disclose the Confidential Information to the Receiving Party in accordance with the limitations set forth in this Agreement. However, the Furnishing Party makes no representation or warranty as to the accuracy or completeness of any Confidential Information provided under this Agreement, and each Party expressly disclaims any and all liability that may be based on the Confidential Information of the Furnishing Party or any errors or omissions therein or therefrom.

9. The Receiving Party agrees that in the event of a breach or anticipated breach of this Agreement by the Receiving Party, the Furnishing Party's remedy at law will not be adequate and in addition to any other remedies available to it, the Furnishing Party shall be entitled to injunctive or similar relief. Notwithstanding anything else in this Agreement, the Receiving Party's liability to the Furnishing Party in contract shall be limited to direct damages, but shall exclude any other liability for special, indirect, incidental, punitive, or consequential damages (whether in contract, tort, warranty, strict liability, or otherwise), including, without limitation, lost profits or lost investment opportunity, even if the Receiving Party has been advised in advance that such damages could occur.

10. Disclosure of Confidential Information shall not be deemed to constitute a grant of a right or license to the Confidential Information or to any patents, patent applications, copyrighted material or trademarks of the Furnishing Party.

11. Execution of this Agreement shall not obligate either Party to enter into any further agreements or to proceed with any possible relationship or transaction.

12. THIS AGREEMENT SHALL BE GOVERNED BY AND INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK, WITHOUT

REGARD TO THE CONFLICT OF LAWS PRINCIPLES THEREOF THAT WOULD REQUIRE THE APPLICATION OF THE LAWS OF ANOTHER JURISDICTION.

13. This Agreement may not be assigned by either Party unless prior written consent is obtained from the other Party; however, either Party may assign this Agreement (including the right to enforce its terms) to a parent or subsidiary without consent.

14. Each Party is entitled, at any time, and without notice to the others, to negotiate, disclose, and to otherwise deal in any manner and for any purpose with third parties regarding its own Confidential Information.

15. No failure or delay on the part of either Party hereto in the exercise of any right hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such right preclude other or further exercise thereof or of any other right.

16. All notices or other communications required to be sent to either Party pursuant to this Agreement shall be in writing and delivered personally, or mailed by certified mail, return receipt requested and postage prepaid, or sent by overnight delivery, or sent by facsimile transmission to such Party at its last known address as specified in the Support Services Agreement.

17. In the event that any provision of this Agreement is declared by any court of competent jurisdiction to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining provisions of this Agreement, which shall be enforced to the maximum extent permitted by law. The Parties agree to renegotiate in good faith any term held invalid and to be bound by the mutually agreed substitute provision.

18. This Agreement may be executed in counterparts, without the necessity that both Parties execute the same counterpart, each of which shall be deemed an original but which together will constitute one and the same agreement. The exchange of executed copies of this Agreement, including the signature page hereto, by facsimile transmission shall constitute effective execution and delivery of this Agreement and may be used in lieu of the original Agreement for all purposes. Signatures of representatives of the Parties transmitted by facsimile shall be deemed to be their original signatures for all purposes.

19. This Agreement does not create or constitute any partnership, joint venture, or agency relationship between the Parties and no Party shall represent that such a relationship exists. Except as required to comply with applicable federal, state, or local law, rule, or regulation, a court or administrative order, or other legal process, or to comply with disclosure requirements under securities laws applicable to the Receiving Party or its affiliated parent, the Receiving Party will not hereafter disclose, and will not permit its Project Personnel to disclose, to any person other than those permitted hereunder to have access to Confidential Information, without the prior written

consent of the Furnishing Party (i) the fact that Confidential Information has been made available to the Receiving Party or that the Receiving Party has inspected any Confidential Information, (ii) the fact that discussions or negotiations have taken place, are taking place or are proposed to take place concerning a possible transaction relating to the Project, or (iii) any of the terms, conditions or other facts with respect to any such possible transaction.

20. This Agreement constitutes the entire Agreement and understanding between the Parties with respect to the subject matter hereof and supersedes all prior written or oral communications, negotiations, understandings, or agreements with respect to the subject matter hereof. This Agreement may be amended only by an agreement in writing duly executed by the Parties hereto.

21. The Receiving Party and the Receiving Party's Project Personnel shall bear all costs of the evaluation of the Confidential Information provided by the Furnishing Party, including the fees and disbursements of counsel and advisors engaged by the Receiving Party.

[Signature page follows]

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed as of the date first written above.

NEW YORK STATE ELECTRIC & GAS CORPORATION

By: [signature]

Name: LAURA S. CONCLINO

Title: VICE PRESIDENT, TECHNICAL SERV

Date: July 12, 2007

NEW YORK REGIONAL INTERCONNECT INC.

By: [signature]

Name: CHRIS L. THOMPSON

Title: V.P.

Date: July 11, 2007

Attachment for Interrogatory
DPS-32.14

Final
OC approved 9/14/0

Scope of the System Reliability Impact Study for the New York Regional Interconnect HVDC Independent Transmission line

1. **Purpose**

The purpose of this study is to evaluate the impact of the proposed New York Regional Interconnect, Inc.'s ("NYRI"), 190 mile, high voltage direct current (HVDC) transmission line (the "Project") on the reliability of the New York State Transmission System. The Project will be connected, at the northern end, to Niagara Mohawk Power Corporation d/b/a National Grid's ("National Grid") Edic Substation. The Project's southerly termination will be at Central Hudson Gas & Electric Corporation's ("CHG&E") Rock Tavern Substation. NYRI's HVDC line will operate at a maximum summer and winter rating of 1200 MW. Each converter station will be supplied with sufficient reactive compensation to supply its own reactive power needs. In addition, the Project now includes a static VAr compensator that will be located at the southern terminus and will provide -75 MVAr /+ 300 MVAr of dynamic reactive power support. The Project will be located in the Town of Marcy in Oneida County, New York at the northern end and the Town of New Windsor in Orange County at the southern end. The Project is expected to be in commercial operation by summer 2011.

The study will assess the impact of the Project on the base case power system, including potentially Affected Systems, and will provide a list of the facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities) required to make the interconnection and non-binding good faith estimates of cost and time to construct those facilities. The study will be conducted in accordance with the applicable NERC, NPCC, NYSRC, CHG&E, National Grid, and Affected Systems' reliability and design standards; and in accordance with applicable New York Independent System Operator ("NYISO"), CHG&E, and National Grid study guidelines, procedures and practices.

2. **Interconnection Plan**

The study will include a description of the proposed facilities and the conceptual design of the Interconnection to the transmission system. The description will include a one-line diagram depicting the proposed facilities and their integration with the existing facilities; See Appendix B for current Attachment Facility conceptual designs.

3. **Study Period**

The study will focus on the period of five years in the future. The study will be conducted using applicable Power Flow, Short Circuit and Stability base cases provided by the NYISO and will include the representation of other proposed projects listed in Appendix A.

4. **Study Area**

The study will evaluate the impact of the Project on the statewide bulk power system (Zones A through K). For the lower voltage transmission systems, the study will focus

on the Points of Interconnection (Edic Substation in the north and Rock Tavern Substation in the south) and the surrounding underlying 69, 115 & 138 kV transmission systems within the Mohawk Valley Region (Zone E), the Hudson Valley Region (Zone G), and one bus into the adjacent Zones C, F and H. The analyses of these adjacent buses may result in the consideration of additional buses to be analyzed.

5. **Base Case Conditions**
The impact of the proposed Project will be evaluated for summer peak load, winter peak load, and light load for the following base case conditions.

Case 1 – Base case without the Project. The base case will include the baseline system and the proposed projects listed in Appendix A. The Short Circuit base case will model all the projects as in-service. The Power Flow base case will normally model all projects in-service at full output, but may model some projects as out-of-service or less than full output as necessary to establish a feasible base commitment and dispatch. Generation will be committed and dispatched in accordance with NYISO practices.

Case 2 – Case 1 with the Project modeled at its full 1200 MW output in the North to South direction with a corresponding redispatch of upstate and downstate generation (1200 MW increase upstate and 1200 MW decrease downstate). Again, generation will be committed and dispatched in accordance with NYISO practices.

The above representation is based on an underlying assumption that the proposed HVDC facility will be utilized during periods that the parallel AC transmission between Edic and Rock Tavern is loaded at or near its normal transfer limit such that the AC transmission system may be constrained / congested without operation of the HVDC facility. Also, based on that assumption, the Project will not be evaluated in the reverse (South to North) direction because it's highly unlikely that the parallel AC system would be constrained in that direction. In the event that this underlying assumption is discovered to be invalid, it may be necessary to evaluate the impact of the Project under other scenarios.

6. **Analysis**
Thermal, Voltage, Stability and Short Circuit analyses will be conducted to assess the performance of the power system within the Study Area, with and without the Project, in accordance with applicable reliability standards and study practices. The analyses will determine the incremental impact of the project on the normal and emergency transfer limits of the Dysinger-East, West-Central, Volney-East, Moses-South, Central-East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable, LIPA Import, NE-NY, and PJM-NY interfaces. NYISO transfer limits will be evaluated in the predominant east-to-west and south direction. The NE-NY and PJM-NY interfaces will be evaluated in both directions. Sufficient analyses will be conducted to determine the most limiting of the thermal, voltage, or stability limit under summer and winter peak load conditions. The incremental impact of the project on all New York inter-state and intra-state phase angle regulators also will be determined. Modifications to base cases, during analyses, will be documented in the Study report. Harmonic analysis and net power factor analyses will be performed as part of the Facility Study.

6.1 Power Flow Analyses

Thermal and voltage analyses, using the PSS/E power flow or comparable program, will be performed for summer and winter peak load conditions in the Study Area. Initial lists of power flow contingencies for thermal and voltage analysis to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of any power flow analyses; the analyses of these contingencies may result in the consideration of additional contingencies.

6.2 Stability Analysis

Stability analysis will be performed, for summer peak and light load conditions, to determine the impact of the Project on system performance within the Study Area. This analysis will evaluate the performance of the system for normal criteria contingencies, and will address issues including, but not limited to, transient stability, dynamic stability (i.e. damping), critical clearing time, coordination of protection and control systems, and performance of any Special Protection Systems that may be affected. An initial list of stability contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the stability analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

6.3 Short Circuit Analysis

Short Circuit analysis will be performed to evaluate the impact of the Project on system protection and adequacy of existing circuit breakers, other fault current interrupting devices, and related equipment in the study area. This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment and CHG&E, National Grid, and Affected System criteria as applicable.

6.4 Extreme Contingency Assessment

The study will evaluate representative extreme contingencies within the Study Area, discuss significant load flow and stability analyses, showing the base case and post-fault conditions in the Study Area, and report on pre- and post-Project system response for the most severe contingencies, as specified in Section 7.0 of the NPCC Basic Criteria, entitled "Extreme Contingency Assessment". An initial list of extreme contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the extreme contingency analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

7. Modeling Assumptions

7.1 Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes, and were modeled in the NYISO FERC 715 power flow

base cases filed in 2005.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

7.3 In order to determine transfer limits, the analysis will simulate generation re-dispatches according to the standard proportions used in NYISO transmission planning and operating studies, for NYISO interfaces. Where applicable, for local (Transmission Owner) interfaces, generation re-dispatching will be done in accordance with Transmission Owner standards and practices. The assumed locations for adjusting generation for evaluating transfer limits of the various interfaces are as follows:

Interface	Locations for Increasing Generation	Locations for Decreasing Generation
Central East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable	~30% Ontario ~70% Upstate NY	~93% New York City ~7% Long Island
Dysinger-East, West-Central, Volney-East	100% Ontario (Toronto)	~93% New York City ~7% Long Island
Moses-South	100% North (Zone D)	~70% Western New York ~30% New York City
LIPA Import	~75% New York City ~25% Hudson (Zone G)	100% Long Island
NYISO – PJM	~70% Downstate ~30% Upstate	~70% Eastern PJM ~30% West/Central PJM
NYISO - ISONE	~50% Ontario ~50% Quebec	~50% Northern NE ~50% Southern NE

8. System Upgrade Facilities

If study results indicate that the Project, as proposed, would result in violations of reliability standards, analyses will be performed to identify any System Upgrade Facilities (SUFs) that would be required to meet the NYISO's Minimum Interconnection Standard.

9. Cost Estimates of Facilities/Time to Construct

A description of facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the New York State Transmission System, and non-binding good faith estimates of cost and time to construct those facilities, will be provided.

10. Report

A report will be prepared, following the report outline (as applicable) specified in the

NYISO Transmission Planning Guideline #1.0. The report will document the 3 phase, L-G and LL-G fault current level changes greater than 100 Amps in the study area and document the short circuit models used to represent the project. The report shall also document the project transformer nameplate rating, winding ratings, configurations and design impedances. Where local generation commitment and/or dispatch was changed to reduce or eliminate a violation, the study report will document the relationships between the violation, Project flow and local generation dispatch, and discuss how operating procedures may be implemented to secure the impacted transmission facility.

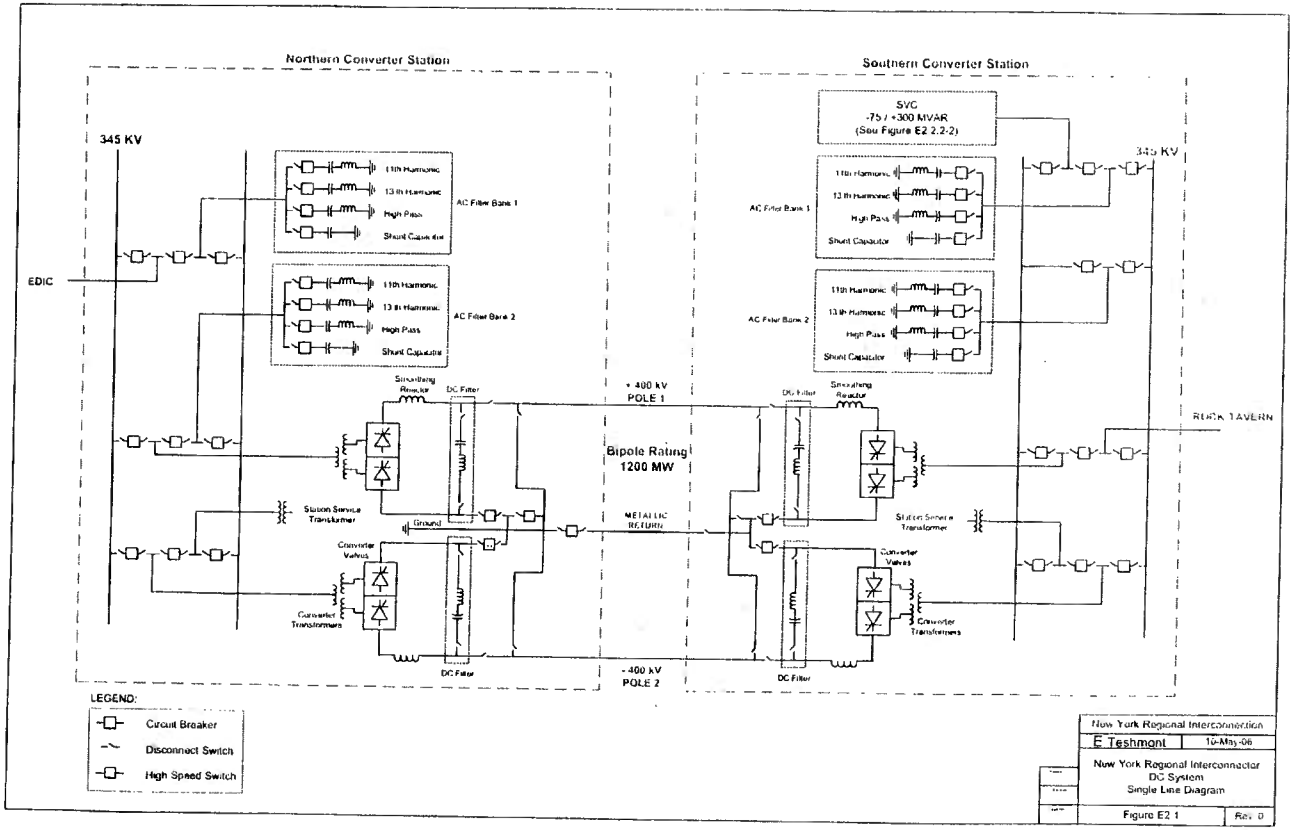
Appendix A

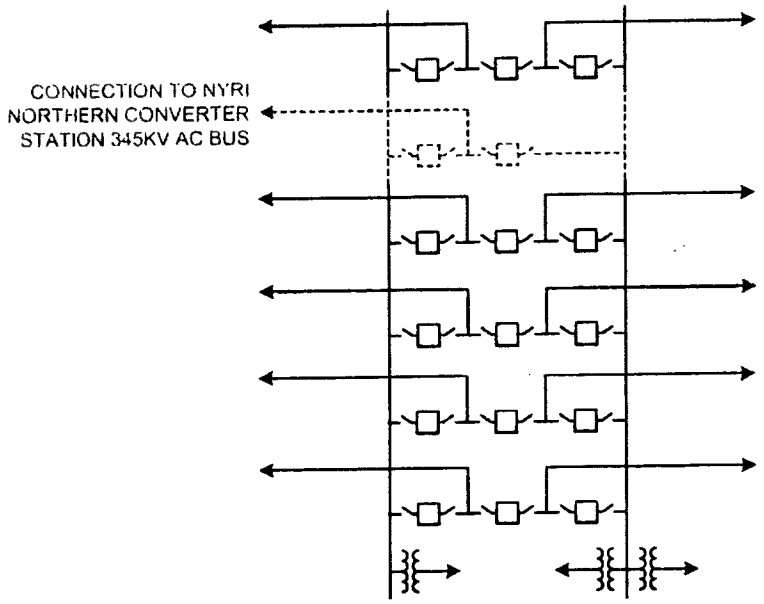
List of Other Proposed Projects to be Modeled in the Base Case For New York Regional Interconnect HVDC

Queue Pos.	Developer/Project Name	Size (MW)
18	NYPA Poletti Project	500
19	NYC Energy Kent Ave	79.9
20	KeySpan Spagnoli Road CC Unit	250
25	ConEd East River Repowering	288
31	SCS Astoria Energy	1000
65	Fortistar LMA Lockport II	79.9
69	Besicorp Empire State Newsprint	660
90	Fortistar VP	79.9
91	Fortistar VAN	79.9
93	PSEG Cross Hudson Project	550
94	Atlantic Energy Neptune PJM-LI DC	660
96	Calpine JFK Expansion	45
106	TransGas Energy	1100
107	Caithness Long Island	310
113	Global Winds Prattsburgh Project	75
117	Chautauqua Windpower Project	50
119	ECOGEN Prattsburgh Wind Farm	79.5
125	Linden VFT Inter-Tie	300
127A	Airtricity Munnsville	40
135	UPC Wind Canandaigua Wind	81
136	Rochester Transmission Project	N/A
139	Entergy Indian Point 3 Uprate	38
141	Flat Rock Wind Power	300
142	Airtricity Hartsville Wind	50
143	Constellation Ginna Plant Uprate	95
144	Invenergy High Sheldon Windfarm	198
146	Con Edison Mott Haven Substation	N/A
147	NY Windpower West Hill Windfarm	40
150	Reunion Power Cherry Valley Wind	70
152	Invenergy Stamford Wind	129
153	ConEd Sprain Brook-Sherman Crk (M-29)	500
155	Invenergy Canisteo Hills Windfarm	149
156	AREC Fairfield Wind Project	120
157	Orion Energy NY I	100
160	AREC Scrub Wind Project	102
161	NY Windpower Marble [illegible] Project	84
163	Clipper Windpower Pine Hills Wind Project	100
164	FPL Energy Long Island Offshore Wind	140
166	AES New York St. Lawrence Wind Farm	130

Queue Pos.	Developer/Project Name	Size (MW)
168	Dairy Hills Wind Farm	132
169	Batavia Wind Farm	90.8
170	Machias Wind Farm	90
171	Clinton County Wind Farm	134
172	Noble Clinton Windpark	80
173	Noble Bliss Windpark	71
174	Noble Altona Windpark	99
175	Noble Ellenburg Windpark	79.5
177	Noble Wethersfield Windpark 230kV option	129
178	Noble Allegany Windpark	99
179	Noble Malone Windpark	159
180	Invenergy Buffalo Rd. Wind Farm 230 kV	165
182	Everpower Howard Wind	79
185	NYPA Blenheim Gilboa Storage	120
186	Community Energy Jordanville Wind	150
187	NY Windpower North Slope Wind	109.5
189	PPM Energy Clayton Wind	132
190	PPM Energy Mixer Road Wind	66

Appendix B
New York Interconnection Single Line Diagram





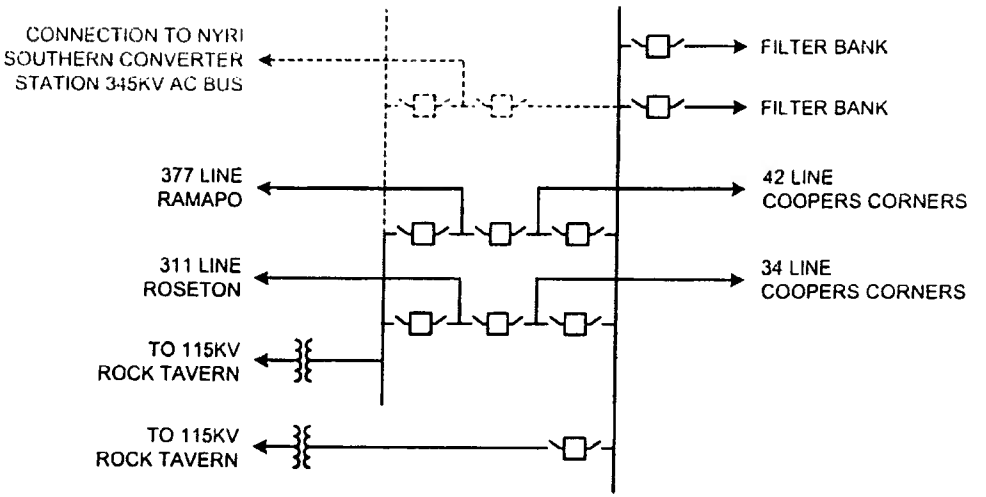
NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Edic

—— Planned Future Facilities at Edic (National Grid)

New York Regional Interconnection	
E Teshmont	10-May-06
Interconnection to Edic 345kV Substation Single Line Diagram	
Figure E2.2.1-7	Rev. 0



NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Rock Tavern

	New York Regional Interconnection	
	E Teshmont	10-May-06
	Interconnection to Rock Tavern 345kV Substation Single Line Diagram	
	Figure E2.2.2-3	Rev. 0

APPENDIX 2 TO LFIP

NEW YORK REGIONAL INTERCONNECT PROJECT

INTERCONNECTION FEASIBILITY STUDY AGREEMENT

THIS AGREEMENT is made and entered into this 8th day of February, 2006 by and among New York Regional Interconnect Inc., organized and existing under the laws of the State of New York ("Developer,"), the New York Independent System Operator, Inc., a not-for-profit corporation organized and existing under the laws of the State of New York ("NYISO"), and Central Hudson Gas and Electric Corporation, a company organized and existing under the laws of the State of New York ("Transmission Owner"). Developer, NYISO and Transmission Owner each may be referred to as a "Party," or collectively as the "Parties."

RECITALS

WHEREAS, Developer is proposing to develop a Large Generating Facility or Merchant Transmission Facility, or capacity addition to an existing Generating Facility or Merchant Transmission Facility consistent with the Interconnection Request submitted by Developer dated May 13, 2005; and

WHEREAS, Developer desires to interconnect the Large Facility with the New York State Transmission System; and

WHEREAS, Developer has requested the NYISO to perform an Interconnection Feasibility Study with the input and assistance of Transmission Owner to assess the feasibility of interconnecting the proposed Large Facility to the New York State Transmission System;

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein the Parties agreed as follows:

1.0 When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated in the NYISO's Commission-approved Standard Large Facility Interconnection Procedures.

2.0 Developer elects and NYISO shall cause to be performed an Interconnection Feasibility Study consistent with Section 6.0 of the Standard Large Facility Interconnection Procedures in accordance with the NYISO OATT. The terms of Sections 6, 13.1 and 13.3 of the LFIP, as applicable, are hereby incorporated by reference herein.

3.0 The scope of the Interconnection Feasibility Study shall be subject to the assumptions set forth in Attachment A to this Agreement.

4.0 The Interconnection Feasibility Study shall be based on the technical information provided by Developer in the Interconnection Request, as may be modified as the result of the Scoping Meeting. NYISO reserves the right to request additional

information from Developer and Transmission Owner as may reasonably become necessary consistent with Good Utility Practice during the course of the Interconnection Feasibility Study and as designated in accordance with Section 3.3.4 of the LFIP and such additional information shall be provided in a prompt manner. If, after the designation of the Point of Interconnection pursuant to Section 3.3.4 of the LFIP, Developer modifies its Interconnection Request pursuant to Section 4.4, the time to complete the Interconnection Feasibility Study may be extended.

5.0 The Interconnection Feasibility Study report shall provide the following information:

- preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- preliminary identification of any thermal overload or voltage limit violations resulting from the interconnection; and
- preliminary description and non-binding estimated cost of facilities required to interconnect the Large Facility to the New York State Transmission System and to address the identified short circuit and power flow issues.

6.0 The Developer shall provide a deposit of $10,000 for the performance of the Interconnection Feasibility Study.

Upon receipt of the Interconnection Feasibility Study the NYISO shall charge and Developer shall pay to NYISO the actual costs of the Interconnection Feasibility Study incurred by the NYISO and Transmission Owner as computed on a time and materials basis in accordance with the rates attached hereto.

Any difference between the deposit and the actual cost of the study shall be paid by or refunded to the Developer, as appropriate.

7.0 Miscellaneous.

7.1 Accuracy of Information. Except as Developer or Transmission Owner may otherwise specify in writing when they provide information to the NYISO under this Agreement, Developer and Transmission Owner each represent and warrant that the information it provides to NYISO shall be accurate and complete as of the date the information is provided. Developer and Transmission Owner shall each promptly provide NYISO with any additional information needed to update information previously provided.

7.2 Disclaimer of Warranty. In preparing the Interconnection Feasibility Study, the Party preparing such study and any subcontractor consultants employed by it shall have to rely on information provided by the other Parties, and possibly by third parties, and may not have control over the accuracy of such information. Accordingly, neither the Party preparing the Interconnection Feasibility Study nor any subcontractor consultant employed by that Party makes any warranties, express or implied, whether arising by operation of law, course of performance or dealing, custom, usage in the trade or profession, or otherwise, including without limitation implied warranties of merchantability and fitness for a particular purpose, with regard to the accuracy, content, or conclusions of the Interconnection Feasibility Study. Developer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

7.3 Limitation of Liability. In no event shall any Party or its subcontractor consultants be liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with this Agreement or the Interconnection Feasibility Study or any reliance on the Interconnection Feasibility Study by any Party or third parties, even if one or more of the Parties or its subcontractor consultants have been advised of the possibility of such damages. Nor shall any Party or its subcontractor consultants be liable for any delay in delivery or for the non-performance or delay in performance of its obligations under this Agreement.

7.4 Third-Party Beneficiaries. Without limitation of Sections 7.2 and 7.3 of this Agreement, Developer and Transmission Owner further agree that subcontractor consultants hired by NYISO to conduct or review, or to assist in the conducting or reviewing, an Interconnection Feasibility Study shall be deemed third party beneficiaries of these Sections 7.2 and 7.3.

7.5 Term and Termination. This Agreement shall be effective from the date hereof and unless earlier terminated in accordance with this Section 7.5, shall continue in effect for a term of one year or until the Interconnection Feasibility Study for Developer's Large Facility is completed, whichever event occurs first. Developer or NYISO may terminate this Agreement upon the withdrawal of Developer's Interconnection Request under Section 3.6 of the LFIP.

7.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to any choice of laws provisions.

7.7 Severability. In the event that any part of this Agreement is deemed as a matter of law to be unenforceable or null and void, such unenforceable or void part shall be deemed severable from this Agreement and the Agreement shall continue in full force and effect as if each part was not contained herein.

7.8 Counterparts. This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as the original instrument.

7.9 Amendment. No amendment, modification or waiver of any term hereof shall be effective unless set forth in writing signed by the Parties hereto.

7.10 Survival. All warranties, limitations of liability and confidentiality provisions provided herein shall survive the expiration or termination hereof.

7.11 Independent Contractor. NYISO shall at all times be deemed to be an independent contractor and none of its employees or the employees of its subcontractors shall be considered to be employees of Developer or Transmission Owner as a result of this Agreement.

7.12 No Implied Waivers. The failure of a Party to insist upon or enforce strict performance of any of the provisions of this Agreement shall not be construed as a waiver or relinquishment to any extent of such party's right to insist or rely on any such provision, rights and remedies in that or any other instances; rather, the same shall be and remain in full force and effect.

7.13 Successors and Assigns. This Agreement, and each and every term and condition hereof, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: Michael Calimano

Title: VP - Operations

Date: 2/24/06

Central Hudson Gas and Electric Corporation

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

Central Hudson Gas and Electric Corporation

By: _____
James P. Lovette

Title: Vice President – Engineering and Environmental Affairs

Date: 2/8/06

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

Central Hudson Gas and Electric Corporation

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: _____

Title: President

Date: January 12, 2006

Attachment A to Appendix 2
Interconnection Feasibility
Study Agreement

ASSUMPTIONS USED IN CONDUCTING THE INTERCONNECTION FEASIBILITY STUDY

The Interconnection Feasibility Study will be based upon the information set forth in the Interconnection Request and agreed upon in the Scoping Meeting held on October 12, 2005:

The Developer will independently contract with a third party, in a manner consistent with Section 13.4 of the Large Facility Interconnection Procedures, to perform certain portions of the Interconnection Feasibility Study, including the short circuit analysis and power flow analysis, and to prepare the draft study report as described in the Interconnection Feasibility Study scope. The Developer will provide the draft study report and supporting documentation to the NYISO, Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid"), and Central Hudson Gas & Electric Corporation ("CHG&E") for review within 60 days from Developer's receipt of the Base Case data necessary to perform the analyses from the NYISO. Developer's obligation to provide the draft study report and documentation within 60 days is a requirement of the Large Facility Interconnection Procedures subject to Section 3.6 of those procedures. The NYISO, National Grid and CHG&E estimate that they will all complete their review of the draft report within 30 days from receipt.

Designation of Point of Interconnection and configuration to be studied.

The Project will be connected, at the northern end, to National Grid's Edic Substation. The Project's southerly termination will be at CHG&E's Rock Tavern Substation. The interconnection with CHG&E's Rock Tavern Substation will be subject to this agreement, while the interconnection with National Grid's Edic Substation will be subject to a separate agreement involving National Grid.

Designation of alternative Point(s) of Interconnection and configuration.

N/A

EXHIBIT 1:

Scope of the Interconnection Feasibility Study for the New York Regional Interconnect HVDC Independent Transmission line

1. **Purpose**

The purpose of this study is to make a preliminary evaluation of the feasibility of the proposed interconnection of New York Regional Interconnect, Inc.'s ("NYRI"), 260 mile, high voltage direct current (HVDC) transmission line (the "Project") to the New York State Transmission System. The Project will be connected, at the northern end, to Niagara Mohawk Power Corporation d/b/a National Grid's ("National Grid") Edic Substation. The Project's southerly termination will be at Central Hudson Gas & Electric Corporation's ("CHG&E") Rock Tavern Substation. NYRI's HVDC line will operate at a maximum summer and winter rating of 1200 MW. The Project will be located in the Town of Marcy in Oneida County, New York at the northern end and the Town of New Windsor in Orange County at the southern end. The Project is expected to be in commercial operation by summer 2010.

The study will assess the impact of the Project on the base case electric system, including potentially Affected Systems, and will provide a list of the facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities) required to make the interconnection and non-binding good faith estimates of cost and time to construct those facilities. The study will be conducted in accordance with the applicable NERC, NPCC, NYSRC, CHG&E, and National Grid reliability and design standards; and in accordance with applicable, New York Independent System Operator ("NYISO"), CHG&E, and National Grid study guidelines, procedures and practices.

2. **Interconnection Plan**

The study will include a description of the proposed facilities and the conceptual design of the Interconnection to the transmission system. The description will include a one-line diagram depicting the proposed facilities and their integration with the existing facilities.

3. **Study Period**

The study will focus on the period of five years in the future. The study will be conducted using appropriate Power Flow and Short Circuit base cases provided by the NYISO and will include the representation of other proposed projects listed in Appendix A.

4. **Study Area**

The study will focus on the Point of Interconnection (Edic Substation in the north and Rock Tavern Substation in the south) and the surrounding 345 kV, and local transmission systems within the Mohawk Valley Region (Zone E), the Hudson Valley Region (Zone G), the Millwood Region (Zone H) and the Dunwoodie Region (Zone I) in upstate and down state New York that are most likely to be affected by the Project (the "Study Area").

5. **Base Case Conditions**
The preliminary impact of the proposed Project will be evaluated for summer and winter peak load conditions for the following base case conditions.

Case 1 – Base case without the Project. The base case will include the proposed projects listed in Appendix A. The Short Circuit base case will model all the projects as in-service. The Power Flow base case will normally model all projects in-service at full output, but may model some projects as out-of-service or less than full output as necessary to establish a feasible base dispatch. Generation will be dispatched in accordance with NYISO practices.

Case 2 – Case 1 with the Project modeled. The Project will be modeled as in-service at full load with MW flows directed towards NYC in the summer base case and MW flows directed northward in the winter base case. Generation will be re-dispatched in the Power Flow case in accordance with NYISO practices.

6. **Analysis**
Limited Thermal, Voltage and Short Circuit analyses will be conducted to assess the performance of the power system within the Study Area, with and without the Project, in accordance with applicable reliability standards and study practices.

6.1 **Power Flow Analyses**
Thermal and voltage analyses, using the PSS/E load flow program or other comparable program, will be conducted for pre-contingency and design criteria contingency conditions, and will be limited to the Study Area. Thermal Limits will be assessed using normal ratings pre-contingency, and applicable emergency ratings (Long-Term-Emergency, LTE, ratings or Short-Term-Emergency, STE, ratings) post-contingency. Voltage limit will be assessed, pre and post contingency, using NYISO voltage limits for the bulk power system and 0.95 – 1.05 pu for other transmission system buses, unless specified otherwise.

6.2 **Short Circuit Analysis**
Short Circuit analysis will be performed to determine the fault duty of buses within the Study Area, and to identify if any circuit breaker ratings have been exceeded as a result of the Project. This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment andNational Grid, and CHG&E criteria.

7. **Modeling Assumptions**

7.1 Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes, and were modeled in the NYISO 2005 FERC 715 power flow base cases.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

8. **Evaluation and Identification of System Upgrade Facilities ("SUFs")**
If study results indicate that the Project, as proposed, would result in violations of reliability standards, analyses will be performed to identify any SUFs that would be required to meet the NYISO's Minimum Interconnection Standard..

9. **Preliminary Cost Estimates of Facilities**
A preliminary description of facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the New York State Transmission System, and non-binding good faith estimates of cost and time to construct those facilities, will be provided. These cost estimates will reflect only the limited analysis performed in this Feasibility Study and do not consider light load or other system conditions that the parties expect to evaluate in the System Reliability Impact Study.

10. **Report**
A report will be prepared to document the feasibility study results and supporting information.

Appendix A

List of Other Proposed Projects to be Modeled in the Base Case For New York Regional Interconnect HVDC

Queue Pos.	Developer/Project Name	Size (MW)
18	NYPA Poletti Project	500
19	NYC Energy Kent Ave	79.9
20	KeySpan Spagnoli Road CC Unit	250
22	Calpine Wawayanda Energy Center	500
24	Reliant Astoria Repowering Phase 1	367
25	ConEd East River Repowering	288
29	Mirant Bowline Point 3	750
31	SCS Astoria Energy	1000
65	Fortistar LMA Lockport II	79.9
69	Besicorp Empire State Newsprint	660
70	Reliant Astoria Repowering Phase 2	173
90	Fortistar VP	79.9
91	Fortistar VAN	79.9
93	PSEG Cross Hudson Project	550
94	Atlantic Energy Neptune PJM-LI DC	660
96	Calpine JFK Expansion	45
107	Caithness Long Island	310
110	Liberty Radial Interconnection to NYC	400
113	Global Winds Prattsburgh Project	75
117	Chautauqua Windpower Project	50
119	ECOGEN Prattsburgh Wind Farm	79.5
127A	Airtricity Munnsville	40
135	UPC Wind Canandaigua Wind	81
136	Rochester Transmission Project	N/A
139	Entergy Indian Point 3 Uprate	38
141	Flat Rock Wind Power	300
142	Airtricity Hartsville Wind	50
143	Constellation Ginna Plant Uprate	95
144	Invenergy High Sheldon Windfarm	198
146	Con Edison Mott Haven Substation	N/A
147	NY Windpower West Hill Windfarm	40
150	Reunion Power Cherry Valley Wind	70
152	Invenergy Stamford Wind	129
153	ConEd Sprain Brook-Sherman Crk (M-29)	500
155	Invenergy Canisteo Hills Windfarm	149
156	AREC Fairfield Wind Project	120
157	Orion Energy NY I	100
158	Orion Energy NY II	100
160	AREC Burke Wind Project	102
161	NY Windpower Marble River Wind Project	76
163	Clipper Windpower Pine Hills Wind Project	100
164	FPL Energy Long Island Offshore Wind	140

Queue Pos.	Developer/Project Name	Size (MW)
166	AES New York St. Lawrence Wind Farm	130
168	Zilka Perry Wind Farm	132
169	Zilkha Batavia Wind Farm	90.8
170	Zilkha Machias Wind Farm	90
171	Zilkha Clinton County	123.8
172	Noble Clinton Wind Field	80
173	Noble Bliss Wind Field	71
174	Noble Altona Wind Field	99
175	Noble Ellenburg Wind Field	79.5
176	Noble Wethersfield Wind Field 115kV option	129
177	Noble Wethersfield Wind Field 230kV option	129
178	Noble Allegany Wind Field	99
179	Noble Malone Wind field	159
180	Invenergy Buffalo Rd. Wind Farm 230 kV	165
182	Everpower Howard Wind	102.3
185	NYPA Blenheim Gilboa Storage	120
186	Community Energy Jordanville Wind	150
187	NY Windpower North Slope Wind	109.5
189	PPM Energy Clayton Wind	132
190	PPM Energy Mixer Road Wind	66

EXHIBIT 2:

Study Tasks Allocated to the NYISO, Transmission Owners and Developer For the Study as Outlined in the Scope

The following tasks apply to the evaluation of the Points of Interconnection specified by the Developer. For this Project, the Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and Central Hudson Gas & Electric Corporation's ("CHG&E") are the relevant Transmission Owners. The Project will be connected, at the northern end, to National Grid's Edic Substation and, at the southern end, to CHG&E's Rock Tavern Substation. Both Points of Interconnection will be evaluated under a single Interconnection Feasibility Study, but will be subject to two study agreements (one for each Transmission Owner).

Tasks No. / Description	Both Points	Edic	Rock Tavern
1. Provide a proposed configuration and associated modeling information of the relevant Transmission Owners' Attachment Facilities as they integrate with Developer's Attachment Facilities to the NYISO and Developer (Consultant).		National Grid	CHG&E
2. Prepare power flow and short circuit cases for the study. Send cases to the Developer (Consultant) and relevant Transmission Owners.	NYISO		
3. Conduct power flow analysis to complete the design of Attachment Facilities and identify any necessary System Upgrade Facilities ("SUFs") from a power flow perspective and deliver to the NYISO and relevant Transmission Owners.	Developer (Consultant)		
4. Conduct short circuit analysis to complete the design of Attachment Facilities and identify any necessary SUFs from a short circuit perspective and deliver to the NYISO and relevant Transmission Owners.	Developer (Consultant)		
5. Conduct a preliminary review of local protection issues relative to the evaluation and design of Attachment Facilities and SUFs and deliver to the NYISO and Developer (Consultant).		National Grid	CHG&E
6. Prepare good faith cost estimate of Transmission Owner's Attachment Facilities and any identified SUFs and provide to the NYISO and Developer.		National Grid	CHG&E
7. Prepare study report and supporting documentation. Sent draft report to the NYISO and relevant Transmission Owners and for review.	Developer (Consultant)		

8. Review draft study report.	NYISO	National Grid	CHG&E

Any Task allocated above to Transmission Owners will be performed by that Transmission Owner pursuant to the terms and conditions of the Technical Services Agreements between the NYISO and each Transmission Owner individually. In addition to the Tasks allocated above, the NYISO will review the study work performed by the Transmission Owners, and the Transmission Owners will review the work of the NYISO for the relevant Point of Interconnection. This review work will not be subject to billing under the Technical Services Agreement. The NYISO will have ultimate responsibility for the study report provided to the Developer.

EXHIBIT 3:

STUDY COSTS

Consistent with Section 6.1 of the LFIP, the NYISO, Niagara Mohawk Power Corporation d/b/a National Grid, and Central Hudson Gas & Electric Corporation estimate in good faith that the Interconnection Feasibility Study reviewing both Points of Interconnection will cost $80,000.

The following are Central Hudson Gas & Electric Corporation Costs for services provided under this Agreement:

Technical Services:	$85 - $140 per hour
Management Services:	$85 - $175 per hour

The following are the rates for the services to be provided by the NYISO under this Agreement:

VP/Director	$255.00/hr.
All others	$175.00/hr.

APPENDIX 2 TO LFIP

NEW YORK REGIONAL INTERCONNECT PROJECT

INTERCONNECTION FEASIBILITY STUDY AGREEMENT

THIS AGREEMENT is made and entered into this 12th day of January, **2006** by and among New York Regional Interconnect Inc. organized and existing under the laws of the State of New York, ("Developer"), the New York Independent System Operator, Inc., a not-for-profit corporation organized and existing under the laws of the State of New York ("NYISO"), and Niagara Mohawk Power Corporation d/b/a National Grid, a company organized and existing under the laws of the State of New York ("Transmission Owner"). Developer, NYISO and Transmission Owner each may be referred to as a "Party," or collectively as the "Parties."

RECITALS

WHEREAS, Developer is proposing to develop a Large Generating Facility or Merchant Transmission Facility, or capacity addition to an existing Generating Facility or Merchant Transmission Facility consistent with the Interconnection Request submitted by Developer dated May 13, 2005; and

WHEREAS, Developer desires to interconnect the Large Facility with the New York State Transmission System; and

WHEREAS, Developer has requested the NYISO to perform an Interconnection Feasibility Study with the input and assistance of Transmission Owner to assess the feasibility of interconnecting the proposed Large Facility to the New York State Transmission System;

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein the Parties agreed as follows:

1.0 When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated in the NYISO's Commission-approved Standard Large Facility Interconnection Procedures.

2.0 Developer elects and NYISO shall cause to be performed an Interconnection Feasibility Study consistent with Section 6.0 of the Standard Large Facility Interconnection Procedures in accordance with the NYISO OATT. The terms of Sections 6, 13.1 and 13.3 of the LFIP, as applicable, are hereby incorporated by reference herein.

3.0 The scope of the Interconnection Feasibility Study shall be subject to the assumptions set forth in Attachment A to this Agreement.

4.0 The Interconnection Feasibility Study shall be based on the technical information provided by Developer in the Interconnection Request, as may be modified as the result of the Scoping Meeting. NYISO reserves the right to request additional

information from Developer and Transmission Owner as may reasonably become necessary consistent with Good Utility Practice during the course of the Interconnection Feasibility Study and as designated in accordance with Section 3.3.4 of the LFIP and such additional information shall be provided in a prompt manner. If, after the designation of the Point of Interconnection pursuant to Section 3.3.4 of the LFIP, Developer modifies its Interconnection Request pursuant to Section 4.4, the time to complete the Interconnection Feasibility Study may be extended.

5.0 The Interconnection Feasibility Study report shall provide the following information:

- preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- preliminary identification of any thermal overload or voltage limit violations resulting from the interconnection; and
- preliminary description and non-binding estimated cost of facilities required to interconnect the Large Facility to the New York State Transmission System and to address the identified short circuit and power flow issues.

6.0 The Developer shall provide a deposit of $10,000 for the performance of the Interconnection Feasibility Study.

Upon receipt of the Interconnection Feasibility Study the NYISO shall charge and Developer shall pay to NYISO the actual costs of the Interconnection Feasibility Study incurred by the NYISO and Transmission Owner as computed on a time and materials basis in accordance with the rates attached hereto.

Any difference between the deposit and the actual cost of the study shall be paid by or refunded to the Developer, as appropriate.

7.0 Miscellaneous.

7.1 Accuracy of Information. Except as Developer or Transmission Owner may otherwise specify in writing when they provide information to the NYISO under this Agreement, Developer and Transmission Owner each represent and warrant that the information it provides to NYISO shall be [illegible] and complete as of the date the information is provided. Developer and Transmission Owner shall each promptly provide NYISO any additional information needed to update information previously provided.

7.2 Disclaimer of Warranty. In preparing the Interconnection Feasibility Study, the Party preparing such study and any subcontractor consultants employed by it shall have to rely on information provided by the other Parties, and possibly by third parties, and may not have control over the accuracy of such information. Accordingly, neither the Party preparing the Interconnection Feasibility Study nor any subcontractor consultant employed by that Party makes any warranties, express or implied, whether arising by operation of law, course of performance or dealing, custom, usage in the trade or profession, or otherwise, including without limitation implied warranties of merchantability and fitness for a particular purpose, with regard to the accuracy, content, or conclusions of the Interconnection Feasibility Study. Developer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

7.3 Limitation of Liability. In no event shall any Party or its subcontractor consultants be liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with this Agreement or the Interconnection Feasibility Study or any reliance on the Interconnection Feasibility Study by any Party or third parties, even if one or more of the Parties or its subcontractor consultants have been advised of the possibility of such damages. Nor shall any Party or its subcontractor consultants be liable for any delay in delivery or for the non-performance or delay in performance of its obligations under this Agreement.

7.4 Third-Party Beneficiaries. Without limitation of Sections 7.2 and 7.3 of this Agreement, Developer and Transmission Owner further agree that subcontractor consultants hired by NYISO to conduct or review, or to assist in the conducting or reviewing, an Interconnection Feasibility Study shall be deemed third party beneficiaries of these Sections 7.2 and 7.3.

7.5 Term and Termination. This Agreement shall be effective from the date hereof and unless earlier terminated in accordance with this Section 7.5, shall continue in effect for a term of one year or until the Interconnection Feasibility Study for Developer's Large Facility is completed, whichever event occurs first. Developer or NYISO may terminate this Agreement upon the withdrawal of Developer's Interconnection Request under Section 3.6 of the LFIP.

7.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to any choice of laws provisions.

7.7 Severability. In the event that any part of this Agreement is deemed as a matter of law to be unenforceable or null and void, such unenforceable or void part shall be deemed severable from this Agreement and the Agreement shall continue in full force and effect as if each part was not contained herein.

7.8 Counterparts. This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as the original instrument.

7.9 Amendment. No amendment, modification or waiver of any term hereof shall be effective unless set forth in writing signed by the Parties hereto.

7.10 Survival. All warranties, limitations of liability and confidentiality provisions provided herein shall survive the expiration or termination hereof.

7.11 Independent Contractor. NYISO shall at all times be deemed to be an independent contractor and none of its employees or the employees of its subcontractors shall be considered to be employees of Developer or Transmission Owner as a result of this Agreement.

7.12 No Implied Waivers. The failure of a Party to insist upon or enforce strict performance of any of the provisions of this Agreement shall not be construed as a waiver or relinquishment to any extent of such party's right to insist or rely on any such provision, rights and remedies in that or any other instances; rather, the same shall be and remain in full force and effect.

7.13 Successors and Assigns. This Agreement, and each and every term and condition hereof, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: Michael Calimano

Title: VP - Operations

Date: 2/24/06

Niagara Mohawk Power Corporation d/b/a National Grid

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

Niagara Mohawk Power Corporation d/b/a National Grid

By: [signature]

Title: VP Transmission Commercial Services

Date: 1/11/06

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

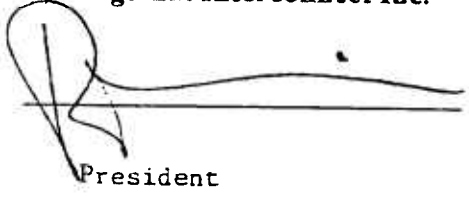
Niagara Mohawk Power Corporation d/b/a National Grid

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: 

Title: President

Date: January 12, 2006

Attachment A to Appendix 2
Interconnection Feasibility
Study Agreement

ASSUMPTIONS USED IN CONDUCTING THE INTERCONNECTION FEASIBILITY STUDY

The Interconnection Feasibility Study will be based upon the information set forth in the Interconnection Request and agreed upon in the Scoping Meeting held on October 12, 2005:

The Developer will independently contract with a third party, in a manner consistent with Section 13.4 of the Large Facility Interconnection Procedures, to perform certain portions of the Interconnection Feasibility Study, including the short circuit analysis and power flow analysis, and to prepare the draft study report as described in the Interconnection Feasibility Study scope. The Developer will provide the draft study report and supporting documentation to the NYISO, Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid"), and Central Hudson Gas & Electric Corporation ("CHG&E") for review within 60 days from Developer's receipt of the Base Case data necessary to perform the analyses from the NYISO. Developer's obligation to provide the draft study report and documentation within 60 days is a requirement of the Large Facility Interconnection Procedures subject to Section 3.6 of those procedures. The NYISO, National Grid and CHG&E estimate that they will all complete their review of the draft report within 30 days from receipt.

Designation of Point of Interconnection and configuration to be studied.

The Project will be connected, at the northern end, to National Grid's Edic Substation. The Project's southerly termination will be at CHG&E's Rock Tavern Substation. The interconnection with National Grid's Edic Substation will be subject to this agreement, while the interconnection with CHG&E's Rock Tavern Substation will be subject to a separate agreement involving CHG&E.

Designation of alternative Point(s) of Interconnection and configuration.

N/A

EXHIBIT 1:

Scope of the Interconnection Feasibility Study for the New York Regional Interconnect HVDC Independent Transmission line

1. **Purpose**

The purpose of this study is to make a preliminary evaluation of the feasibility of the proposed interconnection of New York Regional Interconnect, Inc.'s ("NYRI"), 260 mile, high voltage direct current (HVDC) transmission line (the "Project") to the New York State Transmission System. The Project will be connected, at the northern end, to Niagara Mohawk Power Corporation d/b/a National Grid's ("National Grid") Edic Substation. The Project's southerly termination will be at Central Hudson Gas & Electric Corporation's ("CHG&E") Rock Tavern Substation. NYRI's HVDC line will operate at a maximum summer and winter rating of 1200 MW. The Project will be located in the Town of Marcy in Oneida County, New York at the northern end and the Town of New Windsor in Orange County at the southern end. The Project is expected to be in commercial operation by summer 2010.

The study will assess the impact of the Project on the base case electric system, including potentially Affected Systems, and will provide a list of the facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities) required to make the interconnection and non-binding good faith estimates of cost and time to construct those facilities. The study will be conducted in accordance with the applicable NERC, NPCC, NYSRC, CHG&E, and National Grid reliability and design standards; and in accordance with applicable, New York Independent System Operator ("NYISO"), CHG&E, and National Grid study guidelines, procedures and practices.

2. **Interconnection Plan**

The study will include a description of the proposed facilities and the conceptual design of the Interconnection to the transmission system. The description will include a one-line diagram depicting the proposed facilities and their integration with the existing facilities.

3. **Study Period**

The study will focus on the period of five years in the future. The study will be conducted using appropriate Power Flow and Short Circuit base cases provided by the NYISO and will include the representation of other proposed projects listed in Appendix A.

4. **Study Area**

The study will focus on the Point of Interconnection (Edic Substation in the north and Rock Tavern Substation in the south) and the surrounding 345 kV, and local transmission systems within the Mohawk Valley Region (Zone E), the Hudson Valley Region (Zone G), the Millwood Region (Zone H) and the Dunwoodie Region (Zone I) in upstate and down state New York that are most likely to be affected by the Project (the "Study Area").

5. **Base Case Conditions**
The preliminary impact of the proposed Project will be evaluated for summer and winter peak load conditions for the following base case conditions.

Case 1 – Base case without the Project. The base case will include the proposed projects listed in Appendix A. The Short Circuit base case will model all the projects as in-service. The Power Flow base case will normally model all projects in-service at full output, but may model some projects as out-of-service or less than full output as necessary to establish a feasible base dispatch. Generation will be dispatched in accordance with NYISO practices.

Case 2 – Case 1 with the Project modeled. The Project will be modeled as in-service at full load with MW flows directed towards NYC in the summer base case and MW flows directed northward in the winter base case. Generation will be re-dispatched in the Power Flow case in accordance with NYISO practices.

6. **Analysis**
Limited Thermal, Voltage and Short Circuit analyses will be conducted to assess the performance of the power system within the Study Area, with and without the Project, in accordance with applicable reliability standards and study practices.

6.1 Power Flow Analyses
Thermal and voltage analyses, using the PSS/E load flow program or other comparable program, will be conducted for pre-contingency and design criteria contingency conditions, and will be limited to the Study Area. Thermal Limits will be assessed using normal ratings pre-contingency, and applicable emergency ratings (Long-Term-Emergency, LTE, ratings or Short-Term-Emergency, STE, ratings) post-contingency. Voltage limit will be assessed, pre and post contingency, using NYISO voltage limits for the bulk power system and 0.95 – 1.05 pu for other transmission system buses, unless specified otherwise.

6.2 Short Circuit Analysis
Short Circuit analysis will be performed to determine the fault duty of buses within the Study Area, and to identify if any circuit breaker ratings have been exceeded as a result of the Project. This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment and National Grid, and CHG&E criteria.

7. **Modeling Assumptions**

7.1 Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes, and were modeled in the NYISO 2005 FERC 715 power flow base cases.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

8. **Evaluation and Identification of System Upgrade Facilities ("SUFs")**
If study results indicate that the Project, as proposed, would result in violations of reliability standards, analyses will be performed to identify any SUFs that would be required to meet the NYISO's Minimum Interconnection Standard.

9. **Preliminary Cost Estimates of Facilities**
A preliminary description of facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the New York State Transmission System, and non-binding good faith estimates of cost and time to construct those facilities, will be provided. These cost estimates will reflect only the limited analysis performed in this Feasibility Study and do not consider light load or other system conditions that the parties expect to evaluate in the System Reliability Impact Study.

10. **Report**
A report will be prepared to document the feasibility study results and supporting information.

Appendix A

List of Other Proposed Projects to be Modeled in the Base Case For New York Regional Interconnect HVDC

Queue Pos.	Developer/Project Name	Size (MW)
18	NYPA Poletti Project	500
19	NYC Energy Kent Ave	79.9
20	KeySpan Spagnoli Road CC Unit	250
22	Calpine Wawayanda Energy Center	500
24	Reliant Astoria Repowering Phase 1	367
25	ConEd East River Repowering	288
29	Mirant Bowline Point 3	750
31	SCS Astoria Energy	1000
65	Fortistar LMA Lockport II	79.9
69	Besicorp Empire State Newsprint	660
70	Reliant Astoria Repowering Phase 2	173
90	Fortistar VP	79.9
91	Fortistar VAN	79.9
93	PSEG Cross Hudson Project	550
94	Atlantic Energy Neptune PJM-LI DC	660
96	Calpine JFK Expansion	45
107	Caithness Long Island	310
110	Liberty Radial Interconnection to NYC	400
113	Global Winds Prattsburgh Project	75
117	Chautauqua Windpower Project	50
119	ECOGEN Prattsburgh Wind Farm	79.5
127A	Airtricity Munnsville	40
135	UPC Wind Canandaigua Wind	81
136	Rochester Transmission Project	N/A
139	Entergy Indian Point 3 Uprate	38
141	Flat Rock Wind Power	300
142	Airtricity Hartsville Wind	50
143	Constellation Ginna Plant Uprate	95
144	Invenergy High Sheldon Windfarm	198
146	Con Edison Mott Haven Substation	N/A
147	NY Windpower West Hill Windfarm	40
150	Reunion Power Cherry Valley Wind	70
152	Invenergy Stamford Wind	129
153	ConEd Sprain Brook-Sherman Crk (M-29)	500
155	Invenergy Canisteo Hills Windfarm	149
156	AREC Fairfield Wind Project	120
157	Orion Energy NY I	100
158	Orion Energy NY II	100
160	AREC Burke Wind Project	102
161	NY Windpower Marble River Wind Project	76
163	Clipper Windpower Pine Hills Wind Project	100
164	FPL Energy Long Island Offshore Wind	140

Queue Pos.	Developer/Project Name	Size (MW)
166	AES New York St. Lawrence Wind Farm	130
168	Zilka Perry Wind Farm	132
169	Zilkha Batavia Wind Farm	90.8
170	Zilkha Machias Wind Farm	90
171	Zilkha Clinton County	123.8
172	Noble Clinton Wind Field	80
173	Noble Bliss Wind Field	71
174	Noble Altona Wind Field	99
175	Noble Ellenburg Wind Field	79.5
176	Noble Wethersfield Wind Field 115kV option	129
177	Noble Wethersfield Wind Field 230kV option	129
178	Noble Allegany Wind Field	99
179	Noble Malone Wind field	159
180	Invenergy Buffalo Rd. Wind Farm 230 kV	165
182	Everpower Howard Wind	102.3
185	NYPA Blenheim Gilboa Storage	120
186	Community Energy Jordanville Wind	150
187	NY Windpower North Slope Wind	109.5
189	PPM Energy Clayton Wind	132
190	PPM Energy Mixer Road Wind	66

EXHIBIT 2:

Study Tasks Allocated to the NYISO, Transmission Owners and Developer For the Study as Outlined in the Scope

The following tasks apply to the evaluation of the Points of Interconnection specified by the Developer. For this Project, the Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and Central Hudson Gas & Electric Corporation ("CHG&E") are the relevant Transmission Owners. The Project will be connected, at the northern end, to National Grid's Edic Substation and, at the southern end, to CHG&E's Rock Tavern Substation. Both Points of Interconnection will be evaluated under a single Interconnection Feasibility Study, but will be subject to two study agreements (one for each Transmission Owner).

Tasks No. / Description	Both Points	Edic	Rock Tavern
1. Provide a proposed configuration and associated modeling information of the relevant Transmission Owners' Attachment Facilities as they integrate with Developer's Attachment Facilities to the NYISO and Developer (Consultant).		National Grid	CHG&E
2. Prepare power flow and short circuit cases for the study. Send cases to the Developer (Consultant) and relevant Transmission Owners.	NYISO		
3. Conduct power flow analysis to complete the design of Attachment Facilities and identify any necessary System Upgrade Facilities ("SUFs") from a power flow perspective and deliver to the NYISO and relevant Transmission Owners.	Developer (Consultant)		
4. Conduct short circuit analysis to complete the design of Attachment Facilities and identify any necessary SUFs from a short circuit perspective and deliver to the NYISO and relevant Transmission Owners.	Developer (Consultant)		
5. Conduct a preliminary review of local protection issues relative to the evaluation and design of Attachment Facilities and SUFs and deliver to the NYISO and Developer (Consultant).		National Grid	CHG&E
6. Prepare good faith cost estimate of Transmission Owner's Attachment Facilities and any identified SUFs and provide to the NYISO and Developer.		National Grid	CHG&E
7. Prepare study report and supporting documentation. Sent draft report to the NYISO and relevant Transmission Owners and for review.	Developer (Consultant)		

8. Review draft study report.	NYISO	National Grid	CHG&E

Any Task allocated above to Transmission Owners will be performed by that Transmission Owner pursuant to the terms and conditions of the Technical Services Agreements between the NYISO and each Transmission Owner individually. In addition to the Tasks allocated above, the NYISO will review the study work performed by the Transmission Owners, and the Transmission Owners will review the work of the NYISO for the relevant Point of Interconnection. This review work will not be subject to billing under the Technical Services Agreement. The NYISO will have ultimate responsibility for the study report provided to the Developer.

EXHIBIT 3:

STUDY COSTS

Consistent with Section 6.1 of the LFIP, the NYISO, Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid"), and Central Hudson Gas & Electric Corporation estimate in good faith that the Interconnection Feasibility Study reviewing both Points of Interconnection will cost $80,000.

The following are National Grid's Labor Costs for services provided under this Agreement:

Technical Services	$84.00/hr. to $141.00/hr.
Management Services	$82.00/hr. to $180.00/hr.
VP	$300/hr

These costs are in effect for the period April 2005 through and including June 2006. To the extent National Grid's performance of services extend beyond June 2006, the costs are subject to update. Costs do not include any applicable sales tax.

The following are the rates for the services to be provided by the NYISO under this Agreement:

VP/Director	$255.00/hr.
All others	$175.00/hr.

APPENDIX 3 TO LFIP

INTERCONNECTION SYSTEM RELIABILITY IMPACT STUDY AGREEMENT

NEW YORK REGIONAL INTERCONNECT PROJECT

THIS AGREEMENT is made and entered into this ____ day of _____, 2006 by and among New York Regional Interconnect Inc., organized and existing under the laws of the State of New York, ("Developer,"), the New York Independent System Operator, Inc., a not-for-profit corporation organized and existing under the laws of the State of New York ("NYISO"), and Niagara Mohawk Power Corporation d/b/a National Grid a company organized and existing under the laws of the State of New York, ("Transmission Owner"). Developer, NYISO and Transmission Owner each may be referred to as a "Party," or collectively as the "Parties."

RECITALS

WHEREAS, Developer is proposing to develop a Large Generating Facility or Merchant Transmission Facility, or capacity addition to an existing Generating Facility or Merchant Transmission Facility consistent with the Interconnection Request submitted by the Developer dated May 13, 2005; and

WHEREAS, Developer desires to interconnect the Large Facility with the New York State Transmission System;

WHEREAS, the NYISO has completed an Interconnection Feasibility Study (the "Feasibility Study") and provided the results of said study to the Developer (this recital to be omitted if neither the NYISO nor the Transmission Owner require the Feasibility Study); and

WHEREAS, Developer has requested the NYISO to perform an Interconnection System Reliability Impact Study with the input and assistance of the Transmission Owner to assess the impact of interconnecting the Large Facility to the New York State Transmission System;

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein the Parties agreed as follows:

1.0 When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated in the NYISO's Commission-approved Standard Large Facility Interconnection Procedures.

2.0 Developer elects and NYISO shall cause to be performed an Interconnection System Reliability Impact Study consistent with Section 7.0 of the Standard Large Facility Interconnection Procedures in accordance with the NYISO OATT. The terms of Sections 7, 13.1 and 13.3 of the LFIP, as applicable, are hereby incorporated by reference herein.

3.0 The scope of the Interconnection System Reliability Impact Study shall be subject

to the assumptions set forth in Attachment A to this Agreement.

4.0 The Interconnection System Reliability Impact Study will be based upon the results of the Interconnection Feasibility Study, if conducted, and the technical information provided by Developer in the Interconnection Request, subject to any modifications in accordance with Section 4.4 of the LFIP. NYISO reserves the right to request additional information from Developer and Transmission Owner as may reasonably become necessary consistent with Good Utility Practice during the course of the SRIS and such additional information shall be provided in a prompt manner. If Developer modifies its designated Point of Interconnection, or the technical information provided in the Interconnection Request is modified, the time to complete the Interconnection System Reliability Impact Study may be extended.

5.0 The Interconnection System Reliability Impact Study report shall provide the following information:

- identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- identification of any thermal overload or voltage limit violations resulting from the interconnection;
- identification of any instability or inadequately damped response to system disturbances resulting from the interconnection and
- description and non-binding, good faith estimated cost of facilities required to interconnect the Large Facility to the New York State Transmission System and to address the identified short circuit, instability, and power flow issues.

6.0 The Developer shall provide a deposit of $50,000 for the performance of the Interconnection System Reliability Impact Study. The NYISO's good faith estimate for the time of completion of the Interconnection System Reliability Impact Study is 30 days from the NYISO's and Transmission Owner's receipt of the draft study report from the Developer, as described in Attachment A.

Upon receipt of the Interconnection System Reliability Impact Study, NYISO shall charge and Developer shall pay to NYISO the actual costs of the Interconnection System Reliability Impact Study incurred by the NYISO and Transmission Owner, as computed on a time and materials basis in accordance with the rates attached hereto.

Any difference between the deposit and the actual cost of the study shall be paid by or refunded to the Developer, as appropriate.

7.0 Miscellaneous.

7.1 Accuracy of Information. Except as Developer or Transmission Owner may otherwise specify in writing when they provide information to the NYISO under this Agreement, Developer and Transmission Owner each represent and warrant that the information it provides to NYISO shall be accurate and complete as of the date the information is provided. Developer and Transmission Owner shall each promptly provide NYISO with any additional information needed to update information previously provided.

7.2 Disclaimer of Warranty. In preparing the Interconnection System Reliability Impact Study, the Party preparing such study and any subcontractor consultants employed by it shall have to rely on information provided by the other Parties, and possibly by third parties, and may not have control over the accuracy of such information. Accordingly, neither the Party preparing the Interconnection System Reliability Impact Study nor any subcontractor consultant employed by that Party makes any warranties, express or implied, whether arising by operation of law, course of performance or dealing, custom, usage in the trade or profession, or otherwise, including without limitation implied warranties of merchantability and fitness for a particular purpose, with regard to the accuracy, content, or conclusions of the SRIS. Developer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

7.3 Limitation of Liability. In no event shall any Party or its subcontractor consultants be liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with this Agreement or the Interconnection System Reliability Impact Study or any reliance on the Interconnection System Reliability Impact Study by any Party or third parties, even if one or more of the Parties or its subcontractor consultants have been advised of the possibility of such damages. Nor shall any Party or its subcontractor consultants be liable for any delay in delivery or for the non-performance or delay in performance of its obligations under this Agreement.

7.4 Third-Party Beneficiaries. Without limitation of Sections 7.2 and 7.3 of this Agreement, Developer and Transmission Owner further agree that subcontractor consultants hired by NYISO to conduct or review, or to assist in the conducting or reviewing, an Interconnection System Reliability Impact Study shall be deemed third party beneficiaries of these Sections 7.2 and 7.3.

7.5 Term and Termination. This Agreement shall be effective from the date hereof and unless earlier terminated in accordance with this Section 7.5, shall continue in effect for a term of one year or until the Interconnection System Reliability Impact Study for Developer's Large Facility is completed [approved by the NYISO Operating Committee], whichever event occurs first. Developer or NYISO may terminate this Agreement upon the withdrawal of Developer's Interconnection Request under Section 3.6 of the LFIP.

7.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to any choice of laws provisions.

7.7 Severability. In the event that any part of this Agreement is deemed as a matter of law to be unenforceable or null and void, such unenforceable or void part shall be deemed severable from this Agreement and the Agreement shall continue in full force and effect as if each part was not contained herein.

7.8 Counterparts. This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as the original instrument.

7.9 Amendment. No amendment, modification or waiver of any term hereof shall be effective unless set forth in writing signed by the Parties hereto.

7.10 Survival. All warranties, limitations of liability and confidentiality provisions provided herein shall survive the expiration or termination hereof.

7.11 Independent Contractor. NYISO shall at all times be deemed to be an independent contractor and none of its employees or the employees of its subcontractors shall be considered to be employees of Developer or Transmission Owner as a result of this Agreement.

7.12 No Implied Waivers. The failure of a Party to insist upon or enforce strict performance of any of the provisions of this Agreement shall not be construed as a waiver or relinquishment to any extent of such party's right to insist or rely on any such provision, rights and remedies in that or any other instances; rather, the same shall be and remain in full force and effect.

7.13 Successors and Assigns. This Agreement, and each and every term and condition hereof, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

IN WITNESS THEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

Niagara Mohawk Power Corporation d/b/a National Grid

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

ASSUMPTIONS USED IN CONDUCTING THE INTERCONNECTION SYSTEM RELIABILITY IMPACT STUDY

The Interconnection System Reliability Impact Study will be based upon the results of the Interconnection Feasibility Study, subject to any modifications in accordance with Section 4.4 of the LFIP, and the following assumptions:

The Developer will independently contract with a third party, in a manner consistent with Section 13.4 of the Large Facility Interconnection Procedures, to perform certain portions of the Interconnection System Reliability Impact Study, including the short circuit analysis, stability analysis and power flow analysis, and to prepare the draft study report, as described in the Interconnection System Reliability Impact Study scope approved by the Operating Committee for this facility and, a draft of which is attached hereto as Exhibit 1. The Developer will provide the draft study report and supporting documentation to the NYISO and Transmission Owner for review within 60 days from the later of (a) approval by the NYISO's Operating Committee of the Interconnection System Reliability Impact Study scope for this facility, and (b) Developer receipt of the Base Case data necessary to perform the analyses from the NYISO. Developer's obligation to provide the draft study report and documentation within 60 days is a requirement of the Large Facility Interconnection Procedures subject to Section 3.6 of those procedures. The NYISO and Transmission Owner estimate that they will both complete their review of the draft report within 30 days from receipt. The NYISO and Transmission Owner shall provide services under this Interconnection System Reliability Impact Study Agreement in accordance with the rates provided in Exhibit 2.

Designation of Point of Interconnection and configuration to be studied.

The Project will be connected, at the northern end, to National Grid's Edic Substation. The Project's southerly termination will be at CHG&E's Rock Tavern Substation. The interconnection with CHG&E's Rock Tavern Substation will be subject to this agreement, while the interconnection with National Grid's Edic Substation will be subject to a separate agreement involving National Grid.

Designation of alternative Point(s) of Interconnection and configuration.

N/A

EXHIBIT 1:

Draft#5
8/21/06

Scope of the System Reliability Impact Study for the New York Regional Interconnect HVDC Independent Transmission line

1. **Purpose**

The purpose of this study is to evaluate the impact of the proposed New York Regional Interconnect, Inc.'s ("NYRI"), 190 mile, high voltage direct current (HVDC) transmission line (the "Project") on the reliability of the New York State Transmission System. The Project will be connected, at the northern end, to Niagara Mohawk Power Corporation d/b/a National Grid's ("National Grid") Edic Substation. The Project's southerly termination will be at Central Hudson Gas & Electric Corporation's ("CHG&E") Rock Tavern Substation. NYRI's HVDC line will operate at a maximum summer and winter rating of 1200 MW. Each converter station will be supplied with sufficient reactive compensation to supply its own reactive power needs. In addition, the Project now includes a static VAr compensator that will be located at the southern terminus and will provide -75 MVAr / + 300 MVAr of dynamic reactive power support. The Project will be located in the Town of Marcy in Oneida County, New York at the northern end and the Town of New Windsor in Orange County at the southern end. The Project is expected to be in commercial operation by summer 2011.

The study will assess the impact of the Project on the base case power system, including potentially Affected Systems, and will provide a list of the facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities) required to make the interconnection and non-binding good faith estimates of cost and time to construct those facilities. The study will be conducted in accordance with the applicable NERC, NPCC, NYSRC, CHG&E, National Grid, and Affected Systems' reliability and design standards; and in accordance with applicable New York Independent System Operator ("NYISO"), CHG&E, and National Grid study guidelines, procedures and practices.

2. **Interconnection Plan**

The study will include a description of the proposed facilities and the conceptual design of the Interconnection to the transmission system. The description will include a one-line diagram depicting the proposed facilities and their integration with the existing facilities; See Appendix B for current Attachment Facility conceptual designs.

3. **Study Period**

The study will focus on the period of five years in the future. The study will be conducted using applicable Power Flow, Short Circuit and Stability base cases provided by the NYISO and will include the representation of other proposed projects listed in Appendix A.

4. **Study Area**

The study will evaluate the impact of the Project on the statewide bulk power system (Zones A through K). For the lower voltage transmission systems, the study will focus

on the Points of Interconnection (Edic Substation in the north and Rock Tavern Substation in the south) and the surrounding underlying 69, 115 & 138 kV transmission systems within the Mohawk Valley Region (Zone E), the Hudson Valley Region (Zone G), and one bus into the adjacent Zones C, F and H. The analyses of these adjacent buses may result in the consideration of additional buses to be analyzed.

5. **Base Case Conditions**

The impact of the proposed Project will be evaluated for summer peak load, winter peak load, and light load for the following base case conditions.

Case 1 – Base case without the Project. The base case will include the baseline system and the proposed projects listed in Appendix A. The Short Circuit base case will model all the projects as in-service. The Power Flow base case will normally model all projects in-service at full output, but may model some projects as out-of-service or less than full output as necessary to establish a feasible base commitment and dispatch. Generation will be committed and dispatched in accordance with NYISO practices.

Case 2 – Case 1 with the Project modeled at its full 1200 MW output in the North to South direction with a corresponding redispatch of upstate and downstate generation (1200 MW increase upstate and 1200 MW decrease downstate). Again, generation will be committed and dispatched in accordance with NYISO practices.

The above representation is based on an underlying assumption that the proposed HVDC facility will be utilized during periods that the parallel AC transmission between Edic and Rock Tavern is loaded at or near its normal transfer limit such that the AC transmission system may be constrained / congested without operation of the HVDC facility. Also, based on that assumption, the Project will not be evaluated in the reverse (South to North) direction because it's highly unlikely that the parallel AC system would be constrained in that direction. In the event that this underlying assumption is discovered to be invalid, it may be necessary to evaluate the impact of the Project under other scenarios.

6. **Analysis**

Thermal, Voltage, Stability and Short Circuit analyses will be conducted to assess the performance of the power system within the Study Area, with and without the Project, in accordance with applicable reliability standards and study practices. The analyses will determine the incremental impact of the project on the normal and emergency transfer limits of the Dysinger-East, West-Central, Volney-East, Moses-South, Central-East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable, LIPA Import, NE-NY, and PJM-NY interfaces. NYISO transfer limits will be evaluated in the predominant west-to-east/north-to-south direction. The NE-NY and PJM-NY interfaces will be evaluated in both directions. Sufficient analyses will be conducted to determine the most limiting of the thermal, voltage, or stability limit under summer and winter peak load conditions. The incremental impact of the project on all New York inter-state and intra-state phase angle regulators also will be determined. Modifications to base cases, during analyses, will be documented in the Study report. Harmonic analysis and net power factor analyses will be performed as part of the Facility Study.

6.1 Power Flow Analyses

Thermal and voltage analyses, using the PSS/E power flow or comparable program, will be performed for summer and winter peak load conditions in the Study Area. Initial lists of power flow contingencies for thermal and voltage analysis to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of any power flow analyses; the analyses of these contingencies may result in the consideration of additional contingencies.

6.2 Stability Analysis

Stability analysis will be performed, for summer peak and light load conditions, to determine the impact of the Project on system performance within the Study Area. This analysis will evaluate the performance of the system for normal criteria contingencies, and will address issues including, but not limited to, transient stability, dynamic stability (i.e. damping), critical clearing time, coordination of protection and control systems, and performance of any Special Protection Systems that may be affected. An initial list of stability contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the stability analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

6.3 Short Circuit Analysis

Short Circuit analysis will be performed to evaluate the impact of the Project on system protection and adequacy of existing circuit breakers, other fault current interrupting devices, and related equipment in the study area. This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment and CHG&E, National Grid, and Affected System criteria as applicable.

6.4 Extreme Contingency Assessment

The study will evaluate representative extreme contingencies within the Study Area, discuss significant load flow and stability analyses, showing the base case and post-fault conditions in the Study Area, and report on pre- and post-Project system response for the most severe contingencies, as specified in Section 7.0 of the NPCC Basic Criteria, entitled "Extreme Contingency Assessment". An initial list of extreme contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the extreme contingency analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

7. Modeling Assumptions

7.1

Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes, and were modeled in the NYISO FERC 715 power flow

base cases filed in 2005.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

7.3 In order to determine transfer limits, the analysis will simulate generation re-dispatches according to the standard proportions used in NYISO transmission planning and operating studies, for NYISO interfaces. Where applicable, for local (Transmission Owner) interfaces, generation re-dispatching will be done in accordance with Transmission Owner standards and practices. The assumed locations for adjusting generation for evaluating transfer limits of the various interfaces are as follows:

Interface	Locations for Increasing Generation	Locations for Decreasing Generation
Central East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable	~30% Ontario ~70% Upstate NY	~93% New York City ~7% Long Island
Dysinger-East, West-Central, Volney-East	100% Ontario (Toronto)	~93% New York City ~7% Long Island
Moses-South	100% North (Zone D)	~70% Western New York ~30% New York City
LIPA Import	~75% New York City ~25% Hudson (Zone G)	100% Long Island
NYISO – PJM	~70% Downstate ~30% Upstate	~70% Eastern PJM ~30% West/Central PJM
NYISO - ISONE	~50% Ontario ~50% Quebec	~50% Northern NE ~50% Southern NE

8. System Upgrade Facilities

If study results indicate that the Project, as proposed, would result in violations of reliability standards, analyses will be performed to identify any System Upgrade Facilities (SUFs) that would be required to meet the NYISO's Minimum Interconnection Standard.

9. Cost Estimates of Facilities/Time to Construct

A description of facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the New York State Transmission System, and non-binding good faith estimates of cost and time to construct those facilities, will be provided.

10. Report

A report will be prepared, following the report outline (as applicable) specified in the

NYISO Transmission Planning Guideline #1.0. The report will document the 3 phase, L-G and LL-G fault current level changes greater than 100 Amps in the study area and document the short circuit models used to represent the project. The report shall also document the project transformer nameplate rating, winding ratings, configurations and design impedances. Where local generation commitment and/or dispatch was changed to reduce or eliminate a violation, the study report will document the relationships between the violation, Project flow and local generation dispatch, and discuss how operating procedures may be implemented to secure the impacted transmission facility.

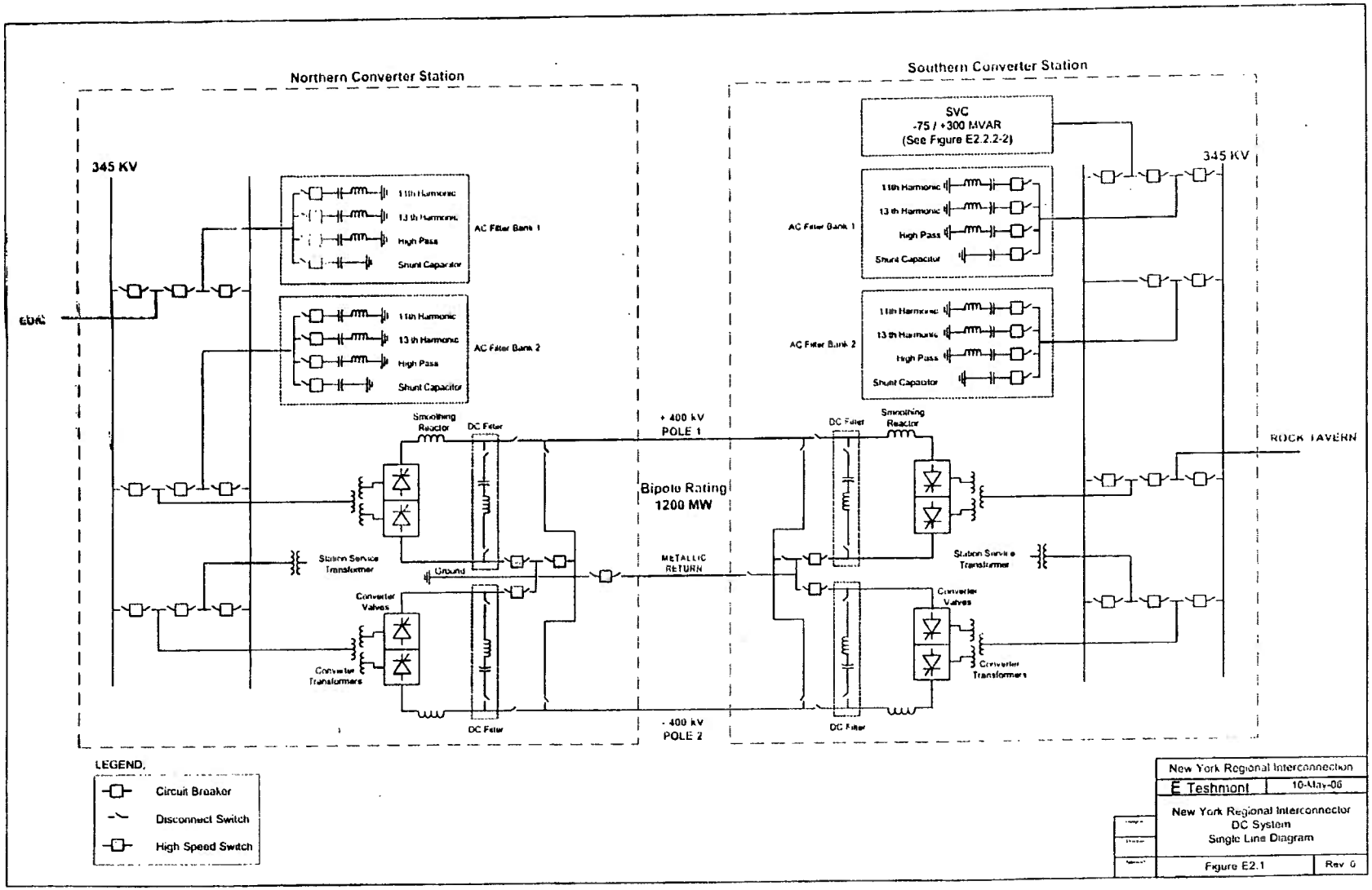
Appendix A

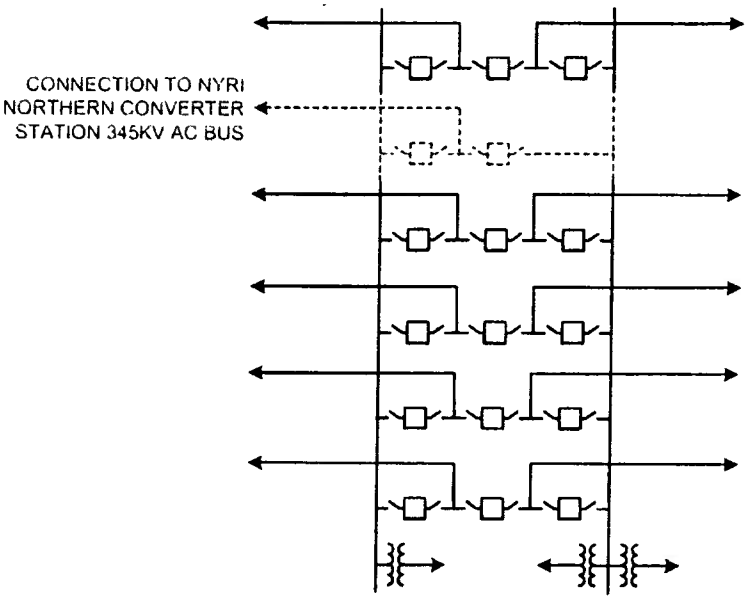
List of Other Proposed Projects to be Modeled in the Base Case For New York Regional Interconnect HVDC

Queue Pos.	Developer/Project Name	Size (MW)
18	NYPA Poletti Project	500
19	NYC Energy Kent Ave	79.9
20	KeySpan Spagnoli Road CC Unit	250
25	ConEd East River Repowering	288
31	SCS Astoria Energy	1000
65	Fortistar LMA Lockport II	79.9
69	Besicorp Empire State Newsprint	660
90	Fortistar VP	79.9
91	Fortistar VAN	79.9
93	PSEG Cross Hudson Project	550
94	Atlantic Energy Neptune PJM-LI DC	660
96	Calpine JFK Expansion	45
106	TransGas Energy	1100
107	Caithness Long Island	310
113	Global Winds Prattsburgh Project	75
117	Chautauqua Windpower Project	50
119	ECOGEN Prattsburgh Wind Farm	79.5
125	Linden VFT Inter-Tie	300
127A	Airtricity Munnsville	40
135	UPC Wind Canandaigua Wind	81
136	Rochester Transmission Project	N/A
139	Entergy Indian Point 3 Uprate	38
141	Flat Rock Wind Power	300
142	Airtricity Hartsville Wind	50
143	Constellation Ginna Plant Uprate	95
144	Invenergy High Sheldon Windfarm	198
146	Con Edison Mott Haven Substation	N/A
147	NY Windpower West Hill Windfarm	40
150	Reunion Power Cherry Valley Wind	70
152	Invenergy Stamford Wind	129
153	ConEd Sprain Brook-Sherman Crk (M-29)	500
155	Invenergy Canisteo Hills Windfarm	149
156	AREC Fairfield Wind Project	120
157	Orion Energy NY 1	100
160	AREC Burke Wind Project	102
161	NY Windpower Marble River Wind Project	84
163	Clipper Windpower Pine Hills Wind Project	100
164	FPL Energy Long Island Offshore Wind	140
166	AES New York St. Lawrence Wind Farm	130

Queue Pos.	Developer/Project Name	Size (MW)
168	Dairy Hills Wind Farm	132
169	Batavia Wind Farm	90.8
170	Machias Wind Farm	90
171	Clinton County Wind Farm	134
172	Noble Clinton Windpark	80
173	Noble Bliss Windpark	71
174	Noble Altona Windpark	99
175	Noble Ellenburg Windpark	79.5
177	Noble Wethersfield Windpark 230kV option	129
178	Noble Allegany Windpark	99
179	Noble Malone Windpark	159
180	Invenergy Buffalo Rd. Wind Farm 230 kV	165
182	Everpower Howard Wind	79
185	NYPA Blenheim Gilboa Storage	120
186	Community Energy Jordanville Wind	150
187	NY Windpower North Slope Wind	109.5
189	PPM Energy Clayton Wind	132
190	PPM Energy Mixer Road Wind	66

Appendix B
New York Interconnection Single Line Diagram





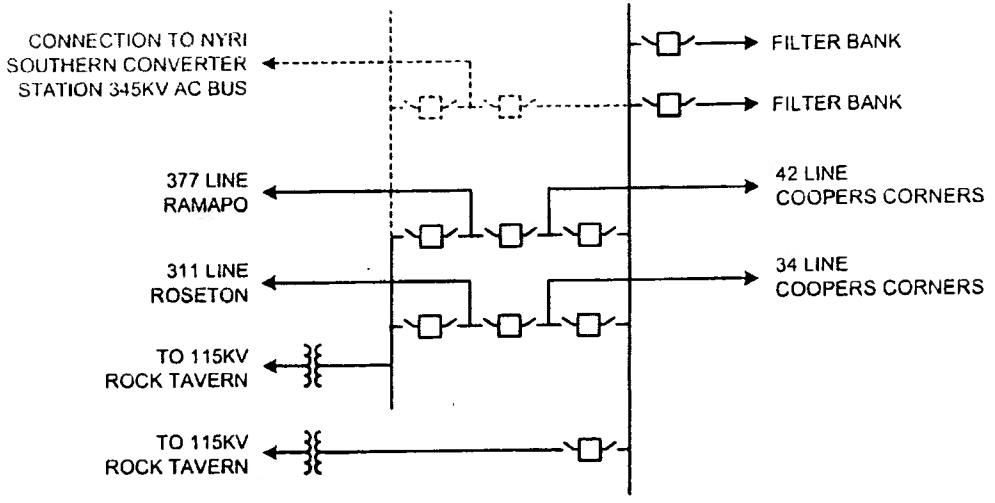
NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Edic

—— Planned Future Facilities at Edic (National Grid)

	New York Regional Interconnection	
	E Teshmont	10-May-06
	Interconnection to Edic 345kV Substation Single Line Diagram	
	Figure E2.2.1-7	Rev. 0



NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Rock Tavern

	New York Regional Interconnection	
	E Teshmont	10-May-06
	Interconnection to Rock Tavern 345kV Substation Single Line Diagram	
	Figure E2.2.2-3	Rev. 0

EXHIBIT 2:

STUDY COSTS

The following are the estimated rate for services and related charges to be provided by Transmission Owner under this Agreement:

Technical Services	$87.00/hr. to $145.00/hr.
Management Services	$84.00/hr. to $185.00/hr.
VP	$310/hr

These costs are in effect for the period June 2006 through and including March 31, 2007. To the extent National Grid's performance of services extend beyond March 31, 2007, the costs are subject to update. Costs do not include any applicable sales tax.

The following are the rates for the services to be provided by the NYISO under this Agreement:

VP/Director	$265.00/hr.
All others	$190.00/hr.

These rates are for work performed by the NYISO during 2006. The rates for work performed after December 31, 2006 are subject to adjustment.

APPENDIX 3 TO LFIP

INTERCONNECTION SYSTEM RELIABILITY IMPACT STUDY AGREEMENT

NEW YORK REGIONAL INTERCONNECT PROJECT

THIS AGREEMENT is made and entered into this ____ day of _____, 2006 by and among New York Regional Interconnect Inc., organized and existing under the laws of the State of New York, ("Developer,"), the New York Independent System Operator, Inc., a not-for-profit corporation organized and existing under the laws of the State of New York ("NYISO"), and Central Hudson Gas and Electric Corporation a corporation organized and existing under the laws of the State of New York, ("Transmission Owner"). Developer, NYISO and Transmission Owner each may be referred to as a "Party," or collectively as the "Parties."

RECITALS

WHEREAS, Developer is proposing to develop a Large Generating Facility or Merchant Transmission Facility, or capacity addition to an existing Generating Facility or Merchant Transmission Facility consistent with the Interconnection Request submitted by the Developer dated May 13, 2005; and

WHEREAS, Developer desires to interconnect the Large Facility with the New York State Transmission System;

WHEREAS, the NYISO has completed an Interconnection Feasibility Study (the "Feasibility Study") and provided the results of said study to the Developer (this recital to be omitted if neither the NYISO nor the Transmission Owner require the Feasibility Study); and

WHEREAS, Developer has requested the NYISO to perform an Interconnection System Reliability Impact Study with the input and assistance of the Transmission Owner to assess the impact of interconnecting the Large Facility to the New York State Transmission System;

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein the Parties agreed as follows:

1.0 When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated in the NYISO's Commission-approved Standard Large Facility Interconnection Procedures.

2.0 Developer ...eets and NYISO shall cause to be performed an Interconnection System Reliability Impact Study consistent with Section 7.0 of the Standard Large Facility Interconnection Procedures in accordance with the NYISO OATT. The terms of Sections 7, 13.1 and 13.3 of the LFIP, as applicable, are hereby incorporated by reference herein.

3.0 The scope of the Interconnection System Reliability Impact Study shall be subject

to the assumptions set forth in Attachment A to this Agreement.

4.0 The Interconnection System Reliability Impact Study will be based upon the results of the Interconnection Feasibility Study, if conducted, and the technical information provided by Developer in the Interconnection Request, subject to any modifications in accordance with Section 4.4 of the LFIP. NYISO reserves the right to request additional information from Developer and Transmission Owner as may reasonably become necessary consistent with Good Utility Practice during the course of the SRIS and such additional information shall be provided in a prompt manner. If Developer modifies its designated Point of Interconnection, or the technical information provided in the Interconnection Request is modified, the time to complete the Interconnection System Reliability Impact Study may be extended.

5.0 The Interconnection System Reliability Impact Study report shall provide the following information:

- identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- identification of any thermal overload or voltage limit violations resulting from the interconnection;
- identification of any instability or inadequately damped response to system disturbances resulting from the interconnection and
- description and non-binding, good faith estimated cost of facilities required to interconnect the Large Facility to the New York State Transmission System and to address the identified short circuit, instability, and power flow issues.

6.0 The Developer shall provide a deposit of $50,000 for the performance of the Interconnection System Reliability Impact Study. The NYISO's good faith estimate for the time of completion of the Interconnection System Reliability Impact Study is 30 days from the NYISO's and Transmission Owner's receipt of the draft study report from the Developer, as described in Attachment A.

Upon receipt of the Interconnection System Reliability Impact Study, NYISO shall charge and Developer shall pay to NYISO the actual costs of the Interconnection System Reliability Impact Study incurred by the NYISO and Transmission Owner, as computed on a time and materials basis in accordance with the rates attached hereto.

Any difference between the deposit and the actual cost of the study shall be paid by or refunded to the Developer, as appropriate.

7.0 Miscellaneous.

7.1 Accuracy of Information. Except as Developer or Transmission Owner may otherwise specify in writing when they provide information to the NYISO under this Agreement, Developer and Transmission Owner each represent and warrant that the information it provides to NYISO shall be accurate and complete as of the date the information is provided. Developer and Transmission Owner shall each promptly provide NYISO with any additional information needed to update information previously provided.

7.2 Disclaimer of Warranty. In preparing the Interconnection System Reliability Impact Study, the Party preparing such study and any subcontractor consultants employed by it shall have to rely on information provided by the other Parties, and possibly by third parties, and may not have control over the accuracy of such information. Accordingly, neither the Party preparing the Interconnection System Reliability Impact Study nor any subcontractor consultant employed by that Party makes any warranties, express or implied, whether arising by operation of law, course of performance or dealing, custom, usage in the trade or profession, or otherwise, including without limitation implied warranties of merchantability and fitness for a particular purpose, with regard to the accuracy, content, or conclusions of the SRIS. Developer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

7.3 Limitation of Liability. In no event shall any Party or its subcontractor consultants be liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with this Agreement or the Interconnection System Reliability Impact Study or any reliance on the Interconnection System Reliability Impact Study by any Party or third parties, even if one or more of the Parties or its subcontractor consultants have been advised of the possibility of such damages. Nor shall any Party or its subcontractor consultants be liable for any delay in delivery or for the non-performance or delay in performance of its obligations under this Agreement.

7.4 Third-Party Beneficiaries. Without limitation of Sections 7.2 and 7.3 of this Agreement, Developer and Transmission Owner further agree that subcontractor consultants hired by NYISO to conduct or review, or to assist in the conducting or reviewing, an Interconnection System Reliability Impact Study shall be deemed third party beneficiaries of these Sections 7.2 and 7.3.

7.5 Term and Termination. This Agreement shall be effective from the date hereof and unless earlier terminated in accordance with this Section 7.5, shall continue in effect for a term of one year or until the Interconnection System Reliability Impact Study for Developer's Large Facility is completed [approved by the NYISO Operating Committee], whichever event occurs first. Developer or NYISO may terminate this Agreement upon the withdrawal of Developer's Interconnection Request under Section 3.6 of the LFIP.

7.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to any choice of laws provisions.

7.7 Severability. In the event that any part of this Agreement is deemed as a matter of law to be unenforceable or null and void, such unenforceable or void part shall be deemed severable from this Agreement and the Agreement shall continue in full force and effect as if each part was not contained herein.

7.8 Counterparts. This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as the original instrument.

7.9 Amendment. No amendment, modification or waiver of any term hereof shall be effective unless set forth in writing signed by the Parties hereto.

7.10 Survival. All warranties, limitations of liability and confidentiality provisions provided herein shall survive the expiration or termination hereof.

7.11 Independent Contractor. NYISO shall at all times be deemed to be an independent contractor and none of its employees or the employees of its subcontractors shall be considered to be employees of Developer or Transmission Owner as a result of this Agreement.

7.12 No Implied Waivers. The failure of a Party to insist upon or enforce strict performance of any of the provisions of this Agreement shall not be construed as a waiver or relinquishment to any extent of such party's right to insist or rely on any such provision, rights and remedies in that or any other instances; rather, the same shall be and remain in full force and effect.

7.13 Successors and Assigns. This Agreement, and each and every term and condition hereof, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

IN WITNESS THEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

New York Independent System Operator, Inc.

By: _____

Title: _____

Date: _____

Central Hudson Gas and Electric Corporation

By: _____

Title: _____

Date: _____

New York Regional Interconnect Inc.

By: _____

Title: _____

Date: _____

ASSUMPTIONS USED IN CONDUCTING THE INTERCONNECTION SYSTEM RELIABILITY IMPACT STUDY

The Interconnection System Reliability Impact Study will be based upon the results of the Interconnection Feasibility Study, subject to any modifications in accordance with Section 4.4 of the LFIP, and the following assumptions:

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Designation of alternative Point(s) of Interconnection and configuration.

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Draft#5
8/21/06

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The study will assess the impact of the Project on the base case power system, including potentially Affected Systems, and will provide a list of the facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities) required to make the interconnection and non-binding good faith estimates of cost and time to construct those facilities. The study will be conducted in accordance with the applicable NERC, NPCC, NYSRC, CHG&E, National Grid, and Affected Systems' reliability and design standards; and in accordance with applicable New York Independent System Operator ("NYISO"), CHG&E, and National Grid study guidelines, procedures and practices.

2. **Interconnection Plan**

The study will include a description of the proposed facilities and the conceptual design of the Interconnection to the transmission system. The description will include a one-line diagram depicting the proposed facilities and their integration with the existing facilities; See Appendix B for current Attachment Facility conceptual designs.

3. **Stu**

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The study will evaluate the impact of the Project on the statewide bulk power system (Zones A through K). For the lower voltage transmission systems, the study will focus

on the Points of Interconnection (Edic Substation in the north and Rock Tavern Substation in the south) and the surrounding underlying 69, 115 & 138 kV transmission systems within the Mohawk Valley Region (Zone E), the Hudson Valley Region (Zone G), and one bus into the adjacent Zones C, F and H. The analyses of these adjacent buses may result in the consideration of additional buses to be analyzed.

5. **Base Case Conditions**

The impact of the proposed Project will be evaluated for summer peak load, winter peak load, and light load for the following base case conditions.

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The above representation is based on an underlying assumption that the proposed HVDC facility will be utilized during periods that the parallel AC transmission between Edic and Rock Tavern is loaded at or near its normal transfer limit such that the AC transmission system may be constrained / congested without operation of the HVDC facility. Also, based on that assumption, the Project will not be evaluated in the reverse (South to North) direction because it's highly unlikely that the parallel AC system would be constrained in that direction. In the event that this underlying assumption is discovered to be invalid, it may be necessary to evaluate the impact of the Project under other scenarios.

6. **Analysis**

Thermal, Voltage, Stability and Short Circuit analyses will be conducted to assess the performance of the power system within the Study Area, with and without the Project, in accordance with applicable reliability standards and study practices. The analyses will determine the incremental impact of the project on the normal and emergency transfer limits of the Dysinger-East, West-Central, Volney-East, Moses-South, Central-East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable, LIPA Import, NE-NY, and PJM-NY interfaces. NYISO transfer limits will be evaluated in the predominant west-to-east/north-to-south direction. The NE-NY and PJM-NY interfaces will be evaluated in both directions. Sufficient analyses will be conducted to determine the most limiting of the thermal, voltage, or stability limit under summer and winter peak load conditions. The incremental impact of the project on all New York inter-state and intra-state phase angle regulators also will be determined. Modifications to base cases, during analyses, will be documented in the Study report. Harmonic analysis and net power factor analyses will be performed as part of the Facility Study.

6.1 Power Flow Analyses

Thermal and voltage analyses, using the PSS/E power flow or comparable program, will be performed for summer and winter peak load conditions in the Study Area. Initial lists of power flow contingencies for thermal and voltage analysis to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of any power flow analyses; the analyses of these contingencies may result in the consideration of additional contingencies.

6.2 Stability Analysis

Stability analysis will be performed, for summer peak and light load conditions, to determine the impact of the Project on system performance within the Study Area. This analysis will evaluate the performance of the system for normal criteria contingencies, and will address issues including, but not limited to, transient stability, dynamic stability (i.e. damping), critical clearing time, coordination of protection and control systems, and performance of any Special Protection Systems that may be affected. An initial list of stability contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the stability analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

6.3 Short Circuit Analysis

Short Circuit analysis will be performed to evaluate the impact of the Project on system protection and adequacy of existing circuit breakers, other fault current interrupting devices, and related equipment in the study area. This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment and CHG&E, National Grid, and Affected System criteria as applicable.

6.4 Extreme Contingency Assessment

The study will evaluate representative extreme contingencies within the Study Area, discuss significant load flow and stability analyses, showing the base case and post-fault conditions in the Study Area, and report on pre- and post-Project system response for the most severe contingencies, as specified in Section 7.0 of the NPCC Basic Criteria, entitled "Extreme Contingency Assessment". An initial list of extreme contingencies to be performed will be developed and agreed upon among the Developer, the NYISO, CHG&E, National Grid, and Affected Systems prior to the commencement of the extreme contingency analysis; the analyses of these contingencies may result in the consideration of additional contingencies.

7. Modeling Assumptions

7.1 Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes, and were modeled in the NYISO FERC 715 power flow base cases filed in 2005.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

7.3 In order to determine transfer limits, the analysis will simulate generation re-dispatches according to the standard proportions used in NYISO transmission planning and operating studies, for NYISO interfaces. Where applicable, for local (Transmission Owner) interfaces, generation re-dispatching will be done in accordance with Transmission Owner standards and practices. The assumed locations for adjusting generation for evaluating transfer limits of the various interfaces are as follows:

Interface	Locations for Increasing Generation	Locations for Decreasing Generation
Central East, Total East, UPNY-SENY, UPNY-ConEd, ConEd Cable	~30% Ontario ~70% Upstate NY	~93% New York City ~7% Long Island
Dysinger-East, West-Central, Volney-East	100% Ontario (Toronto)	~93% New York City ~7% Long Island
Moses-South	100% North (Zone D)	~70% Western New York ~30% New York City
LIPA Import	~75% New York City ~25% Hudson (Zone G)	100% Long Island
NYISO – PJM	~70% Downstate ~30% Upstate	~70% Eastern PJM ~30% West/Central PJM
NYISO - ISONE	~50% Ontario ~50% Quebec	~50% Northern NE ~50% Southern NE

8. System Upgrade Facilities

If study results indicate that the Project, as proposed, would result in violations of reliability standards, analyses will be performed to identify any System Upgrade Facilities (SUFs) that would be required to meet the NYISO's Minimum Interconnection Standard.

9. Cost Estimates of Facilities/Time to Construct

A description of facilities (Transmission Owners' Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the New York State Transmission System, and non-binding good faith estimates of cost and time to construct those facilities, will be provided.

10. Report

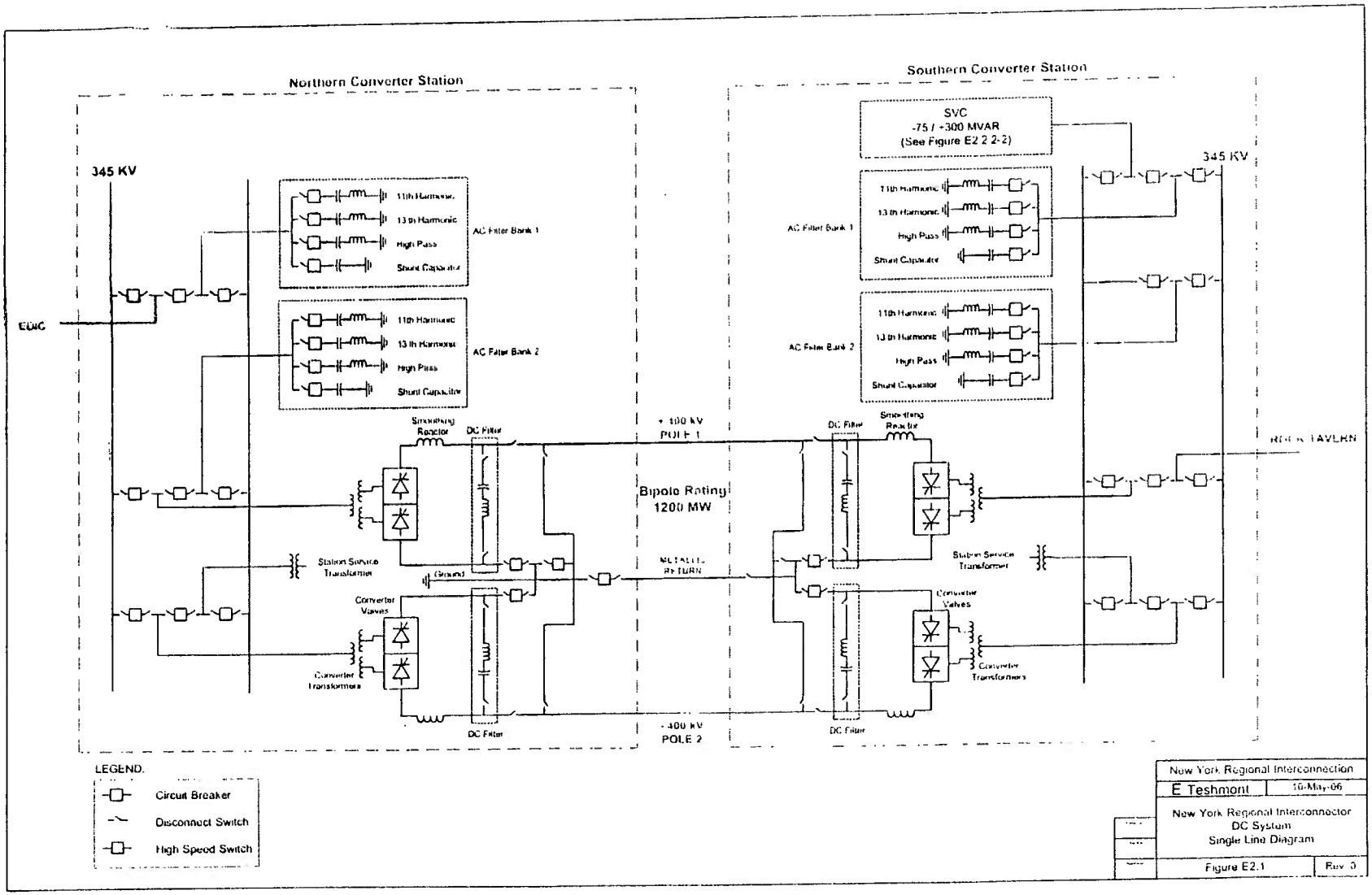
A report will be prepared, following the report outline (as applicable) specified in the NYISO Transmission Planning Guideline #1.0. The report will document the 3 phase, L-G and LL-G fault current level changes greater than 100 Amps in the study area and document the short circuit models used to represent the project. The report shall also document the project transformer nameplate rating, winding ratings, configurations and design impedances. Where local generation commitment and/or dispatch was changed to reduce or eliminate a violation, the study report will document the relationships between the violation, Project flow and local generation dispatch, and discuss how operating procedures may be implemented to secure the impacted transmission facility.

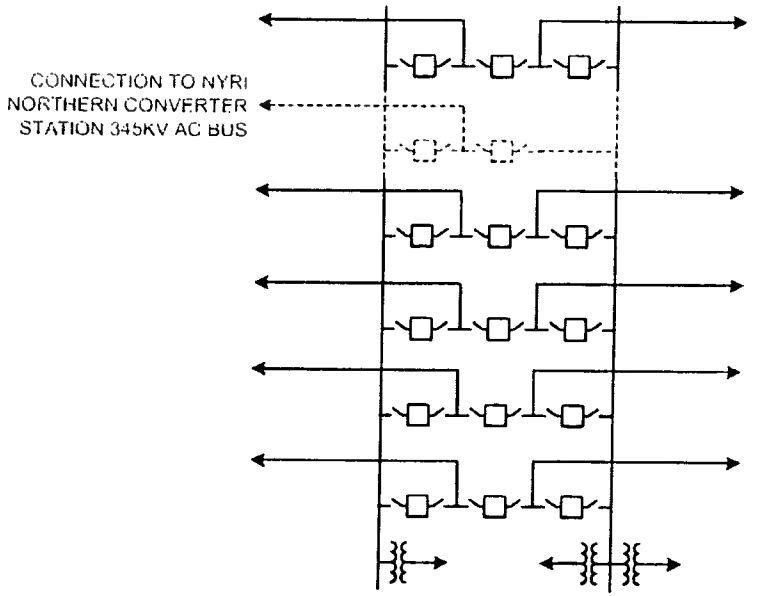
Appendix A

List of Other Proposed Projects to be Modeled in the Base Case For New York Regional Interconnect HVDC

Queue Pos.	Developer/Project Name	Size (MW)
18	NYPA Poletti Project	500
19	NYC Energy Kent Ave	79.9
20	KeySpan Spagnoli Road CC Unit	250
25	ConEd East River Repowering	288
31	SCS Astoria Energy	1000
65	Fortistar LMA Lockport II	79.9
69	Besicorp Empire State Newsprint	660
90	Fortistar VP	79.9
91	Fortistar VAN	79.9
93	PSEG Cross Hudson Project	550
94	Atlantic Energy Neptune PJM-LI DC	660
96	Calpine JFK Expansion	45
106	TransGas Energy	1100
107	Caithness Long Island	310
113	Global Winds Prattsburgh Project	75
117	Chautauqua Windpower Project	50
119	ECOGEN Prattsburgh Wind Farm	79.5
125	Linden VFT Inter-Tie	300
127A	Airtricity Munnsville	40
135	UPC Wind Canandaigua Wind	81
136	Rochester Transmission Project	N/A
139	Entergy Indian Point 3 Uprate	38
141	Flat Rock Wind Power	300
142	Airtricity Hartsville Wind	50
143	Constellation Ginna Plant Uprate	95
144	Invenergy High Sheldon Windfarm	198
146	Con Edison Mott Haven Substation	N/A
147	NY Windpower West Hill Windfarm	40
150	Reunion Power Cherry Valley Wind	70
152	Invenergy Stamford Wind	129
153	ConEd Sprain Brook-Sherman Crk (M-29)	500
155	Invenergy Canisteo Hills Windfarm	149
156	AREC Fairfield Wind Project	120
157	Orion Energy NY 1	100
160	AREC Burke Wind Project	102
161	NY Windpower Marble River Wind Project	84
163	Clipper Windpower Pine Hills Wind Project	100
164	FPL Energy Long Island Offshore Wind	140
166	AES New York St. Lawrence Wind Farm	130
168	Dairy Hills Wind Farm	132
169	Batavia Wind Farm	90.8
170	Machias Wind Farm	90

Queue Pos.	Developer/Project Name	Size (MW)
171	Clinton County Wind Farm	134
172	Noble Clinton Windpark	80
173	Noble Bliss Windpark	71
174	Noble Altona Windpark	99
175	Noble Ellenburg Windpark	79.5
177	Noble Wethersfield Windpark 230kV option	129
178	Noble Allegany Windpark	99
179	Noble Malone Windpark	159
180	Invenergy Buffalo Rd. Wind Farm 230 kV	165
182	Everpower Howard Wind	79
185	NYPA Blenheim Gilboa Storage	120
186	Community Energy Jordanville Wind	150
187	NY Windpower North Slope Wind	109.5
189	PPM Energy Clayton Wind	132
190	PPM Energy Mixer Road Wind	66


Northern Converter Station
Southern Converter Station
345 KV
345 KV
EDIC
SVC
-75 / +300 MVAR
(See Figure E2 2 2-2)
11th Harmonic
13 th Harmonic
High Pass
Shunt Capacitor
AC Filter Bank 1
AC Filter Bank 2
Smoothing Reactor
DC Filter
+ 400 kV
POLE 1
Bipole Rating
1200 MW
METALLIC RETURN
Station Service Transformer
Ground
Converter Valves
Converter Transformers
-400 kV
POLE 2
LEGEND:
Circuit Breaker
Disconnect Switch
High Speed Switch
New York Regional Interconnection
E Teshmont
16-May-06
New York Regional Interconnector
DC System
Single Line Diagram
Figure E2.1
Rev 0



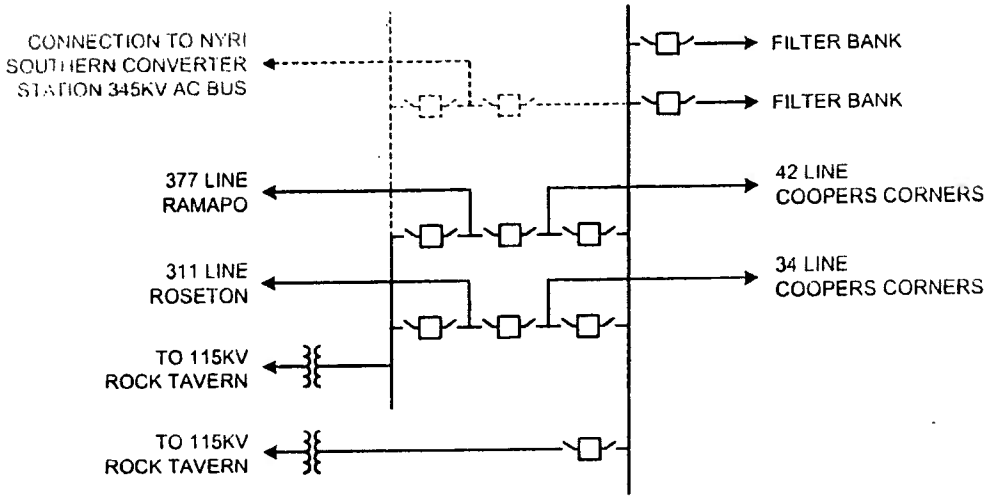
NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Edic

—— Planned Future Facilities at Edic (National Grid)

New York Regional Interconnection	
E. Teshmont	10-May-06
Interconnection to Edic 345kV Substation Single Line Diagram	
Figure E2.2.1-7	Rev. 0



NOTE:

----- Facilities Proposed for NYRI Project

—— Existing Facilities at Rock Tavern

	New York Regional Interconnection	
	E Teshmont	10-May-06
	Interconnection to Rock Tavern 345kV Substation Single Line Diagram	
	Figure E2.2.2-3	Rev. 0

EXHIBIT 2:

STUDY COSTS

The following are the estimated rate for services and related charges to be provided by Transmission Owner under this Agreement:

Technical Services:	$85 - $140 per hour
Management Services:	$85 - $175 per hour

The following are the rates for the services to be provided by the NYISO under this Agreement:

VP/Director	$265.00/hr.
All others	$190.00/hr.

These rates are for work performed by the NYISO during 2006. The rates for work performed after December 31, 2006 are subject to adjustment.

Attachment for Interrogatory
DPS-32.17

8/29/2007

NYRI - 400 kV HVDC Project
Rough Order of Magnitude (ROM) Cost Estimate

345 kV AC intertie between Converter Station AC Yard and EDIC Substation using XLPE Cable (Structures and Equipt beyond the Potheads within Substation are included in separate estimate by the Substation owner) (per Figure E-2.2.1-1)

Description	Ratings
3 PH AC Voltage:	345 kV
Transmission Capacity:	1,200 MW
Cable: 2000 kcmil XLPE	
No. of cond/per phase	2
Total No. of Conductors	6
Ampacity	2,008 Amps

	Unit	Qty
Circuit Length	2,000 ft	2,000
Trench (Concr): 3 ftD x 5 ftW	0.56 cy/ft	1,111 cy.
Trench (Excav.): 6 ftD x 7 ftW	1.56 cy/ft	3,111 cy.
Backfill (Thermal) 3 ftD x 2 ftW	0.22 cy/ft	444
Asphalt (just for trench)	0.13 cy/in.ft	130

A. Materials and Transportation

		Unit Prices	Qty	Cost	
Cable, 1/c 2000 kcmil CU XLPE		120 $/cable.ft	12,000	1,440,000	
Termination, 1ph		20,000 $/Ea	12	240,000	
Splice, 1 ph		18,000 $/Ea	0	0	
X-Bonding splice, 1ph		20,000 $/Ea	0	0	
Grounding Cable #4/0 Cu		2.00 $/ft	4,000	8,000	
PVC Duct, 8 in Sch.40		16.00 $/ft	14,000	224,000	preassembled 20 Ft Lengths
Cable bonding kits/link boxes		1,000.00 $/Ea	0	0	
Miscellaneous--Special Tools/spares		15%		286,800	
	A.	**Subtotal Material:**		2,198,800	Cable, Splices, Term & Grounding

B. Labor - Civil Construction and Installation

Excavation, incl. Shoring		70 $/cy	3,111	217,778	
Concrete (incl test+rebar)		350 $/cy	1,111	388,889	
Asphalt		300 $/cy	130	38,889	
Backfill		30 $/cy	444	13,333	
Duct Supports/Accessories		2.00 $/Ea	3,200	6,400	
Manholes and accessories		30,000 $/Ea	0	0	
Conduit Install		10 $/ft	14,000	140,000	based on Labor rate of $100 per hour in NY
	B1.	**Subtotal Civil Installation:**		805,289	
Cable Installation+Testing		200,000 $/setups	1	200,000	
Cable Terminating		15,000 $/Ea	12	180,000	
Splicing		15,000 $/Ea	0	0	
	B2.	**Subtotal Cable Installation:**		380,000	Cable, Splices, Term & Grounding
	B.	**Subtotal Labor (B1 + B2)**		1,185,289	

C. Other Costs

C1. Survey/Engr/CM (8% of A+B)			270,727
C2. Contingency (20% of A+B+C1)			730,963
	C.	**Subtotal Other Costs:**	1,001,690
		Total (A+B+C):	$4,385,779

Note: Area is considered constricted since it is basically at an operating substation.

SUMMARY

A.	**Total Materials and Transportation**		**$2,198,800**
B.	**Labor - Civil Construction and Installation**		**$1,185,289**
	Direct Cost Labor + Material		**$3,384,089**
C.	**Route Surveys**		
	Ground Survey		**part of Converter Sta Survey**
D.	**Engineering and Inspection**		
	- includes Engineering, Procurement, and Construction Management (including Inspection) Services	8%	**$270,727**
E.	**Administrative Overhead**		
	- Owner Administration Costs		**by owner**
	- Contractor(s)/Vendor(s) Administrative Overhead		**part of A, B, C and D above**
F.	**Contingency**	20%	**$730,963**
	TOTAL (A+B+C+D+E+F)		**$4,385,779**

Note: Above excludes Land and Right-of-Way Acquisition Costs, Permitting Costs, Finance Costs including Interest During Construction, Fees for Legal Services and other any other Services not listed.

Attachment for Interrogatory
DPS-32.18

6/29/2007

NYRI - 400 kV HVDC Project
Rough Order of Magnitude (ROM) Cost Estimate
345 kV AC Intertie to existing Rock Tavern Substation as per Converter Station Layout Figures
(Structures and Equipt within Substation are included in separate estimate by the Substation owner)
(per Figure E-2.2.2-1)

BILL OF MATERIAL - ROM Estimate

I. Rigid Bus Intertie (nominal 600 MW)

ITEM	QUAN	Unit	DESCRIPTION	Unit Cost, $	Total Cost, $
1	6000	ft	RIGID BUS, Al, 4 in dia, 3 Phases	4.00	24,000
2	200		STATION POST INSULATOR for Rigid Bus	1,100	220,000
3	200		BUS SUPPORT Foundation for Rigid Bus	150.00	150,000
	4000	ea 200			
4	4000	ft	STEEL PERIMETER FENCE and GROUNDING EQUIPT	40	160,000
	A.		Subtotal Material		530,000
	B.		Labor % of A.	85%	450,500

II. Underground Cable Intertie (nominal 600 MW)

Description	Ratings
3 PH AC Voltage,	345 kV
Transmission Capacity,	600 MW
Cable, 2000 kcmil XLPE	
No. of conc/per phase	2
Total No. of Conductors	6
Ampacity	1,004 Amps

	Unit	Qty
Circuit Length	1,600 ft	1,600
Trench (Concr) 3 ftD x 5 ftW	0.56 cy/ft	889 cy.
Trench (Excav) 6 ftD x 7 ftW	1.56 cy/ft	2,489 cy.
Backfill (Thermal) 3 ftD x 2 ftW	0.22 cy/ft	356
Asphalt (just for trench)	0.13 cy/lin.ft	104

A. Materials and Transportation

	Unit Prices	Qty	Cost	
Cable, 1ic 2000 kcmil CU XLPE	120 $/cable,ft	9,600	1,152,000	
Termination, 1ph	20,000 $/Ea	12	240,000	
Splice, 1 ph	18,000 $/Ea	0	0	
X-Bonding splice, 1ph	20,000 $/Ea	0	0	
Grounding Cable #4/0 Cu	2.00 $/ft	3,200	6,400	
PVC Duct, 6 in Sch 40	16.00 $/ft	11,200	179,200	preassembled 20 Ft Lengths
Cable bonding lids/link boxes	1,000.00 $/Ea	0	0	
Miscellaneous--Special Tools/spares	15%		236,640	
A. Subtotal Material:			1,814,240	Cable, Splices, Term & Grounding

B. Labor - Civil Construction and Installation

Excavation, incl Shoring	70 $/cy	2,489	174,222
Concrete (incl test+rebar)	350 $/cy	889	311,111
Asphalt	300 $/cy	104	31,111
Backfill	30 $/cy	356	10,667
Duct Supports/Accessories	2.00 $/Ea	2,560	5,120
Manholes and accessories	30,000 $/Ea	0	0
Conduit Install	10 $/ft	11,200	112,000	based on Labor rate of $100 per hour in NY
B1. Subtotal Civil Installation:			644,231	
Cable Installation+Testing	200,000 $/setups	1	200,000	
Cable Terminating	15,000 $/Ea	12	180,000	
Splicing	15,000 $/Ea	0	0	
B2. Subtotal Cable Installation:			380,000	Cable, Splices, Term & Grounding
B. Subtotal Labor (B1 + B2)			1,024,231	

Note. Area is considered constricted since it is basically at an operating substation.

SUMMARY

A.	**Total Materials and Transportation**		**$2,344,240**
B.	**Labor - Civil Construction and Installation**		**$1,474,731**
	Direct Cost	**Labor + Material**	**$3,818,971**
C.	**Route Surveys**		
	Lidar and Ground Survey		part of Converter Sta Survey
D.	**Engineering and Inspection**		
	- Includes Engineering, Procurement, and Construction Management (including Inspection) Services	8%	$305,518
E.	**Administrative Overhead**		
	- Owner Administration Costs		by owner
	- Contractor(s)/Vendor(s) Administrative Overhead		part of A, B, C and D above
F.	**Contingency**	20%	**$824,898**
	TOTAL (A+B+C+D+E+F)		**$4,949,387**

Note. Above excludes Land and Right-of-Way Acquisition Costs, Permitting Costs, Finance Costs including Interest During Construction, Fees for Legal Services and other any other Services not listed.

Attachment for Interrogatory
DPS-32.20

ScienceLab.com
Chemicals & Laboratory Equipment

Health	1
Fire	1
Reactivity	0
Personal Protection	C

Material Safety Data Sheet
Ethylene glycol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylene glycol

Catalog Codes: SLE1072

CAS#: 107-21-1

RTECS: KW2975000

TSCA: TSCA 8(b) inventory: Ethylene glycol

CI#: Not available.

Synonym: 1,2-Dihydroxyethane; 1,2-Ethanediol; 1,2-Ethandiol; Ethylene dihydrate; Glycol alcohol; Monoethylene glycol; Tescol

Chemical Name: Ethylene Glycol

Chemical Formula: HOCH2CH2OH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylene glycol	107-21-1	100

Toxicological Data on Ingredients: Ethylene glycol: ORAL (LD50): Acute: 4700 mg/kg [Rat]. 5500 mg/kg [Mouse]. 6610 mg/kg [Guinea pig]. VAPOR (LC50): Acute: >200 mg/m 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation. Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Non-mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to kidneys, liver, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human

organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

Skin Contact:
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion:
Medical Conditions Aggravated by Exposure:
Persons with pre-existiing kidney, respiratory, eye, or neurological problems might be more sensitive to Ethylene Glycol.
Notes to Physician:
1. Support vital functions, correct for dehydration and shock, and manage fluid balance.
2. The currently recommended medical management of Ethylene Glycol poisoning includes elimination of Ethylene Glycol and metabolites. Elimination of Ethylene Glycol may be achieved by the following methods:
a. Emptying the stomach by gastric lavage. It is useful if initiated within < 1 of ingestion.
b. Correct metabolic acidosis with intravenous administration of sodium bicarbonate, adjusting the administration rate accoridng to repeated and frequent measurement of acid/base status.
c. Administer ethanol (orally or by IV (intravenously)) or fomepizole (4-methylpyrazole or Antizol)) therapy by IV as an antidote to inhibit the ormation of toxic metabolites.
d. If patients are diagnosed and treated early in the course with the above methods, hemodialysis may be avoided if fomepizole or ethanol therapy is effective and has corrected the metabolic acidosis, and no renal failure is present. However, once severe acidosis and renal failure occured, however, hemodialysis is necessary. It is effective in removing Ethylene Glycol and toxic metabolites, and correcting metabolic acidosis.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 398°C (748.4°F)

Flash Points: CLOSED CUP: 111°C (231.8°F). (Tagliabue.)

Flammable Limits: LOWER: 3.2%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Safety glasses. Synthetic apron. Gloves (impervious). For most conditions, no respiratory protection should be needed. However, if material is heated or sprayed and if atmospheric levels exceed exposure guidelines, use an approved vapor (air purifying) respirator.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 120 (mg/m3) [Australia]
TWA: 100 (mg/m3) from ACGIH (TLV) [United States]
CEIL: 125 (mg/m3) from OSHA (PEL) [United States]
CEIL: 50 (ppm) from OSHA (PEL) [United States]

TWA: 52 STEL: 104 (mg/m3) [United Kingdom (UK)] Inhalation
TWA: 10 (mg/m3) [United Kingdom (UK)] SKIN3
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (syrupy)

Odor: Odorless.

Taste: Mild sweet

Molecular Weight: 62.07 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 197.6°C (387.7°F)

Melting Point: -13°C (8.6°F)

Critical Temperature: Not available.

Specific Gravity: 1.1088 (Water = 1)

Vapor Pressure: .06 mmHg @ 20 C; .092 mmHg at 25 C

Vapor Density: 2.14 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -1.4

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:
Soluble in cold water, hot water, acetone.
Slightly soluble in diethyl ether.
Miscible with lower aliphatic alcohols, glycerol, acetic acid, acetone and similar ketones, aldehydes, pyridine, similar coal tar bases.
Practically insoluble in benzene and its homologs, chlorinated hydrocarbons, petroleum ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials.

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Non-*corrosive in* presence of glass.

Special Remarks on Reactivity:

Hygroscopic. Absorbs moisture from the air.
Avoid contamination with materials with hydroxyl compounds.
Also incompatible with aliphatic amines, isocyanates, chlorosulfonic acid, and oleum

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 4700 mg/kg [Rat].
Acute toxicity of the vapor (LC50): >200 mg/m3 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Non-mutagenic for bacteria and/or yeast.
May cause damage to the following organs: kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion.
Slightly hazardous in case of skin contact (irritant, permeator), of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Published Toxic Dose/Conc:
TDL [Man] - Route: oral; Dose: 15gm/kg
Lethal Dose/Conc 50% Kill
LD50 [Rabbit] - Route: dermal; Dose: 9530 ul/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. No human data has been reported at this time.
May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation. May cause more severe response if skin is abraded. A single prolonged exposure is not likely to result in material being absorbed through skin in harmful amounts. Massive contact with damaged skin may result in absorption of potentially harmful amounts
Eyes: Vapors or mist may cause temporary eye irritation (mild temporary conjunctival inflammation) and lacrimation. Corneal injury is unlikely or insignificant..
Ingestion: It is rapidly absorbed from the gastrointestinal tract. Oral toxicity is expected to be moderate in humans due to Ethylene Glycol even though tests with animals show a lower degree of toxicity. Excessive exposure (swallowing large amounts) may cause gastrointestinal tract irritation with nausea, vomiting, abdominal discomfort, diarrhea.
It can affect behavior/central nervous system within 0.5 to 12 hours after ingestion. A transient inebriation with excitement, stupor, headache, slurred speech, ataxia, somnolence, and euphoria, similar to ethanol intoxication, can occur within the first several hours. As sthe Ethylene Glycol is metabolized, metabolic acidosis and further central nervous system depression (convulsions, muscle weakness) develop. Serious intoxication may develop to coma associated with hypotonia, hyporeflexia, and less commonly seizures, and meningismus. 12 to 24 hours

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 41000 mg/l 96 hours [Fish (Trout)]. 46300 mg/l 48 hours [water flea]. 34250 mg/l 96 hours [Fish (bluegill fish)]. 34250 mg/l 72 hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Ethylene glycol
Illinois chemical safety act: Ethylene glycol
New York release reporting list: Ethylene glycol
Rhode Island RTK hazardous substances: Ethylene glycol
Pennsylvania RTK: Ethylene glycol
Minnesota: Ethylene glycol
Massachusetts RTK: Ethylene glycol
Massachusetts spill list: Ethylene glycol
New Jersey: Ethylene glycol
Louisiana spill reporting: Ethylene glycol
TSCA 8(b) inventory: Ethylene glycol
TSCA 4(a) proposed test rules: Ethylene glycol
SARA 313 toxic chemical notification and release reporting: Ethylene glycol
CERCLA: Hazardous substances.: Ethylene glycol: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed.
S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 0

Personal Protection: C

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Not applicable.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:18 PM

Last Updated: 10/10/2005 08:18 PM

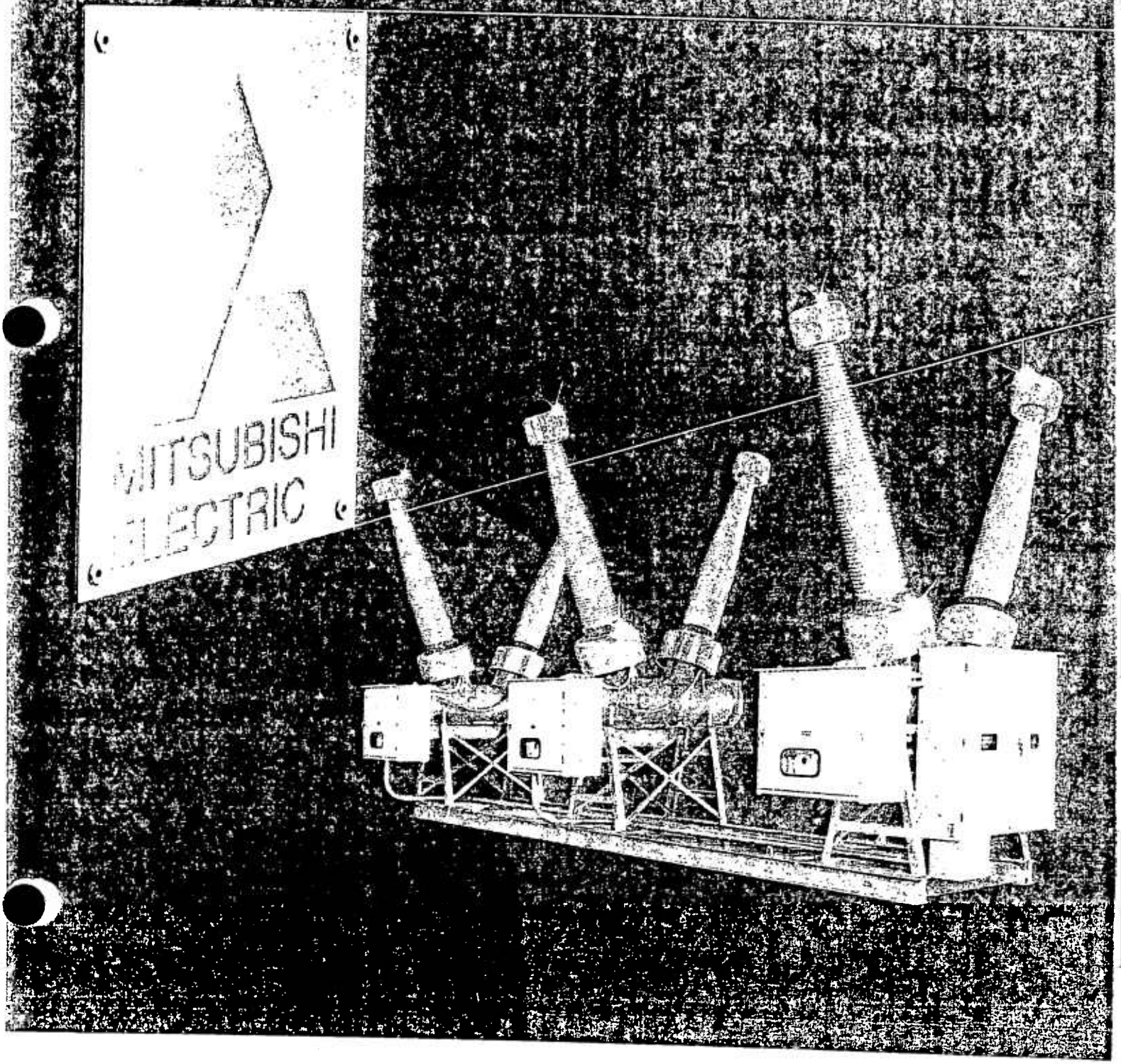
Attachment for Interrogatory
DPS-32.24

MITSUBISHI ELECTRIC POWER PRODUCTS, INC.

SF$_6$ CIRCUIT BREAKER

DEAD TANK TYPE

MODEL 300-SFMT-40E
300-SFMT-50E



Introduction

Mitsubishi Electric Power Products, Inc. is an affiliate of Mitsubishi Electric Corporation.

Factory

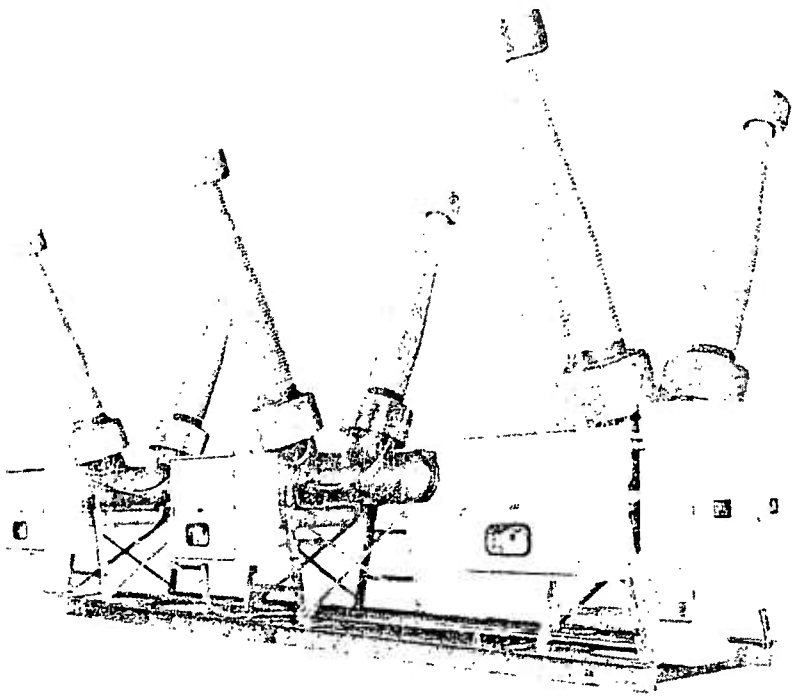
Mitsubishi Electric Power Products Manufacturing facility is located in Warrendale, Pennsylvania, a suburb of Pittsburgh. This location also serves as the center for product service and training.

Evolutionary Design

Thousands of breakers rated at transmission voltages through 1100kV have been installed and are operating reliably on T&D systems worldwide. Introduced in 1974, the design is based on proven engineering principals and extensive development and testing.

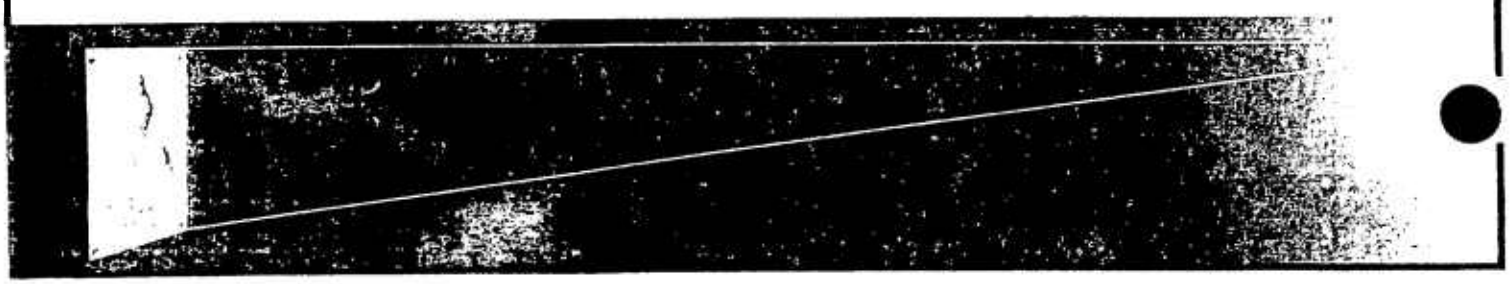
The SFMT features mechanically independent pole-operated, isolated phase dead tanks supported by galvanized steel frames. Each tank houses a single-break puffer interrupter and supports two porcelain or composite bushings. The tanks and bushings are pressurized with SF_6 gas.

The frame of each phase also supports the mechanism cabinet. It houses a torsion spring-type operating mechanism and interphase linkages. The control cabinet can be mounted on any phase and houses the control circuits.



TYPE	300-SFMT-40E	300-SFMT-50E
Voltage (max kV)	362	362
BIL (kV Crest)	1300	1300
60 Hz withstand (kV)	555	555
Continuous Current (A)	1200 / 2000 / 3000	1200 / 2000 / 3000
Interrupting Current (kA)	40	50
Interrupting Time (cycles)	2	2
Total Weight (lbs/kgs)	6621 / 3003*	6621 / 3003*
Weight of SF_6 (lbs/kgs)	365 / 166	365 / 166

* Per Pole



Revolutionary Performance

The SFMT breaker reflects Mitsubishi Electric's commitment to supply power circuit breakers with extended service lives, that meet or exceed the most demanding specifications for interrupting, insulating, and current-carrying capabilities. The design and performance of all breakers are fully verified in accordance with the procedures of ANSI C 37 and IEC 62271-100, and by Mitsubishi's factory procedures that subject the breakers to conditions that are considerably more comprehensive and severe.

These procedures have confirmed the safety and ruggedness of Mitsubishi breakers. For example, tests confirm Mitsubishi breakers withstand 10,000 mechanical operations and severe seismic forces, and that they operate reliably in extremely low or high temperatures.

Users also report extraordinarily low cost of ownership based on exceptional reliability, application flexibility, safety, and ease of maintenance.

Features of the SFMT Design Insulation

- Dead Tank Construction
- Only SF_6 for Open Gap Insulation
- No Solid Insulation Bridging the Open Contacts
- Low Operating Pressure (85 psig @ 20°C) for 362kV, 40kA and 50kA ratings

Primary Electrical Parts/Interrupters

- True Puffer Interrupters
- Contacts Easily Accessible for Inspection and Changeout
- Verified Full Dielectric and Interrupting Rating at Lockout Pressure
- High Strength Porcelain or Composite Bushings
- Integral NEMA 4-hole bushing terminal

Application Flexibility

- Mechanically Tested and Verified to −50°C with tank heaters
- Definite Purpose Capacitive Current Switching Capability
- Reactor Switching Capability
- Tested and Verified for Seismic Applications
- Quiet Operation; Suitable for Urban Installations

Mechanical Operations

- Spring Type Operating Mechanism
- Energy Stored in Powerful Torsion Bars
- Universal Type Spring Charging Motor (AC/DC)
- Quick Spring Charging for O-CO-10 sec-CO Duty Cycle

Rapid Installation

- Integral NEMA 4-Hole Bushing Terminals
- Complete Breaker Factory Assembled and Production Tested

Controls

- Space for a maximum of Four BCTs per Bushing

Proof

- Tested and Verified for 90% Short Line Fault

Fault

- Tested and Verified to Exceed ANSI and IEC Standards
- Verified in Environmental Test Lab
- Production Tested as a Fully Assembled Breaker

Options

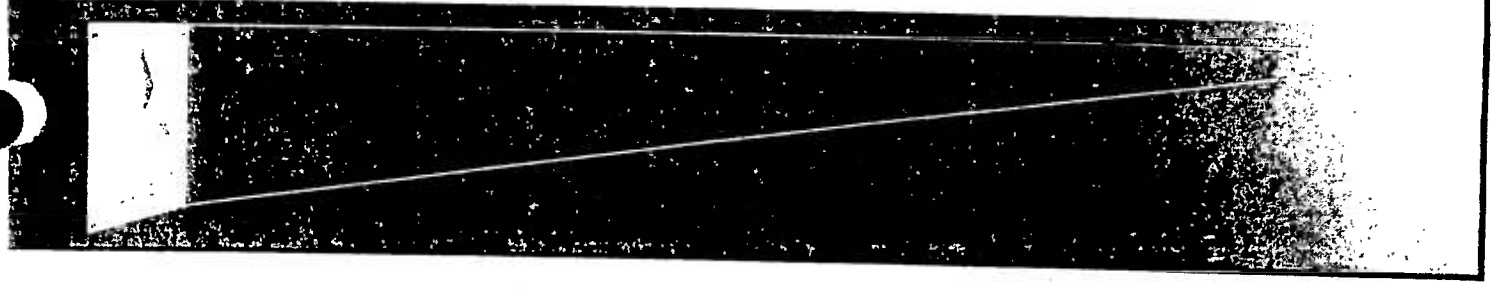
- Tank Heaters for Low Temperature Applications
- High Altitude
- Composite Insulators
  - Factory Installed Interphase Wiring and "I"- Beam Base

Features to Reduce Installation and Maintenance

All SFMT breakers are fully assembled, pressurized and tested to ANSI or IEC and Mitsubishi standards prior to shipment. Each breaker is shipped under partial pressure with dry nitrogen gas. Installation is completed rapidly and easily with the assistance of a Mitsubishi field service engineer. Site work is limited to removing all packing, bolting the frame to the foundation, and installing the bushings. Then, the interrupter tanks and bushings are vacuum-filled to operating pressure with bottled SF6 gas, and the control and power leads are connected. The breaker is then ready for final inspection and any field testing required by the user.

The torsion bar spring mechanism requires no maintenance over the life of the breaker.

Critical interrupter components (stationary and moving arcing contacts and nozzles) need only be inspected after 2000 operations at rated load current. The components are removed easily by simply unbolting the tank inspection cover. Unlike other designs, there are no interrupter valves, seal rings, solid insulation or screens to inspect.



Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-33
Requested By:	Jim de Waal Malefyt
Date of Request:	November 15, 2006
Reply Date:	February 20, 2008
Witness:	Panel A
Subject:	Applicant's Albany Office

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1. Please state the number of days and hours per week that the applicant's office is occupied by a representative knowledgeable about the proposed facility.

Response:

Representatives knowledgeable about the Project are available in the Albany office or else where by appointment. Most working hours by these representatives are spent in the field or in consultants offices providing support and direction for the development of needed materials and analysis

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-34
Requested By:	Andrew Harvey
Date of Request:	November 15, 2006
Reply Date:	February 20, 2008
Witness:	Panel C and Panel D
Subject:	Economic Impacts

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1. Provide the estimated peak construction workforce by discipline and the associated home communities from which these workers will be drawn.

Response:

The labor resources for this project are expected to be made up primarily of locally available skilled craftsmen already present in the general project area. The available labor resources consist of approximately 218 Journeyman Linemen, 409 apprentice linemen, and 30 equipment operators.

It is anticipated that there will be other related transmission, distribution, and station projects with similar construction schedules competing for the available local labor resources; however, it is not expected that the labor requirements would exceed the overall available labor force. In general, it is expected that the construction of the NYRI facility will attract somewhere between 15% to 30% of the skilled craftsmen available within the local labor pool; specifically, about 40% of the linemen, 5% of the equipment operators, and 20% of the general labor needed to execute this project's anticipated 275 to 300 person labor force requirements. The apprentice classifications are expected to make up 10% of the requirements for linemen and general labor. Any skilled resources, such as linemen and cable splicers not locally available will be staffed from skilled resources from outside the project area.

2. Provide the number of permanent jobs by discipline and salary that will be created by this proposal.

Response:

This information concerning the operations and maintenance staffing for the Project has not yet been developed.

3. Provide a quantification of the potential impact on residential property values along the 190 mile corridor of the proposal.

Response:

a. There has been no quantitative analysis of potential residential property value impacts along the Proposed Route or the numerous alternative routes detailed in the Supplemental Article VII Application. However, a literature review of studies that discuss the economic impact of transmission lines on residential and agricultural property values was prepared in "Analysis of the NYRI Project's Impact on Tourism in the Local Tourist Economies" (see Supplemental Article VII Application, Appendix K).

4. Provide a quantification of the potential economic impact on business property values as well as on the businesses themselves along the 190-mile corridor of the proposal.

Response:

There has been no quantitative analysis of potential economic impact on business property values or potential business activity impacts along the Proposed Route or the numerous alternative routes detailed in the Supplemental Article VII Application. However, see response to DPS 34-5 below with respect to potential impact on the tourism industry.

5. Provide a quantification of the potential economic impact on the tourism industry along the 190- mile corridor of the proposal.

Response:

The Project did not prepare a quantification of economic impact on tourism of the proposed NYRI transmission line but performed a systematic qualitative assessment in "Analysis of the NYRI Project's Impact on Tourism in the Local Tourist Economies" (see Appendix K of the Supplemental Article VII Application).

The report reviews the potential effect on tourism in three specific areas likely to be affected by the project: (a) the Upper Delaware Scenic and Recreational River (UDSSR) corridor,

(b) the D&H Canal park, and (c) the Norwich, NY, area near the proposed Alteren resort development:

a. The study shows that there would be no demonstrable impact on tourist economy of the UDSRR corridor. The proposed NYRI transmission line would not likely be visible within three miles of any part of the most visited part of the corridor, between Sparrow Bush, NY, and Narrowsburg, NY. North of Narrowsburg, there are intermittent areas where the transmission line has the potential to be seen in the middleground to background zones of view but would not be visible in the foreground of views from the River which are the two conditions that the Supplemental Visual Impact Assessment (see Appendix M of the Supplemental Article VII Application) concluded would have the greatest impact.

b. The proposed NYRI transmission line may have a small effect on tourism at the D&H Canal Park. The area of the D&H Canal Park, in which the historic features and visitor facilities are concentrated, is already crossed by an electric transmission line that is an established part of the park's visual character. To the extent that the presence of an electric transmission line affects levels of visitation, the park would already be affected by the presence of the other transmission line. Because the proposed transmission line would be placed in the same corridor as the pre-existing line, the additive effect of the new transmission would at most be moderate.

c. The proposed NYRI transmission line will be entirely underground through the Alteren project site, the only visual change that it will create will be a slight widening of the cleared area associated with the existing NYSEG Woods Corners-E Norwich 46 kV transmission line. This visual change will be subtle, and because it will occur at the far western edge of the Alteren project site where it will not cause direct interference with the proposed land uses, there is no basis for assuming the presence of this underground line would affect the development potential of the site, the desirability of the properties in the completed project, or the ability of the completed project to attract visitors from outside the area.

6. Provide any known studies that discuss the economic impact of transmission lines on residential property values, business property values, and on business activity, tourism, and recreational activities.

Response:

a. A literature review of studies that discuss the economic impact of transmission lines on residential and agricultural property values was prepared in "Transmission Lines and Property Values: Review of the Research and Summary of Key Findings" (see Appendix K of the Supplemental Article VII Application).

b. A search for impacts of transmission lines on tourism and tourist economies was conducted in technical reports, research studies, and academic journals. However, no studies were found that focus on any of the possible relationships between electric transmission lines, tourism, and tourist expenditures. More details can be found in "Analysis of the NYRI Project's Impact on Tourism in the Local Tourist Economies" (see Supplemental Article VII Application, Appendix K).

7. Provide an assessment of the economic impact on each of the communities adjacent to the 190-mile corridor that the proposed transmission line would follow.

Response:

The assessment of economic impacts details in the region that the proposed route is located can be found in Exhibit 6 of the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-35
Requested By:	Jim de Waal Malefyt
Date of Request:	November 15, 2006
Reply Date:	February 20, 2008
Witness:	Panel A
Subject:	Local Legal Requirements

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1. Provide a detailed explanation of the basis for any requested waiver in view of the existing technology, factors of cost or economics, or the needs of consumers.

Response:

See Exhibit 7 of the Supplemental Article VII Application.

2. Provide an analysis of alternatives (such as re-routing, design changes or other measures) that would enable the proposed facility to comply with substantive local requirements.

Response:

See Exhibit 7 of the Supplemental Article VII Application.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.: DPS-36
Requested By: Jim de Waal Malefyt
Date of Request: November 15, 2006
Reply Date: February 20, 2008
Witness: Panel G
Subject: Financial Viability and Organizational Structure

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1. Describe the applicant's organizational, clearly identifying its lines of ownership and responsibility.

Response:

NYRI is a corporation organized and existing under the New York Transportation Corporation Law. The sole business of NYRI is the development, financing, construction, and operation and maintenance of the Project. NYRI is a wholly-owned subsidiary of Colmac NYRI, Inc. ("Colmac NYRI"), a Delaware corporation. Colmac NYRI is owned by ACI NYRI, Inc. ("ACI NYRI") a Delaware corporation, Asgard Resources Limited ("ARL"), a corporation incorporated under the laws of Canada, Borealis Transmission Inc. ("BTI"), a corporation incorporated under the laws of Canada and BPC Transmission Corporation ("BPC"), a corporation incorporated under the laws of Canada.

ACI NYRI is wholly owned by American Consumers Industries Inc. ("ACI"), a Delaware corporation. Neither ACI nor ACI NYRI have any financial or controlling interest in any entities that own generation, transmission or distribution assets in the New York control area. ACI owns all or part of four Qualifying Facilities ("QF") located in Utah, Montana, California and Pennsylvania. The entire output of these facilities is committed under long term contracts.

ARL is owned by 6615503 Canada Inc., a family trust organized under the laws of Canada. Neither ARL nor 6615503 Canada Inc. has any financial or controlling interest in any entities that own generation, transmission or distribution assets in the United States.

BPC is a wholly owned subsidiary of BPC Penco Corporation ("BPC Penco"). BPC Penco is a wholly owned subsidiary of OMERS Administration Corporation, the administrator of the Ontario Municipal Employees Retirement System pension plan ("OMERS"). OMERS is one of Canada's leading pension funds, with over $48 billion in assets under management and is rated AAA by S&P. BTI is a wholly owned subsidiary of Borealis Infrastructure Corporation. All of the participating equity of Borealis Infrastructure Corporation is owned by OMERS.

Neither BPC, BTI nor their affiliated entities have a financial or controlling interest in any entities that own generation, transmission or distribution assets in the United States.

2. Describe the financial resources that will be available to the applicant to start and sustain the construction of its proposed facility

Response:

The major investors in the project to date, American Consumer Resources Inc. and Borealis Infrastructure, have made substantial commitments to provide the development funding and the equity in the project. The balance of the funds will be raised in the traditional project finance market. Access Capital, a financial consultant, has made early inquiries with several of the major financial institutions involved in project financing and has received strong interest in financing the project conditional on a siting certificate and suitable FERC approved rate recovery being obtained.

Case 06-T-0650
New York Regional Interconnect Inc. Application

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST

Request No.:	DPS-37
Requested By:	Richard H. Powell
Date of Request:	January 5, 2007
Reply Date:	February 20, 2008
Witness:	Panel A
Subject:	Applicable Legal Provisions

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1. **Reference Exhibit 4. Subsection 4.7.3 and Exhibit 7.0.**

   Provide copies of all Comprehensive and Master Land Use Plans, studies and assessments and maps prepared by interstate commissions, federal agencies, state, regions, counties, and local municipalities and local, state and federal (if any) land use controls and laws, and maps that were reviewed by the applicant in the preparation of this subsection and Exhibit 7.0 Local Ordinance Review.

Response:

See enclosed CD-ROM, "Supplemental Article VII, Interrogatory DPS 37-1, Response"

Attachment for Interrogatory
DPS-37.1 (on CD)