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Orange & Rockland
a conEdison, inc. company

Matthew Sniffen
Director
Electric Operations

January 14, 2009
By Hand Delivery

Jaclyn A. Brilling
Secretary
New York Public Service Commission
3 Empire State Plaza
Albany, NY 12223-1350

Re: Case 04-M-0159, Proceeding on the Motion of the Commission to Examine the Safety of Electric Transmission and Distribution Systems
2008 Stray Voltage Detection and Electric Facility Inspection Report
Consolidated Edison Company of New York, Inc.

Dear Secretary Brilling:

Orange and Rockland Utilities, Inc. ("O&R") submits for filing an original and five (5) copies of its *2008 Stray Voltage Detection and Electric Facility Inspection Report* ("Report").

The Report details the results of O&R's Stray Voltage Detection Program and its Electric Facility Inspection Program for the year ended November 30, 2008 and provides the certification of O&R's Vice President – Operations that O&R has achieved its annual performance targets.

Sincerely,

Matthew Sniffen
Director of Electric Operations

Enclosures

Report on Orange and Rockland Utilities, Inc.'s Implementation of the Electric Safety Standards For the Period December 1, 2007 through November 30, 2008 Case 04-M-0159

Pearl River, NY
January 15, 2009

Report on Orange and Rockland Utilities, Inc.'s Implementation of the Electric Safety Standards For the Period December 1, 2007 through November 30, 2008 Case 04-M-0159

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December 1, 2007 through November 30, 2008
Case 04-M-0159

Section One
Background

The Public Service Commission's ("PSC" or "Commission") Electric Safety Standards ("Safety Standards"), issued on January 5, 2005 in Case 04-M-0159, require utilities to conduct an annual system-wide stray voltage detection program and a five-year cycle equipment inspection program to mitigate stray voltage risks to the public and promote reliability.

This report describes Orange and Rockland Utilities, Inc.'s ("Orange and Rockland", "O&R" or "Company") stray voltage detection program and equipment inspection program conducted in 2008 and addresses the following:

1. Results of the stray voltage testing program;
2. Additional stray voltage detection;
3. Results of the electrical equipment inspection program;
4. Adherence to Safety Standards Performance Mechanism;
5. Certification of stray voltage testing and inspection programs;
6. Analysis of results;
7. Additional stray voltage related initiatives; and
8. Future improvements.

Section Two
Overview of the Orange and Rockland Electric System

O&R provides electric service to approximately 220,288 customers in a service area covering slightly more than 1,000 square miles. The Company operates an electric transmission and distribution ("T&D") system that includes 166 distribution circuits with approximately 2,882 circuit miles of overhead and underground cable, nearly 300 miles of transmission right of way, 35 distribution substations, 2 distribution switchyards, 6 transmission substations, 7 transmission/distribution substations, 3 transition structures and 3 transmission switchyards. The Company also owns the transmission interconnections to ten substations for single industrial customers.

The O&R service territory is separated geographically into two operating divisions, Eastern and Northern. The Eastern Division, which is the Company's most densely populated Division, is supplied from an open-loop radial 13.2 kV distribution system. The Northern Division is fed from longer 4 kV, 13.2 kV and 34.5 kV radial circuits. The Company's backbone transmission is 69 kV and 138 kV. In the Northern Division, 69 kV transmission is the predominant operating voltage, and a few 34.5 kV transmission lines serve limited load.

The O&R customer portfolio is principally residential in nature and includes a wide variety of commercial, light industrial, agricultural and recreational facilities. The Company's New York service area encompasses all or portions of Rockland, Orange and Sullivan Counties, and includes 62 incorporated municipalities. The Company also serves customers in northern New Jersey and northeastern Pennsylvania.

Transmission:

The transmission system consists of 6,799 structures – 6,789 overhead facilities and 10 underground manholes. Approximately 75% of the overhead transmission structures are wood poles, with the remaining 25% comprised of steel lattice towers and steel poles. Transmission line operating voltages are 345 kV, 138 kV, 69 kV and 34.5 kV. There are over 3,500 acres of transmission line corridor. Third parties privately own approximately 93% of the corridor for which O&R has rights-of-way.

O&R also maintains 345 kV and 500 kV overhead transmission lines located within the O&R service territory that are jointly owned with, or wholly owned by, Consolidated Edison Company of New York, Inc. ("Con Edison").

Distribution:

The O&R distribution system is an open-loop overhead radial system serving customers through both overhead facilities and underground residential distribution ("URD").

Underground

O&R does not have an underground network system as is typical in dense urban environments. The Company's underground system is comprised of URD, distribution-circuit exits originating at the substations, and short underground cable sections in place due to clearance considerations. Generally, all underground systems originate from or terminate to the overhead system.

The O&R underground system has 17,174 structures that require stray voltage testing and 28,955 structures that require visual inspection every five years pursuant to the Safety Standards. The majority of the structures that do not require testing are fiberglass handholes.[1] Below is a summary of the structures:

	Test (units)	Inspect (units)
Single-phase pad mounted transformers	13,446	13,446
Three-phase pad mounted transformers	1,415	1,415
Mat mounted transformers (fence)	8	8
Submersible underground transformers	85	85
Switches mounted on box pad	1,679	1,679
Manholes (distribution)	170	170
Pull boxes	48	48
Vaults	0	11
Handholes	323	12,093

Overhead

O&R is predominately an overhead distribution company, consisting of 166 distribution circuits over approximately 2,882 circuit miles. Service to customers is provided via a distribution system operating at a variety of primary voltages, including 4.16 kV, 4.8 kV, 13.2 kV and 34.5 kV. Primary conductors are typically supported on Class 2 - 45 foot distribution poles that are either solely owned, solely owned – jointly used, or jointly owned with one of several telecommunication companies including Verizon, Frontier and Citizens. A number of third parties have attachment rights to the distribution facilities, including competitive local exchange carriers and cable television providers.

O&R's pole population includes 134,963 structures, of which 100,203 structures require stray voltage testing and 134,963 structures require visual inspection every five years pursuant to the Safety Standards.[2] Below is a summary of the structures:

[1] 11,781 units require visual inspections but do not require stray voltage testing because they are either fiberglass structures (non-conductive) or vaults not accessible to the public.

[2] The remaining 34,760 poles do not require stray voltage testing because these poles have no attached appurtenances capable of conducting electricity; their electrically conductive appurtenances are not accessible to the public (pre-wired wood), are enclosed in fiberglass (non-conductive) structures, or are de-energized; and / or the poles are deemed inaccessible to the public.

	Test (units)	Inspect (units)
Wood poles	112,398	112,398
Risers	17,377	17,377
Pre-wired wood poles		3,755
Fiberglass poles		1,433

Streetlights

There are 1,333 streetlights mounted on metal poles throughout the O&R service territory. The majority of these streetlights are owned and maintained by a municipality or other third party. The Safety Standards require that O&R test all of these metal pole streetlights for stray voltage.[3]

Traffic Signals

There are 490 traffic signals mounted on metal poles throughout the O&R service territory. The New York State Department of Transportation or local municipalities own these traffic signals. O&R does not own or maintain any traffic signals within its service territory. The Safety Standards require that O&R test all of these metal-pole-mounted traffic signals for stray voltage.

[3] The large majority of streetlights in the Company's service area are mounted on wooden poles, and do not require stray voltage testing because their electrically conductive surfaces are not accessible to the public.

Section Three
Testing and Inspection Results

2008 Stray Voltage Testing Program:

Summary

By order issued on July 21, 2005 in Case 04-M-0159, the Commission required that O&R complete annual stray voltage testing of its entire publicly accessible T&D systems by November 30, 2008.

During the annual period ending November 30, 2008, O&R tested for stray voltage all T&D facilities with publicly accessible components capable of conducting electricity and all metallic streetlights and traffic signals. The Company also tested all publicly accessible third party facilities electrically bonded to and in close proximity to the tested O&R system components.

O&R conducted separate stray voltage test programs for the transmission and distribution systems. Non-Company labor (i.e. contractors) was used to perform the majority of the test work within each program. Non-Company labor was selected through O&R's bid selection process and was required to adhere to applicable Company safety requirements. O&R established an administrative group to manage and review contractor work and performance. In addition, O&R established a separate Quality Assurance group within its Operations Training and Compliance Department to further facilitate and ensure compliance.

Testing of the transmission system began in April 2008. Non-Company labor conducted the testing on overhead and underground transmission structures.

O&R commenced stray voltage testing of its underground and overhead distribution system in December 2007 and completed its testing in November 2008. Non-Company labor conducted all the testing on distribution facilities and non-Company owned streetlights and traffic signals.

Underground

- Scope

  O&R's URD facilities total 28,955 structures, of which 17,174 structures require stray voltage testing. The remaining 11,781 structures are fiberglass (non-conductive) structures or vaults not accessible to the public. For the test period

ending November 30, 2008, O&R tested 16,732 structures, of the 17,174 structures that require testing. Nearly all of the structures tested operated at a primary voltage of 13.2 kV (three-phase) or 7.62 kV (single-phase). Other metallic structures and objects within a 5'0" radius of a tested underground facility were also tested, regardless of ownership, if electrically bonded to the distribution system.

A total of 442 underground units (1.53% of O&R's URD structures) were not tested due to inaccessibility. Inaccessible structures include:

- Locked Gate/Fence - Structures behind locked gates and fences that are not accessible to the public are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Vaults - Structures located inside buildings. These structures are accessible only to Company and building maintenance personnel and not accessible to the public. These structures are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Orange and Rockland Property - Structures located on O&R property, such as substations, are accessible only to Company personnel and authorized contractors and not accessible to the public. These facilities are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Handholes –The majority of O&R handholes are fiberglass and therefore do not require annual stray voltage testing. Many of these structures are located and buried on private property. The accessible structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.

- Overall Program

The testing of the underground distribution system commenced in December 2007 and concluded November 2008. The work was contracted to a vendor, and at the conclusion of the 2008 program, approximately 20 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Data Analyst and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with handheld electronic devices[4] to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor and O&R collaboratively managed the field data utilizing a licensed

[4] Dell Axim X50v Pocket PC and Trimble Juno ST with an integrated GPS.

product, Stray Voltage Manager, along with O&R's Electric Information Management System ("EIMS").

- Test Procedure

O&R's Stray Voltage underground testing program is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. To test for stray voltage, the contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Stray Voltage Procedure 2202 ("Procedure 2202"), set forth as Exhibit 1 to this Report. The HD device is an independently certified low voltage AC test probe.[5] These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up test procedure was performed in accordance with O&R's Stray Voltage Investigative Procedure 2203 ("Procedure 2203"), set forth as Exhibit 2 to this Report. If the results of the testing performed utilizing Procedure 2203 proved positive, then O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203, or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

The Company's Quality Assurance Program ("QA Program") selectively sampled and retested 893 distribution structures. This statistically significant sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of a normal sample size for a unit population of 150,001 to 500,000. The sample selection was distributed across the various structure types. Of the 893 structures selected, 153 (17.1%) were underground structures. Quality Assurance identified no stray voltage conditions during retesting.

- Results

A total of 16,732 URD structures were stray voltage tested. One stray voltage condition was identified and permanently mitigated. No injuries were associated with the finding. The description of the condition and mitigation is provided in the Year End Public Service Commission Report set forth as Appendix 2 of this Report.

Overhead

- Scope

O&R's distribution pole population is 134,963 of which 100,203 must be tested for stray voltage. The remaining 34,760 poles do not require stray voltage testing because these wood poles have no attached appurtenances capable of conducting electricity; their electrically conductive appurtenances are not accessible

[5] William J. McNulty, P.E. completed the testing and certification process for the HD Electric Company. In addition, Consolidated Edison validated the testing at the NTL test labs.

to the public (pre-wired wood), are enclosed in fiberglass (non-conductive) structures, or are de-energized; and/or the poles are deemed inaccessible to the public. For the test period ending November 30, 2008, O&R tested appurtenances on all 100,203 poles. Nearly all of the structures tested operated at a primary voltage of 13.2 kV (three-phase) or 7.62 kV (single-phase). Some facilities in northwest Orange County and portions of Sullivan County operate at a higher primary voltage of 34.5 kV (three-phase) or 19.9 kV (single-phase).

Points tested include all attached appurtenances capable of conducting electricity on wood poles, such as guy wires, grounds, risers, and Company and non-Company owned attachments within 8'0" from ground level. Other metallic structures and objects within a 5'0" radius of a wood pole were also tested, regardless of ownership, if electrically bonded to the distribution system.

Approximately 1,436 or 1.1%, overhead units are de-energized structures or inaccessible to the public and were not tested. Inaccessible structures include:

- Locked Gate/Fence – Poles behind locked gates and fences that are not accessible to the public and are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Dangerous Grades (Cliffs) – Poles located on cliffs and other dangerous grades are generally inaccessible to even Company personnel and are approached only under urgent circumstances. The performance of the testing work would constitute an unacceptable risk to the employee. These poles are not accessible to the public and are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.
- Orange and Rockland Property – Poles located on O&R property, such as substations, are accessible only to Company personnel and authorized contractors and are not accessible to the public. These facilities are not included in the annual testing program. These structures will be inspected in accordance with existing Company maintenance cycle programs and at least once every five years consistent with the Safety Standards.

- Overall Program

The testing of the overhead distribution system commenced in December 2007 and concluded November 30, 2008. The work was contracted to a vendor, and at the conclusion of the 2008 program, approximately 20 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Data Analyst and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with handheld electronic devices to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor and O&R collaboratively managed the field data utilizing a licensed product, Stray Voltage Manager, along with O&R's Electric Information Management System ("EIMS").

- Test Procedure

O&R's Stray Voltage overhead distribution testing program is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. To test for stray voltage, the inspectors used HD Electric Company's LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up test procedure was performed in accordance with O&R's Procedure 2203. If the results of the testing performed utilizing Procedure 2203 proved positive, O&R immediately implemented corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of Procedure 2203, or safeguarded the facility from the general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

The Company's QA Program selectively sampled and retested 893 distribution structures. This statistically significant sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of a normal sample size for a unit population of 150,001 to 500,000. The sample selection was distributed across the various structure types. Of the 893 structures selected, 353 (39.5%) were overhead structures. Quality Assurance identified no stray voltage conditions during retesting.

- Results

A total of 100,203 overhead poles were tested throughout Rockland, Orange and Sullivan Counties. Of the poles tested, 31 voltage conditions were found and mitigated. These voltage conditions include induction, neutral to earth and stray voltage. Of the 31 overhead conditions, 2 voltage conditions remain on the system =/> 1.0 volt after mitigation.[6] These are deemed as neutral to earth and induced voltages. The contractor and O&R program management safeguarded all conditions until Company crews or the responsible party arrived to perform the work. The conditions were mitigated within twenty-four (24) hours to one week. No injuries were associated with the findings. The description of the conditions and mitigation are provided in the Year End Public Service Commission Report set forth as Appendix 2 of this Report.

[6] Maximum voltage remaining on the system after mitigation is 3.9 volts.

Streetlights and Traffic Signals

- Scope

O&R owns and maintains 399 metal pole streetlights. An additional 934 metal pole streetlights and 490 traffic signals owned by various municipalities and Highway Departments were identified by the Company's contractor. These populations do not include streetlights on limited access highways which are not tested because they are not accessible to the public and because performing testing on highways presents a danger to the test personnel. Nearly all of the structures tested operated at a secondary voltage of 120/240 volts. The Company tested all 1,333 streetlights and 490 traffic signals by November 30, 2008.

- Overall Program

The testing of the streetlight and traffic signal metal poles commenced in September 2008 and concluded November 30, 2008. The work was contracted to a vendor, and at the conclusion of the 2008 program, approximately 5 contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager, Data Analyst and a Line Supervisor managed the contractor's performance. The Stray Voltage Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps and street surveys, in conjunction with handheld electronic devices, to record the testing and location of each structure. O&R Stray Voltage Program personnel and the contractor collaboratively managed and maintained the stray voltage testing data. The contractor and O&R collaboratively managed the field data utilizing a licensed product, Stray Voltage Manager, along with O&R's Electric Information Management System ("EIMS").

- Test Procedure

The Company's Stray Voltage testing program for streetlight and traffic signal metal poles is administered in accordance with the Company's February 18, 2005 Program filing with the Commission in Case 04-M-0159. The contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors to test for stray voltage, in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Upon detection of AC voltage equal to or greater than 1.0 volt, a follow-up procedure was performed in accordance with O&R's Procedure 2203. If the results of the testing performed utilizing Procedure 2203 proved positive, O&R immediately implemented corrective action. O&R mitigated the stray voltage in the manner prescribed in Section 5 of Procedure 2203, or safeguarded the facility from the

general public until the appropriate responsible entity was contacted to de-energize the structure pending repair.

The Company's QA Program selectively sampled and retested 893 distribution structures. This statistically significant sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of a normal sample size for a unit population of 150,001 to 500,000. The sample selection was distributed across the various structure types. Of the 893 structures selected, 303 (33.9%) were streetlights and traffic signals structures. Quality Assurance identified no stray voltage conditions during retesting.

- Results

A total of 1,333 metal pole streetlights and 490 traffic signal poles, were tested throughout Rockland, Orange and Sullivan Counties.

No stray voltage conditions were identified on streetlights, and one stray voltage condition was identified on a traffic signal pole. The traffic signal pole was safeguarded until a municipality representative arrived for mitigation. The voltage measured zero after mitigation. No injuries were associated with the finding. The description of the condition and mitigation is provided in the Year End Public Service Commission Report set forth as Appendix 2 of this Report.

Substations

- Scope

During 2008, O&R tested the publicly accessible fencing of all of its New York substations consisting of 35 distribution substations, 2 distribution switchyards, 6 transmission substations, 7 transmission/distribution substations, 3 transition structures, 3 transmission switch yards, and ten substations for single industrial customers.

These tests were conducted in conjunction with stray voltage testing on the transmission system.

- Overall Program

The substation fence tests commenced in April 2008 and concluded in October 2008. The work was contracted to a vendor, and at the conclusion of the 2008 program, four contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager and Extra High Voltage ("EHV") personnel managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's substation location maps, in conjunction with handheld electronic devices, to record the testing and location of each substation fence test. O&R EHV personnel, Stray Voltage personnel, and the

contractor collaboratively managed the stray voltage testing. The field data was maintained through proprietary data management software known as Fastgate.

- Test Procedure

O&R's Stray Voltage substation testing program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-0159. To test for stray voltage, the contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Although no stray voltage was detected on substation fences, O&R's Procedure 2203 specifies that upon detection of an AC voltage, a follow-up test procedure is performed. If the results of the testing performed utilizing Procedure 2203 prove positive, O&R would immediately implement corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of the Procedure.

The Company's QA Program selectively sampled and retested 893 distribution structures. This statistically significant sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of a normal sample size for a unit population of 150,001 to 500,000. The sample selection was distributed across the various structure types based on the potential risk to public safety. Of the 893 structures selected, 17 (1.9%) were substation fences. Quality Assurance identified no stray voltage conditions during retesting.

- Results

The exterior fences at 100% of O&R's New York substations, a total of 66 substation fences, were tested throughout Rockland, Orange and Sullivan Counties. No stray voltage conditions were identified.

Transmission

- Scope

O&R's transmission system currently consists of 6,799 structures; 6,789 overhead facilities and 10 underground manholes, including 345 kV and 500 kV overhead transmission lines located within the O&R service territory that are jointly owned with, or wholly owned by, Con Edison. Approximately 75% of the overhead transmission structures are wood poles with the remaining 25% comprised of steel lattice towers and steel poles. Transmission line operating voltages are 345 kV, 138 kV, 69 kV and 34.5 kV. There are over 3,500 acres of transmission corridor, 93% of which are privately owned by third parties, where the Company maintains rights-of-way.

During the 2008 test program, 6,799 structures, or 100% of the transmission system was tested. None of the transmission pole plant was classified as inaccessible.

- Overall Program

The testing of the transmission system commenced in April 2008, and the overhead system was concluded in October 2008. The work was contracted to a vendor, and at the conclusion of the 2008 program, four contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager and EHV personnel managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used transmission plan and profile maps, in conjunction with handheld electronic devices, to record the testing and location of each structure. O&R EHV personnel, Stray Voltage personnel, and the contractor collaboratively managed the stray voltage testing and visual inspection data utilizing proprietary data management software known as Fastgate.

- Test Procedure

O&R's Stray Voltage transmission testing program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-0159. The contractor's inspectors used HD Electric Company LV-S-5 Direct Contact Low Voltage Detectors in accordance with O&R's Procedure 2202. The HD device is an independently certified low voltage AC test probe. These probes were used for detection of low AC voltage on conductive equipment or apparatus.

Although no stray voltage was detected on transmission structures, O&R's Procedure 2203 specifies that upon detection of an AC voltage, a follow-up test procedure is performed. If the results of the testing performed utilizing Procedure 2203 prove positive, O&R would immediately implement corrective action to mitigate the stray voltage in the manner prescribed in Section 5 of the Procedure.

In 2008, the Quality Assurance Program selectively sampled 100 (1.5%) of the 6,789 overhead structure towers for retesting. The sample size was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for QA testing. Quality Assurance identified no stray voltage conditions on retesting.

- Results

All of O&R's New York transmission system, consisting of 6,789 overhead structures and 10 underground transmission manhole covers, were tested throughout Rockland, Orange and Sullivan Counties. No stray voltage conditions were identified.

2008 Electrical Facility Inspection Program:

Summary

Pursuant to the Safety Standards, O&R is required to visually inspect 100% of its electric equipment over a five-year cycle and inspect approximately 20% of its equipment annually. In 2008, O&R visually inspected approximately 18.1% of the Company's T&D system. This included 13.7% of the overhead distribution system, 19.3% of the underground distribution system, and 99.9% of the transmission system. In addition, all O&R substations were visually inspected in 2008 through the Company's Class One Inspection Program performed by its Substation Operations Department.[7]

In total, O&R has visually inspected approximately 93.8% of the Company's T&D facilities during the annual inspection cycles from 2005 through 2008. This includes 99.9% of the transmission system, 99.9% of the overhead distribution system, 65.4% of the underground distribution system, and 100% of its New York substations.

Non-Company labor performed the majority of the transmission and distribution system inspection work. O&R established an administrative group to manage and review contractor work and performance. In addition, O&R established a separate Quality Assurance group within its Operations Training and Compliance Department to further facilitate and ensure compliance.

To ensure compliance with the Safety Standard's visual inspection requirements for substations, O&R conducted the Company's Substation Class One Inspections by which substations are inspected at least once a month. In 2008, Company personnel conducted the inspections for all of O&R's 66 New York substations.

O&R continued its annual overhead transmission facility inspection program in 2008. O&R inspects all of its 6,789 overhead transmission facilities annually. This represents 99.9% of the transmission system.[8] Inspection of the overhead transmission system commenced in April 2008 and concluded in October 2008.

[7] A Class One Inspection is a monthly visual inspection of O&R substations to ensure the various components of the substation and its appurtenances are properly maintained and functional. All Substation maintenance programs, including Class One Inspections are further defined in the Company's Annual Service Reliability Filing to Staff (Case 90-E-1119).

[8] O&R also has ten underground transmission manholes that are not part of the annual overhead transmission inspection program and will be inspected separately by Company personnel.

Underground

- Scope

The O&R URD system consists of 28,955 structures. A total of 5,582 units of underground distribution equipment were visually inspected in 2008, or 19.3% of the URD system. O&R prioritized identified defects in accordance with the requirements outlined in the Company's Underground Work Procedure 2201-3, Inspection for Underground Distribution Structures and Equipment ("Procedure 2201-3") set forth as Exhibit 3 of this Report.

- Inspection Procedure

The Company's Underground Visual Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-1059. The visual inspection of the URD system commenced in December 2007 and concluded November 30, 2008. The work was contracted to a vendor who worked within the guidelines established by Procedure 2201-3. An O&R Program Manager, Data Analyst, and a Line Supervisor managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor field inspectors used O&R's distribution system maps in conjunction with handheld electronic devices to record the inspections of each structure. O&R Visual Inspection Program personnel and the contractor collaboratively managed and maintained the inspection data. O&R and the contractor collaboratively managed the field data utilizing a licensed product, Stray Voltage Manager, along with O&R's Electric Information Management System ("EIMS").

The contractor, consistent with Procedure 2201-3, categorized defects as Priority 5 (highest priority) to Priority 1 (lowest priority). Priority 5 defects require immediate attention and permanent repair to be completed within 24 hours. Priority 4 defects must be permanently repaired within seven days. Priorities 3 through 1 defects are scheduled to be repaired in conjunction with normal routine work.

The Company's QA Program selectively sampled and re-inspected 893 distribution structures. This sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for a lot size of 35,000 to 150,000 units. The sample selection was distributed across the various structure types. Of the 893 structures selected, 153 (17.1%) were underground structures. The QA program found that the contractor inspectors had reported equipment problems consistent with the inspection requirement.

- Results

A total of 5,582 underground structures, or 19.3% of the URD system, were visually inspected in 2008. Forty five Priority 5 defects were identified, and all were repaired within 24 hours. Examples of Priority 5 situations included padmount transformers knocked off their base and corroded exteriors. Fifty one Priority 4 defects were identified, and all were repaired within seven days. In addition, 457 Priorities 3 through 1 defects were found, of which, 48, or 10.5% were permanently repaired. The remaining defects will be repaired during normal routine work or monitored.

Overhead

- Scope

The O&R overhead distribution system consists of 134,963 structures. The equipment associated with 18,473 structures, or 13.7% of the overhead distribution system, was visually inspected in 2008. The equipment visually inspected included poles, guy wires, grounds, risers, cross arms, conductors, and other appurtenances. O&R prioritized identified defects in accordance with the requirements outlined in O&R's Overhead Work Procedure 2200-3, Inspection Procedure for Overhead Distribution Structures and Equipment ("Procedure 2200-3"), set forth as Exhibit 4 of this Report.

- Inspection Procedure

O&R's Overhead Visual Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed in Case 04-M-1059. The visual inspection of the overhead distribution system commenced in December 2007 and concluded in November 2008. The work was contracted to a vendor who worked within the guidelines established by Procedure 2200-3. An O&R Program Manager, Data Analyst and a Line Supervisor managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used O&R's distribution system maps in conjunction with handheld electronic devices to record the inspections of each structure. O&R Visual Inspection Program personnel and the contractor collaboratively managed and maintained the inspection data utilizing a licensed product, Stray Voltage Manager, along with O&R's Electric Information Management System ("EIMS").

The contractor, consistent with Procedure 2200-3, categorized defects as Priority 5 (high priority) to Priority 1 (low priority). Priority 5 defects require immediate attention and permanent repairs to be completed within 24 hours. Priority 4 defects must be permanently repaired within seven days. Priorities 3 through 1 defects are scheduled to be repaired in conjunction with normal routine work.

The Company's QA Program selectively sampled and re-inspected 893 distribution structures. This sample size exceeds the 800 units required by the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant sample sizes for a lot size of 35,000 to 150,000 units. The sample selection was distributed across the various structure types. Of the 893 structures selected, 353 (39.5%) were overhead devices. The QA program concluded that the contractor inspectors had reported equipment problems consistent with the inspection requirement.

- Results

A total of 18,473 overhead structures, or 13.7% of the overhead system, were visually inspected. Nine Priority 5 defects were identified, and all were repaired within 24 hours. Fifteen Priority 4 defects were identified, and all were repaired within seven days. Examples of Priority 5 and 4 defects include a tree on the primary conductor, detached riser pipes, and a primary conductor off of a pin insulator. In addition, 3,196 Priorities 3 through 1 defects were identified, of which 611, or 19.1% were permanently repaired. The remaining defects will be repaired during normal routine work.

Substations

- Scope

During 2008, 100% of O&R's New York substations, a total of 35 distribution substations, 2 distribution switchyards, 6 transmission substations, 7 transmission/distribution substations, 3 transition structures, 3 transmission switchyards and ten substations for single industrial customers were visually inspected pursuant to the requirements of the Safety Standards. These inspections were conducted in conjunction with Substation Operations' annual Class 1, Class 3 and Class 4 inspection programs.

- Inspection Procedure

O&R's Substation Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-1059. Company labor conducted all inspections and repairs. The Substation Operations Department manages the substation inspection and maintenance programs.

- Results

All of the O&R substations were visually inspected. All critical defects identified during the visual inspections were properly repaired. The remaining defects identified will be repaired as system contingencies allow or with normal

routine work. The remaining defects do not affect integrity, safety or reliability of the O&R system.

Transmission

- Scope

The O&R transmission system consists of 6,789 overhead structures and 10 underground manholes. All of the overhead structures, 99.8% of the transmission system, were visually inspected in 2008. The inspected overhead transmission equipment included poles, towers, guy wires, grounds, arms, conductors, and other appurtenances. O&R prioritized identified defects in accordance with the requirements outlined in the Company's work procedures: Ground Patrol Standard (EHV-001), Helicopter Patrol Standard (EHV- 002) and Transmission Line Inspection (Specification EHV-001-07), set forth as Exhibit 5, 6 and 7 of this Report.

- Inspection Procedure

O&R's Transmission Visual Inspection Program is administered in accordance with the Company's February 18, 2005 Program filed with the Commission in Case 04-M-1059. The testing of the overhead transmission system commenced in April 2008 and concluded in October 2008. The work was contracted to a vendor (separate from the vendor employed for distribution inspections) and at the conclusion of the 2008 program, four contract employees were engaged in field collection, information and data management, and administration. An O&R Program Manager and EHV personnel managed the contractor's performance. The O&R Program Manager reports to the Company's Director – Electric Operations.

The contractor's field inspectors used transmission plan and profile maps, in conjunction with handheld electronic devices, to record the inspection of each structure. O&R Inspection Program management and the contractor collaboratively managed the visual inspection data. The contractor maintained the field data at its business office, utilizing proprietary data management software known as Fastgate.

The contractor categorized defects as Priority 3 (high priority) to Priority 1 (low priority)[9]. Priority 3 defects require immediate attention and permanent repairs to be completed as system contingencies allow. Priority 2 defects are conditions that should be corrected as manpower and system requirements permit. Priority 1 defects are conditions that should be evaluated as routine maintenance is performed.

In 2008, the Quality Assurance program selectively sampled 100 of the 6,789 overhead structures. The sample size selected was developed from the latest version of ANSI Z1.4 (MIL-STD-105D) for the determination of statistically significant

[9] The Fastgate data management system utilizes a Priority 3 – 1 classification scale. Previous inspection years were classified on a Priority 5 – 1 scale.

sample sizes for QA testing. The re-inspections verified the visual inspection results reported by the contractor.

- Results

A total of 6,789 transmission structures, 99.8% of O&R's New York transmission system, were visually inspected throughout Rockland, Orange and Sullivan Counties in 2008. A total of 466 conditions were identified. Of the structures inspected, no Priority 3 defects were identified. Ninety four Priority 2 defects were located, and 2 were repaired. The remaining 92 Priority 2 defects require careful planning and outage scheduling to minimize impacting customer reliability. Three hundred seventy two Priority 1 defects were identified, and 5 have been repaired. The remaining 459 deficiencies do not affect integrity, safety or reliability of the O&R system and will be scheduled for repair as short interval maintenance tasks in the future.

Section 4
Public Service Commission Performance Mechanism

As required by the Safety Standards and the Commission's July 21, 2005 Order issued in Case 04-M-0159, O&R stray voltage tested 100% of its publicly accessible T&D system with components capable of conducting electricity including 100% of its transmission system and New York substation fences and publicly accessible metal pole streetlights and traffic signals by November 30, 2008. Accordingly, O&R has met the stray voltage testing requirements for 2008 and is not subject to the revenue adjustment provided in the Safety Standards Performance Mechanism.

O&R visually inspected approximately 18.1% of the Company's T&D system during 2008, including 13.7% of the overhead system, 19.3% of the URD system, 99.8% of the transmission system and all New York substations by November 30, 2008. In total, O&R has visually inspected approximately 93.8% of the Company's T&D facilities during the first four years (2005 to 2008) of the current five year inspection cycle.[10] This includes 99.9% of the transmission system, 99.9% of the overhead distribution system, 65.4% of the URD system, and 100% of its New York substations. Accordingly, O&R has exceeded the 2008 performance goal for inspections and is not subject to the revenue adjustment provided in the Safety Standards Performance Mechanism.

[10] Data reconciliation revealed approximately 15,636 duplicate pole inspections for the period 2005 - 2007. Total percentage of visual inspections includes 2005 - 2008 Inspection Programs, less 15,636 duplications.

Section 5
Certification of Program

Corporate certifications of the Stray Voltage Testing Program and the Visual Inspection Program are attached as Appendix 1.

Section 6
Analysis of Results

O&R visited 172,676 electrical structures and performed 125,623 stray voltage tests as part of its stray voltage-testing program in its service territory for 2008.

Thirty-one voltage conditions were identified on its overhead distribution system, one stray voltage condition on the underground system and one on a traffic signal pole. With such a small population of stray voltage cases, there are no major trends to analyze or root causes to address. O&R mitigated each of these cases as described in the Year End Public Service Commission Report set forth as Appendix 2 of this Report.

O&R visually inspected 30,910 T&D structures, identifying 54 Priority 5 conditions and 66 Priority 4 conditions on its system. The 9 Priority 5 conditions identified on the overhead system were mainly primary conductors off pin insulators and one low hanging service wire. The 45 Priority 5 conditions identified on the underground system were either transformers dislocated from their base, units with corroded exteriors or damaged handhole covers. No Priority 3 conditions were identified on the transmission system. The 94 Priority 2 conditions on the transmission system were primarily woodpecker holes and vegetation issues. The small population of high priority conditions reflects O&R's successful and continuing evaluation and maintenance of its T&D systems through circuit reliability initiatives, the vegetation management program, and equipment maintenance programs. There are no major trends to analyze or root causes to address with such a small population of high priority conditions.

Section 7
Other Pertinent Information

Additional Stray Voltage Detection:

Daily Job Site Testing Requirements

- Overall Program

  As required by the Safety Standards, O&R has incorporated daily job-site stray voltage test requirements into its routine work practices. This practice requires that O&R personnel test each job site for stray voltage at the end of each workday and before departing the site upon completion of the work assignment. The testing is in accordance with O&R's Procedure 2202, set forth in Exhibit 1 of this Report. O&R is not conducting this testing during major system emergencies such as storm response.

- Results

  No stray voltage was reported during routine work in 2008.

Reports from the Public

- Overall Program

  For 2008, O&R received 22 calls from customers reporting a stray voltage or shock hazard. Of the 22 calls received, 13 were valid cases and O&R immediately investigated and/or mitigated the conditions. Two injuries were associated with these incidents. One injury was caused by Company-owned equipment, and the other injury involved customer-owned equipment.

  In compliance with the Order's Appendix B, Event Notification Requirements, O&R made written or telephonic notification to the Office of Electricity and Environment in a manner prescribed by that Office.

- Results

  A total of 22 incidents were reported to O&R; 9 incidents proved to be unsubstantiated, while 13 cases were validated. Of the 13 substantiated cases, 7 were attributable to O&R system equipment and 6 were due to third party equipment.

  The causes of the 7 cases attributable to O&R system equipment were 2 failed secondary neutral connections, 1 underground equipment failure, 1 primary conductor off a pin insulator, 1 circuit requiring phase balancing, and 2 induced voltage conditions from transmission lines. The 6 cases attributable to third parties were 3 faulty customer wiring, 2 grounding problems at customer swimming pools and an electrician was injured while working on customer-owned equipment.

Quality Assurance & Quality Control:

Utilizing the resources of O&R's Quality Assurance and Compliance Department, the Company expanded its comprehensive QA Program for the Gas transmission and distribution system to include its electric system. In addition to assuring compliance with the requirements of the Safety Standards by those charged with implementing its provisions, the Company's electric QA Program is designed to promote the health and safety of the public; provide for the reliable and economical operation for the Company's electric system; promote compliance with applicable electric codes and regulations; and ensure utilization of Company resources in an efficient manner.

The O&R Electric QA Program also includes a Corrective Action Documentation and Trending procedure.[11] The purpose of this procedure is to define the process by which Quality Assurance and Compliance maintains a corrective action database and trends discrepancies identified by the QA Program. O&R personnel implementing the electric QA Program are independent from the Electric Operations and Electric Engineering Groups and Company personnel responsible for the implementation of the Stray Voltage Testing and Visual Inspection Programs.

QA conducted a review of the Stray Voltage Testing and Visual Inspection Program (Program) from March to December 2008. Quality Assurance performed stray voltage testing and visual inspection on a selective sample of Company and municipal streetlights, traffic signals, overhead and underground distribution facilities and transmission structures to ensure testing of equipment and the accuracy of data and records. Quality Assurance conducted announced and unannounced field observations of field testers to verify tests were performed on all required structures. Quality Assurance found the testing and inspections effectively performed and producing results consistent with the Program's objectives.

Stray Voltage Initiatives:

O&R has worked and communicated with the PSC Staff on issues attendant with the implementation of the Safety Standards. O&R continues to attend joint meetings with the other New York utilities and PSC staff to seek best practices, employ lessons learned, and ensure a high degree of consistency in the implementation of the Safety Standards requirements. O&R personnel also attended the National Stray Voltage Conference conducted by Consolidated Edison, Inc. this past summer.

As a result of ongoing experience and clarifications provided by Staff, O&R modified its work practices and procedures for implementation of the Safety Standards. The Company's current work procedures are attached as Exhibits 1 through 7 of this Report.

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[11] Details on the O&R Electric QA Program and the Corrective Action Documentation were included with the Company's February 18, 2005 filing with the Commission in Case 04-M-0159.

O&R, as a subsidiary of Consolidated Edison, Inc. ("CEI"), has availed itself of the shared research and development ("R&D") activities of CEI's subsidiary, Consolidated Edison Company of New York, Inc. ("Con Edison"). Con Edison's R&D department is involved in several initiatives that may lead to a reduction in stray voltage or better detection techniques. Those activities relevant to the O&R system include:

Exacter Outage-Avoidance System

Exacter is an outage-avoidance system that identifies and locates failing electrical distribution equipment before a power outage occurs. Exacter equipment identifies arcing sources that signify failing electrical equipment and disregards normal emissions like corona, industrial loads, etc. that occur within electrical systems. Reports of line equipment disturbances, with GPS locations, are generated. This technology promotes pre-emptive maintenance action to minimize outages and promotes public safety. O&R introduced this pilot project in 2008 and will continue utilizing this technology during 2009.

Future Improvements:

O&R continues to initiate programs and work practices to enhance its stray voltage detection and equipment inspection programs. This section discusses these improvements.

Low Priority Repair Program

During each inspection cycle, low priority defects are reported, such as, disconnected grounds, disconnected/missing molding and broken/missing guy guards. Such defects identified in 2008 were targeted to be repaired within the 2008 inspection cycle. Contractors and Company personnel performed the work. Of the 3,747 low priorities identified, 664, or 17.7% have been permanently repaired. In addition, 324 low priority defects identified in 2007 were repaired.

Electric Inspection Management System ("EIMS")

EIMS was developed collaboratively by O&R's Stray Voltage Program management and O&R's Information Technology Department, and is a data management tool designed to accept and retain all stray voltage program test information and follow-up mitigation work. EIMS will become the central data management warehouse for all transmission and distribution inspection and maintenance programs. During 2008, additional enhancements were developed bringing greater functionality to the data management system. Subsequent releases are scheduled through the end of 2009, to assist with managing the low priority repairs and reliability inspection programs.

Appendix One

Certification of Program

CERTIFICATION OF STRAY VOLTAGE TESTING

James W. Tarpey, on this 7th day of January 2009, certified as follows:

1. I am Vice President of Orange and Rockland Utilities, Inc. ("Orange and Rockland" or "the Company").

2. I am responsible for overseeing Orange and Rockland's stray voltage testing program, and in that capacity I have monitored the Company's stray voltage testing program during the test period December 1, 2007 to November 30, 2008. During the 2008 test period, Orange and Rockland instituted and diligently carried out a program designed to meet the stray voltage testing requirements of the Public Service Commission's Safety Standards, issued and effective January 5, 2005 as modified by Order issued July 21, 2005 in Case 04-M-0159, *Proceeding Instituting Safety Standards.*

3. To the best of my knowledge, information and belief, during the 2008 test period, Orange and Rockland identified and tested for stray voltage all Company-owned publicly accessible electric facilities and components capable of conducting electricity located in the Company's New York service territory except for such facilities that are identified in the Company's Annual Report submitted herewith.

James W. Tarpey

CERTIFICATION OF INSPECTIONS

James W. Tarpey, on this 7th day of January, 2009, certifies as follows:

1. I am Vice President of Orange and Rockland Utilities, Inc. ("Orange and Rockland" or "the Company").

2. I am responsible for overseeing Orange and Rockland's electric facility visual inspection program, and in that capacity I have monitored the Company's visual inspection program during the twelve months ended November 30, 2008 (the twelve-month period). During the twelve-month period, Orange and Rockland instituted and diligently carried out a program designed to meet the visual inspection requirements established by the Public Service Commission's Safety Standards, issued and effective January 5, 2005 as modified by Order issued July 21, 2005 in Case 04-M-0159, *Proceeding Instituting Safety Standards.*

3. To the best of my knowledge, information and belief, during the twelve-month period, Orange and Rockland has visually inspected the requisite number of electric facilities, defined as towers, poles, guy wires, risers, overhead cable and conductors, transformers, breakers, switches and other above ground equipment and facilities, and the interior of manholes, service boxes, vaults and other underground structures, except those that are ordinarily encased in sealed compartments, and except those that would require the utility to perform a destructive test as part of the visual inspection program, and except those exempted by the July 21, 2005 Order, including the requirement to have conducted a visual inspection of approximately 80% of its New York electric facilities through November 30, 2008.*

James W. Tarpey

*% is the cumulative facility inspection total for 2005, 2006, 2007and 2008.

Appendix Two

Year End Public Service Commission Report

Orange and Rockland Utilities, Inc. 2008 - Testing Summary	System Units Total	YTD Units Completed/ Monthly Units Completed	YTD % Completed/ Monthly % Completed	Units with Voltage Found > =1.0 v	Percent of Units Tested with Voltage >= 1.0 v	Units Classified as Inaccessible
Monthly Update		9,096	6.74%	5		0
Monthly Update		3,301	11.40%	0		0 0
Monthly Update		256	14.04%	1		0
Monthly Update		2	3.03%	0		0
Monthly Update		553	8.13%	0		0
Monthly Update		13,208	7.65%	0		0

Data Collected through 11/30/08
Update covers 10/16/2008 through 11/30/2008

Of the 134,963 distribution poles, 34,760 poles are fiberglass structures, wood poles that have no attached appurtenances capable of conducting electricity, are de-energized structures and / or are deemed inaccessible.

Of the 28,955 underground structures, 11,781 are fiberglass (non-conductive) structures or vaults not accessible to the public.

Definition of Inaccessible:
Inaccessible to the public (fenced in facilities, O&R facilities, facilities located within buildings, dangerous grade, etc).

Year end data reconciliation revealed additional units found with voltage =/> 1.0 volt. The error was due to changes in data management and reporting.

[redacted]

Monthly Update = totals since previous report

Report to include data through the 15th of the month
Report due to PSC Staff by the end of each month

Footnote any differences that a Utility may have

Orange and Rockland Utilities, Inc.

Test Year 2008
Summary of Voltages Found

	# of units voltage level not recorded	# of units between 1.0v and 4.4v	# of units between 4.5v and 7.9v	# of units between 8v - 24.9v	# of units between 25 - 99.9v	# of units greater than 100v	Unit Total
Pole	0	0	0	0	0	0	0
Ground	1	7	0	3	1	1	13
Guy	0	7	0	0	1	0	8
Riser	0	2	1	0	1	0	4
Other	1	4	0	0	1	0	6
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	1	0	0	0	0	1
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Metal Street Light Pole	0	0	0	0	0	0	0
Traffic Signal Pole	0	0	1	0	0	0	1
Control Box	0	0	0	0	0	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0

Orange and Rockland Utilities, Inc. Test Year 2008 Summary of Voltages Found	# of units voltage level not recorded	# of units between 1.0v and 4.4v	# of units between 4.5v and 7.9v	# of units between 8v - 24.9v	# of units between 25 - 99.9v	# of units greater than 100v	Unit Total
[illegible]							
Pole	0	0	0	0	0	0	0
Ground	1	7	0	3	1	1	13
Guy	0	7	0	0	1	0	8
Riser	0	2	1	0	1	0	4
Other	1	4	0	0	1	0	6
[illegible]							
Handhole / Pull box	0	0	0	0	0	0	0
Manhole	0	0	0	0	0	0	0
Padmount Switchgear	0	0	0	0	0	0	0
Padmount Transformer	0	1	0	0	0	0	1
Vault – Cover/Door	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
[illegible]							
Metal Street Light Pole	0	0	0	0	0	0	0
Traffic Signal Pole	0	0	1	0	0	0	1
Control Box	0	0	0	0	0	0	0
Pedestrian Crossing Pole	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
[illegible]							
Fence	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
[illegible]							
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
[illegible]							
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
[illegible]							
Lattice Tower	0	0	0	0	0	0	0
Pole	0	0	0	0	0	0	0
Ground	0	0	0	0	0	0	0
Guy	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0

Orange and Rockland Utilities, Inc. Test Year 2008 - Mitigation	Units with Voltage Found >= 1 Volt	Units Permanently Repaired by Utility	Units Referred to Others for Permanent Repair	Comments
	1	1		A guy wire measured 26 volts. A ground rod was installed and the voltage measured zero after mitigation.
	1	1		A detached ground wire measured 1.1 volts. The ground wire was re-connected and the voltage measured zero after mitigation.
	1	1		A cut ground wire measured 26 volts. The ground wire was repaired and the voltage measured zero after mitigation
	1	1		Indication of stray voltage on a cut ground wire. The ground wire was repaired and the voltage measured zero after mitigation.
	1	1		An O&R guy wire measured 1.7 volts and 4.3 volts was detected on a telephone guy wire on the same pole. Both guy wires were bonded to a ground rod. The voltage measured zero after mitigation.
	1		1	Amperage was detected on a cable service wire. O&R equipment measured zero volts. The customer was advised to contact the cable company for permanent repairs.
	1	1		A cut ground wire measured 16 volts. The ground wire was repaired and the voltage measured zero after mitigation.
	1	1		A guy wire measured 1.7 volts. The guy wire was rebonded to the system neutral and the voltage measured zero after mitigation
	1	1		A guy wire measured 1 volt. A fiberglass strain rod was installed to the guy wire, the guy wire was bonded to the ground rod and the equipment measured zero volts after mitigation.
	1	1		A guy wire measured 1.1 volts. A ground rod was installed and the guy wire was bonded to the ground rod. The voltage measured zero after mitigation.
	1	1		The telephone company reported voltage on a pole. A guy wire measured 3.5 volts. The guy wire was bonded to the ground wire, below the strain insulator. The voltage measured 0.1 volts after mitigation.
	1		1	The cable company reported voltage on a ground wire. Although the ground wire was bonded to the neutral wire, the voltage still remained. Further investigation determined that there was a problem at the meter pan. The customer was advised to contact an electrician.
	1	1		A riser measured 40.5 volts; the guy wire 1.2 volts and the ground wire 8.9 volts on the same pole. Additional ground rods were installed and bonded to the ground wire. The equipment measured zero volts after mitigation.
	1	1		A ground wire measured 1.7 volts. The ground wire was rebonded to the ground rod. The voltage measured zero after mitigation.
	1	1		A ground wire measured 1.5 volts. The ground wire was rebonded to the ground rod. The ground wire measured 0.8 volts after mitigation
	1	1		Two guy wires on the same pole measured 2.4 volts and 1.9 volts. Three ground rods were installed and bonded to the ground wire. The voltage measured 1.9 and 1.3 volts after mitigation. The remaining voltage was deemed neutral to earth voltage.
	1	1		A pole measured 3.6 volts on the guy wire; 3.2 volts on the ground wire and 1.7 volts on the riser. Three ground rods were installed and bonded to the system neutral. The voltage measured 3.5 (guy wire), 3.1 (ground wire) and 1.5 (riser) after mitigation. The remaining voltage was deemed as induction from the substation and transmission lines located in close proximity
	1	1		A ground wire measured 10 volts. The ground wire was rebounded to the ground rod and the voltage measured zero after mitigation.
	1	1		A riser measured 2 volts. A ground rod was installed and bonded to the ground wire. The structure measured zero volts after mitigation.
	1	1		A ground wire measured 3.2 volts. The ground wire was bonded to the ground rod. The structure measured zero volts after mitigation.
	1	1		A pole measured 20 volts on the ground wire and 12 volts on the guy wire. Connections were made from the ground and guy wires to the common neutral wire. The voltage measured zero after mitigation
	1	1		A ground wire measured 1 volt. An additional ground rod was installed and the voltage measured zero after mitigation
	1	1		A guy wire measured 2.1 volts. The guy wire was bonded to the ground wire and the voltage measured zero after mitigation.

Orange and Rockland Utilities, Inc. Test Year 2008 - Mitigation	Units with Voltage Found >= 1 Volt	Units Permanently Repaired by Utility	Units Referred to Others for Permanent Repair	Comments
	1		1	The cable company reported an electric discharge from a meter pan. A cable wire ground connection measured 1.5 volts. The cable company made the repairs on the ground connection. The voltage measured zero after mitigation.
	1	1		A ground wire measured 1.2 volts. An additional ground rod was installed and bonded to the existing ground wire. The equipment measured 0.3 volts after mitigation.
	1	1		The cable company reported 2 volts on a cable service wire. New ground connections were made. The equipment measured 0.1 volts after mitigation.
	1	1		A secondary riser measured 3.8 volts. The existing grounds were bonded to the system neutral. The riser measured zero volt after mitigation.
	1	1		The telephone company reported voltage on 3 poles with missing ground wires. One of the poles measured 200 volts. Ground wires were installed on all poles. The voltage measured zero after mitigation.
	1	1		The telephone company reported 3 volts on the telephone service wire. The ground wire was rebonded to the ground rod. The voltage measured zero after mitigation.
	1	1		The cable company reported 1.5 volts on the cable service wire. New connections were made from the service to the home. The voltage measured zero after mitigation.
	1	1		A riser measured 6.5 volts. An additional ground rod was installed and the voltage measured 0.1 volts after mitigation.
	1	1		O&R contractor reported 1.7 volts on single phase pad. Crew added a ground rod and rebonded to mitigate to 0.2 volts.
	1		1	O&R contractor reported 7 volts on Traffic Signal pole. D.O.T. responded and mitigated to zero.

Appendix Three

2008 Visual Inspection Program Report

Orange and Rockland Utilities, Inc.

2008 Inspection Program Results Report by Priority & Structure Type

Distribution Poles	9	15	190	2,842	164	**3,220**		24	3,196
Underground Facilities	45	51	109	335	13	**553**		96	457
Transmission	N/A	N/A	372	94	0	**466**		372	94

Priority by Structure Type

Priority 5	9	0	0	**9**	**9**	**0**
Priority 4	15	0	0	**15**	**15**	**0**
Priority 3	165	23	2	**190**	**81**	**109**
Priority 2	2,430	405	7	**2,842**	**508**	**2,334**
Priority 1	126	37	1	**164**	**22**	**142**

Defect by Structure Type

Pole Condition	26	0	26	3	**23**
Grounding System	170	1	171	64	**107**
Anchors/Guy Wire	445	0	445	143	**302**
Cross Arm/Bracing	1	0	1	1	**0**
Riser	6	0	6	2	**4**
Primary Wire/Broken Tie	46	0	46	30	**16**
Secondary Wire	1	0	1	1	**0**
Neutral	0	0	0	0	**0**
Insulators	6	0	6	1	**5**
Transformers	1	0	1	0	**1**
Cutouts	0	0	0	0	**0**
Lightning Arrestors	1	0	1	1	**0**
Trimming Related	329	3	332	128	**204**
Other	2,178	6	2,184	261	**1,923**

Priority 5	29	0	16	**45**	**45**	**0**	**Primary Cable**	0	0	0	0	**0**	**0**
Priority 4	10	1	40	**51**	**51**	**0**	**Secondary Cable**	0	0	0	0	**0**	**0**
Priority 3	0	0	109	**109**	**2**	**107**	**Neutral Cable**	0	0	0	0	**0**	**0**
Priority 2	331	4	0	**335**	**46**	**289**	**Off Pad**	29	0	0	29	**29**	**0**
Priority 1	13	0	0	**13**	**0**	**13**	**Oil Leak**	0	0	0	0	**0**	**0**
							Lock/Latch	4	2	3	9	**7**	**2**
							Structure Integrity	20	0	15	35	**24**	**11**
							Other	330	3	147	480	**84**	**396**

Priority 5-N/A	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Priority 4-N/A	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Priority 3	13	2	51	10	0	0	6	148	142	**372**	5	**367**
Priority 2	1	4	2	3	0	6	2	9	67	**94**	2	**92**
Priority 1	0	0	0	0	0	0	0	0	0	**0**	0	**0**

****Reported using 1 as the highest priority

Exhibit One

O&R Stray Voltage Test Procedure 2202

WORK PROCEDURE:	Stray Voltage Test Procedure

Stray Voltage Test Procedure

ORANGE AND ROCKLAND UTILITIES, INC.

DATE:	REVISION: 2	DEPT.
12/16/05		Electric Overhead Line
APPROVED BY	Reference:	PROCEDURE NUMBER:
		2202-1

WORK PROCEDURE:	Stray Voltage Test Procedure

1.) Purpose:

The purpose of this procedure is to define the process of conducting "Stray Voltage" testing in the field. The steps described in this procedure are in accordance with the Public Service Commission Safety Standard Case 04-M-0159.

2.) General Information:

In January 2005 the Public Service Commission issued a new Safety Standard that mandates testing of all structures that are "**capable of conducting electricity, and publicly accessible"** for stray voltage. The Safety Standard has defined "Stray Voltage" as voltage conditions on electric facilities that should not exist, at a level of 8.0 Volts AC or higher.

However, any voltage detected even if it is less than 8.0 Volts must be treated as stray voltage and made safe. To determine the presence of and actual stray voltage level follow the **Stray Voltage Investigation Procedure No. 2203.**

3.) Equipment to be tested:

The following equipment and structures must be tested for the presence of stray voltage.

a. Street Lights – Company owned i.e. company number, Municipal owned in public thoroughfares. **Metal Poles only!**
b. Utility poles - ground down lead and exposed ground rods.
c. Guy Wires and anchors. (O&R and other Utility facilities.)
d. Control Boxes (Recloser, Sectionalizer, Voltage Regulator, Capacitor, Traffic, and any other controls accessible to the public. Even if they are not owned or maintained by O&R
e. Traffic Light Structures
f. UG Risers (Metal)
g. Pad Mount Transformers and box pads.
h. UG Switching Equipment
i. Any metallic parts or surfaces of accessible utility manhole and hand hole covers.
j. Fencing around the perimeter of substations and Customer owned equipment.

NOTE: Any positive indications for stray voltage discovered during this test procedure must be reported immediately. The location must be safe guarded until the problem has been resolved or made safe.

4.) Test Equipment:

The test equipment to be used for stray voltage testing are the **LV-S-5 Direct Contact Low Voltage Detector** and the **GS-LV Ground Shield**, manufactured by HD Electric Company.

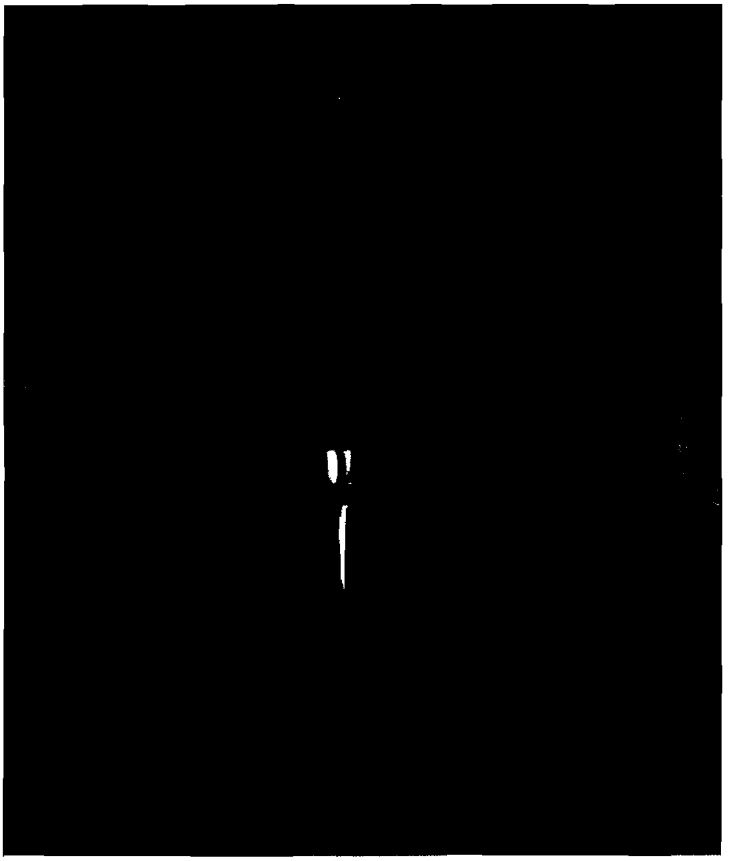
The LV-S-5 is a hand held low voltage detector for testing exposed metallic surfaces and conductors for the presence of low voltage 60Hz AC. This detector is designed to be hand held as shown and to detect AC voltage on any metallic surface or conductor that is in direct contact with the metallic tip of the detector. The presence of AC voltage greater than 5 volts is indicated by a flashing red light. (See Diagram 1)

The detector **MUST** be hand held as shown. The use of heavy gloves such as lineman's insulating gloves may reduce the sensitivity of the detector. Keep hands and fingers behind the hand guard as shown at all times (See Diagram 2). This probe can be used to detect voltages up to 600VAC with direct contact and higher voltages may be detected at a distance. Do not exceed 600VAC with direct contact. Maintain a safe distance from voltages greater than 600VAC at all times.

The GS-LV is used in areas where high voltage lines or other energized conductors are present and it prevents the strong electric fields from these lines from interfering with normal voltage tests. The ground shield is attached to the detector by sliding it over the detector handle until it locks in place (See Diagram 3). The ground shield has an attached ground lead and an alligator clip, which is to be connected to a driven earth ground.

WORK PROCEDURE:	Stray Voltage Test Procedure

Diagram1



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WORK PROCEDURE:	Stray Voltage Test Procedure

Diagram 2

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Diagram 3

5.) Validating Test Equipment:

Prior to commencing with the testing of the equipment in the field the LV-S-5 Detector must be tested for proper operation. This test must be performed at the beginning of each day, and again at the end of each workday.

Test the LV-S-5 Detector with the PT-LV-5 Detector Tester before and after each use. The PT-LV-5 supplies a non-lethal low voltage AC signal at the metal plate on the end shown with the large arrow. (Diagram 4)

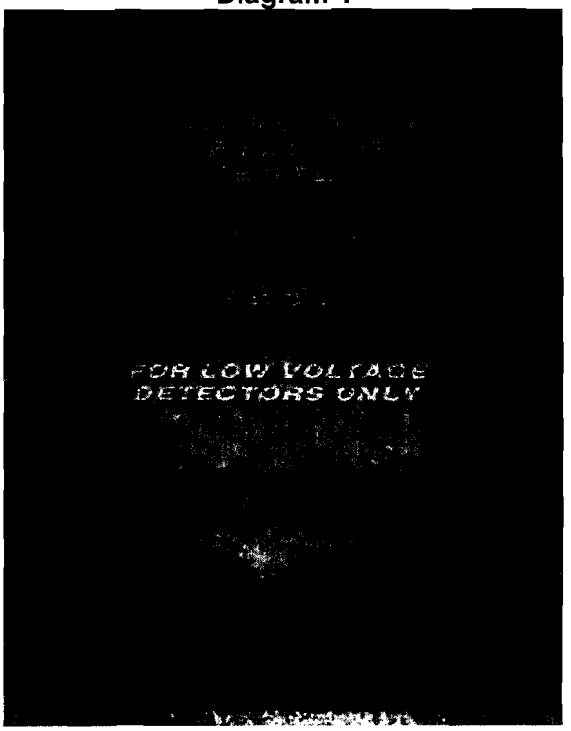
To test the LV- S-5 Detector, hold the Tester as shown, (Diagram 5) press the ON button, hold the Detector as shown and make direct contact between the metal tip on the Detector and the metal pate on the Detector Tester. A red light on the Detector Tester indicates the battery is OK. A flashing red light on the Detector means voltage is detected. Replace the battery in the Tester with a 9V alkaline type when the red light is not visible. Note that both units should be hand held as shown for testing. Your hands are part of the test circuit and hand placement can affect test results.

Once the LV-S-5 detector has been successfully tested, it may be inserted into the **GS-LV Ground Shield** when the testing environment requires.

WORK PROCEDURE:	Stray Voltage Test Procedure

CAUTION: For use by trained personnel only. This device generates 6VAC for testing LV-S-5 low voltage AC voltage detectors. There is no danger of electric shock when this tester is used as directed.

Diagram 4



Metal Plate

ORANGE AND ROCKLAND UTILITIES, INC.

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WORK PROCEDURE:	Stray Voltage Test Procedure

Diagram 5

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6.) Test Procedure:

Conducting Field Test
Once the LV-S-5 Low Voltage Detector has been tested for use in the field the following procedure can be used.

Hold the LV-S-5 detector as shown in diagram 2 at all times. **The hand of the user becomes the second terminal of the measurement circuit and the ground reference.** The Metal tip of the detector must make contact with the surface or the equipment being tested.

If the LV-S-5 Low Voltage Detector detects stray voltage then place the ground shield onto the detector. Attach the alligator clip of the ground shield to a driven ground. Hold the foam portion of the ground shield and touch the metal tip of the detector to the equipment as was previously done.

NOTE: **Substation personnel** testing the substation fence before entering and after exiting are only to test using both the Low Voltage Detector and the Ground Shield Record the results of each stray voltage test on the STRAY VOLTAGE TEST FORM FOR O.H & U. G. DISTRIBUTION STRUCTURES.

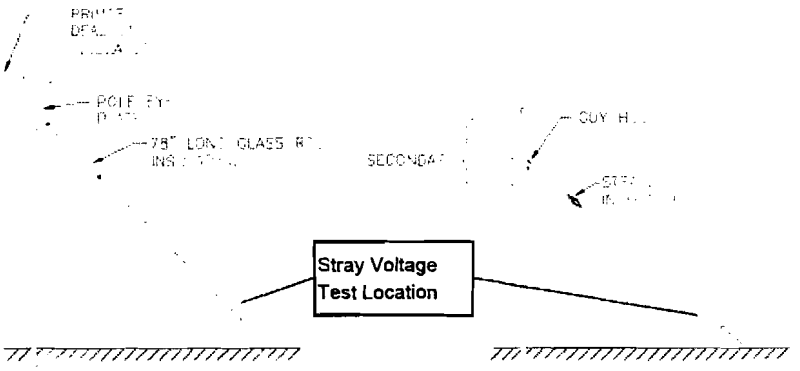
NOTE: If the LV-S-5 Low Voltage Detector detects stray voltage while the GS-LV Ground Shield is in place, refer to the Orange and Rockland Stray Voltage Investigation Procedure 2203 to determine the source of the voltage.

I. Street Lights – Place the metal tip of the LV-S-5 detector on the surface of the metal street light pole.

II. Utility Pole Ground Down Leads – Place the detector on the ground down lead and exposed ground rod. Record the results of your test on the data sheet. Test all utility down leads on the pole i.e. telephone and cable.

III. Guy Wires and Anchors - Place the detector on the guy wire surface and exposed anchor rod. Record the results of your test on the data sheet. Test all utility guy wires and anchors associated with the pole being tested i.e. telephone and cable.

WORK PROCEDURE:	Stray Voltage Test Procedure



PRIMARY ANCHOR GUY SECONDARY ANCHOR GUY

IV. Control Boxes - Place the metal tip of the LV-S-5 detector on the surface of the metal control box and associated cables. The term control box includes the equipment listed in section 3 d. and any other hardware that is accessible to the public.

V. Traffic Light Structures - Place the metal tip of the LV-S-5 detector on the surface of the metal traffic light structure and control panel.

VI. UG Risers (Metal) - Place the metal tip of the LV-S-5 detector on the surface of the metal primary or secondary riser.

VII. Pad Mount Transformers - Place the metal tip of the LV-S-5 detector on the surface of the metal surface of the pad mount transformer.

VIII. UG Switching Equipment - Place the metal tip of the LV-S-5 detector on the metal or conducting surface of the UG switch.

IX. Utility Manhole Covers - Place the metal tip of the LV-S-5 detector on the metal surface of the manhole cover.

X. Hand Hole Covers - Place the metal tip of the LV-S-5 detector on the metal surface of the hand hole cover or metal hold down bolts.

XI. Fencing – Place the metal tip of the LV-S-5 detector on the fence support posts and fencing.

Exhibit Two

O&R Stray Voltage Investigation Procedure 2203

WORK PROCEDURE:	Stray Voltage Investigation Procedure

Stray Voltage Investigation Procedure

WORK PROCEDURE:	Stray Voltage Investigation Procedure

Purpose:

The purpose of this procedure is to establish the process for the investigation of reported stray voltage conditions, and stray voltages detected during the annual stray voltage-testing program. This procedure encompasses the initial investigation process, how to perform preliminary measurements, test data collection, identifying the possible cause, and suggested mitigation procedures.

NOTE: This procedure provides recommended investigation processes only. The investigation steps outlined in the procedure may have to be modified to suit the situation being investigated. Any confirmed stray voltage discovered during the execution of this test procedure must be reported to a **SUPERVISOR** immediately.

General Information:

This procedure is formatted for the investigation of reported Stray Voltage conditions. Stray voltage conditions for investigation are determined by a positive response to the initial **Stray Voltage Test procedure No. 2202** or a reported shock situation.

The following procedure is designed to help identify the source of the stray voltage and formulate a root cause for the condition. Additionally, several mitigations methods are included although they should not be limited to the scope of this procedure. Stray voltage situations may be very complex and the resolution may require an engineered solution. Therefore, it is extremely important to maintain detailed documentation to assist with the engineering evaluation.

In some cases, further evaluation is required and the installation of a recording voltmeter and a detailed engineering study may become necessary. The installation of these devices and all the data necessary for an engineering evaluation **will not** be covered in this work procedure.

Test Equipment:

The following is a list of test equipment and materials required to properly test for stray voltage.

a. (1) Ground Resistance Tester[1]
b. (1) 4 ft. Ground Rod (Additional Rods may be used)
c. (1) Digital Multi-meter (Fluke Model 87 DVM or equivalent)[2]
d. **(1) Set of Fused Test Leads Model 131479 with 1/8 amp fast acting fuse**
e. (1) Clamp on Amp Meter
f. (1) 500Ω **5**-Watt shunt resistor. **(Dual test adapter Banana Plug with set screws)**

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g. (1) Reel of #12 Awg. Copper wire. (Optional for use when a ground cannot be established in close proximity to the points being tested.)

[1] The AEMC ground resistance detector currently employed by O&R **cannot** be used to measure the resistance of an individual or test ground rod. It is capable of measuring ground resistances in multi-grounded WYE systems only. However, it is capable of measuring current in the individual ground down leads.

NOTE: In areas where a reference ground rod cannot be established, such as a downtown area where concrete sidewalks are prevalent the following process can be performed.

1.) Establish test points between two conductive surfaces. (Use the 500Ω shunt resister when performing this test. As and example, a ground down lead and fence or drainage system cover.

2.) Try to simulate a person by obtaining a reading in the areas someone would be able to reach.

[2] The threshold for mitigation is =/> 1.0 volt. Any loaded voltage readings of less than 1.0 volt is to be recorded as found, however, no mitigation is required below this value. [1]

Test Procedure:

The following is the recommended procedure for confirming the existence of stray voltage when it is detected during the Stray Voltage Test Procedure 2202 or a reported shocking incident.

Note: Documentations is extremely important when conducting a stray voltage investigation and must be maintained through out the investigation period.

I.) General Procedures:

A.) Visual Inspection:

1.) Identify and record the system type.

---

[1] At the Upstate Utilities meeting held September 29, 2005, in Binghamton, NY, PSC staff Christian Bovin and Jason Pause prescribed the = /> 1.0 Volt threshold for stray voltage testing as it relates to testing in accordance with PSC Case 04-M-0159.

2.) Visually examine the neutral system present in the area where the stray voltage has been recorded or a shock has been reported. Look for broken neutrals and bad connectors in the neutral itself. Record this information in the Investigation Data Sheet.

3.) Visually examine the condition of the utility ground rod connections, and note any additional ground rods present for the other utilities. Examine the condition of the bonding between all the ground rods present at this location.

4.) Examine the condition of the secondary system including neutral grounding, and the service to facility being tested.

5.) Look for blown fuses on capacitor banks in the area.

B.) Test Results:

1.) If voltage levels of **(5.0 Volts AC)** [2] and above are measured using the following procedures refer to **Section 5** of this procedure for possible mitigation procedures.

2.) In the Upstate Utility Meeting held in Binghamton, NY dated September 29, 2005. The PSC established a minimum mitigation level of =/> 1.0 volt. The amount of reduction in the voltage level after mitigation may vary depending on a number of circumstances. In some situations, it is impossible to establish voltage levels to 1.0 volt and most mitigation steps will not change this situation. These situations may be classified as "Naturally Occurring Voltages."

3. Prior to commencing any stray voltage testing the fuse in the test leads must be tested for continuity. This is done by:

a. Place the Digital Volt Meter setting to measure resistance
b. Touch the two test leads together completing the circuit
c. The meter should indicate zero ohms or near zero.

If the meter indicates infinity or open circuit replace the fuse in the test leads and repeat the steps above. Stray voltage testing cannot commence until this test has been completed successfully.

This test can be performed with the shunt resistor installed. If the test is conducted with the shunt resistor install the meter will read the value of the shunt resistor.

II.) Equipment Testing:

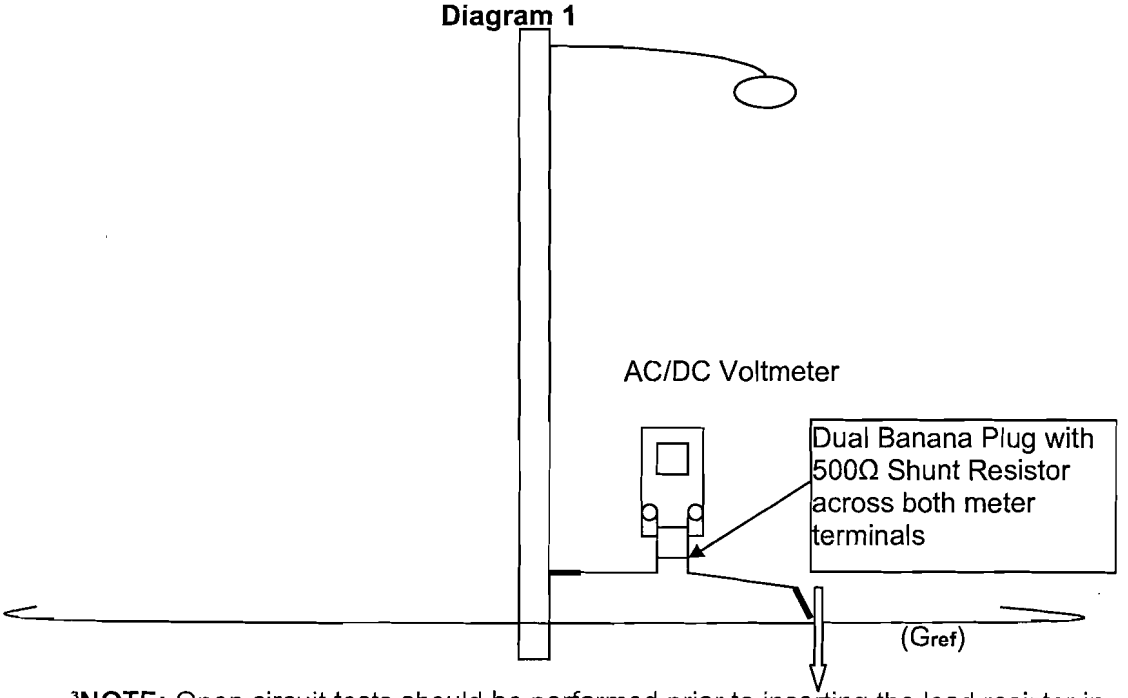
A.) Street Light Investigation:

1.) Examine the bonding of the grounding connections at the location under test. Including the service entrance cable and all grounding connections to the secondary system.

2.) Establish a temporary reference ground approximately 4 feet from the streetlight to be tested. Measure and document the resistance of the reference ground rod. Place one of the multi-meter leads on the streetlight to be tested, and the other end on the temporary ground reference. Measure and document the voltage between the (See Diagram 1 below for test points.) This test is considered an **open circuit** [3] test. Record the voltage level in the data sheet in Appendix A.

3.) Place one end of the multi-meter lead with the 500Ω resistor inserted across the terminals on the streetlight to be tested and the other end on the temporary ground reference. (See Diagram 1 below for test points.) Record the voltage readings observed in the data sheets.

Diagram 1



[3]**NOTE:** Open circuit tests should be performed prior to inserting the load resistor in each of the following tests.

B.) Ground Down Lead:

WORK PROCEDURE:	Stray Voltage Investigation Procedure

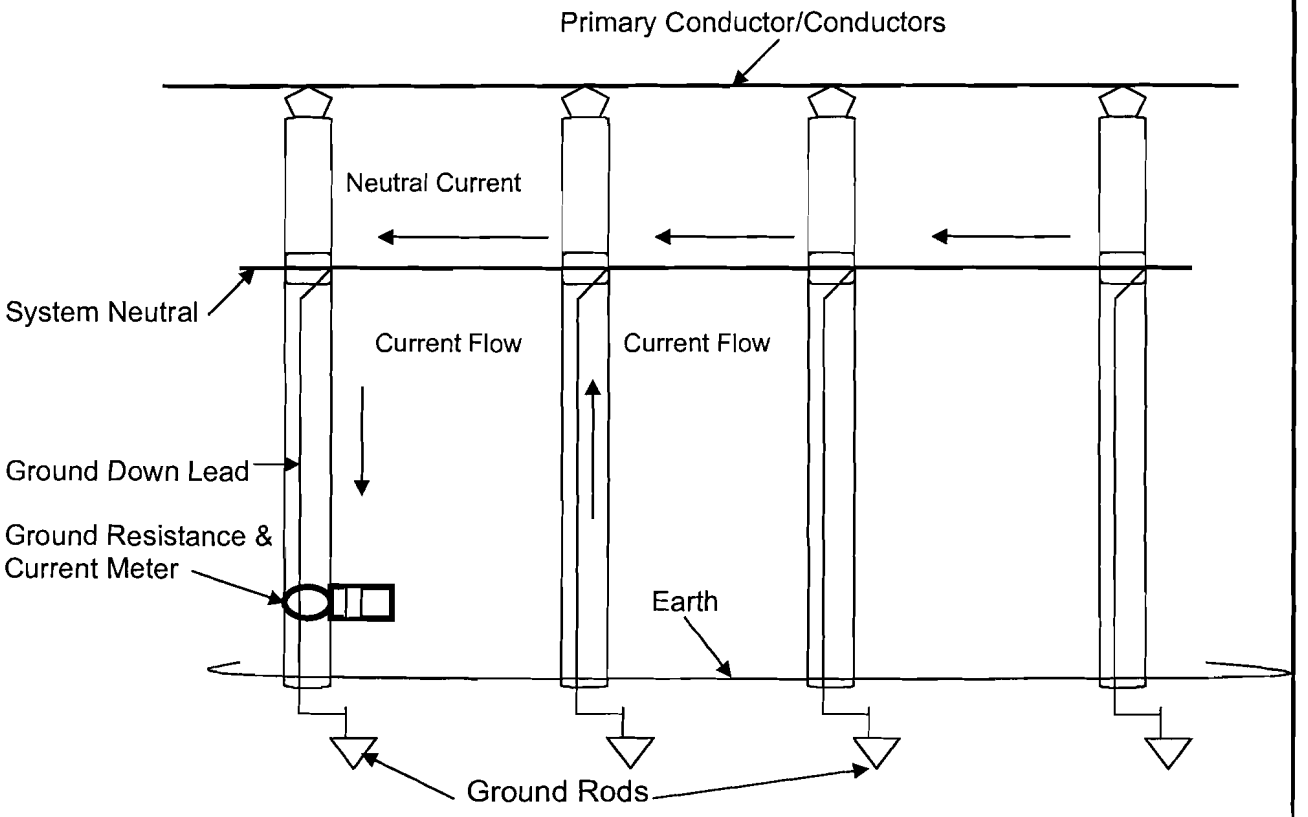
1. Examine the primary neutral and ground down lead bonds to the primary system neutral and the connections at the driven ground rods. Record your observations in the data sheets.

2. Using an approved test device measure and record the current flow in the ground down lead being tested.

3. Using the ground rod resistance tester, test and document the ground rod resistance and current at the location where stray voltage has been detected.

   NOTE: This step it to be repeated for every location where testing is performed on a multi-grounded WYE system. This test may be omitted if it is a ground down lead for an equipment location on a delta primary system.

Diagram 2



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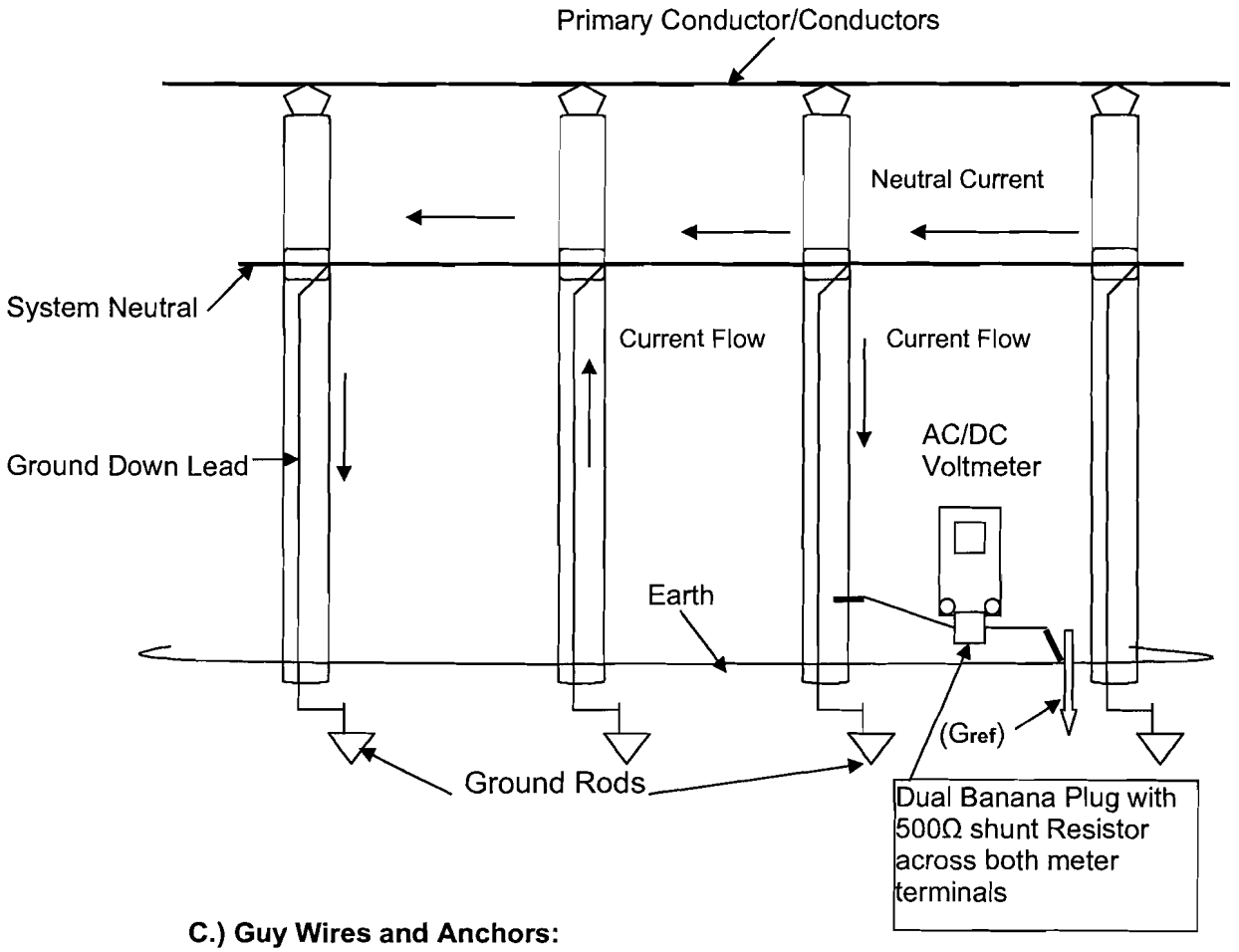
3. Test for Neutral to Earth Voltage levels. Establish a temporary driven ground 4 feet from the ground down lead. Measure and document the open circuit voltage as described in note 3 above. Measure and document the voltage between the primary neutral ground down lead and the reference ground rod. (See Diagram 3) If a temporary ground reference cannot be established, refer to the instructions above.

Diagram 3



C.) Guy Wires and Anchors:

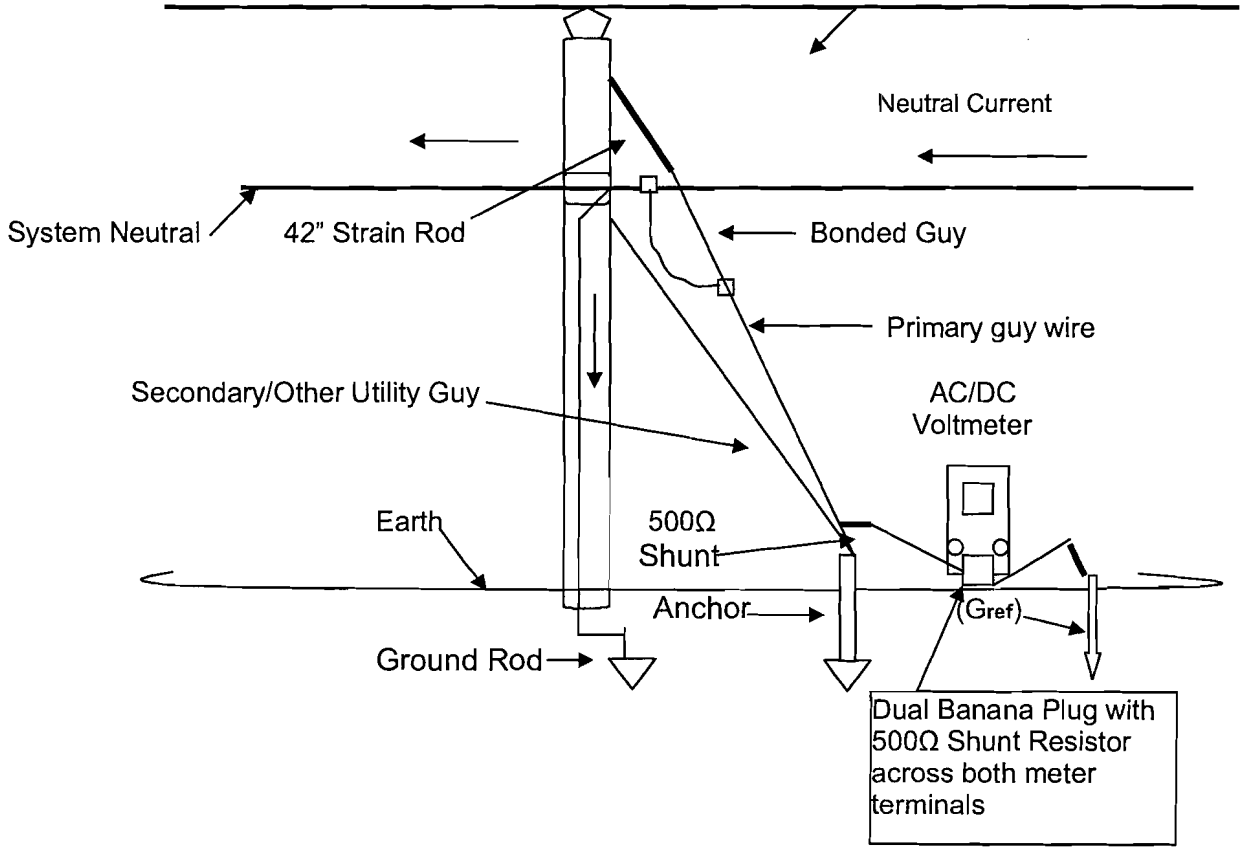
WORK PROCEDURE:	Stray Voltage Investigation Procedure

1.) Perform a visual inspection of the facilities that supply power to the location, examine the bonding on the primary system neutral and all grounding connections, including the guy wire bond to the system neutral.

2.) Using the ground rod resistance tester, test and document the ground rod resistance and current (when present) at the location where stray voltage has been detected.

3.) Test for Neutral to Earth Voltage levels. Establish a temporary driven ground 4 feet from the guy wire anchor(s). Measure and document the open circuit voltage as described in note 3 above. Measure and document the voltage between the guy wire and anchors and the reference ground rod with a 500Ω shunt resistor installed. Record this voltage.

Diagram 4



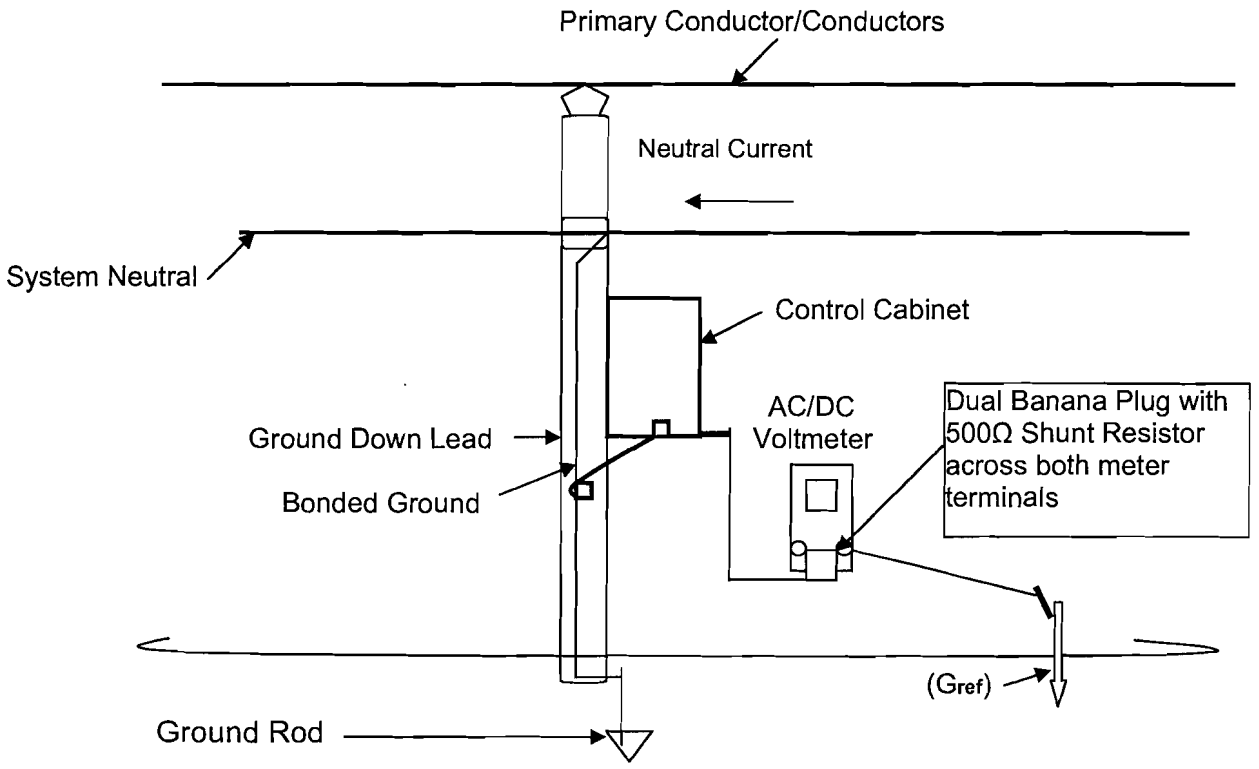
D.) Control Box:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections. The control cabinet must be grounded externally. Examine for the presence of a ground connection and quality of the connection.

2.) Using the ground rod resistance tester, test and document the ground rod resistance and current at the location where stray voltage has been detected.

3.) Test for Neutral to Earth Voltage levels. Establish a temporary driven ground 4 feet from the ground down lead. Measure and document the open circuit voltage as described in note 3 above. Measure and document the voltage between the reference ground rod and control cabinet with a 500Ω shunt resistor installed.

Diagram 5



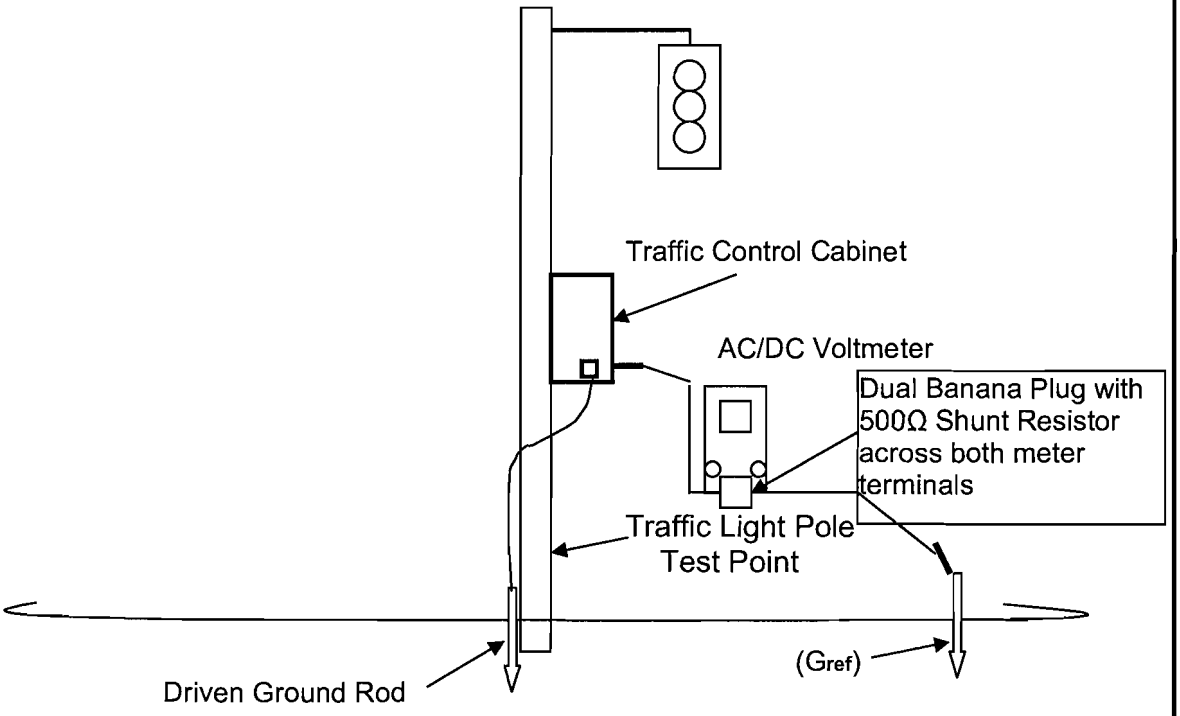
E.) Traffic Light Investigation:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections. The control cabinet must be grounded externally. Examine for the presence of a ground connection and quality of the connection.

2.) Establish a temporary driven ground 4 feet from the ground down lead. Place one end of the multi-meter meter lead on the streetlight support structure to be tested and the other end on the ground reference. Measure and document the voltage between the test points. Record the voltage level in the data sheet in Appendix A.

3.) Place one end of the multi-meter lead with the 500Ω shunt resistor installed on the streetlight control cabinet to be tested and the other end on the ground reference. (See Diagram 1 below for test points.)

Diagram 6

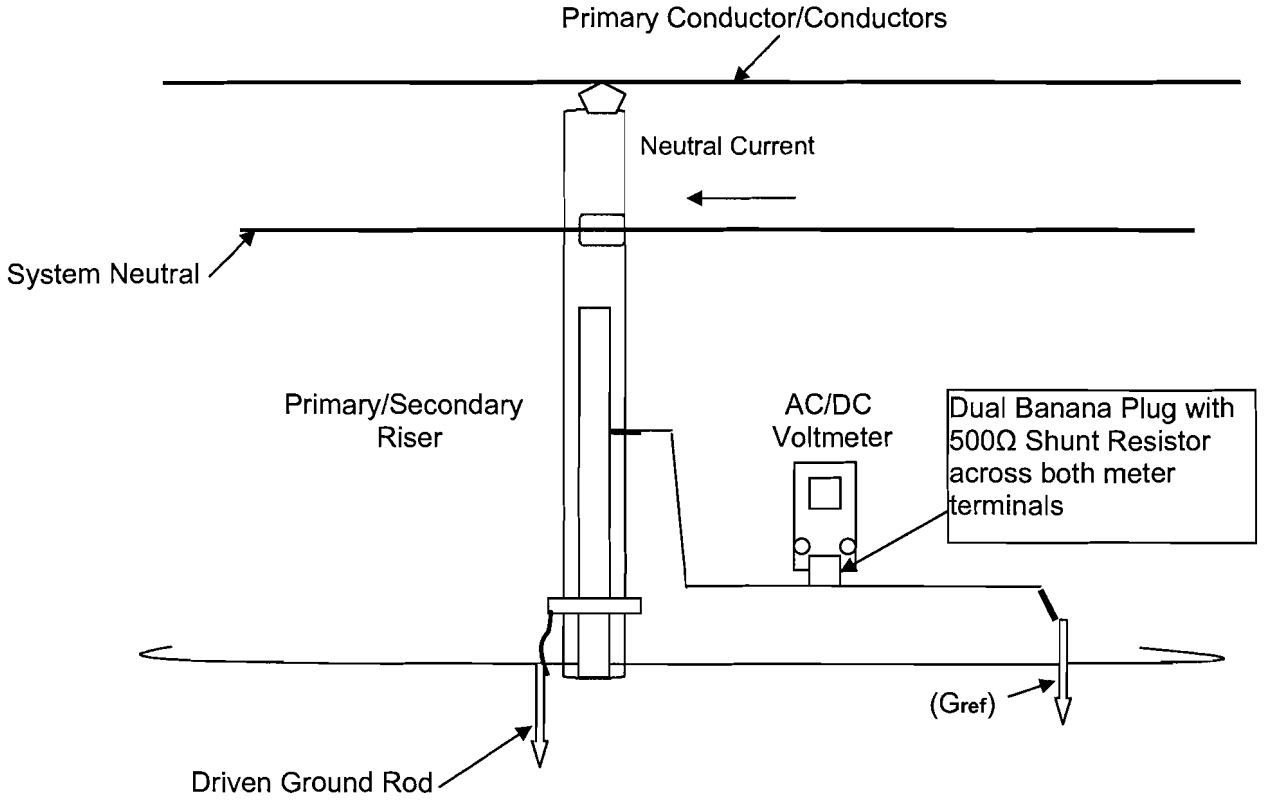


F.) Underground Riser Primary/Secondary:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections.

2.) Establish a temporary driven ground 4 feet from the riser pole under test. Measure and document the open circuit voltage as described in note 3 above. Place one end of the multi-meter lead with the 500Ω shunt resistor installed on the steel conduit to be tested and the other end on the ground reference. Measure and document the voltage between the (See Diagram 1 below for test points.)

Diagram 7



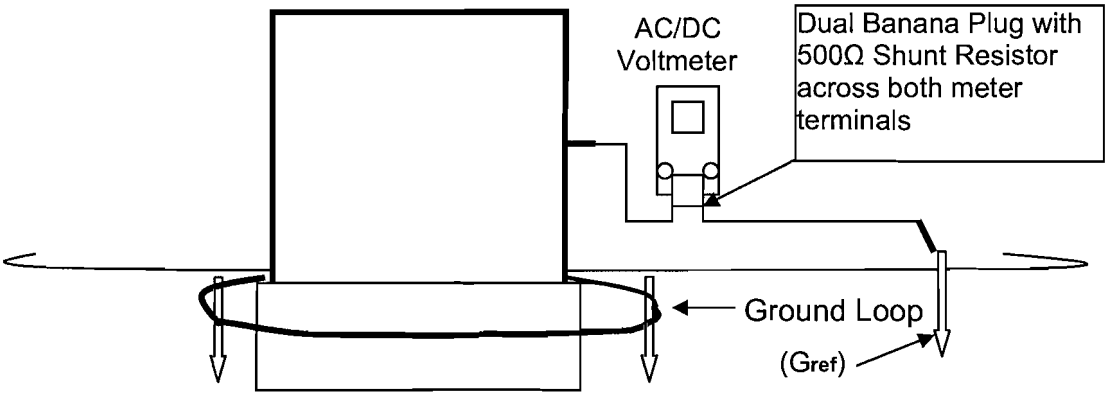
G.) Pad mount Transformers and Box Pads:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections.

2.) Establish a temporary driven ground 4 feet from the ground down lead. Measure and document the open circuit voltage as described in note 3 above. Place one end of the multi-meter lead with the 500Ω shunt resistor installed on the transformer to be tested and the other end on the ground reference. Measure and document the voltage between the (See Diagram 1 below for test points.)

Diagram 8

Pad Mount Transformer & Box Pads
U.G Switching Equipment



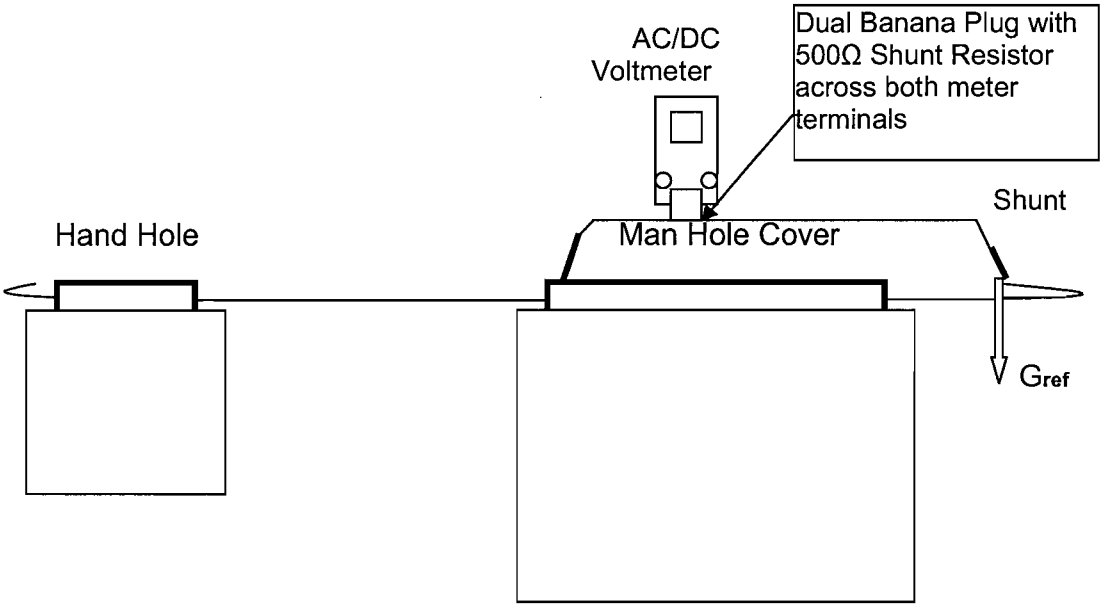
H.) Manhole and Hand hole Test:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections.

2.) Establish a temporary driven ground 4 feet from the ground down lead. Measure and document the open circuit voltage as described in note 3 above. Place one

end of the multi-meter lead with the 500Ω shunt resistor installed on the manhole or hand-hole cover to be tested and the other end on the ground reference. Measure and document the voltage between the test surface and the reference ground rod. (See Diagram 9 below for test points.)

Diagram 9



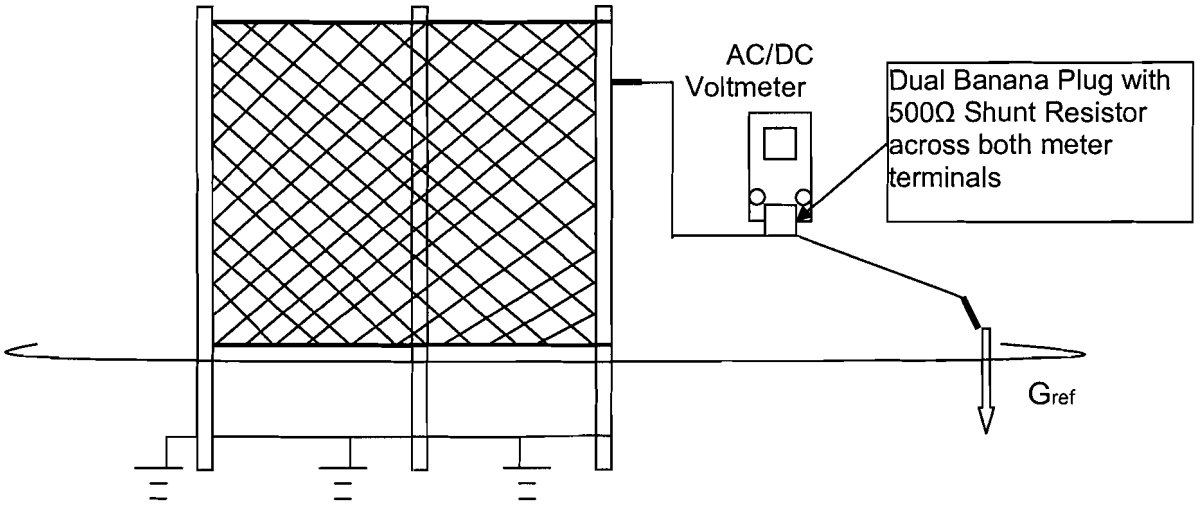
I.) Fencing Test:

1.) Perform a visual inspection of the facilities that supply power to the location, including the service entrance cable and all grounding connections.

2.) Establish a temporary driven ground 4 feet from the ground down lead. Measure and document the open circuit voltage as described in note 3 above. Place one end of the multi-meter lead with the 500Ω shunt resistor installed on the fence to

be tested and the other end on the ground reference. Measure and document the voltage between the ground reference rod and the surface being tested.
(See Diagram 10 below for test points.)

Diagram 10



5.) Mitigation

The mitigation of stray voltage situations can very difficult in some situations. For the purpose of this work procedure mitigation has be broken into general areas. There may be several subparts to each area. Not all are listed, only some examples are provided as a reference.

A.) Grounding

One of the more obvious and simplest solutions to stray voltage problems is the proper installation of grounds and proper bonding. However, there are situations where additional grounding can cause the stray voltage levels to increase. **It is important to monitor the voltage levels every time a change is made.** Whether the bonding has been redone or additional grounding points are installed. Retest the point as you proceed.

The grounding practices employed shall comply with the NESC standards for grounding methods.

a.) On a multi-grounded WYE distribution, system there must be as a minimum four grounding points per mile. This includes neutral and equipment grounds. Install additional ground rods if less than four. Each piece of equipment attached to the distribution circuit shall have a bonded connection to the system neutral and a driven ground rod.

b.) Examine the quality of the bonding of the secondary systems to the primary neutral system, and the quality of the system connections to the ground rods.

c.) Install additional grounding points at the point you are trying to mitigate. This may require the installation of several ground rods spaced at least 10 feet apart to obtain maximum effectiveness. (If you are applying the ground to a specific test area.)

d.) Install bonded connections to any guy wires that are not bonded to the system neutral. These guy wire and anchor assemblies significantly aid in improving the effectiveness of out grounding facilities.

A.) Isolation

In some instances, isolation from the primary system neutral will be the only way to alleviate the stray voltage issue. The examples listed below are isolation practices

allowed by the NESC. Employing of any of practices requires the approval of Distribution Engineering.

a.) Secondary facilities bond may be separated from the primary system bond only if a separate grounding electrode is employed. The grounding electrode for the primary system and the secondary system shall be at least 20 feet apart where practical.

b.) Interconnection of independent grounding conductors is allowed only when the multi-grounded WYE distribution system has sufficiently heavy grounding electrodes.

c.) Interconnection of primary grounding conductor and the secondary conductor may be made through a spark gap device only if a multi-grounded neutral system is present.

d.) Interconnection of independent grounding conductors is allowed though an approved neutral isolation device. (Ronk Blocker®) This device should be employed only when there is a sufficiently multi-grounded neutral system available.

e.) Cable and telephone system neutrals **must** be isolated from the service neutral being isolated. This requires coordination with the cable and telephone engineering departments.

A.) Engineered Solution(s)

In some instances, mitigation of the stray voltage situation is not easily obtained. In these instances, an engineered solution may be required. In this case, additional testing and research outside of the scope of this procedure will be required. Some examples of these solutions are as follows.

a) Primary system evaluation by the Engineering Department may be required. Evaluation of the phase balancing and neutral currents present.

b) Evaluation of the primary neutral system conductor size. In some cases, an undersized or insufficient neutral system may be present.

c) Ground rod resistances may be required to perform a proper analysis.

Exhibit Three

O&R Inspection Procedure for 2201-3 for Underground Distribution Structures and Equipment

WORK PROCEDURE:	Inspections Procedure for Underground Distribution Structures and Equipment

Inspections Procedure for Underground Distribution Structures and Equipment

WORK PROCEDURE:	Inspections Procedure for Underground Distribution Structures and Equipment

1.) Purpose:

The purpose of this procedure is to establish a uniform method for inspecting and recording the condition of underground distribution facilities.

2.) General Information:

In January 2005, the Public Service Commission issued Case 04-M-0159, Order Instituting Safety Standards that mandates the visual inspection of 20% of the electrical distribution system each year with the requirement that 100% of the electric distribution system be inspected by the end of each fifth year. This inspection is designed to identify hazardous conditions and assess the over all condition of all underground equipment.

The results of all the Underground Inspections performed shall be recorded on the **SAFETY INSPECTION FORM FOR UNDERGROUND DISTRIBUTION STRUCTURES AND EQUIPMENT.** See appendix A.

3.) Underground Equipment to be Inspected:

The following equipment and structures must be visually inspected for overall condition and damage.

a.) **Manholes** – Are to be visual inspected for structure integrity and overall condition of the cable system. Frame and covers must be properly set. The manholes should be opened in accordance with Underground Work Procedures 1503-1, 1504-1, and 1505-1. The cable system will be visually inspected for cracking, tracking, hardware corrosion, integrity of cable support system, and swelling of the accessories. Ten digit grid numbers shall be installed, if not previously installed.

b.) **Switchgear** – An exterior and interior visual inspection will be completed on each above grade switch enclosure. Inspect enclosure for corrosion, hardware damage, equipment lock, accessibility, and overall condition. The enclosure shall be opened and an internal visual inspection shall be completed. The cable system will be visually inspected for cracking, tracking, swelling of the accessories, and dielectric media leakage. Install ten digit grid numbers on outside of enclosure, if not previously installed.

c.) **Transformers** – An exterior and interior visual inspection will be completed on all underground distribution transformers. Inspect transformer for corrosion, hardware damage, equipment lock, accessibility, and overall condition. The transformer will be opened and an internal visual inspection shall be completed. The cable system will be visually inspected for cracking, tracking, swelling of the accessories, and leaking dielectric fluid. Install ten digit grid numbers on outside of enclosure, if not previously installed.

d.) **Box Pads** – An exterior and interior visual inspection will be completed on all accessible underground distribution box pads. Inspect box pads for exterior damage to fiberglass and make sure box pad covers are securely fastened. The box pad will be opened and an internal visual inspection shall be completed. The cable system will be visually inspected for cracking, tracking, swelling of the accessories, and corrosion indications. Install ten digit grid numbers, if not previously installed.

e.) **Hand Holes** – An exterior and general visual inspection will be completed on all accessible underground distribution hand holes. Inspection will check for exterior damage and to ensure covers are securely fastened.

f.) **Grounds** – All equipment ground conductors shall be visual inspected to ensure continuity and proper connection.

4.) Failure Classifications and Repair Schedule

All defects and anomalies identified shall be categorized and prioritized for repair. Repair priorities and corrective action shall be defined as follows.

1. **Priority Five** – Is a condition that requires correction immediately. All repairs must be made within 24 hours of identification. Priority 5 repairs can be, but are not limited to, any condition that could result in danger to the public or imminently cause an interruption of service. The ability to immediately correct will be subject to maintaining the integrity of the distribution system and therefore may be delayed if loading, safety, and other reliability concerns require that the repair be deferred. If deferred, the condition shall be monitored regularly until system conditions allow the repair to commence.

2. **Priority Four** – Is a condition that should be corrected within 7 calendar days, subject to system constraints.

3. **Priority Three** – Is a condition that should be corrected as manpower and system requirements permit. These conditions typically have no impact on the short-term safety or performance of the electric system, but likely will as time passes.

4. **Priority Two** – Is a condition that should be evaluated as routine maintenance is performed.

5. **Priority One** – Is a condition that can be recorded and monitored. The repair and/or replacement are not a priority.

Exhibit Four

O&R Inspection Procedure 2200-3 for Overhead Distribution Structures and Equipment

WORK PROCEDURE:	Inspections Procedure for Overhead Distribution Structures and Equipment

ORANGE AND ROCKLAND UTILITIES, INC.

DATE: 1/04/2008	REVISION: 3 (1/08)	DEPT. Electric Overhead Line
APPROVED BY	Reference:	PROCEDURE NUMBER: 2200-3

WORK PROCEDURE:	Inspections Procedure for Overhead Distribution Structures and Equipment

1.) Purpose:

The purpose of this procedure is to establish a uniform method for inspecting and recording the condition of overhead distribution facilities.

2.) General Information:

In January 2005, the Public Service Commission issued Case 04-M-0159, Order Instituting Safety Standards that mandates the visual inspection of 20% of the electrical distribution system each year with the requirement that 100% of the electric distribution system be inspected by the end of each fifth year. This inspection is designed to identify hazardous conditions, and assess the over all condition of all overhead equipment.

The results of all the Overhead Inspections performed shall be recorded on the **SAFETY INSPECTION FORM FOR OVERHEAD DISTRIBUTION STRUCTURES AND EQUIPMENT.** See appendix A.

3.) Overhead Equipment to be Inspected:

The following equipment and structures must be visually inspected for overall condition and damage. The intent is to perform these inspections from the ground.

a.) **Distribution Poles** – Are to be visually observed for any condition that may decrease the structures ability to support loading imposed on them.

b.) **Conductor Supports** – Visual observation of the cross arms for breakage, significant cracking, blistering and overall condition. Braces and brackets are to be inspected also, and missing support bolts and hardware are to be reported.

c.) **Transformer Inspections** – Overhead distribution transformers shall be carefully observed for leaking dielectric fluid, integrity of the supporting brackets, mechanical defects or damage. Observations shall include reviewing for the presence of animal guards, the condition of the primary and secondary conductor, and condition of the lightning arresters.

d.) **Insulators** – All the overhead distribution insulators shall be carefully observed for visual signs of breakage, cracking, flash over and displacement.

e.) **Cut outs** – All cut out (fuse) assemblies shall be visually inspected for breakage, cracking and signs of flashover. The condition of lightning protection system at the cut out pole shall also be determined through visual observation.

f.) **Tie Wires** – All tie in points at the pole top shall be reviewed for damaged, broken, or missing tie wires.

g.) **Trees/Vines** – Inspect for tree and vine impingements at each pole top. Look for dead branches or leaders that are over or in close proximity to the distribution lines and structures.

h.) **Guy wires and Anchors** – All guy wires and anchors shall be reviewed for damaged or loose connections. The anchor shall be secure and not exposed as to pose a hazard to public traffic.

i.) **Conductors** – All overhead primary and secondary conductors shall be visually inspected for general condition. The conductor shall be secured at all tie points. Additional visual observations shall be made for vertical clearance above the ground and horizontal clearance to adjacent structures and conductors.

j.) **Riser Poles** – All riser poles shall be visually observed for general condition of the support system, - (i. e. cross arms, braces, and hardware). Additional observation of the lightning protection system and the presence of animal guards are also required.

k.) **Other Equipment** – Visual observations shall be performed on other overhead distribution equipment such as reclosers, sectionalizers, voltage regulators, and capacitor banks in accordance with their annual maintenance programs.

l.) **Switches and Disconnects** – A visual observation shall be performed on all overhead disconnect and Gang Operated Air Breaks (GOABs) for broken and cracked insulators, flashed over insulators, defective or missing lightning protection, and overall condition of the support structures – (i.e. single phase disconnect device cross arms). The review of the GOAB handles is also required. The switch handles shall be examined for tightness of all mounting bolts, proper grounding of the handle and a locking device for security is in place.

m.) **Grounds** – All ground conductors shall be visually observed to ensure continuity and proper connection. Exposed bare copper ground wires within 8' from the base of the pole shall be noted.

4.) Failure Classifications and Repair Schedule

All defects and anomalies identified shall be categorized and prioritized for repair. Repair priorities and corrective action shall be defined as follows.

1. **Priority Five** – Is a condition that requires correction immediately. All repairs must be made within 24 hours of identification. Priority 5 repairs can be, but are not limited to, any condition that could result in danger to the public or imminently cause an interruption of service. The ability to immediately correct will be subject to maintaining the integrity of the distribution system and therefore may be delayed if loading, safety, and other reliability concerns require that the repair be deferred. If deferred, the condition shall be monitored regularly until system conditions allow the repair to commence.

2. **Priority Four** – Is a condition that should be corrected within 7 calendar days, subject to system constraints.
3. **Priority Three** – Is a condition that should be corrected as manpower and system requirements permit. These conditions typically have no impact on the short-term safety or performance of the electric system, but likely will as time passes.
4. **Priority Two** – Is a condition that should be evaluated as routine maintenance is performed.
5. **Priority One** – Is a condition that can be recorded and monitored. The repair and/or replacement are not a priority.

Exhibit Five

O&R Transmission Ground Patrol Standard – EHV-001

1.0 PURPOSE

The purpose of this procedure is to establish a standard which defines the requirements and frequency of scheduled ground patrols of the overhead transmission system for the purposes of visual inspection so that conditions which potentially jeopardize the safe and reliable operation of the system can be identified and addressed.

2.0 APPLICABILITY

This procedure applies to all overhead electric transmission lines which are maintained by Orange & Rockland Utilities (ORU). Unless specifically directed otherwise, ground patrols shall cover the entire transmission line up to the first conductor attachment point in each substation. The facilities covered under this procedure are categorized below.

- All overhead transmission lines owned solely by ORU. For the purposes of this standard these lines will be referred to as the ORU lines.
- All overhead transmission lines on the west side of the Hudson River which are solely owned by Consolidated Edison Company of New York (CECONY) and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the CECONY lines. These lines are identified in Appendix A.
- All overhead transmission lines on the west side of the Hudson River which are jointly owned by CECONY and ORU and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the jointly owned lines. These lines are identified in Appendix A.
- All overhead transmission lines on the west side of the Hudson River which are jointly owned by CECONY, ORU, and Public Service Electric and gas Company (PSE&G), and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the jointly owned lines. These lines are identified in Appendix A.

3.0 REGULATORY REQUIREMENTS

3.1 The New York State Public Service Commission (PSC) Order Instituting Safety Standards established under PSC Case 04-M-0159 requires that transmission lines be inspected at least once every five years. The inspection performed during the ground patrols described herein is intended to provide compliance with the inspection requirements of the PSC order, therefore ground patrols shall be conducted in accordance with the latest revision of the order.

3.2 The PSC Order Instituting Safety Standards also requires that stray voltage testing of transmission structures and guy wires be performed at least annually. Stray voltage testing of each structure, fence, and guy wire on ORU transmission lines shall be performed during the annual patrol described in this procedure. Stray voltage testing of CECONY owned and jointly owned lines shall be performed during the spring patrol described in this procedure. Stray voltage testing shall be conducted in accordance with the latest revision of the O&R Stray Voltage Investigation Procedure (Procedure No 2203), and the PSC order.

3.3 The PSC Order Requiring Enhanced Transmission Right-Of-Way Management Practices by Electric Utilities established under PSC Case 04-E-0822 requires a minimum of one ground patrol per year for all bulk transmission facilities and for all other "critical" transmission facilities as defined by the North East Power Coordinating Council (NPCC). The ground patrols described herein are intended to provide compliance with the patrol requirements of the PSC order, therefore ground patrols shall be conducted in accordance with the latest revision of the order.

3.4 CECONY and jointly owned lines are considered part of the North American bulk electric system (BES) and are therefore covered by the reliability standards developed for the BES by the North American Electric Reliability Corporation (NERC). These lines are important components of the BES and are therefore patrolled more frequently than the ORU lines. NERC Standard FAC-003, Transmission Vegetation Management Program, requires that vegetation on transmission rights-of-way be periodically inspected. The

inspection performed during the ground patrols described herein, along with aerial patrols, which are described in another procedure are intended to provide compliance with the inspection requirements of FAC-003, therefore ground patrols shall be conducted in accordance with the latest revision of FAC-003 and the Company's Transmission Vegetation Management Program (TVMP).

4.0 PROCEDURE

4.1 Ground Patrol Schedule

- All ORU lines shall be patrolled once per calendar year. The patrol shall be completed by September 30.
- All CECONY lines and jointly owned lines shall be patrolled twice per year, once in the spring and once in the fall.

4.2 Whenever practical and at the discretion of the EHV (Extra High Voltage) Supervisor, short interval tasks should be performed during this patrol, such as removal of undesirable trees in the wire zone or replacement of signage.

4.3 The patrol shall be conducted by a crew of one or two ORU or contract employees who are qualified to perform such patrols in accordance with the requirements of Section 5 of this document. Personnel not meeting the qualifications required under Section 5 may participate in the ground patrols if they are utilized to assist a qualified person. In such cases the qualified person shall be responsible for conducting the patrol and the unqualified person shall assist the qualified person (i.e. by driving or removing vegetation). In addition to standard PPE and safety equipment required by the Company, employees conducting this patrol shall have the following equipment and informational material at a minimum.

- Four wheel drive (4WD) vehicle, all terrain vehicle (ATV), or track vehicle.
- Mobile phone or radio
- Binoculars

- Chainsaw
- Laser range finder
- Vegetation clearance tables
- Plan and Profile drawings of lines to be patrolled
- Previous inspection information for lines to be patrolled
- Relevant specifications and procedures including this procedure

4.4 The EHV Supervisor shall ensure that System Operations is notified of the plan established for each day's patrol at the beginning of each day. The EHV Supervisor, or his authorized representative, and patrol crew foreman shall review the area to be covered prior to starting each day's patrol to determine how the patrol will be conducted and what equipment will be necessary.

4.5 Patrol personnel shall perform a detailed visual inspection of all components of the transmission line and right-of-way (ROW) from the ground, including but not limited to vegetation clearances, fall over potential from tall dead or otherwise compromised trees, structures, conductors, shield wires, splices, dead end fittings, spacers, hardware, insulators, and ROW conditions, which are described in more detail in Appendix B, Items To Be Observed and Classification of Conditions.

4.6 Classification of Conditions

Conditions that are identified during patrols shall be classified on the inspection form according to the priorities listed below. All Priority 3 conditions shall be reported to the EHV Supervisor and the System Operator immediately, via radio, cell phone, or telephone in accordance with Operating Instruction (OI) 6-T-5, Procedure for Repairs on the Transmission System, so that prompt action can be taken to alleviate the condition of imminent threat to the transmission line. Priority 1 and 2 conditions shall be reported to the EHV Supervisor via the inspection forms at the end of the day of the patrol.

The EHV Supervisor shall report all priority 2 and 3 vegetation conditions to the Company's Vegetation Manager as soon as he is made aware of them. The EHV

supervisor shall ensure that all reported conditions are recorded in the Company's transmission line inspection database, including reports of "no conditions found".

- Priority 1 – Routine Classification - A condition that should be corrected when time or situation permits. These conditions generally do not directly jeopardize the safe and reliable operation of the system and would be addressed on normal maintenance cycles or re-evaluated on the next ground patrol. Examples of such conditions are damaged ROW entrance gates or vegetation that has grown beyond the At Time of Vegetation Management clearance, but not beyond the Action Threshold clearance, as identified Appendix B of this document. Broken insulators classified as Priority 1 shall be replaced within 36 months of being identified.

- Priority 2 – Prompt Classification - A condition that does not pose an imminent threat to line reliability or safety as described under Priority 3, but if not corrected, has the potential to develop into a Priority 3 condition. Priority 2 conditions shall be corrected within 60 days if system conditions, manpower, workload, and weather allow. Priority 2 conditions that are not corrected within this time frame shall be reviewed with Engineering or the Vegetation Manager (vegetation conditions only), and monitored on a monthly basis, until they are corrected. Examples of such conditions are a broken shield wire strand or vegetation that has grown beyond the Action Threshold clearance, but not beyond the Minimum Clearance as identified Appendix B of this document.

- Priority 3 – Emergency Classification - A condition where a component of a transmission line is in imminent danger of failure which would result in a hazard to personnel, the public, or the integrity of the transmission line. Priority 3 conditions require immediate action to eliminate the threat (i.e. de-energization or de-loading), and correction as soon as possible. Examples of such conditions are broken shield wires or vegetation that has encroached beyond the Minimum Clearance as identified Appendix B of this document.

Conditions shall be reported on a span by span basis using structure numbers to identify the spans. Employees conducting ground patrols shall provide all data requested on the inspection form, which may be in either paper or electronic format. All conditions shall be recorded. In addition forms shall be submitted for spans where no conditions are identified, indicating that no conditions were found. Sample inspection forms are attached in Appendices C (Standard Form) and D (Vegetation Form). Vegetation conditions shall be recorded on both forms. All other conditions shall only be recorded on the standard form. The EHV Supervisor shall use the standard form to document the results of the patrol. The EHV Supervisor shall forward the all vegetation forms to the Vegetation Manager for evaluation and action.

4.7 On occasion, it may not be possible to properly assess a condition from the ground. When identified, such conditions shall be reported with remarks indicating that a climbing inspection is necessary to assess the observation.

4.8 Personnel performing the patrol shall be provided with a list of outstanding conditions from the transmission line inspection database by the EHV Supervisor so that these conditions can be evaluated.

4.9 Personnel performing the patrol shall submit inspection forms to the EHV Supervisor within one business day of completing the patrol. The EHV Supervisor shall review the information, evaluate the conditions found, initiate action as required, and ensure that the information is loaded into the transmission line inspection database. Priority 1 conditions may either be scheduled for repair or placed into the work backlog at the discretion of the EHV Supervisor.

4.10 The EHV Supervisor shall prepare a quarterly report summarizing by transmission line all outstanding conditions and all conditions that were repaired during the quarter. All reports shall be kept on file for a minimum of five years by the EHV Supervisor. The reports for the CECONY and jointly owned lines shall be submitted to CECONY's Section Manager of Transmission Line Maintenance.

4.11 Emergency Ground Patrols

Emergency ground patrols of certain transmission lines may be ordered by the System Operator or other management personnel during contingencies or in response to breaker operations or feeder trips. Emergency patrols shall be conducted in the same general manner as a scheduled patrols, except that personnel will be directed to focus on the cause of a specific problem based upon information supplied by System Operations or Engineering. Observations shall be reported by phone or radio to the EHV Supervisor or System Operator.

5.0 QUALIFICATIONS OF PATROL PERSONNEL

5.1 Personnel conducting ground patrols shall have a strong working knowledge of overhead transmission line. They shall be able to visually identify the components of transmission lines and any anomalies that may result in safety or reliability problems, component failures, or feeder trips. All patrol personnel shall be thoroughly familiar with the requirements of the TVMP which concern vegetation clearances, vegetation fall-over threats, and the wire zone – border zone concept.

5.2 All patrol personnel shall be able to classify conditions found in accordance with the priority codes established in Section 4.6 of this document. In particular, personnel shall be able to properly identify and clearly explain conditions which represent an imminent threat to the reliability of a transmission line.

5.3 Personnel performing stray voltage testing shall be proficient in the use of the test meter specified in the Company's Stray Voltage Investigation Procedure. They shall demonstrate this understanding to the EHV supervisor once per calendar year using the actual test meter. In the case of contract employees a written statement from the employee's company indicating that the employee understands the procedure and is proficient in the use of the test meter shall be required as proof of the employee's qualifications.

5.4 All personnel performing ground patrols shall understand how to record and report the results of their patrol on electronic or paper inspection forms.

5.5 Personnel that have qualified as EHV linemen, because of their training, experience and knowledge, are considered qualified to perform ground patrols provided that ORU personnel directly responsible for managing the Company's TVMP have reviewed the relevant aspects of the TVMP (identified in paragraph 4.1 of this document) with them.

5.6 Other personnel shall be considered qualified to perform these patrols if they have had five years of experience in the design, construction, inspection, or maintenance of overhead transmission lines provided that ORU management personnel directly responsible for managing the Company's TVMP have reviewed the relevant aspects of the TVMP (identified in paragraph 4.1 of this document) with them.

5.7 In the case of contract employees a written statement from the employee's company indicating that the employee has the experience, knowledge, and ability required by relevant paragraphs of Section 4.0 of this document shall be required as proof of the employee's qualifications.

5.8 All personnel performing ground patrols shall review this procedure and the relevant aspects of the Company's TVMP at least once per calendar year. This review shall be conducted by the EHV Supervisor and the Vegetation Manager or other management personnel with detailed knowledge of the TVMP.

6.0 RESPONSIBILITIES – The EHV Supervisor and General Line Supervisor responsible for EHV are responsible for the implementation of this procedure.

7.0 REFERENCES

7.1 NYS PSC Order Instituting Safety Standards established under PSC Case 04-M-0159, Latest Revision

7.2 NYS PSC Order Requiring Enhanced Transmission Right-Of-Way Management Practices by Electric Utilities established under PSC Case 04-E-0822, Latest Revision

7.3 NERC Reliability Standard FAC-003, Transmission Vegetation Management Program, Latest Revision

7.4 Orange & Rockland Utilities Transmission Vegetation Management Plan, Latest Revision

7.5 Orange & Rockland Utilities Procedure 2203, Stray Voltage Investigation Procedure, Latest Revision

7.6 Orange & Rockland Utilities Operating Instruction 6-T-5, Procedure for Repairs on the Transmission System

8.0 APPENDICES

8.1 Appendix A – CECONY and Jointly Owned Transmission Lines

8.2 Appendix B – Items to be Observed

8.3 Appendix C – Patrol Inspection Form Example

8.4 Appendix D – Vegetation Inspection Form

9.0 ADVICE AND COUNSEL – The Division Superintendent responsible for EHV shall provide advice and counsel on this procedure.

APPENDIX A

CECONY and Jointly Owned Transmission Lines

Line Number	Owner
5018 - New York Portion	CECONY
Y88 & Y94	CECONY and ORU
Y94 & W72	CECONY and ORU
67 & 68	CECONY and ORU
69 & 70 - New York Portion	CECONY and ORU
69 & 70 - New Jersey Portion	PSE&G and ORU
77	CECONY

APPENDIX B

Items to Be Observed

1. Vegetation Clearances – The clearance tables below shall be used evaluate vegetation conditions on the ROW. Clearances between conductors and vegetation which are less than the Minimum Clearance shown in the tables shall be classified as Priority 3, and reported immediately in accordance with the requirements of paragraph 4.6. Clearances between conductors and vegetation which are less than the Action Threshold clearance but greater than the Minimum Clearance shall be classified as Priority 2.

   Inspection personnel shall pay particular attention to vegetation growing in upland knolls or in wetlands because of the higher risk of vegetation related problems in these locations. Knolls sometimes feature minimal clearances between lower conductors and vegetation. In wetlands, certain types of vegetation such as ailanthus (tree of heaven) can grow quickly when they break through the canopy of lower growing vegetation. One of the most effective methods of detecting such vegetation is to scan the entire wetland from a high point using binoculars.

ORU Transmission Line Vegetation Clearance Tables

Clearance at Structure between Trees and Conductors

Voltage (KV)	Lateral (Cs) (Feet)	Vertical (As) (Feet)	Clearance Classification
500	25	25	At Time of Vegetation Management
	20	20	Action Threshold
	15	15	Minimum Clearance
345	21	21	At Time of Vegetation Management
	15	15	Action Threshold
	10	10	Minimum Clearance

138	17	17	At Time of Vegetation Management
	10	10	Action Threshold
	5	5	Minimum Clearance
69	15	15	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance
34.5	15	15	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance

Clearance Within Span Between Trees and Conductors

Voltage (KV)	Lateral (Cs) (Feet)	Vertical (As) (Feet)	Clearance Classification
500	51	31	At Time of Vegetation Management
	30	25	Action Threshold
	15	15	Minimum Clearance
345	44	26	At Time of Vegetation Management
	20	20	Action Threshold
	10	10	Minimum Clearance
138	41	23	At Time of Vegetation Management
	14	14	Action Threshold
	4	4	Minimum Clearance
69	35	35	At Time of Vegetation Management
	10	10	Action Threshold
	4	4	Minimum Clearance
34.5	20	20	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance

Notes:

1. At Time of Vegetation Management Clearance - Clearance to be achieved at time of vegetation management. Equivalent to NERC FAC-003-1 Clearance 1.
2. Action Threshold Clearance - Clearance greater than Minimum Clearance, but less than the clearance at Time of Vegetation Management. If found during growing season monitor every seven days until cleared, otherwise clear prior to next growing season.
3. Minimum Clearance - Minimum radial clearance around conductor under all operating conditions. Equivalent to NERC FAC-003 Clearance 2.
4. In cases where "At Time of Vegetation Management" or "Action Threshold" clearances cannot be attained because of ROW width limitation, trees shall be trimmed to the property line.

5. "Clearance at Structure" as defined in Table 4A applies to 50 feet measured in either longitudinal direction from the centerline of the structure. "Clearance Within Span" applies within the entire span except at the structure.
6. For vee string construction reduce "Action Threshold" lateral clearance by 4 feet for 345KV and 2 feet for 138KV.

2. Vegetation Fall-Overs – Trees that are growing within the ROW boundary and appear tall enough to fall into a transmission conductor shall be classified as Priority 2. If such trees pose an imminent threat to the line because of excessive lean, uprooting, or other such condition they shall be classified as Priority 3, whether they are on or off the ROW.

3. Conductor, Shield Wire, and Hardware - All conductor, shield wire, hardware, guy wires, and fittings shall be observed. Generally any condition that could cause a conductor to drop or a structure to fail should be classified as Priority 3; however there are too many possible situations to describe in this document so personnel performing the patrol shall use their judgment to classify conditions found in accordance with the guidelines established in 4.6 of this procedure. Guidance shall be obtained from the EHV Supervisor or Engineering if required. The conditions listed below are typical of the conditions that shall be observed.

- Note conductor clearances which appear to be abnormal for the line being patrolled
- Note jumper clearances which appear to be abnormal for the line being patrolled. Check for burn marks.
- Broken or separated conductor or shield wire strands
- Corona rings
- Dampers
- Spacers
- Fiberoptic cable and attachment hardware including cable jacket
- Excessive wear on hardware
- Hardware alignment

- Missing or backed out cotter keys
- Broken, flashed, or contaminated insulators

Insulators – Post insulators operating supporting 69KV or 138KV span conductors or jumpers having damage to more than 25% of the skirts shall be classified as Priority 2. Conditions involving damage to less than 25% of the skirts shall be classified as Priority 1.

The following table shall be used to classify conditions involving broken cap and pin insulators assembled into insulator strings.

Voltage	No. of Intact Insulators Remaining in a String,	Classification
500KV	15 or less	Priority #3
	16 to 20	Priority #2
	20 to one less than full string	Priority #1
345KV	10 or less	Priority #3
	11 or 12	Priority #2
	13 to one less than full string	Priority #1
138KV	5 or less	Priority #3
	6 or 7	Priority #2
	8 to one less than full string	Priority #1
69KV	2 or less	Priority #3
	3	Priority #2
	4 to one less than full string	Priority #1

APPENDIX C

Patrol Inspection Form Example

ORANGE & ROCKLAND UTILITIES, INC. TRANSMISSION LINE MAINTENANCE GROUND PATROL REPORT	CREW: Joe Smith, Tom Jones, SAMPLE	LINE NUMBER: #1 DATE: June 9, 1927 SHEET 1 OF 1

GENERAL COMMENTS:

1. Gate to access road off Route 99 found open. We locked it.
2. Kids playing in field near poles 21-23.

FROM	TO	ELECTRICAL	PRI	STRUCTURAL	PRI	R.O.W.	PRI	Comments
Ryan Sub.	13							
13	14	Kite string top Phase	2					
				Pole full of Woodpecker holes	2			
Smith Road	Bakey Rd.					Needs trimming	2	
47	49							
51		1 of 8 broken bottom phase	3					
53								

56		Middle post broken	1					

EHV Supervisor Sample
(or representative)

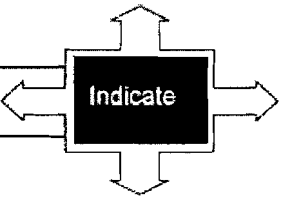
CORRECTIVE ACTIONS TAKEN: _____

ORANGE AND ROCKLAND UTILITIES, INC.

EHV WORK PROCEDURE	Ground Patrol Standard – EHV-001

APPENDIX D – VEGETATION INSPECTION FORM

Transmission Line ROW Vegetation Management Inspection Sheet



Patrol: Spring Fall Climbing

Municipality:

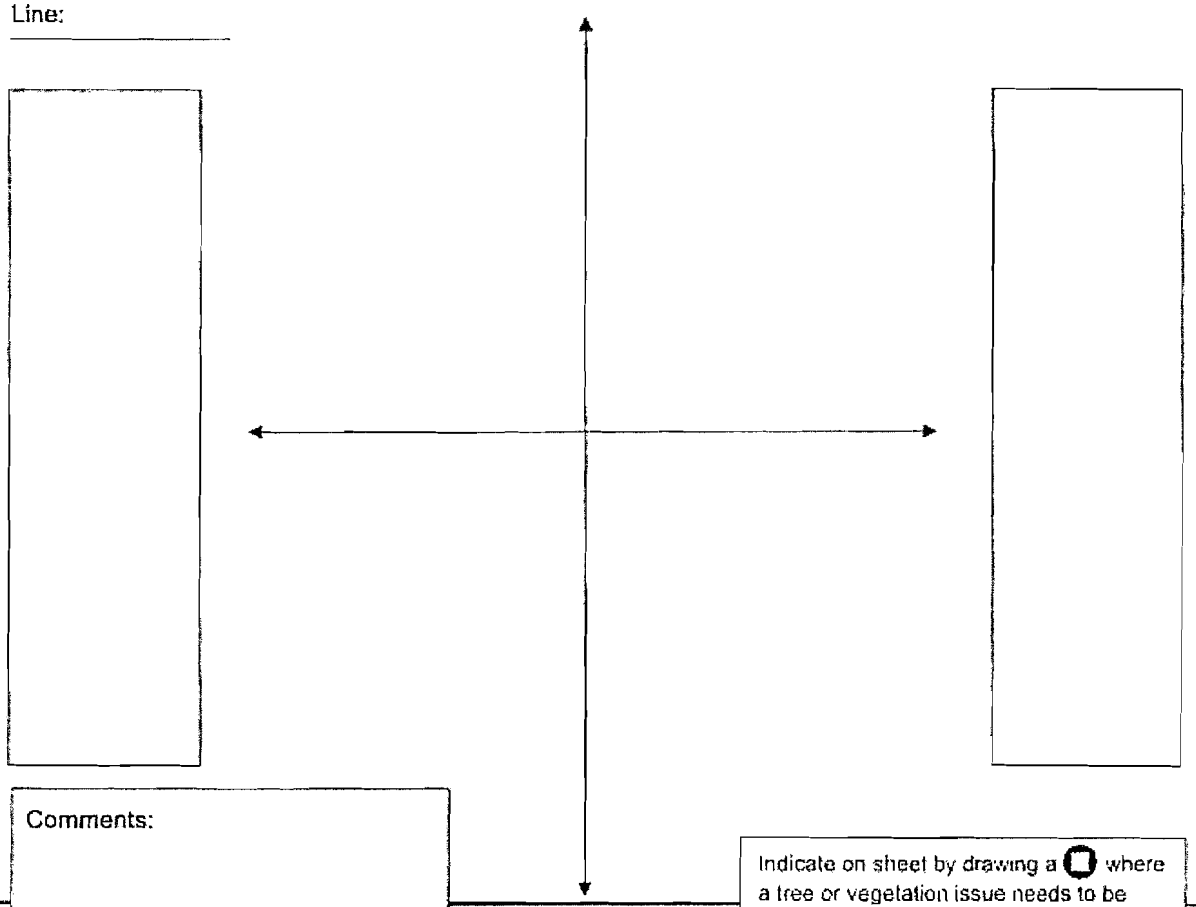
Name:

Nearest Cross Street:

Date:

TOWER NUMBER

Line:



Comments:

Indicate on sheet by drawing a ▢ where a tree or vegetation issue needs to be addressed. Please be specific. Also indicate approximate footage from tower on arrow lines.

rsedes:

Octo

Date:

TOWER NUMBER

Exhibit Six

O&R Transmission Helicopter Patrol Standard – EHV-002

1.0 PURPOSE

The purpose of this procedure is to establish a standard which defines the requirements and frequency of scheduled helicopter patrols of the overhead transmission system for the purposes of visual inspection so that conditions which potentially jeopardize the safe and reliable operation of the system can be identified and addressed.

2.0 APPLICABILITY

This procedure applies to all overhead electric transmission lines which are maintained by Orange & Rockland Utilities (ORU). Unless specifically directed otherwise, aerial patrols shall cover the entire transmission line up to the first conductor attachment point in each substation. This procedure does not apply to comprehensive helicopter patrols or live line helicopter work. The facilities covered under this procedure are categorized below.

- All overhead transmission lines owned solely by ORU. For the purposes of this standard these lines will be referred to as the ORU lines.
- All overhead transmission lines on the west side of the Hudson River which are solely owned by Consolidated Edison Company of New York (CECONY) and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the CECONY lines. These lines are identified in Appendix A.
- All overhead transmission lines on the west side of the Hudson River which are jointly owned by CECONY and ORU and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the jointly owned lines. These lines are identified in Appendix A.
- All overhead transmission lines on the west side of the Hudson River which are jointly owned by CECONY, ORU, and Public Service Electric and Gas Company (PSE&G), and maintained by ORU in accordance with inter utility agreements. For the purposes of this standard these lines will be referred to as the jointly owned lines. These lines are identified in Appendix A.

3.0 REGULATORY REQUIREMENTS

3.1 The PSC Order Requiring Enhanced Transmission Right-Of-Way Management Practices by Electric Utilities established under PSC Case 04-E-0822 requires a minimum of one aerial patrol per year for all bulk transmission facilities and for all other "critical" transmission facilities as defined by the North East Power Coordinating Council (NPCC). The helicopter patrols described herein are intended to provide compliance with this requirement and shall therefore be conducted in accordance with the latest revision of the order.

3.2 CECONY and jointly owned lines are considered part of the North American bulk electric system (BES) and are therefore covered by the reliability standards developed for the

BES by the North American Electric Reliability Corporation (NERC). These lines are important components of the BES and are therefore patrolled more frequently than the ORU lines. NERC Standard FAC-003, Transmission Vegetation Management Program, requires that vegetation on transmission rights-of-way be periodically inspected. The inspection performed during the helicopter patrols described herein, along with the ground patrols described in the Ground Patrol Standard, EHV-001 are intended to provide compliance with the inspection requirements of FAC-003.

4.0 PROCEDURE

4.1 Helicopter Patrol Schedule

- All ORU lines shall be patrolled every other month for a total of six patrols per year, with the exception that Line 51 and Line 702 shall be patrolled monthly.
- All CECONY lines and jointly owned lines and ORU lines 51 and 702 shall be patrolled monthly for a total of twelve patrols per year.
- Infrared inspections will be performed during the spring and summer, usually as part of the March and July patrols. The EHV supervisor shall have the authority to schedule infrared inspections during different months to allow for operational flexibility.
- Additional flights may be ordered by System Operations or EHV in response to system events or emergencies such as feeder trips.

4.2 The EHV Supervisor shall ensure that the System Operations Department, the Distribution Control Center, Engineering, and the Emergency Preparedness Section are notified of the plan established for each day's patrol prior to the beginning of the flight. The EHV Supervisor shall ensure that any additional special notifications are made (i.e. Flights over West Point on Lines 841, 851, 853, & 93 require that West Point Range Control be notified @ 845-938-3930).

4.3 The helicopter pilot shall have final responsibility for the proper and safe operation of the helicopter. The pilot shall have the authority to postpone or terminate any flight for any safety or flight related reason including but not limited to adverse weather conditions, airworthiness of the helicopter, or the pilot's own physical condition.

4.4 Safety rules and procedures for helicopter operation shall be the sole responsibility of the helicopter pilot, and shall be followed at all times. The observer shall inform the pilot of any extraordinary or hazardous conditions that the pilot is likely to be unaware of (i.e. severe wire or structural damage).

4.5 The pilot shall be accompanied by at least one observer, who shall meet the qualifications of Section 5.0 of this procedure. The patrol observer shall have the authority to postpone or terminate any flight for any reason. The patrol observer shall

perform a visual inspection of all components of the transmission line and right-of-way (ROW), including but not limited to vegetation clearances, fall over potential from tall dead or otherwise compromised trees, structures, conductors, shield wires, splices, dead end fittings, spacers, hardware, insulators, and ROW conditions, which are described in more detail in Appendix B, Items To Be Observed and Classification of Conditions. The observer shall record and classify all conditions that are observed. The observer may request the pilot to hover or circle in order to properly assess a condition.

4.6 The patrol observer shall carry the previous Aerial Patrol Summary report on each flight. All observations shall be recorded each time they are encountered, even if they were reported on previous patrols. In addition to recording the information required under the previous paragraph, the patrol observer shall record all departure times, arrival times, and flight durations, and all other information required to develop the Aerial Patrol Summary report for the current flight.

4.7 The patrol observer must be willing and able to ride in the helicopter without discomfort or fear that would adversely affect the observer's performance. Visual acuity of 20-20, with correction, and normal color perception are required.

4.8 Flights shall be conducted at speeds and altitudes which afford the observer the best opportunity to thoroughly inspect the line and ROW, and which are consistent with flight safety.

4.9 Classification of Conditions

Conditions that are identified during patrols shall be classified on the inspection form according to the priorities listed in this section. All Priority 3 conditions shall be reported to the EHV Supervisor immediately. In some cases it may be necessary to suspend the patrol and land the aircraft at the nearest heliport to obtain clear communication with the EHV Supervisor. Priority 1 and 2 conditions shall be reported to the EHV Supervisor via the inspection forms at the end of the day of the patrol.

The EHV Supervisor shall report all priority 3 conditions to System Operations immediately in accordance with Operating Instruction (OI) 6-T-5, Procedure for Repairs on the Transmission System, so that prompt action can be taken to alleviate the condition of imminent threat to the transmission line. In addition the EHV Supervisor shall report all priority 2 and 3 vegetation conditions to the Company's Vegetation Manager as soon as he is made aware of them. The EHV supervisor shall ensure that all reported conditions are recorded in the Company's transmission line inspection database.

- Priority 1 – Routine Classification - A condition that should be corrected when time or situation permits. These conditions generally do not directly jeopardize the safe and reliable operation of the system and would be addressed on normal maintenance cycles or re-evaluated on the next ground patrol. Examples of such conditions are damaged ROW entrance gates or vegetation that has grown beyond

the At Time of Vegetation Management clearance, but not beyond the Action Threshold clearance, as identified Appendix B of this document. Broken insulators classified as Priority 1 shall be replaced within 36 months of being identified.

- Priority 2 – Prompt Classification - A condition that does not pose an imminent threat to line reliability or safety as described under Priority 3, but if not corrected, has the potential to develop into a Priority 3 condition. Priority 2 conditions shall be corrected within 60 days if system conditions, manpower, workload, and weather allow. Priority 2 conditions that are not corrected within this time frame shall be reviewed with Engineering or the Vegetation Manager (vegetation conditions only), and monitored on a monthly basis, until they are corrected. Examples of such conditions are a broken shield wire strand or vegetation that has grown beyond the Action Threshold clearance, but not beyond the Minimum Clearance as identified Appendix B of this document.

- Priority 3 – Emergency Classification - A condition where a component of a transmission line is in imminent danger of failure which would result in a hazard to personnel, the public, or the integrity of the transmission line. Priority 3 conditions require immediate action to eliminate the threat (i.e. de-energization or de-loading), and correction as soon as possible. Examples of such conditions are broken shield wires or vegetation that has encroached beyond the Minimum Clearance as identified Appendix B of this document.

Conditions shall be reported on a span by span basis using structure numbers to identify the spans. Employees conducting helicopter patrols shall provide all data requested on the Patrol Inspection Form, which may be in either paper or electronic format. All conditions shall be recorded. Sample inspection forms are attached in Appendices C (Patrol Inspection Form) and D (Vegetation Inspection Form). Vegetation conditions shall be recorded on both forms. All other conditions shall only be recorded on the Patrol Inspection Form. The EHV Supervisor shall use the Vegetation Inspection Form to document the results of the patrol. The EHV Supervisor shall forward all Vegetation Inspections Forms to the Vegetation Manager for evaluation and action.

4.10 On occasion, it may not be possible to properly assess a condition from the helicopter. Such conditions shall be reported with remarks indicating that a ground observation or climbing inspection is necessary for proper assessment.

4.11 The patrol observer shall submit inspection forms to the EHV Supervisor within one business day of completing the patrol. The EHV Supervisor shall review the information, evaluate the conditions found, initiate action as required, and ensure that the information is loaded into the transmission line inspection database. Priority 1 conditions may either be scheduled for repair or placed into the work backlog at the discretion of the EHV Supervisor.

4.12 The patrol observer shall summarize the results of the flight in an Aerial Patrol Summary report, an example of which is attached in Appendix E. Although a different report

format is permissible with the approval of the EHV Superintendent, all information required by the report format shall be recorded by the patrol observer. The report shall be submitted to the EHV Superintendent through the EHV Supervisor and GLS within one week of the flight.

4.13 Emergency helicopter patrols of certain transmission lines may be ordered by the System Operator or other management personnel during contingencies or in response to breaker operations or feeder trips. Emergency patrols shall be conducted in the same general manner as a scheduled patrols, except that personnel will be directed to focus on the cause of a specific problem based upon information supplied by System Operations or Engineering. Observations shall be promptly reported to the EHV Supervisor or System Operator.

5.0 QUALIFICATIONS OF PATROL PERSONNEL

5.1 Observers conducting helicopter patrols shall have a strong working knowledge of overhead transmission lines. They shall be able to visually identify the components of transmission lines and any anomalies that may result in safety or reliability problems, component failures, or feeder trips. All patrol personnel shall be thoroughly familiar with the requirements of the TVMP which concern vegetation clearances, vegetation fall-over threats, and the wire zone – border zone concept.

5.2 Observers shall be able to classify conditions found in accordance with the priority codes established in Section 4.6 of this document. In particular, personnel shall be able to properly identify and clearly explain conditions which represent an imminent threat to the reliability of a transmission line.

5.3 Observers shall understand how to record and report the results of their patrol on electronic or paper inspection forms.

5.4 Personnel that have qualified as EHV linemen, because of their training, experience and knowledge, are considered qualified observers provided that ORU personnel directly responsible for managing the Company's TVMP have reviewed the relevant aspects of the TVMP with them.

5.5 Other personnel shall be considered qualified to perform these patrols if they have had five years of experience in the design, construction, inspection, or maintenance of overhead transmission lines provided that ORU management personnel directly responsible for managing the Company's TVMP have reviewed the relevant aspects of the TVMP with them.

5.6 All observers shall review this procedure and the relevant aspects of the Company's TVMP at least once per calendar year. This review shall be conducted by the EHV Supervisor and the Vegetation Manager or other management personnel with detailed knowledge of the TVMP.

5.7 In cases where emergency patrols are required during periods when qualified observers are unavailable, patrols may be conducted using available overhead distribution personnel as observers at the discretion of EHV supervision or the Senior System Operator. An additional patrol may be required when qualified observers become available.

6.0 RESPONSIBILITIES – The EHV Supervisor and General Line Supervisor responsible for EHV are responsible for the implementation of this procedure.

7.0 REFERENCES

7.1 NYS PSC Order Requiring Enhanced Transmission Right-Of-Way Management Practices by Electric Utilities established under PSC Case 04-E-0822, Latest Revision

7.2 NERC Reliability Standard FAC-003, Transmission Vegetation Management Program, Latest Revision

7.3 Orange & Rockland Utilities Transmission Vegetation Management Plan, Latest Revision

7.4 Orange & Rockland Utilities Operating Instruction 6-T-5, Procedure for Repairs on the Transmission System

8.0 APPENDICES

8.1 Appendix A – CECONY and Jointly Owned Transmission Lines

8.2 Appendix B – Items to be Observed

8.3 Appendix C – Patrol Inspection Form Example

8.4 Appendix D – Vegetation Inspection Form Example

8.5 Appendix E – Aerial Patrol Summary Report Example

9.0 ADVICE AND COUNSEL – The Division Superintendent responsible for EHV shall provide advice and counsel on this procedure.

APPENDIX A

CECONY and Jointly Owned Transmission Lines

Line Number	Owner
5018 - New York Portion	CECONY
Y88 & Y94	CECONY and ORU
Y94 & W72	CECONY and ORU
67 & 68	CECONY and ORU
69 & 70 - New York Portion	CECONY and ORU
69 & 70 - New Jersey Portion	PSE&G and ORU
77	CECONY

APPENDIX B

Items to be Observed

1. Vegetation Clearances – The clearance tables below shall be used evaluate vegetation conditions on the ROW. Clearances between conductors and vegetation which are less than the Minimum Clearance shown in the tables shall be classified as Priority 3, and reported immediately in accordance with the requirements of paragraph 4.6. Clearances between conductors and vegetation which are less than the Action Threshold clearance but greater than the Minimum Clearance shall be classified as Priority 2.

   Inspection personnel shall pay particular attention to vegetation growing in upland knolls or in wetlands because of the higher risk of vegetation related problems in these locations. Knolls sometimes feature minimal clearances between lower conductors and vegetation. In wetlands, certain types of vegetation such as ailanthus (tree of heaven) can grow quickly when they break through the canopy of lower growing vegetation.

ORU Transmission Line Vegetation Clearance Tables

Clearance at Structure between Trees and Conductors

Voltage (KV)	Lateral (Cs) (Feet)	Vertical (As) (Feet)	Clearance Classification
500	25	25	At Time of Vegetation Management
	20	20	Action Threshold
	15	15	Minimum Clearance
345	21	21	At Time of Vegetation Management
	15	15	Action Threshold
	10	10	Minimum Clearance
138	17	17	At Time of Vegetation Management
	10	10	Action Threshold
	5	5	Minimum Clearance
69	15	15	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance
34.5	15	15	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance

Clearance Within Span Between Trees and Conductors

Voltage (KV)	Lateral (Cs) (Feet)	Vertical (As) (Feet)	Clearance Classification
500	51	31	At Time of Vegetation Management
	30	25	Action Threshold
	15	15	Minimum Clearance
345	44	26	At Time of Vegetation Management
	20	20	Action Threshold
	10	10	Minimum Clearance
138	41	23	At Time of Vegetation Management
	14	14	Action Threshold
	4	4	Minimum Clearance
69	35	35	At Time of Vegetation Management
	10	10	Action Threshold
	4	4	Minimum Clearance
34.5	20	20	At Time of Vegetation Management
	8	8	Action Threshold
	4	4	Minimum Clearance

Notes:

1. At Time of Vegetation Management Clearance - Clearance to be achieved at time of vegetation management. Equivalent to NERC FAC-003-1 Clearance 1.
2. Action Threshold Clearance - Clearance greater than Minimum Clearance, but less than the clearance at Time of Vegetation Management. If found during growing season monitor every seven days until cleared, otherwise clear prior to next growing season.
3. Minimum Clearance - Minimum radial clearance around conductor under all operating conditions. Equivalent to NERC FAC-003 Clearance 2.
4. In cases where "At Time of Vegetation Management" or "Action Threshold" clearances cannot be attained because of ROW width limitation, trees shall be trimmed to the property line.
5. "Clearance at Structure" as defined in Table 4A applies to 50 feet measured in either longitudinal direction from the centerline of the structure. "Clearance Within Span" applies within the entire span except at the structure.
6. For vee string construction reduce "Action Threshold" lateral clearance by 4 feet for 345KV and 2 feet for 138KV.

2. Vegetation Fall-Overs – Trees that are growing within the ROW boundary and appear tall enough to fall into a transmission conductor shall be classified as Priority 2. If such trees pose an imminent threat to the line because of excessive lean, uprooting, or other such condition they shall be classified as Priority 3, whether they are on or off the ROW.

3. Conductor, Shield Wire, and Hardware - All conductor, shield wire, hardware, guy wires, and fittings shall be observed. Generally any condition that could cause a conductor to drop or a structure to fail should be classified as Priority 3; however there are too many possible situations to describe in this document so personnel performing the patrol shall use their

judgment to classify conditions found in accordance with the guidelines established in 4.9 of this procedure. Guidance shall be obtained from the EHV Supervisor or Engineering if required. The conditions listed below are typical of the conditions that shall be observed.

- Note conductor clearances which appear to be abnormal for the line being patrolled
- Note jumper clearances which appear to be abnormal for the line being patrolled. Check for burn marks.
- Broken or separated conductor or shield wire strands
- Corona rings
- Dampers
- Spacers
- Fiberoptic cable and attachment hardware including cable jacket
- Excessive wear on hardware
- Hardware alignment
- Missing or backed out cotter keys
- Broken, flashed, or contaminated insulators

Insulators – Post insulators operating supporting 69KV or 138KV span conductors or jumpers having damage to more than 25% of the skirts shall be classified as Priority 2. Conditions involving damage to less than 25% of the skirts shall be classified as Priority 1.

The following table shall be used to classify conditions involving broken cap and pin insulators assembled into insulator strings.

Voltage	No. of Intact Insulators Remaining in a String,	Classification
500KV	15 or less 16 to 20 20 to one less than full string	Priority #3 Priority #2 Priority #1
345KV	10 or less 11 or 12 13 to one less than full string	Priority #3 Priority #2 Priority #1
138KV	5 or less 6 or 7 8 to one less than full string	Priority #3 Priority #2 Priority #1
69KV	2 or less 3 4 to one less than full string	Priority #3 Priority #2 Priority #1

4. Objects Hanging from Line Conductors or Shield Wires – Foreign objects such as long balloon clusters which are found hanging from conductors, shield wires, or structures and have a significant potential to cause phase to phase or phase to ground faults shall be classified as Priority 3 conditions. Objects such as balloon clusters which are not long enough to cause faults shall be classified as Priority 1 conditions.

5. Aviation Obstruction Lights – Aviation obstruction lights exist on the Hudson River Crossing tower in Stony Point which supports circuits Y88 and Y94. Conditions involving inoperability of these lights shall be reported to the Senior System Operator and the EHV Supervisor as soon as they are identified, so that notifications can be made to the proper aviation authorities. After they are reported, these conditions shall be classified as Priority 2, however if they are not repaired within 15 days the EHV Supervisor shall report them to the Senior System Operator again, and continue to do so every 15 days until they are repaired.

6. Structural Conditions – All poles, towers, and foundations shall be observed. Any condition that could cause a conductor to drop or a structure to fail should be classified as Priority 3; however there are too many possible situations to describe in this document so personnel performing the patrol shall use their judgment to classify conditions found in accordance with the guidelines established in 4.9 of this procedure. Guidance shall be obtained from the EHV Supervisor or Engineering if required. The conditions listed below are typical of the conditions that shall be observed.

- Loose, bent, or broken steel
- Missing or severely rusted, bolts, nuts, and palnuts
- Missing or loose anchor bolts
- Cracked or deteriorating foundations
- Rusted steel – particular attention shall be given to ground line locations
- Misalignment or leaning of towers or poles
- Erosion around foundations and bases
- Bird or insect nests on towers or poles
- Woodpecker holes or other damage caused by animals or insects
- Condition of exposed grounding connections and counterpoise

7 Right-Of-Way Conditions – The conditions listed below are typical of the conditions that shall be observed. ROW conditions are generally classified as Priority 1, unless an extreme condition which affects safety or reliability is identified.

- Encroachments including but not limited to buildings, pools, parking lots, etc.
- Unauthorized use of access roads
- Activity on or near the ROW which could damage the transmission lines
- Dumping and abandoned vehicles
- New roads onto or on the ROW
- New locked gates on the ROW
- New utilities constructed across the ROW
- Erosion and unstable conditions
- Condition of access roads, bridges, culverts, drainage ditches, swales, and water bars
- Conditions of ROW gates

APPENDIX C

Patrol Inspection Form Example

Division: _____

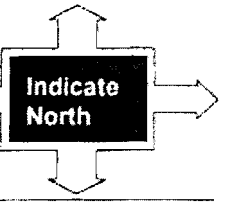
Date of Patrol: _____ **Observer:** _____

Line	Condition	Priority

APPENDIX D

Vegetation Inspection Form Example

Transmission Line ROW Vegetation Management Inspection Sheet



Patrol: Spring Fall Climbing

Municipality: _____

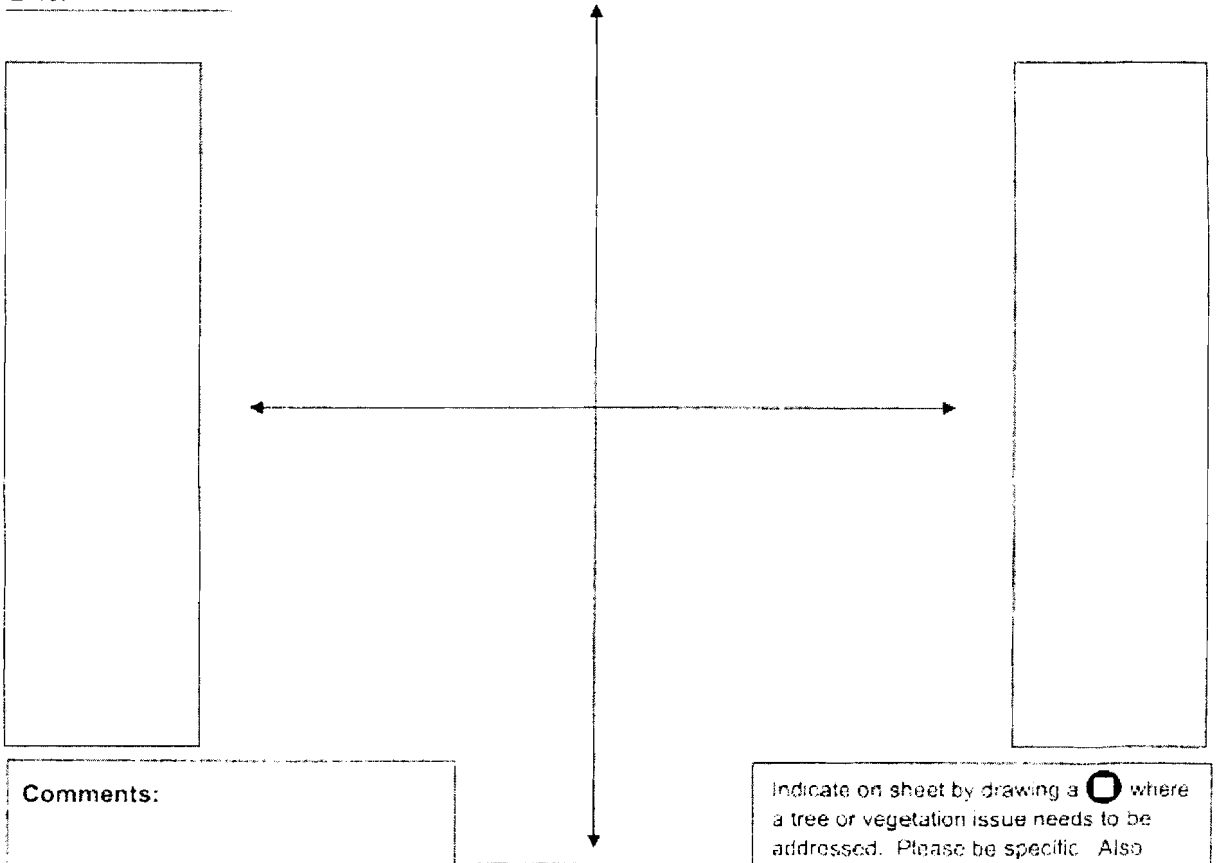
Name: _____

Nearest Cross Street: _____

Date: _____

Line: _____

TOWER NUMBER



Comments:

TOWER NUMBER

Indicate on sheet by drawing a ○ where a tree or vegetation issue needs to be addressed. Please be specific. Also indicate approximate footage from tower on arrow lines.

APPENDIX E

Aerial Patrol Summary Report Example

TRANSMISSION LINE MAINTENANCE
AERIAL PATROL SUMMARY
ORANGE AND ROCKLAND UTILITIES

DIVISION: NORTHERN – MIDDLETOWN DATE: 07/27/05 OBSERVER: DELK

AIRCRAFT: BELL JET RANGER N0402-TD PILOT: PETE ZANLUNGHI

LINES TO BE ACCOUNTED FOR: 3, 4, 6, 7, 10, 11, 12, 13, 18, 24, 25, 26, 27, 29, 100, 101, 122

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Line #	Side	Description	
Line #3		Clear	
Line #4 – 6		Shoemaker to Pocatello-All two leg towers-arms rusting badly. Need paint Tower flashed behind Shoprite 19 DE flashed phase 1 – line 4 1 broken – 5 flashed – line 6 Arm splintered 3 poles from Vandozor Rd. Highland lakes 25/10	
Line #9		Pole #14 Down lead needs repair	
Line #10		Clear plastic ties	
Line #11		Pole #80 arms rotted 5 or 6 poles before crossing Rt 6 at Slate Hill; Chip glass on riser arm 8 poles West of Co. Rt. 93 Chip glass of riser arm – 34 5 post 8 poles East of Co. Rt. 22 in Johnson Rotted cross arm 9 poles West of Ford Lee Rd. 3rd pole off 84 West – Woodpecker holes #90 – chip phase 2 6 poles South of 84 – pole looks bad H Structure near railroad track – arm looks bad Pole 344 Neversink Drive Port Jervis – Need Aerial #1 and 5 Pole 374 D/De H structure Broken insulators top of hill Balloon on wire Dolsentown Rd EXT. Not priority Rte 108	
Line #12 – 13		Tower #194 treat and backfill around legs Tower #82 broken glass phase 2 12-131 Line 131 Flashed insulators towers #133-135	2/6/2003
		Line 12 Tower 211 Flashed glass	
Line #18		#97 – chipped glass phase 1 2 flashed ins #46 – big splinter hanging from pole needs to be looked at Checked and look OK. Pole 80 cross arm condition repaired 11/26/03	
		Pole 24 – Defective insulator. To be repaired 07.22.04	
Line #24 – 25		Tower #40 flashed phase #1 need reclosers on line 25.	
Line #101		Clear	
Line #119		Pole 27 Chipped Glass Phase 2 - Pole 2 out of Shoemaker Broken Ground Wire	
Line #120		Pole #36 top post chipped	
Line #26		Towers 99 and 101 Flashed Insulators	

Exhibit Seven

Transmission Line Inspection – EHV-01-07

EHV-01-07

ORANGE AND ROCKLAND UTILITIES
500 ROUTE 208
MONROE, NEW YORK 10950-9986

SPECIFICATION EHV-01-07

TRANSMISSION LINE INSPECTION

Robert Marsden

Robert Marsden
General Line Supervisor

November 20, 2007

SCOPE OF SERVICES

INSPECTION, DEVELOPMENT AND MAINTENANCE OF DATABASE FOR DATA RECORDING AND REPORTING, STRAY VOLTAGE MEASUREMENT, GROUND RESISTANCE MEASUREMENT, AND WOOD POLE AND STEEL GRILLAGE EVALUATIONS

1.0 INTRODUCTION

Inspection - The contractor shall perform one detailed visual inspection from the ground of the entire overhead transmission system of Orange & Rockland Utilities (ORU or the company) in each year of the contract and record any conditions or deficiencies that are discovered concerning vegetation, the right-of-way, structures, wires , hardware, and any other components of the overhead transmission system, into an electronic database that will be developed, furnished, and maintained by the contractor as part of this contract. When no conditions or deficiencies are discovered in a particular span the contractor shall record "no conditions found" in the database. This database shall be known as the Transmission System Database.

The overhead transmission system shall be considered to include all overhead lines operating at 34.5KV and above. This includes approximately 475 miles of ROW and approximately 7000 structures comprised of approximately 600 steel poles, 5400 wood pole structures, and 1000 lattice steel structures. Work will be performed in Sullivan, Orange, and Rockland counties in New York, Bergen and Passaic counties in New Jersey, and Pike County in Pennsylvania.

Transmission System Database - The contractor shall develop and maintain the Transmission System Database for the duration of the contract. The database will be used as the main repository for information on the company's inspection findings. Inspection findings from the detailed visual inspection required under this specification shall be loaded

into the database by the contractor. In addition the contractor shall supply the company with three manager stations on company computers that will be used by ORU to record information from other inspections performed by company personnel, record repairs, and generate reports. The contractor shall also furnish three view-only stations to the company.

The contractor shall supply the company with an electronic copy and a hard copy of all data in the Transmission System Database at the end of the contract term. The precise method of transferring this data shall be determined by the contractor and company.

Stray Voltage Testing - The contractor shall perform a stray voltage (SV) measurement on all 7000 transmission structures and associated guy wires and fences in the vicinity of transmission structures on the transmission right-of-way (ROW) in each year of the contract. All SV measurements shall be recorded on an excel spreadsheet.

Ground Resistance Measurement - The contractor shall perform ground resistance measurements (GRM) on all 345KV and 500KV structures on the system in 2008. This involves approximately 385 structures (steel poles and steel lattice). In each subsequent year of the contract, the contractor shall perform GRM on 20% of these structures (approximately 77 structures) according to a schedule developed in collaboration with the company EHV Supervisor or General Line Supervisor (GLS). The contractor shall provide the results of the GRM to the company EHV Supervisor on a weekly basis by submitting hard copies of the GRM form. Prior to the end of each year the contractor shall provide the results of the GRM program for that year to the EHV Supervisor on an Excel spreadsheet.

Wood Pole and Steel Grillage Ground Line Evaluations – In addition to being visually inspected each year, all wood transmission pole structures (approximately 5400) shall be sounded. The Contractor shall inspect,

measure and record wood pole ground line resistance measurements using a digital recording resistograph meter for any poles that fail a sounding test or visual inspection. The contractor shall enter the results of these evaluations in the Transmission System Database in a format agreed to by the company.

Approximately 600 steel lattice structures are supported on steel grillage foundations. 20% of all steel grillage foundations (approximately 120 structures) shall be evaluated in each year of the contract in accordance with the procedure described in the Detailed Requirements section of this specification. The contractor shall develop a schedule for this work in collaboration with the EHV Supervisor or GLS. The contractor shall enter the results of these evaluations in the Transmission System Database.

1.1 REFERENCE DOCUMENTS

- ORU Ground Patrol Procedure. EHV-001
- Consolidated Edison Instruction for Measuring Ground Resistance of Overhead Transmission Structures, CE-TI-6251
- Ground Resistance Measurement Test Form
- Orange & Rockland Utilities Stray Voltage Investigation Procedure, Procedure 2203
- Tables Describing the ORU Transmission System in New York and New Jersey, entitled, Transmission Lines New York Area and Transmission Line New Jersey Area.
- ORU System Map entitled, 2004 Generating Stations, Substations, and Transmission Lines. (All Lines not identified – for reference only)
- ORU Transmission Lines Key Maps Sheets 1A, 1, 2, and 3 of 3. (All Lines not identified – for reference only)

- Orange & Rockland Spill Reporting Requirements

- Plan and Profile Drawings and tower and pole configurations for all of the Company's overhead transmission lines. These drawings will be provided to the successful bidder after the contract is awarded.

2.0 GENERAL REQUIREMENTS

- This is a lump sum contract. The contractor's price per year shall include all labor, supervision, tools, instruments, equipment, software, computers, and support staff to perform all work described in this specification. The contractor and the company will establish a system of monthly partial payments based upon the amount of actual work performed and verified by the company. The contractor shall furnish unit adjustment prices that will be used for credits or extras when actual work performed as part of the annual lump sum price differs significantly from the estimated work included in the lump sum. This is further described in the Pricing section of this specification.

- The contractor, in collaboration with the company EHV Supervisor or GLS, shall develop a schedule for all work required under this contract prior to starting work each year. No work shall commence until the schedule is developed and approved by the EHV Superintendent or his designee. The schedule shall meet the requirements of all sections of this specification and EHV-001. It shall contain significant milestones for all components of the work as described in section 1.0. The contractor shall provide monthly status reports to the EHV Supervisor or GLS which compare actual work progress against the schedule. The contractor shall update the schedule when any significant adjustments are made. The company shall have the ability to reassign the contractor's inspection personnel to any line in the system with twenty-four hour notice at no additional cost to the company.

- The contractor shall monitor the progress of the work and ensure that the schedule is adhered to. Any issues that result in significant deviations from the schedule shall be brought to the attention of the EHV Supervisor or GLS.

- The contractor shall develop and submit an Environmental Health and Safety Plan (EHASP) to the company after the contract is awarded. No work shall commence until the plan is approved by the company in writing. EHASP requirements are included in greater detail in other bid documents.

- All bidders are required to attend a pre bid meeting.

- The contractor shall assign qualified and experienced personnel to perform the work under this contract. Personnel performing the inspections required under this contract shall meet or surpass the qualifications required in EHV-001. All inspection personnel shall be thoroughly familiar with EHV-001. In addition they shall be equipped with the equipment and tools listed in EHV-001 at a minimum.

- Inspection personnel, support staff, supervision supplied by the contractor shall be trained in the use of the field computers that will be used on this project and shall be thoroughly familiar with the Transmission System Database that will be developed by the contractor as part of this project, and how their individual assignments are coordinated with the database. In addition:

    - Contractor personnel performing wood pole evaluations involving soundings and resistance measurements shall be familiar with the digital resistograph and be capable of interpreting resistograph charts.

    - In addition to personnel with the expertise to develop the Transmission System Database the contractor shall employ

personnel with expertise to support and maintain the system and assist company personnel with modifications, problems, customized reports, etc. for the duration of the contract.

- Contractor personnel requiring access to the ROW or regular access to the Blooming Grove service center shall obtain identification badges from the company. This will be coordinated by the EHV Supervisor or GLS. Personnel will be required to supply personal information and be photographed at the ORU operations center in Spring Valley NY.

2.1 DETAILED REQUIREMENTS

2.1.1 Inspection

The contractor shall perform a detailed visual inspection of each span of each transmission line on each transmission ROW. Plan and Profile drawings provided by ORU to the contractor and the referenced documents provided with the bid package shall be used as guide by inspection personnel to ensure that the inspection of all transmission lines and transmission ROWs is performed. The inspection shall be performed in accordance with Procedure EHV-001.

The contractor shall perform the inspection using high power binoculars, digital zoom cameras, laser range finders, and other tools and equipment to the greatest extent possible to identify any defects or conditions to any element or component of any transmission line or transmission ROW on a span by span basis. Any defects or abnormal conditions that are discovered shall be recorded on field computers which are coordinated with the format of the Transmission Inspection Database that will be developed by the contractor under this specification. In spans where no defects or abnormal conditions are discovered an entry of "no conditions

found" shall be made. The contractor shall classify all conditions in the field in accordance with the priorities defined in EHV-001. Data shall be transferred from the field computers to the Transmission System Database at a frequency not to exceed once per week.

In addition to recording vegetation conditions on the field computers, all vegetation conditions shall be recorded on the Vegetation Inspection Form provided in EHV-001. The contractor shall immediately notify the EHV Supervisor, GLS, or Superintendent of any priority 3 conditions, whether vegetation-related or otherwise, which are identified during the inspection.

The inspection of all 345KV and 500KV transmission lines shall be started no earlier than March 15th of each year and shall be completed by June 1st of each year. The inspection of all other lines shall be completed by September 30th of each year.

Digital images of all defects shall be taken by the contractor's inspection personnel and shall be uploaded into the Transmission System Database. All images shall be related to the specific record identifying the defect in the database.

In the first year of the contract a digital image of each structure shall be taken from a point on the ROW that provides the best overall transverse view of the structure, ROW section, and the configuration of the conductors and appurtenances on the structure. All images shall be related to the corresponding structure number in the database.

All digital images shall be stored with a date stamp.

The Contractor will be provided with company locks, danger signs, and identification signs. During the inspection, the Contractor shall add or replace these items as needed. When new conditions are

found and repaired by the contractor the contractor shall record the condition and the condition repair in the field computer. When existing conditions are repaired the contractor shall enter the repair into the field computer. In either case the contractor shall ensure that the Transmission Inspection Database is populated with the most accurate data.

The contractor shall install new number tags on up to 1000 structures per year in accordance with a schedule that the contractor shall develop in collaboration with the EHV Supervisor or GLS. Tags shall only be installed on structures that are not currently tagged. Poles and towers shall be tagged in accordance with the two 5 digit coordinate system used by ORU. Tag trays shall be nailed into wood structures. Hilti fasteners shall be used to attach tag trays to steel structures. Feeder number tags shall be installed on all 69KV, 138KV, and 345KV structures, where they do not currently exist.

Additional emergency patrols, shall be performed as required by the company. It is anticipated that such patrols will not be required frequently. When they are performed they will be limited to specific lines and specific types of problems (i.e. feeder trips). The contractor will be compensated @ T&E rates if ordered to perform this work. Typically all routine inspections in progress will be suspended until emergency inspections are completed.

The contractor shall accommodate a TVI detection instrument, known as Exacter in at least one inspection vehicle. The Exacter will be provided by the company. Once it is powered on and set into the operating mode the Exacter performs a TVI survey, records all pertinent information, and periodically transfers the information to a central computer automatically. The contractor's only responsibility concerning Exacter under this contract is to turn it on

at the beginning of an inspection shift, keep it in the inspection vehicle in a safe and secure manner, and turn it off at the end of the shift. This exacter is encased in a hard plastic case the size of a small suitcase and is lightweight.

2.1.2 Transmission System Database (TSB)

The format and capability of the TSB are critical to the company because the data will be used to develop maintenance plans for the entire transmission system and demonstrate compliance with important regulatory requirements. Bidders are expected to have had significant experience in the type of work required under this specification, and to have worked with or developed such databases for overhead transmission inspections in the past.

The Superintendent of EHV, assisted by company IR personnel as required, shall approve the contractor's proposed TSB prior to the award of this contract. If the TSB is not approved the bid will not be accepted. It is understood that at the time of bidding the contractor may not possess a TSB that fully meets the company's requirements, however all bidders are expected to have access to a TSB that closely meets them. Approval will therefore be based on the system's capability to record, store, manage, and report data, and the contractor's ability to modify the system to fully meet the company's needs.

Procedure EHV-001 shall be used as a guideline to identify transmission components and elements, conditions, etc., but it does not provide a complete listing. The TSB shall be significantly more comprehensive than the Procedure. In addition to meeting the guidelines established in EHV-001 the TSB shall meet the following minimum criteria.

- Identify Operating Voltage of all lines

- Identify the type of inspection (i.e. Ground Patrol, Helicopter Patrol, or Climbing Inspection)
- Identify all locations on a span by span basis using structure numbers and line designations (i.e. Pole 50 - 51, Line 111).
- Record that inspections were performed even when no conditions are identified by establishing a "No Conditions Found" designation.
- Record the date of the inspection and the inspector's name.
- Record the date of a repair of a condition and the employee's name.
- Identify all components and elements of the overhead transmission system including the ROW and vegetation (i.e. Conductor).
- Identify all possible conditions or defects that can occur on each component or element (i.e. Conductor, Strand Damage).
- Classify all conditions or defects according to the priorities identified in ORU Procedure EHV-001 and further described in Appendix B of that document (i.e. Vegetation Closer than Minimum Clearance – Priority 3).
- Include descriptive remarks for inspection or repair personnel.
- Capability to attach structure images to individual structures and images of conditions found to individual conditions reported.

The TSD shall provide the capability for development of custom reports by ORU supervisory personnel with the skill level to use programs such as Microsoft Access and Excel. In addition the TSD shall provide the following pre-programmed reports. All of the

reports listed shall be available for any date range and shall feature subtotals arranged to provide the most relevant information. All reports except summary reports shall contain information from most of the data fields in the TSD. The contractor shall review all report formats with and obtain approval of the EHV Superintendent prior to finalizing the report formats.

- All Outstanding Conditions Sorted By Line Sorted by Condition
- All Outstanding Conditions Sorted By Condition Sorted By Line
- All Outstanding Conditions Sorted By Priority Sorted By Line
- All Outstanding Conditions Sorted By Priority Sorted By Condition
- All Outstanding Vegetation Conditions Sorted By Priority Sorted By Line
- All Outstanding Vegetation Conditions Sorted By Priority Sorted By Line for 345KV and 500KV Lines Only
- All Outstanding Vegetation Conditions Sorted By Line Sorted By Priority
- All Outstanding Vegetation Conditions Sorted By Line Sorted By Priority for 345KV and 500KV Lines Only
- Summary of Outstanding Conditions Sorted By Line Sorted by Condition
- Summary of Outstanding Conditions Sorted By Condition Sorted By Line
- Summary of Outstanding Conditions for Entire System
- All Repaired Conditions Sorted By Line Sorted by Condition

- All Repaired Conditions Sorted By Condition Sorted By Line
- All Repaired Conditions Sorted By Priority Sorted By Line
- All Repaired Conditions Sorted By Priority Sorted By Condition
- All Repaired Vegetation Conditions Sorted By Priority Sorted By Line
- All Repaired Vegetation Conditions Sorted By Priority Sorted By Line for 345KV and 500KV Lines Only
- All Repaired Vegetation Conditions Sorted By Line Sorted By Priority
- All Repaired Vegetation Conditions Sorted By Feeder Sorted By Priority for 345KV and 500KV Lines Only
- Summary of Repaired Conditions Sorted By Line Sorted by Condition
- Summary of Repaired Conditions Sorted By Condition Sorted By Line
- Summary of Repaired Conditions for Entire System
- Stray Voltage Measurements Sorted by Line Sorted by SV Measurement
- Stray Voltage Measurements Sorted by SV Measurement Sorted by Line
- Stray Voltage Measurements sorted by Line for 345KV and 500KV Lines only

As previously stated herein, the contractor shall utilize field computers which interface with the main database to record

information from the visual inspections required under this specification. The TSD shall be capable of data transfer in both directions. In addition the TSD shall be readily accessible for data entry by ORU personnel performing inspections not covered under this specification or performing data entry to indicate that repairs to conditions in the database have been made. These transactions will be made from laptop or desktop computers by office personnel or from field computers.

The contractor shall clearly define where data will reside and how the TSD will be secured and updated. The following flow chart and information provides additional guidelines.

Orange & Rockland Utilities

Pole Maintenance Software Solution - RFP Requirements

September 19th, 2007

At a high-level, the specification for an application to manage Transmission Line Patrols and Pole Inspection & Treatment work should include the following requirements:

- Data Flow / Process requirements
- Mobile Application requirements
- Back-office Application requirements

Data Flow / Process Requirements

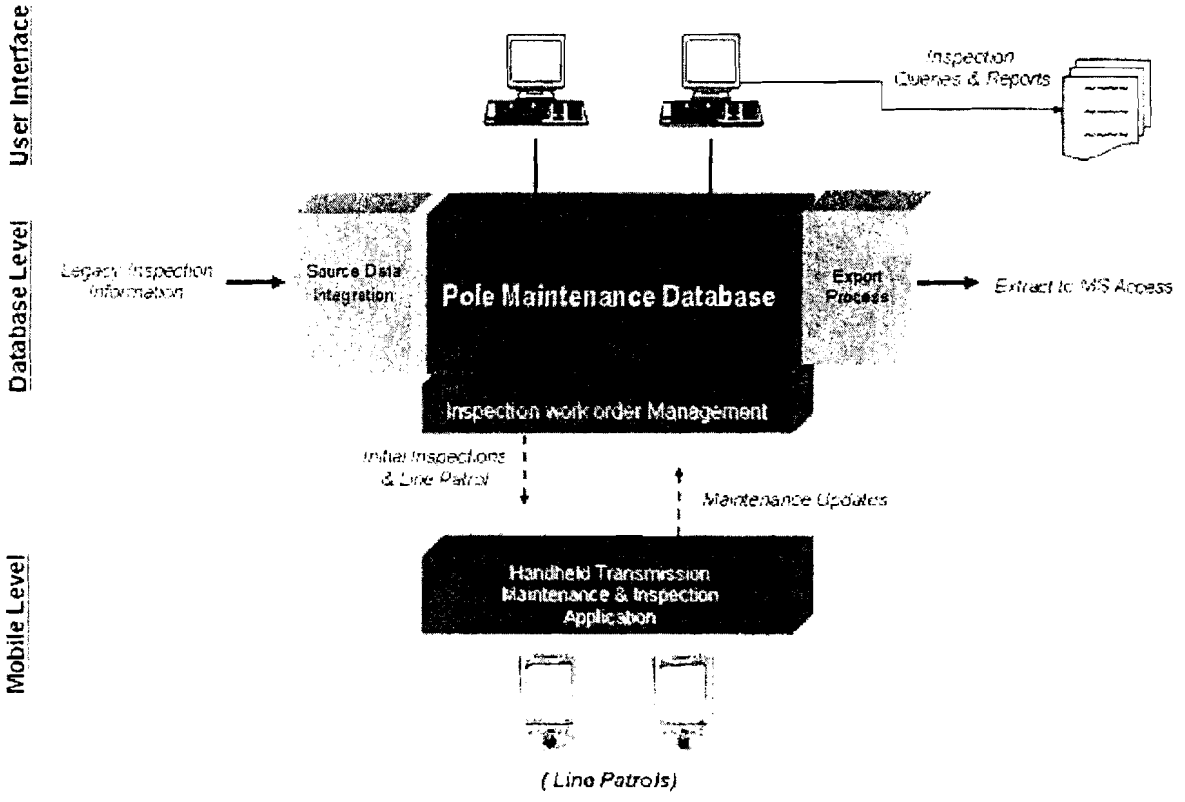

Figure 1: Pole Maintenance Back-office to Field Dataflow

The pole management application should consist of a data flow which promotes the seamless and accurate transfer of data between mobile and back-office systems, as well as allow multiple users to query and run reports on the backend database. The process data flow should also support the following capabilities:

- Built-in Mobile work management dashboard which tracks the status of work issued to the field
- Import/Export engine which manages the data flow from the mobile field collection unit to the backend database so updates made in the field can be applied directly to the master database
- Historical accumulation of inspection information
- Historical accumulation of issues identified during Line Patrols along with associated dates (Date Found/Resolved) and status information (Open, Complete etc.)
- Solution must support ability to take previously collected information (i.e. defects, decay, conditions, etc.) to the field in order for foreman to be able to update existing conditions and add new conditions

Mobile Field Application Requirements

The mobile field application should be built for ease of use and accuracy of collection in the field. Integrated validations displayed to the user during the data collection process and a menu driven data entry system must be used to facilitate data entry and minimize the opportunity for data entry errors. The mobile application should also have the following features:

- Data maintenance capabilities that let field crews gather new data and update existing information using handheld computers.
- Display land base information with road names and centerlines

- Spatially display poles relative to the land base
- Validations displayed when required attributes are left blank
- Visual cues that indicate if a network location has been visited
- The field application should have the ability to collect the detailed information described in this specification and Procedure EHV-001 such as:
  - Attributes such as Structure number, structure type, insulator type, line number
  - Inspection information such as Inspection Type, Original Ground line Circumference, Effective Ground line Circumference
  - Maintenance issues such as Vegetation Problem, Leaning Pole, Brace Broken, Guy Slack or Broken, Conductor Damage, Broken Insulators
  - Stray voltage testing information such as Voltage Found, Voltage, Voltage Problem, Action

Back-office Software Requirements

The back-office Pole Maintenance database application must have the ability to display pole location information in a map-based view to support ad-hoc map printouts. It should also support the display of poles in a spreadsheet-style view to allow users to easily re-organize, sort and query the data using common spreadsheet tools. In addition, the application should also support the following capabilities:

- Ability to search, filter and report on information based on structure number
- Ability to quickly isolate individual structures and view detailed information on condition, maintenance performed, attributes, and other information that has been collected in the field

- Manage historical information of activity performed at the pole allowing users to isolate trends and patterns
- In the map view, display land base information with road names and centerlines as a reference to pole locations. Spatially display poles relative to the land base.
- Automated reports whose results can be written to PDF format or exported to Excel/Access
- Generate maps and work order packets for structures to be inspected/repaired/replaced in the field
- Ability to print maps
- Ability to capture and manage data including (but not limited to):
  - Asset conditions
  - GPS coordinates
  - Map X/Y coordinates of poles that are placed relative to the land base
  - Identification numbers
  - Facility type
  - Steel Rating, Facility Rating
  - Manufacturer, length
  - Inspection information with time and date stamps
  - Detailed decay and damage information
  - Digital images
  - Historical activity at each structure

- Run preconfigured queries including:
  - Components needing maintenance
  - Maintenance already performed
  - Weekly detailed reports
  - Weekly and year-to-date summaries
- Line Patrol Data view which displays the results of Orange and Rockland Line Patrols. This view should display:
  - Pole Information
  - Inspection Information
  - Decay Information
  - Maintenance Information
  - Reported Items
- The ability for desktop users to review the updated information collected in the field before posting updates to the back-office database.

2.1.3 Stray Voltage Testing

The Contractor shall perform SV testing on all transmission structures, guy wires, down leads, and fences in the vicinity of transmission structures on the entire transmission ROW each year, including fences of substations which either supply or are supplied by overhead transmission lines. This work shall be performed in accordance with Orange & Rockland Utilities Stray Voltage Investigation Procedure (Procedure 2203).

All SV measurements shall be recorded in the TSD in a manner that records the line designation, structure number, structure type (wood pole, fence, etc.), SV measurement without resistor, SV measurement with resistor, SV measurement after mitigation, and date of measurement at a minimum. All fences and guy wires shall be related to the relevant structure number in the database. The format for this database shall be developed by the contractor in collaboration with the EHV Supervisor or GLS.

All SV testing shall be completed and the results shall be recorded in the TSD by September 30th of each year.

2.1.4 Ground Resistance Measurement

Ground resistance measurements shall be performed on 345KV and 500KV structures in accordance with the Consolidated Edison Instruction for Measuring Ground Resistance of Overhead Transmission Structures, specification CE-TI-6251. The method using the Unilap Geo X earth Tester manufactured by LEM instruments shall be used. This meter is no longer available from LEM. The Fluke 1625 Geo Earth Tester shall be used in place of

the LEM tester if the contractor does not possess a LEM meter.

As previously mentioned the contractor shall record the results of all GRM on the GRM form provided by the company. In addition the contractor, in collaboration with the EHV Supervisor or GLS shall develop an Excel spreadsheet which shall be used as an electronic database for the GRM. The spreadsheet shall include the following fields at a minimum: Date of Measurement and GRM (Ohms). The same spreadsheet shall be used from year to year to create a historical database of GRM. After the first round of testing is performed ORU will add some fields to the spreadsheet in order to manage internal specification compliance.

A GRM at each structure shall consist of up to three separate measurements as described in CE-TI-6251. If the first measurement yields a resistance of 10 ohms or less additional measurements are not necessary. If the first measurement yields a reading above 10 ohms, the leads shall be moved and the structure shall be re-measured up to two additional times until a measurement of 10 ohms or less is obtained. If a measurement of 10 ohms or less is not obtained by the third reading, no additional measurements shall be performed at that structure. GRM forms shall be submitted for each measurement taken at each structure. All measurements shall be recorded on the spreadsheet.

GRM like all other work performed under this specification, shall be included in the contractor's lump sum price per year. It is possible however that a significantly reduced or increased number of readings relative to the estimated number of GRM in Section 1.0 may required. An adjustment price per GRM is therefore included in the pricing section of this specification. This price shall be used for credits or extras each year if the number of GRM varies by more than 10% of the estimated GRM for that year.

2.1.5 Wood Pole and Steel Grillage Evaluation

All work regarding the sounding and ground line resistance measurements of wood transmission poles shall be performed in accordance with accepted industry standards. While the vast majority of wood structures consist of one vertical pole, a small percentage consists of two vertical poles. In cases where two poles exist, the contractor shall evaluate both poles and record and classify any conditions found, including "no conditions found" for both poles under the same structure number in the Transmission System Database in a format agreed to by the company.

The contractor shall supply digital resistograph equipment, and the equipment to upload electronic charts from the resistograph and provide detailed results in CD format, in addition to classifying and recording pole conditions in the Transmission System Database.

The Contractor shall inspect 20% of steel lattice tower grillage footings at grade to 18" below grade. The contractor shall excavate around each tower leg to the specified depth and inspect each leg for corrosion or deterioration. A digital image of each leg of each structure shall be taken and stored in the Transmission System Database and related to the structure and condition that is logged into the database, even for "no conditions found" situations. The contractor shall classify any conditions found in accordance with the priorities listed in EHV-001. The contractor shall backfill around all footings before moving to the next structure, unless a priority 3 condition is discovered, in which case the EHV Supervisor, GLS, or Superintendent shall be immediately notified.

Steel grillage legs with wax plugs poured around them in the excavated zone, showing no signs of corrosion or deterioration shall be classified as Priority 1, and a note indicating "wax plug"

shall be placed in the remarks field of the Transmission System Database.

3.0 PRICING

Lump Sum Price

All work covered under this specification including development and maintenance of the TSD shall be included in the annual lump sum prices for 2008 through 2012.

Lump Sum – 2008 $ _____

Lump Sum – 2009 $ _____

Lump Sum – 2010 $ _____

Lump Sum – 2011 $ _____

Lump Sum – 2012 $ _____

Adjustment Unit Prices

The contractor shall furnish unit adjustment prices that will be used for credits or extras when the amount of actual work performed as part of the annual lump sum price differs by more than 10%, plus or minus from the amount of estimated work included in the lump sum, which is identified in Section 1.0. No adjustments other than those defined below shall be allowed.

Ground Resistance Measurement $ _____ /GRM

Ground Line Evaluation of Wood Pole $ _____ /Pole

Evaluation of Steel Grillage Foundation $ _____ /Tower

T&E Rates

The contractor shall supply hourly T&E Rates for the following personnel and equipment for each year of the contract. T&E rates will be used to compensate the contractor for out of scope work, such as emergency patrols. Rates for field inspector and technician shall include resistograph, digital camera, Fluke earth ground resistance tester model 1625, GPS receiver, office computer with CD/DVD burner, office productivity software (word processor, spreadsheet, database), CAD software, high speed (> 1.0 MBit) internet connection, cellular telephone, tools including chainsaw and standard hand tools, all necessary office supplies including CD's, binders, paper, etc. All rates include applicable fuel, insurance, workers comprehensive insurance and overhead.

Item	2008	2009	2010	2011	2012
Field Inspector	$ _____	$ _____	$ _____	$ _____	$ _____
Office Technician	$ _____	$ _____	$ _____	$ _____	$ _____
4WD Pick Up Truck	$ _____	$ _____	$ _____	$ _____	$ _____
ATV w/Trailer	$ _____	$ _____	$ _____	$ _____	$ _____