

**State of New York
Public Service Commission**

Case 04-M-0159

**Niagara Mohawk Power Corporation
d/b/a National Grid**

Stray Voltage Testing and Facility Inspection

2021 Annual Report

Report on the results of stray voltage testing and facility inspections
for the 12-month period ended December 31, 2021

February 15, 2022

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I. Background

The New York State Public Service Commission’s (“Commission”) Electric Safety Standards adopted on January 5, 2005 in Case 04-M-0159, with subsequent revisions issued July 21, 2005, December 15, 2008, March 22, 2013, and January 13, 2015 (collectively referred to herein as the “Safety Standards” or “Order”), require annual stray voltage testing of certain electric facilities accessible to the public and inspections of utility electric facilities at least every five years.

In the March 22, 2013 Order, the Commission revised the annual testing requirement for stray voltage. Under the revision, overhead distribution facilities, underground residential distribution (“URD”) facilities, overhead and underground transmission structures, and substation fences will be tested for stray voltage at least once every five years. Streetlights and underground distribution facilities will continue to be tested annually.

This report describes the stray voltage detection program and facility inspection program conducted by Niagara Mohawk Power Corporation d/b/a National Grid (“Niagara Mohawk” or “Company”) for the 12-month period ended December 31, 2021.

II. Company Overview

Niagara Mohawk provides service to approximately 1,600,000 customers over its electric transmission and distribution system in a service area of approximately 25,000 square miles in New York State. For the stray voltage detection and facility inspection programs, Niagara Mohawk divides its system into subprograms to schedule and track testing and inspections. The subprograms include the Company’s (a) distribution overhead system, (b) distribution and transmission underground system, (c) streetlight system, (d) transmission overhead system, and (e) substations.

a. Distribution Overhead System

Niagara Mohawk’s distribution overhead system consists of structures supporting circuits energized at voltages up to 15kV spanning close to 32,000 circuit miles. Distribution system stray voltage testing and facility inspections are currently performed by the Company’s internal workforce and contractors.

b. Distribution and Transmission Underground System

Niagara Mohawk’s distribution and transmission underground system is made up of facilities such as manholes, hand-holes, vaults, and switchgear. Fiberglass hand holes are not subject to stray voltage testing under the Safety Standards.¹ Stray voltage testing of the Company’s underground system is currently performed by contractors. Facility inspections of the underground system are currently performed by contractors.

¹ See July 21, 2005 Order, at 23; March 22, 2013 Order, at Appendix A, 3(c).

c. Streetlight System

Niagara Mohawk's streetlight system contains underground fed metallic streetlight standards and municipal-owned streetlights and traffic control devices. Overhead fed streetlights on wooden poles are not included in the streetlight program for stray voltage testing. For the underground fed metallic streetlight standards, contractors perform the stray voltage testing at night when the lights are operational. Stray voltage testing on traffic control devices takes place in conjunction with the contractors' testing of the overhead and underground systems during the daytime hours. The streetlight facility inspections on Company-owned facilities take place during the day and are performed by an external workforce.

d. Transmission Overhead System

Niagara Mohawk's transmission overhead system, which includes the sub-transmission system, consists of structures that support circuits energized at voltages of 12 kV, 23kV, 34.5kV, 46kV, 69kV, 115kV, 230kV, and 345kV. The transmission system spans the entire state and is approximately 8,465 circuit miles in length. Stray voltage testing on the transmission system is performed by Niagara Mohawk and contractors.

e. Substations

Stray voltage results for substation fences were collected internally by the operating group. The dataset identified both Company-owned and customer-owned substation locations to be tested.

III. Stray Voltage Testing Program

During the calendar year ended December 31, 2021, the Company conducted stray voltage testing of 100% of Company and non-Company owned metallic streetlights and traffic signals and 100% of publicly accessible Company-owned underground distribution facilities that are capable of conducting electricity. In addition, the Company conducted stray voltage testing of its publicly accessible overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences that are capable of conducting electricity.

In addition, and in compliance with the Safety Standards, Niagara Mohawk:

- a. Immediately safeguarded and/or mitigated all voltage findings ≥ 1.0 volt. In instances where the stray voltage finding was determined to be caused by customer-owned equipment, the area was immediately made safe and the customer or responsible person associated with the premises was notified of the unsafe condition and the need for the customer to arrange for a permanent repair. Voltage findings determined to be caused by a Company-owned facility were immediately safeguarded and/or mitigated. All permanent repairs were made within 45 days.

- b. Tested all publicly accessible structures and sidewalks within a 30-foot radius of the electric facility or streetlight where there was a stray voltage finding ≥ 1.0 volt.
- c. Responded, investigated, and mitigated positive findings of shock incidents reported by the public.

Niagara Mohawk visited 410,081 facilities for stray voltage testing in calendar year 2021. Testing was not required on 136,792 facilities because: the facilities are wood utility poles that have no attached appurtenances capable of conducting electricity; or the facilities' electrically conductive appurtenances are not accessible to the public (pre-wired wood); the facilities are enclosed in fiberglass (non-conductive materials); the facilities are de-energized; and/or the facilities are inaccessible to the public.

Inaccessible facilities include:

- a. Locked Gate/Fence – Poles behind locked gates and fences that are not accessible to the public, (e.g., facilities located in fenced areas owned by other utilities such as water companies).
- b. Dangerous Grades – Poles located on cliffs and other dangerous grades are generally inaccessible to Company personnel and the general public and are approached only under urgent circumstances. The performance of stray voltage testing on these facilities would constitute an unacceptable risk to the employee/contractor.
- c. Company Property – Poles located on Company property such as substations are accessible only to Company personnel and authorized contractors.
- d. Vaults – Structures located inside buildings. These structures are accessible only to Company and building maintenance personnel.
- e. Limited Access Highway Facilities – Structures located on highways and highway exit and entrance ramps. The performance of stray voltage testing on these structures would constitute an unacceptable risk to the employee/contractor.

As required by the Safety Standards, Niagara Mohawk performed 2,791 miles of mobile testing system scans between January 1, 2021 and December 31, 2021. A summary of the results of the mobile testing scans is contained in Appendix 8, which is a copy of the Company's mobile scan report filed with the Commission on November 29, 2021.

IV. Facility Inspection Program

The Safety Standards require Niagara Mohawk to visually inspect approximately 20% of its facilities annually, resulting in a five-year inspection goal for all facilities to be inspected.

Niagara Mohawk visually inspects its overhead distribution and transmission systems on a five-year cycle from the ground, as prescribed by the Safety Standards.

In addition, Niagara Mohawk performs the following inspections, some of which are recurring on specific cycles, some of which are scheduled on an as-needed basis:

- Aerial Infrared – Helicopter-based thermographic imaging of connections and equipment.
- Aerial Patrols – Helicopter based visual examination of transmission facilities and equipment.
- Comprehensive Helicopter Patrol – A comprehensive methodical examination of all components comprising the transmission system by helicopter.
- Tower Footing – Embedded support structure that supports a transmission tower.
- Wood Pole – Inspection of the wood pole at and below the ground line.

Niagara Mohawk's ground-based visual inspection program is segmented into five categories: distribution facility inspection; underground facility inspections; streetlight inspections; transmission facility inspections; and substation inspections.² Each program is summarized by its associated procedure document. The inspections include visual inspections of the assets to determine if deficiencies exist. Deficiencies are captured by codes entered into handheld computers. Data is then downloaded for review and follow up work.

In accordance with the Safety Standards, Niagara Mohawk uses the following severity levels to establish priority for repairs and scheduling:

- a. Level I – Repair as soon as possible but not longer than one week. A Level I classification represents an actual or imminent safety hazard to the public or a serious and immediate threat to the delivery of power. Critical safety hazards present at the time of the inspection shall be guarded until the hazard is mitigated.
- b. Level II – Repair within one year. A Level II classification represents conditions that are likely to fail prior to the next inspection cycle and represent a threat to safety and/or reliability should a failure occur prior to repair.

² Substation inspections are more complex than those performed on other facilities and differ in variety of ways including, but not limited to: inspection schedules, system that captures inspection data, and work prioritization (supervisory review determines work to be completed versus Levels I-IV).

- c. Level III – Repair within three years. A Level III classification represents conditions that do not present immediate safety or operational concerns and would likely have a minimal impact on the safe and reliable delivery of power should a failure occur prior to repair.
- d. Level IV – A Level IV classification represents conditions found, but repairs are not needed at this time. Level IV is used to track atypical conditions that do not require repair within a five-year timeframe. This level is used for future monitoring purposes and planning proactive maintenance activities.

In accordance with the Safety Standards, when a temporary repair is located during an inspection or is performed by the Company, best efforts are made to make a permanent repair of the facility within 90 days. Temporary repairs that remain on the system for more than 90 days are due to extraordinary circumstances (*e.g.*, storms and outage constraints), and usually require extensive repair activity. Niagara Mohawk has compiled a list of exceptions of temporary repairs that still remain in place after the 90-day requirement. The list and justifications can be found in Appendix 5 of this report.

Niagara Mohawk provides classroom and field training to personnel inspecting facilities in accordance with the Company’s Electric Operating Procedures (“EOPs”). The classroom training covers topics including: EOPs, distribution maintenance inspection and elevated voltage testing training, Computapole handheld training, Computapole database training, distribution vegetation training, geographic information system training, feeder patrols training, and basic electricity training.

The Company provides new distribution inspectors with training upon hiring, with ongoing yearly refresher courses. Niagara Mohawk updates course materials based on relevant EOPs and Company standards.

V. Company Facilities

Niagara Mohawk has approximately 1,532,109 individual facilities that must be visited for stray voltage testing and approximately 1,595,039 individual facilities that require a facility inspection. These facilities are broken down into the following five main categories:

- a. Distribution Overhead – The Company’s testing criteria for distribution overhead facilities involves testing all Company-owned or jointly-owned wood poles with utility electrical facilities located on both public thoroughfares and customer property, including backyards or alleys. Stray voltage testing is performed on all wooden poles with metallic attachments (*e.g.* ground wires, ground rods, anchor guy wires, or riser pipes), and/or any electrical equipment within reach of the general public. Distribution overhead facilities are included in both the stray voltage and facility inspection programs.

b. Distribution and Transmission Underground Facilities –The Company’s testing criteria for underground facilities involves testing all subsurface structures, including above ground, pad-mounted structures. Included in the underground facilities are padmount switchgear cases, padmount transformer cases, electric utility manhole covers, submersible transformer covers, electric utility handhole covers, network vaults, and grates. These facilities are included in both the stray voltage and facility inspection programs. Inspections of the underground system involve underground and padmount assets.

c. Streetlights and Traffic Signals – Streetlights include Company-owned metal pole streetlights and municipal-owned metal pole streetlights to which the Company provides service. The testing criteria for streetlights and traffic signals involves testing all metal pole streetlights, traffic signals, and pedestrian crosswalk signals located on publicly accessible thoroughfares. Stray voltage testing of streetlights is performed at night while the fixtures are energized. Privately-owned light fixtures are not included in the stray voltage testing program, per the Safety Standards.³ All Company-owned streetlights are included in the facility inspection program.

d. Substation Fences - Niagara Mohawk operates and maintains substation facilities that are necessary for the operation of the electric grid. These substations are fenced in for security, as well as to ensure the safety of the general public. Substation fences are included in the stray voltage testing program.

e. Transmission Overhead Structures – The testing criteria for transmission overhead structures involves testing all structures, guys, and down leads attached to the facilities. Transmission structures support circuit voltages of 12 kV and greater. Transmission poles with distribution underbuild are included in the transmission category. All transmission structures are included in both the stray voltage and facility inspection programs.

VI. Annual Performance Targets

The year ended December 31, 2021 was the second year of the Company’s stray voltage and inspection Cycle 4 program. In compliance with the Safety Standards, Niagara Mohawk met the annual performance target for stray voltage testing of 20% of overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences, as well as 100% of metallic streetlights and underground distribution facilities. In addition, in compliance with the Safety Standards, Niagara Mohawk met the annual performance target for inspection of approximately 20% (*i.e.*, 95% of the annual target of 20%, or 19%) of its electric facilities for the period that ended December 31, 2021.

³ March 22, 2013 Order, at Appendix A, §§ 1(d) and 3(a).

The results are summarized in the tables below.

Stray Voltage Testing Results

Elevated Voltage Testing Annual Summary			
Program	Total Units	Units Completed in 2021	% Completed
Distribution**	1,313,676	274,556	20.900%
Underground	28,226	28,226	100.000%
Streetlights*	84,527	84,527	100.000%
Transmission**	104,812	21,904	20.898%
Substation	868	868	100.000%

*Note: Streetlights include traffic controls but exclude fiberglass standards.

**Note: Pursuant to the March 22, 2013 Order, the Company is required to test 100% of streetlights and underground distribution facilities annually. Overhead distribution facilities, URD facilities, overhead and underground transmission structures, and substation fences are required to be tested at least once every five years.

Facility Inspection Program Results

Category	Total System Units	Units Completed in 2021	Actual Inspected in 2021
Overhead Distribution	1,264,630	259,312	20.505%
Overhead Transmission	105,583	22,292	21.113%
Underground	103,032	20,573	19.968%
Pad-mounted Transformers	73,586	15,502	21.067%
Streetlights	48,208	12,992	26.950%
TOTAL	1,595,039	330,671	20.731%

Inspection Performance Summaries

Overhead Distribution Facilities

Inspection Year	Number of Overhead Distribution Structures Inspected	% of Overall System Inspected (Cumulative)
2020	257,879	20%
2021	259,312	21%

Overhead Transmission Facilities

Inspection Year	Number of Overhead Transmission Facilities Inspected	% of Overall System Inspected (Cumulative)
2020	22,112	21%
2021	22,292	21%

Underground Facilities

Inspection Year	Number of Underground Facilities Inspected	% of Overall System Inspected (Cumulative)
2020	18,729	18%
2021	20,573	20%

Padmount Transformers

Inspection Year	Number of Padmount Transformers Inspected	% of Overall System Inspected (Cumulative)
2020	13,061	18%
2021	15,502	21%

Streetlights

Inspection Year	Number of Streetlights Inspected	% of Overall System Inspected (Cumulative)
2020	12,974	23%
2021	12,992	27%

VII. Certifications

Pursuant to Section 7 of Appendix A of the Safety Standards, the president or officer of each utility with direct responsibility for overseeing stray voltage testing and facility inspections shall provide an annual certification to the Commission that the utility has, to the best of his or her knowledge, exercised due diligence in carrying out a plan, including quality assurance, that is designed to meet the stray voltage testing and inspection requirements, and that the utility has:

- Tested its publicly accessible electric facilities and street lights in accordance with the Safety Standards, and
- Inspected the requisite number of electric facilities.

The certifications are attached as Appendix 16 to this report.

VIII. Analysis of Causes of Findings and Stray Voltage

The Safety Standards require the electric utilities to perform an inventory on all stray voltage findings and report on the number of these findings each year. Section 1(f) of the December 15, 2008 Order defines a finding as “any confirmed voltage reading on an electric facility or streetlight greater than or equal to 1 volt measured using a volt-meter and 500-ohm shunt resistor.” Section 1(c) defines stray voltage as “voltage conditions on electric facilities that should not ordinarily exist. These conditions may be due to one or more factors, including, but not limited to, damaged cables, deteriorated, frayed, or missing insulation, improper maintenance, or improper installation.” Utilities are required to report on all findings whether or not the voltage is normal to the electric system.

Niagara Mohawk identified 36 instances of stray voltage during the Company’s manual stray voltage testing program in 2021. These voltages resulted from a variety of conditions including: deterioration of conductors; age of equipment; exposure to the elements; and various customer related issues. A majority (21) of stray voltage conditions identified were on distribution structures.

The following table contains a breakdown of the causes of stray voltage findings identified through the Company’s 2021 manual testing effort. Niagara Mohawk has repaired and/or mitigated all findings that were determined to be hazardous. Mobile testing findings are addressed in the Mobile Stray Voltage Testing Report attached as Appendix 8.

Structure Type	Cause of Stray Voltage	Stray Voltage Found
Distribution	Down Ground	2
Distribution	Equip Other	1
Distribution	Ground Connection	5
Distribution	Guy	10
Distribution	Insulator	1
Distribution	Neutral	1
Distribution	Service Wire	1
Street Lights - Traffic Signals	Equip Other	1
Street Lights - Traffic Signals	Ground Connection	1
Street Lights - Traffic Signals	Service Wire	1
Street Lights - Traffic Signals	Customer Problem	3
Transmission	Down Ground	2
Transmission	Ground Connection	7
TOTAL		36

In accordance with the Safety Standards, when Niagara Mohawk discovered a finding on an electric facility or streetlight during stray voltage testing, the Company tested all publicly accessible structures and sidewalks within a minimum 30-foot radius of the electric facility or streetlight. Niagara Mohawk did not identify any additional findings associated with the initial test structure as a result of the 30-foot radius testing.

IX. Analysis of Inspection Results

Note: Total Number of Deficiencies may add up to more than the total Locations with Deficiencies due to deficiencies on multiple facilities at a single location.

Overhead Distribution Structures

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
259,312	96,539	37.229%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	512	0.352%
2	3,536	2.431%
3	21,414	14.725%
4	119,967	82.492%
Total:	145,429	100.000%

Overhead Transmission Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
22,292	17,365	77.898%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	15	0.052%
2	61	0.213%
3	2,228	7.766%
4	26,384	91.969%
Total:	28,688	100.000%

Underground Facilities

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
20,573	11,801	57.362%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	90	0.713%
2	859	6.807%
3	336	2.662%
4	11,335	89.818%
Total:	12,620	100.000%

Pad-mount Transformers

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
15,502	3,372	21.752%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	47	0.924%
2	359	7.059%
3	91	1.789%
4	4,589	90.228%
Total:	5,086	100.000%

Streetlights

Table of Locations with Deficiencies

Locations Inspected	Locations w/Deficiencies	%Locations w/Deficiencies
12,992	7,261	55.888%

Breakdown of Locations with Deficiencies

Priority Rate	Number of Deficiencies	% Deficiencies Found
1	0	0.000%
2	238	2.124%
3	0	0.000%
4	10,966	97.876%
Total:	11,204	100.000%

In 2021, Niagara Mohawk identified an overall total of 203,027 deficiencies:

- Priority Rating 1 Total = 664, or 0.327% of the overall total.
- Priority Rating 2 Total = 5,053, or 2.488% of the overall total.
- Priority Rating 3 Total = 24,069, or 11.855% of the overall total.
- Priority Rating 4 Total = 173,241 (inventory), or 85.329% of the overall total.

X. Quality Assurance

Electric Quality Assurance/Quality Control Program

National Grid's Elevated Voltage ("EV") and Visual Inspection & Maintenance ("I&M") Quality Assurance/Quality Control program provides for increased program continuity, monthly audits for monitoring of program performance, and assurance that a Quality Assurance/Quality Control ("QA/QC") program independent of the EV and I&M work groups is maintained.

Separate of the independent Electric QA/QC program, Quality Control ("QC") audits are conducted by National Grid I&M supervisory staff. The purpose of the QC audits is to self-validate recorded findings involving all distribution, transmission, and sub-transmission assets that have been inspected to identify potential maintenance codes and elevated voltage issues. Conversely, the independent Electric QA/QC program encompasses a quantitative random sampling of the entire population of inspection results derived from the field audited EV testing and I&M inspections.

Revisions to QA/QC Program 2021

- NA

I&M Risk Levels Identified

The analysis of the QA/QC I&M Program data is intended to identify the nature and magnitude of Risk Level 1 and Risk Level 2 as applicable to the I&M Program results.

Electric QA/QC I&M Risk Level Definitions
QA/QC program involves performing an additional QA/QC audit of randomly-selected assets having been previously assessed by the field inspector, with the intent of verifying previously identified maintenance codes.
<u>Risk 1</u> <ul style="list-style-type: none">• Reliability/ Safety Concern.• Identified facility/component repaired or replaced within one week of the inspection date.
<u>Risk 2</u> <ul style="list-style-type: none">• Facility/component condition that must be repaired/replaced within 1 year.• QA/QC identification of maintenance codes which may affect reliability.
<u>Risk 3</u> <ul style="list-style-type: none">• Facility/component condition that must be repaired/replaced within 3 years.• QA/QC identification of maintenance codes which may not effect reliability.• The QA/QC auditor determined the original I&M inspector's maintenance code was incorrect.• The independent QA/QC auditor determines a data quality issue.

Asset Inspection & Maintenance Audits

National Grid's Electric QA/QC group audited (7,663) distribution, transmission and sub-transmission assets that had been field inspected for maintenance during 2021. The method used to confirm and/or achieve the required quality of asset audits, involved follow-up field audit by QA/QC personnel through a monthly random sample, with the intent of verifying identified maintenance codes derived from the population of assets inspected by field force operations during calendar year 2021. This process captured incorrect or missed maintenance codes and noted timeliness of repairs when evident. In order to achieve a minimum 95% level of confidence, applicable to the entire population of inspection data and resulting random sample analysis, commonly applied statistical principles were utilized to conduct the audit process.

The QA/QC field audit process is designed to validate the field inspector findings. Results are considered to be passing when there is a match between the field inspection maintenance codes and QA/QC follow-up audit results. Based upon the accrued inspection data provided by the Company's Inspections Department, and the findings identified through follow-up QA/QC process, the overall accuracy of field inspection findings that impact reliability (Risk 1 and Risk 2) was validated at 97%.

2021 Field Inspections – QA/QC Audit Results

The following table illustrates the population and breakdown of assets inspected by field force and compliance percentages related to system reliability concerns (Risk Levels 1 & 2 findings) identified through QA/QC process during calendar year 2021

Asset Category	I & M Field Inspector	QA/QC Field Auditor		QA/QC Risk Levels		Compliance Percent (%)
		Assets Inspected	Assets Audited	M Codes Audited	Risk 1	
Distribution	259,312	6880	8789	5	294	97%
Sub-Transmission	15,428	466	778	0	13	98%
Transmission	6,864	317	491	0	7	99%
		Total Compliance Percent				97%

QA/QC I&M Audit Analysis

National Grid desires a minimum threshold for inspection compliance percentage at 95%. QA/QC analysis of regional findings by misidentified maintenance codes and missed maintenance codes are conducted for the purpose of determining compliance percentage of maintenance code trending for a particular region.

- Misidentified Maintenance Code – When the field Inspector incorrectly identifies a maintenance code for a condition found at a structure.

- Missed Maintenance Code – When the QA/QC Inspector identifies a maintenance code that the field inspector did not account for at a structure.

If the compliance percentage is less than 95% to 90%, the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable. If the validation accuracy is less than 90%, Operations is responsible for further trending analysis and/or corrective action and an implementation plan to improve field force inspections.

QA/QC Miss-Identified Maintenance Code Trends

Region	QA/QC Misidentified M Codes	Maintenance Code Description	Trending Quantity	Total Sample Size Audited YTD	Compliance Percent
48	221-Dist	Guy – Not in compliance with NESC Code	10	1365	99%
54	221-Dist	Guy – Not in compliance with NESC Code	17	1070	98%
57	218-Dist	Guy – Not in compliance with NESC Code	28	1652	98%
60	218-Dist	Guy – Not in compliance with NESC Code	20	1739	99%
	220-Dist	Guy – Guy wire marker needed	14		99%
	221-Dist	Guy – Not in compliance with NESC Code	25		99%
62	218-Dist	Guy – Not in compliance with NESC Code	11	838	99%

QA/QC Missed Maintenance Code Trends

Region	QA/QC added M Codes	Maintenance Code Description	QTY	Total Sample Size Audited YTD	Compliance Percent
48	115-Dist	Pole – Riser guard required	10	1365	99%
	152-Dist	Transformer – Missing ground wire	12		99%
	155-Dist	Transformer – Animal guards required	10		99%
	215-Dist	Guy – Guy Span not in compliance w/Code	17		99%
	221-Dist	Guy – Not in compliance with NESC Code	11		99%
	274-Dist	Spacer Cable – Messenger guard missing	11		99%
50	118-Dist	Pole – Stencil/Correction required	12	1079	99%
	218-Dist	Guy – Not in compliance with NESC Code	13		99%
	264-Dist	GIS – Misc.– Transmission overbuilt	11		99%

54	207-Dist	Switch – LA blown/missing/improper	11	1070	99%
	272-Dist	Spacer Cable – Bracket not bonded	10		99%
56	213-Dist	Ground – Non-standard	10	525	98%
	215-Dist	Guy – Guy Span not in compliance w/Code	15		97%

QA/QC Missed Maintenance Code Trends

Region	QA/QC added M Codes	Maintenance Code Description	QTY	Total Sample Size Audited YTD	Compliance Percent
57	155-Dist	Transformer – Animal guards required	15	1652	99%
	210-Dist	Ground – Wire broke or loose	14		99%
	212-Dist	Ground – Guard required	12		99%
60	118-Dist	Pole – Stencil/correction required	13	1739	99%
	132-Dist	Insulator – I7 Aluminum capped	28		98%
	155-Dist	Transformer – Animal guards required	10		99%
	213-Dist	Ground – Non-standard	28		98%
	292-Dist	Riser – Animal guard missing	12		99%
62	118-Dist	Pole – Stencil/ correction required	12	838	99%
	213-Dist	Ground – Non-standard	34		96%

I&M Results – Repairs

Per the Safety Standards, the QA/QC program is responsible to verify permanent repairs have been made in response to field force operations inspections performed, along with the timeliness of the repair. The 2021 field force inspection process yielded the following asset deficiencies and repair activities for I & M defined Level 1, Level 2, and Level 3 priorities:

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Year	Priority Level / Repair Expected	Deficiencies Found (Total)	Repaired Within Required Time Frame	Repaired Past Required Due Date	Not Repaired and Not Due	Not Repaired – Overdue
2021	I	664	655	9	0	0
	II	5053	1385	0	3668	0
	III	24069	487	0	23582	0
	IV	170499	23953	0	146546	0
	Temp Repairs	75	65	4	6	0

The QA/QC group performed 268 Level 1 only follow-up field audits and validated that the 263 repairs were completed within the required time frame and 5 Level 1 had not been repaired and were overdue at time of audit.

Elevated Voltage (EV) Assets Audited

The National Grid QA/QC 2021 EV Field Audit program targeted an overall minimum confidence level of 95% applicable to field force operations inspection of its Distribution, Underground, Transmission and Sub-Transmission assets. Additionally, a minimum confidence level of 98% should be realized for tested streetlights and traffic controls. The inspection process requires elevated voltage testing be conducted for each utility asset that can conduct electricity and is publicly accessible. In order for each QA/QC EV audit to have successfully “passed,” the following test parameters must be validated:

- The voltage recording shall be below established regulatory thresholds (≤ 1 volt or mitigated).
- All assets having a “testable object” were in fact tested by the field Inspector.

EV Risks Identified

The analysis of the QA/QC EV Program data is intended to identify the nature and magnitude of Risk Level 1 and Risk Level 2 as applicable to the EV Program results.

Electric QA/QC EV Risk Level Definitions
QA/QC program methodology involved performing an additional QA/QC audit of randomly-selected assets having been previously tested by field inspector. In order for the QA/QC test to have “passed,” it must confirm that all assets having a ‘testable object’ were in fact tested.
<p><u>Risk 1</u></p> <ul style="list-style-type: none"> • An elevated voltage reading was identified by the EV field tester and the independent QA/QC auditor found the voltage not mitigated below regulatory/company thresholds after the 45 days. • The QA/QC auditor measured a voltage that exceeds the regulatory/company thresholds greater than or equal to <u>1 volt</u>.
<p><u>Risk 2</u></p> <ul style="list-style-type: none"> • The EV field tester determined there was not a testable object, and the independent QA/QC auditor identifies a testable component existed at the audited asset. • The EV field tester determined there was in fact a testable component and the independent QA/QC auditor revealed no testable component at the audited asset.
<p><u>Risk 3</u></p> <ul style="list-style-type: none"> • The EV field tester and or the independent QA/QC field auditor deem the structure inaccessible or non-testable. • The independent QA/QC field auditor determines a data quality issue. • Reasonable effort to effectively eliminate the stray voltage condition on overhead Sub-Transmission or Transmission structures was attempted but it some cases cannot achieve a reading of 1 volt or less after mitigation due to neutral currents and induced voltages.

2021 QA/QC EV Field Asset Audit Results

The QA/QC group audited **8817** elevated voltage assets for Distribution, Underground, Transmission, Sub-Transmission and Streetlights during eight operating regions.

QA/QC EV Assets Audited

Region	QA/QC Assets Audit Totals
48	1702
50	1060
51	546
54	949
56	711
57	1575
60	1489
62	785
Total	8817

Total QA/QC EV Asset Audits Totals by Category Type

Category Type	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	Totals
Distribution	1051	809	411	710	460	1307	1206	598	6552
Underground	103	33	39	86	68	20	57	25	431
Sub Trans	67	69	38	24	57	106	94	29	484
Transmission	46	19	19	79	24	30	30	32	279
Streetlights	435	130	39	50	102	112	102	101	1071
Totals	1702	1060	546	949	711	1575	1489	785	8817

2021 QA/QC EV Field Asset Audit Results – Risk Level

Risk Level 1 Identified

The National Grid 2021 QA/QC EV audits achieved an overall confidence level of **100%** for Risk Level 1 for distribution, underground, transmission and sub-transmission assets.

Additionally, an overall confidence level of **100%** for Risk 1 Level was achieved for the electric QA/QC EV streetlight/ traffic control audits.

QA/QC Risk 1 Level Identified

<u>Category Type</u>	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	<u>Total</u>
Distribution	0	0	0	0	0	0	0	0	0
Underground	0	0	0	0	0	0	0	0	0
Sub Trans	0	0	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0	0	0
Streetlights	0	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0	0

Risk Level 2 Identified

A total of 225 QA/QC EV audits (approximately 3% of 8817 audits performed) resulted in Risk Level 2 being identified. The National Grid 2021 QA/QC EV audits achieved an overall confidence level **97%** accuracy of identification of testable components.

QA/QC Risk Level 2 Identified

<u>Category Type</u>	Region 48	Region 50	Region 51	Region 54	Region 56	Region 57	Region 60	Region 62	<u>Total</u>
Distribution	29	22	17	13	15	24	14	9	143
Underground	1	1	1	0	0	8	30	20	61
Sub Trans	6	1	0	0	0	4	0	0	11
Transmission	0	0	0	0	0	0	0	0	0
Streetlights	5	0	0	0	0	2	2	1	10
Totals	41	24	18	13	15	38	46	30	225

QA/QC EV Audit Analysis – Risk Level 1 & Risk Level 2

(1) Category Type: Distribution, Underground, Sub - Transmission & Transmission

Region	Dist., UG, Sub-T, Trans			Compliance Percent	Electric QA/QC Additional Analysis Required	Operations Corrective Action Required
	Risk 1	Risk 2	Assets Audited		≥90% and ≤95%	<90%
48	0	36	1267	97%		
50	0	24	930	97%		

51	0	18	507	96%		
54	0	13	899	99%		
56	0	15	609	98%		
57	0	36	1463	98%		
60	0	44	1387	97%		
62	0	29	684	96%		

Note: In regions where QA/QC field audits validated the minimum confidence level to have been met or exceeded, no additional analysis or corrective action is required (N/A).

- If the validation accuracy range is 90% to 95%, (Distribution, Underground, Sub-Transmission & Transmission) the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable.
- If the validation accuracy is less than 90%, (Distribution, Underground, Sub-Transmission & Transmission) Operations is responsible for further trending analysis and/or corrective action and an implementation plan to improve field force inspections.

QA/QC EV Audit Analysis – Risk Level 1 & 2

(2) Category Type: Streetlights & Traffic Controls

Regions	Street Lights & Traffic Controls			Compliance Percent	Electric QA/QC Additional Analysis Required	Operations Corrective Action Required
	Risk 1	Risk 2	Total Sample Size Audited YTD			
					≥95% and ≤98%	<95%
48	0	5	435	99%		
50	0	0	130	100%		
51	0	0	39	100%		
54	0	0	50	100%		
56	0	0	102	100%		
57	0	2	112	98%	X	
60	0	2	102	98%	X	
62	0	1	101	99%		

Note: In regions where QA/QC field audits validated the minimum confidence level to have been met or exceeded, no additional analysis or corrective action is required (N/A).

- If the validation accuracy range is 95% to 98%, (Street Lights & Traffic Controls) the electric QA/QC group will conduct further analysis of accrued data for potential trending. Operations will be responsible for corrective action where applicable.

- If the validation accuracy is less than 95%, (Street Lights & Traffic Controls) Operations is responsible for further trending analysis and/or corrective action and implementation plan to improve field force inspections.

Summary

QA/QC I&M Audit Program

The National Grid Electric QA/QC analysis of the Missed maintenance codes (defects) conducted in 2021 by the National Grid QA/QC team concluded that the following:

Distribution

Maintenance Code 218/221 (Guy – Not in compliance with NESC Code) was missed repeatedly across the NY territory. QA/QC discovered 86 errors applicable to maintenance Code 218/221.

Sub-Transmission

Maintenance Code 528/532 (Pole/Tower – Aerial number missing) was missed several times across the NY territory. QA/QC discovered 10 errors applicable to maintenance Code 528/532.

Transmission

Maintenance Code 528/532 (Pole/Tower – Aerial number missing) was missed several times across the NY territory. QA/QC discovered 7 errors applicable to maintenance Code 528/532.

Action item:

Electric QA/QC and Electric Operations conducted further analysis of the data file and additional investigation into identification of deficiency causal factors. Corrective actions have been assigned to the appropriate regional Inspection groups.

QA/QC EV Program

No Risk Level 1 deficiencies for Distribution, Underground, Sub-Transmission and Transmission were identified through the QA/QC audit process. Based upon the compliance percentage of QA/QC inspection program findings (100% accuracy), further analysis of the accrued QA/QC EV inspection data is not warranted.

Action Item: NA

APPENDIX SUMMARY

Appendix 1: Stray Voltage Testing Summary

Appendix 2: Summary of Energized Objects

Appendix 3: Summary of Shock Reports from the Public

Appendix 4: Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Appendix 5: Temporary Repair Exceptions

Appendix 6: Inspections Summary

Appendix 7: Summary of Overdue Repairs

Appendix 8: Mobile Testing

Appendix 9: NG-USA EOP G016 Equipment Elevated Voltage Testing

Appendix 10: NG-USA EOP D004 Distribution Line Patrol and Maintenance

Appendix 11: NG-USA EOP UG006 Underground Inspection and Maintenance

Appendix 12: NG-USA EOP T007.01 Transmission and Sub Transmission Ground Level Visual Inspection

Appendix 13: NG-USA EOP G017 Street Light Standard Inspection Program

Appendix 14: NG-USA EOP G004 Shock Complaints

Appendix 15: NG-USA EOP G029 Tracking Temporary Repairs to Electric System

Appendix 16: Certifications

Appendix 1

Stray Voltage Testing Summary

Appendix 1

Stray Voltage Testing Summary

Nationalgrid	Total System Units Requiring Testing	Units Completed	Percent Completed	Units with Voltage Found (>= 1.0v)	Percent of Units Tested with Voltage (>= 1.0v)	Units Classified as Inaccessible
Data as of December 31,2021						
Distribution Facilities	1,313,676	274,556	20.90%	21	0.008%	4,751
Underground Facilities	28,226	28,226	100.00%	0	0.000%	1,202
Street Lights / Traffic Signals	84,527	84,527	100.00%	6	0.007%	3,339
Substation Fences	868	868	100.00%	0	0.000%	376
Transmission	104,812	21,904	20.90%	9	0.04%	1
TOTAL	1,532,109	410,081	26.77%	36	0.01%	9,669

Appendix 2

Summary of Energized Objects

Appendix 2

Summary of Energized Objects (Manual Testing)

Summary of Voltages Found							
nationalgrid	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	14	5	2	21	21	0	0
Pole (910)	1	0	0	1	1	0	0
Ground (914)	3	0	1	4	4	0	0
Guy (915)	10	5	1	16	16	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	1	5	0	6	6	0	0
Metal Street Light Pole (971/981)	1	5	0	6	6	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	1	0	1	1	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	9	0	0	9	9	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	9	0	0	9	9	0	0
Guy (934)	0	0	0	0	0	0	0
Other	1	0	0	1	1	0	0
Totals	24	10	2	36	36	0	0

NOTE - National Grid is only mitigating those locations where voltage is confirmed to be 1.0 volts or greater

NOTE - Individual facility counts (pole, ground, guy, etc) may add up to more than the total on a summary line due to voltage on multiple facilities at a single location or pole

NOTE - "Other" category generally includes incorrect facility types reported (example - a pole code turned in for voltage found on an underground device).


NOTE - 'Readings after Mitigation' total reflects only permanent repairs made. Temporary repairs will be made permanent within 45 days.

Appendix 3


Summary of Shock Reports from the Public

Appendix 3


Summary of Shock Reports from the Public


Summary of Shock Reports from the Public		
 2021 1st Quarter January 1, 2021 - March 31, 2021	Quarterly Update	Yearly Total
I. Total shock calls received:	15	15
Unsubstantiated	9	9
Normally Energized Equipment	1	1
Stray Voltage:		
Person	5	5
Animal		
II. Injuries Sustained/Medical Attention Received Due To SV		
Person		
Animal		
III. Voltage Source:	5	5
Utility Responsibility		
Issue with primary, joint, or transformer		
Secondary joint (Crab)		
SL service Line		
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary		
OH Service		
OH Service neutral		
Pole		
Riser		
Other	1	1
Customer Responsibility		
Contractor damage		
Customer equipment/wiring	4	4
Other Utility/Gov't Agency Responsibility		
SL Base Connection		
SL Internal wiring or light fixture		
Overhead equipment		
IV. Voltage Range:	5	5
1.0V to 4.4V		
4.5V to 24.9V		
25V and above		
Unknown	5	5

Summary of Shock Reports from the Public

 2021 2nd Quarter April 1, 2021 - June 30, 2021			Quarterly Update	Yearly Total
I. Total shock calls received:			28	43
	Unsubstantiated		10	19
	Normally Energized Equipment		7	8
	Stray Voltage:			
	Person		10	15
	Animal		1	1
II. Injuries Sustained/Medical Attention Received Due To SV				
	Person			
	Animal			
III. Voltage Source:			11	16
	Utility Responsibility			
	Issue with primary, joint, or transformer			
	Secondary joint (Crab)			
	SL service Line			
	Abandoned SL service line			
	Defective service line			
	Abandoned service line			
	OH Secondary			
	OH Service			
	OH Service neutral			
	Pole			
	Riser			
	Other		1	2
	Customer Responsibility			
	Contractor damage			
	Customer equipment/wiring		10	14
	Other Utility/Gov't Agency Responsibility			
	SL Base Connection			
	SL Internal wiring or light fixture			
	Overhead equipment			
IV. Voltage Range:			11	16
	1.0V to 4.4V		1	1
	4.5V to 24.9V			
	25V and above		1	1
	Unknown		9	14

Summary of Shock Reports from the Public

 2021 3rd Quarter July 1, 2021 - September 30, 2021		Quarterly Update	Yearly Total
I. Total shock calls received:		36	79
	Unsubstantiated	10	29
	Normally Energized Equipment	6	14
	Stray Voltage:		
	Person	20	35
	Animal		1
II. Injuries Sustained/Medical Attention Received Due To		1	1
	Person	1	1
	Animal		
III. Voltage Source:		20	36
	Utility Responsibility		
	Issue with primary, joint, or transformer		
	Secondary joint (Crab)		
	SL service Line		
	Abandoned SL service line		
	Defective service line		
	Abandoned service line		
	OH Secondary		
	OH Service	4	4
	OH Service neutral	3	3
	Pole		
	Riser		
	Other		2
	Customer Responsibility		
	Contractor damage	1	1
	Customer equipment/wiring	12	26
	Other Utility/Gov't Agency Responsibility		
	SL Base Connection		
	SL Internal wiring or light fixture		
	Overhead equipment		
IV. Voltage Range:		20	36
	1.0V to 4.4V	1	2
	4.5V to 24.9V	4	4
	25V and above		1
	Unknown	15	29

Summary of Shock Reports from the Public		
 2021 4th Quarter October 1, 2021 - December 31, 2021	Quarterly Update	Yearly Total
I. Total shock calls received:	13	92
Unsubstantiated	4	33
Normally Energized Equipment	4	18
Stray Voltage:		
Person	5	40
Animal		1
II. Injuries Sustained/Medical Attention Received Due To	0	1
Person		1
Animal		
III. Voltage Source:	5	41
Utility Responsibility		
Issue with primary, joint, or transformer		
Secondary joint (Crab)		
SL service Line		
Abandoned SL service line		
Defective service line		
Abandoned service line		
OH Secondary		
OH Service		4
OH Service neutral		3
Pole		
Riser		
Other		2
Customer Responsibility		
Contractor damage		1
Customer equipment/wiring	3	29
Other Utility/Gov't Agency Responsibility		
SL Base Connection	1	1
SL Internal wiring or light fixture		
Overhead equipment		
Other	1	1
IV. Voltage Range:	5	41
1.0V to 4.4V		2
4.5V to 24.9V		4
25V and above	3	4
Unknown	2	31

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Appendix 4

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Detail of Deficiencies by Facilities	2017				2018				2019				2020				2021				
	Priority Level	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs	I	II	III	Temp Repairs
	Repair Expected	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days	Within 1 week	Within 1 year	Within 3 years	Within 90 days
Overhead Facilities																					
Repaired in Time Frame	978	4700	39168	111	1817	449	35987	66	871	2989	12209	57	798	2963	1837	49	507	1120	482	55	
Repaired - Overdue	46	357	1471	14	71	4	1246	13	23	114	0	11	9	149	0	3	5	0	0	2	
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	18563	0	0	0	25822	0	0	2416	20932	3	
Not Repaired - Overdue	0	100	454	1	0	3	757	0	0	17	0	0	0	85	0	0	0	0	0	0	
Total Overhead Facilities	1024	5157	41093	126	1888	456	37990	79	894	3120	30772	68	807	3197	27659	52	512	3536	21414	60	
Underground Facilities																					
Repaired in Time Frame	139	654	8	1	278	867	115	1	102	472	17	1	117	971	95	1	88	127	2	5	
Repaired - Overdue	0	36	0	1	9	2	0	1	0	27	0	0	2	25	0	2	2	0	0	2	
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	55	0	0	0	160	0	0	732	334	3	
Not Repaired - Overdue	0	0	0	0	0	1	1	0	0	10	0	0	0	44	0	0	0	0	0	0	
Total Underground Facilities	139	690	8	2	287	870	116	2	102	509	72	1	119	1040	255	3	90	859	336	10	
Pad Mount Facilities																					
Repaired in Time Frame	79	443	53	2	67	494	73	3	82	423	34	1	67	423	9	0	47	130	2	0	
Repaired - Overdue	0	48	2	1	5	4	0	0	0	9	0	1	3	24	0	0	0	0	0	0	
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	46	0	0	0	88	0	0	229	89	0	
Not Repaired - Overdue	0	2	0	0	0	26	0	0	0	14	0	0	0	1	0	0	0	0	0	0	
Total Pad Mount Facilities	79	493	55	3	72	524	73	3	82	446	80	2	70	448	97	0	47	359	91	0	
Street Light Facilities																					
Repaired in Time Frame	0	339	2	0	0	197	2	0	0	204	2	0	0	343	1	3	0	3	0	0	
Repaired - Overdue	0	12	0	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	317	0	0	0	2461	0	0	235	0	0	
Not Repaired - Overdue	0	1	0	0	0	24	0	0	0	38	0	1	0	71	0	0	0	0	0	0	
Total Street Light Facilities	0	352	2	0	0	228	2	0	0	242	319	1	0	415	2462	3	0	238	0	0	
Transmission Facilities																					
Repaired in Time Frame	8	129	1879	1	10	96	1384	2	7	44	146	3	9	42	20	2	13	5	1	5	
Repaired - Overdue	1	44	786	3	0	31	411	2	0	12	0	3	0	19	0	1	2	0	0	0	
Not Repaired - Not Due	0	0	0	0	0	0	0	0	0	0	1071	0	0	0	1170	0	0	56	2227	0	
Not Repaired - Overdue	0	74	931	0	0	65	675	0	0	65	0	0	0	51	0	0	0	0	0	0	
Total Transmission Facilities	9	247	3596	4	10	192	2470	4	7	121	1217	6	9	112	1190	3	15	61	2228	5	

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process - Level IV Conditions

Overhead Facilities	2017		2018		2019		2020		2021	
	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired	Number of Conditions Found	Number of Conditions Repaired
Overhead Facilities										
Pole Condition										
Pole Condition	50025	32600	46079	30212	35975	23286	30870	16535	26766	11492
Grounding System	23367	4319	23821	9206	20737	7431	13617	1817	22900	2707
Anchors/Guy Wire	54553	9906	53856	9976	38725	6697	39445	5523	28265	3253
Cross Arm/Bracing	1687	2	851	1	889	3	1013	0	804	0
Riser	4	0	772	0	777	1	953	0	1268	0
Conductors										
Primary Wire/Broken Ties	2	2	1	0	0	0	1	0	0	0
Secondary Wire	0	0	0	0	1	0	0	0	0	0
Neutral	0	0	0	0	0	0	0	0	0	0
Insulators	7311	4	5678	2	5551	0	7614	0	7222	0
Pole Equipment										
Transformers	22807	20	23978	5	21385	8	25212	0	21755	2
Cutouts	1	0	3	0	2	0	0	0	0	0
Lightning Arrestors	5994	2	5821	0	6925	0	6226	4	5677	2
Other Equipment	1085	90	1718	746	1361	632	1992	261	1748	221
Miscellaneous										
Trimming Related	0	0	0	0	0	0	0	0	0	0
Other	3814	75	3891	654	4353	465	4679	631	3562	505
Overhead Facilities Total	170650	47020	166469	50802	136681	38523	131622	24771	119967	18182
Transmission Facilities										
Towers/Poles										
Steel Towers	739	0	519	0	901	0	778	0	659	0
Poles	6749	0	5586	0	2937	0	3709	0	4000	0
Anchors/Guy Wire	1997	1319	1300	970	950	713	585	284	768	517
Crossarm/Brace	60	0	0	0	0	0	1	0	0	0
Grounding System	684	0	47	0	367	0	71	0	105	0
Conductors										
Cable	16	0	7	0	11	0	2	0	6	0
Static/Neutral	0	0	0	0	0	0	0	0	0	0
Insulators	247	0	167	0	119	0	82	0	105	0
Miscellaneous										
Right of Way Condition	205	0	89	0	159	0	452	0	66	0
Other	27205	6070	23382	4120	17328	3539	17732	3057	20675	2786
Transmission Facilities Total	37902	7389	31097	5090	22772	4252	23412	3341	26384	3303

Underground Facilities										
Underground Structures										
Damaged Cover	0	0	1	0	6	3	26	9	10	5
Damaged Structure	32	24	90	9	47	1	804	0	858	0
Congested Structure	0	0	0	0	0	0	0	0	0	0
Damaged Equipment	1	1	2	0	3	0	0	0	1	0
Conductors										
Primary Cable	0	0	0	0	0	0	0	0	0	0
Secondary Cable	0	0	0	0	0	0	0	0	0	0
Neutral Cable	0	0	0	0	0	0	0	0	0	0
Racking Needed	0	0	0	0	0	0	0	0	0	0
Miscellaneous										
Other	8886	2578	14051	3771	9866	2049	9129	1172	10466	1061
Underground Facilities Total	8918	2601	14144	3780	9920	2053	9959	1181	11335	1066
Pad Mount Transformers										
Underground Structures										
Damaged Structure	2042	1022	2298	683	1735	338	1863	160	1503	146
Damaged Equipment	40	40	38	38	22	22	15	15	5	5
Damaged Cable	0	0	0	0	0	0	0	0	0	0
Oil Leak	8	0	3	0	0	0	1	0	0	0
Off Pad	0	0	1	0	0	0	0	0	0	0
Lock/Latch/Penta	0	0	0	0	0	0	0	0	0	0
Miscellaneous										
Other	5545	3576	8027	4920	5210	3211	3931	1764	3081	1251
Pad Mount Transformer Total	7635	4638	10367	5641	6967	3571	5810	1939	4589	1402
Streetlights										
Streetlight										
Base/Standard/Light	13702	4	10554	10	8429	1	8241	0	9572	0
Handhole/Service Box	0	0	0	0	0	0	0	0	0	0
Service/Internal Wiring	451	1	1215	0	81	0	3	0	5	0
Access Cover	1641	184	1489	0	1782	0	1740	0	1351	0
Miscellaneous										
Other	414	1	111	0	218	0	93	0	38	0
Streetlight Total	16208	190	13369	10	10510	1	10077	0	10966	0
Total Level IV Conditions										
Overall Total	225,105	61,648	222,077	65,313	176,340	48,399	170,803	31,232	162,275	23,953

Summary of Deficiencies and Repair Activity Resulting from the Inspection Process

Year	Priority Level / Repair Expected		Deficiencies Found (Total)	Repaired In Time Frame	Repaired - Overdue	Not Repaired - Not Due	Not Repaired - Overdue
2017							
	I	Within 1 week	1251	1204	47	0	0
	II	Within 1 year	6939	6265	497	0	177
	III	Within 3 years	44754	41110	2259	0	1385
	IV	N/A	237642	61840	0	175802	0
	Temp Repairs	Within 90 days	135	115	19	0	1
2018							
	I	Within 1 week	2257	2172	85	0	0
	II	Within 1 year	2270	2103	48	0	119
	III	Within 3 years	40651	37561	1657	0	1433
	IV	N/A	232684	65323	0	167361	0
	Temp Repairs	Within 90 days	88	72	16	0	0
2019							
	I	Within 1 week	1085	1062	23	0	0
	II	Within 1 year	4438	4132	162	0	144
	III	Within 3 years	32460	12408	0	20052	0
	IV	N/A	183652	48400	0	135252	0
	Temp Repairs	Within 90 days	78	62	15	0	1
2020							
	I	Within 1 week	1005	991	14	0	0
	II	Within 1 year	5212	4742	218	0	252
	III	Within 3 years	31663	1962	0	29701	0
	IV	N/A	177227	31232	0	145995	0
	Temp Repairs	Within 90 days	61	55	6	0	0
2021							
	I	Within 1 week	664	655	9	0	0
	II	Within 1 year	5053	1385	0	3668	0
	III	Within 3 years	24069	487	0	23582	0
	IV	N/A	170499	23953	0	146546	0
	Temp Repairs	Within 90 days	75	65	4	6	0

Appendix 5

Temporary Repair Exceptions

Appendix 5

Temporary Repair Exceptions

National Grid has 4 temporary repair exceptions to report.

Distribution

Feeder#	Line#	Pole#	Location	Region	Op District	Date Inspected	Comments	Maint Code	Priority	Comments	Quantity
01252	23	45	County Hwy 49/Paisley Road	62	39	11/09/2021	Pole in swamp and guyed off with two ropes	111	9	See comments	1

Underground

Line#	StrID	Str Type	Location	Region	District	Date Insp	Maint Code	Feeder#	Priority	Comments	Quantity
5012	3-4	HH	Unknown	51	09	11/20/2021	606	5261	9	CRACKED	1
5012	5-2	HH	Unknown	51	09	11/20/2021	606	5261	9	2 CRACKED CORNERS	1
5017	6-1B	HH	Private Dr	51	09	11/18/2021	600	5261	9	CHIPPED CORNER	1

Appendix 6

Inspections Summary

2021 PSC QTR 4 REPORT								
NATIONAL GRID		2020	2021	2022	2023	2024		
	Total	Units	Units	Units	Units	Units	2020-2024	2020-2024
2020 - 2024 Inspection Summary	System Units	Completed	Completed	Completed	Completed	Completed	Units Completed	Percent Completed
Distribution - Unique Inspections	1,264,630	257,879	259,312				517,191	40.90%
Distribution - Total Inspections	0	258,158	260,355				518,513	n/a
Underground Facilities - Unique	103,032	18,729	20,573				39,302	38.15%
Underground Facilities - Total	0	18,967	20,798				39,765	n/a
URD - Unique Inspections	73,586	13,061	15,502				28,563	38.82%
URD - Total Inspections	0	13,079	15,560				28,639	n/a
Street Light / Traffic Sig - Unique	48,208	12,974	12,992				25,966	53.86%
Street Light / Traffic Sig - Total	0	12,980	12,993				25,973	n/a
Transmission - Unique Inspections	105,583	22,112	22,292				44,404	42.06%
Transmission - Total Inspections	0	22,155	22,391				44,546	n/a
Grand Total - Unique Inspections	1,595,039	324,755	330,671				655,426	41.09%

Appendix 7

Summary of Overdue Repairs

Appendix 8

Mobile Testing

**2021 Mobile Stray Voltage Testing Report
November 29, 2021**

A. Background

Niagara Mohawk Power Corporation d/b/a National Grid (“Niagara Mohawk” or “Company”) submits its 2021 Mobile Stray Voltage Testing Report (“Report”) pursuant to the Public Service Commission’s *Order Adopting Changes to Electric Safety Standards* issued December 15, 2008 in Case 04-M-0159 and *Orders Requiring Additional Mobile Stray Voltage Testing* issued July 21, 2010 and June 23, 2011 in Case 10-E-0271 (collectively, the “Orders”). In compliance with the Commission’s Orders, Niagara Mohawk’s 2021 mobile testing consisted of one mobile scan in Albany and Niagara Falls and two mobile scans in Buffalo. Niagara Mohawk utilized Osmose Utilities Services, Inc. (“Osmose”) to conduct the mobile scans. The results of the mobile scans are detailed in the tables below.

B. Mobile Testing Verification Process

Niagara Mohawk verifies a stray voltage finding made by the mobile scan by using its own internal testing verification procedure as outlined in the Company’s Electric Operating Procedure, NG-USA EOP G016. Verification entails using an HD probe to test all metallic objects in the area using a ground reference point as close as practical to the facility being tested up to 25 feet. In the event a suitable ground source cannot be located within the 25-foot range, the Company employs Osmose’s verification procedure, which allows for using a ground reference point of within 100 feet of the structure.

C. Mobile Testing Results by City

1. Albany

Testing began in Albany on October 11, 2021 and was completed on October 15, 2021 with the following results:

- a. Total stray voltage findings = 2*
- b. Stray voltage findings at 4.4v and below = 2 (100%)
- c. Stray voltage findings at 4.5v and above = 0 (0%)
- d. Miles scanned = 204
- e. Niagara Mohawk structures scanned = 4,523

	<i>Events/Hits</i>				
	2017	2018	2019	2020	2021
<i>Albany</i>	121	108	111	10	2

*Of 88 total events, 86 were found on municipal-owned assets, including 84 on streetlights. While the Company is required to test municipal-owned streetlights for elevated voltage, the City of Albany is responsible for maintaining and repairing these assets.

2. Niagara Falls

Testing began in Niagara Falls on May 26, 2021 and was completed on May 27, 2021 with the following results:

- a. Total stray voltage findings = 4
- b. Stray voltage findings at 4.4v and below = 2 (50%)
- c. Stray voltage findings at 4.5v and above = 2 (50%)
- d. Miles scanned = 35
- e. Niagara Mohawk structures scanned = 1,267

<i>Events/Hits</i>					
	2017	2018	2019	2020	2021
<i>Niagara Falls</i>	31	32	38	11	4
100% of events in 2021 were found on streetlights.					

3. Buffalo

Niagara Mohawk conducted two separate mobile scans of Buffalo in 2021. The first mobile scan began on April 19, 2021 and was completed on June 3, 2021 with the following results:

- a. Total stray voltage findings = 246
- b. Stray voltage findings at 4.4v and below = 200 (81%)
- c. Stray voltage findings at 4.5v and above = 46 (19%)
- d. Miles scanned = 1,280
- e. Niagara Mohawk structures scanned = 27,665

The second mobile scan began on August 16, 2021 and was completed on October 1, 2021 with the following results:

- a. Total stray voltage findings = 290
- b. Stray voltage findings at 4.4v and below = 252 (87%)
- c. Stray voltage findings at 4.5v and above = 38 (13%)
- d. Miles scanned = 1,272¹
- e. Niagara Mohawk structures scanned = 27,478

¹ Variances in mileages and structures scanned are attributable to route reconfiguration due to construction, road blocks, and private roads.

<i>Events/Hits</i>										
	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021
	-	-	-	-	-	-	-	-	-	-
	Scan	Scan	Scan	Scan	Scan	Scan	Scan	Scan	Scan	Scan
	1	2	1	2	1	2	1	2	1	2
<i>Buffalo</i>	328	278	338	318	354	427	401	514	246	290
98% of events in 2021 were found on streetlights										

A majority of the 2021 findings were below 4.5v: Albany (100%), Niagara Falls (50%), and Buffalo (81% in Scan 1 and 87% in Scan 2).

D. Mobile Testing Repair/Mitigation Efforts

As of November 5, 2021, Niagara Mohawk completed 90.04% of the total permanent repairs in Buffalo (Scan 1 & Scan 2), Niagara Falls, and Albany.

A summary table illustrating repair status by region can be found in Appendices A-E. These tables are updated as of November 5, 2021.

E. Mobile Testing Program Costs

As of November 5, 2021, the total cost of the mobile scan surveys is \$1,802,881.

City	Actual Miles	Events Found	Event Rate	Repairs	Mobile Inspection Cost
Buffalo Scan 1	1,280	246	0.19	243	\$1,730,462
Buffalo Scan 2	1,272	290	0.23	241	
Niagara Falls	35	4	0.11	4	\$32,918
Albany	204	2	0.01	*0	\$39,501
Total	2,791	542	0.19	488	\$1,802,881

*As noted above, streetlights in the City of Albany are municipal-owned; therefore, the City of Albany is responsible for maintaining and repairing these assets. There were 88 events found during the 2021 scan, of which 84 were on streetlights owned by the City of Albany. Municipal contractors shadowed National Grid crews during the scan and all needed repairs on streetlights were completed at that time.

F. Mobile and Manual Testing Program Comparison

It cost the Company on average five times more to conduct mobile testing (per mile cost) when compared to manual testing (per unit cost) in Albany, Niagara Falls, and Buffalo in 2021.

	Albany		Niagara Falls		Buffalo Scan 1 & 2	
2021 Estimated Costs²	Manual	Mobile	Manual	Mobile	Manual	Mobile
Non- Streetlighting Eqp.	\$17,033	\$39,501	\$4,092	\$32,918	\$102,381	\$1,730,462
Metallic Streetlighting Eqp.	\$4,153		\$1,755		\$26,980	
Delta	Δ \$18,315		Δ \$27,071		Δ \$1,601,101	


² The estimated manual testing costs are based on the per unit cost of conducting a manual elevated voltage test in Albany, Niagara Falls, and Buffalo and the number of facilities scanned during mobile testing in 2021. The numbers reflect what it would have cost the Company had it performed manual testing in these cities in 2021.

Appendix A


Mobile Testing & Repair Summary

NY Stray Voltage Mobile Testing Summary Report 2021					
11/5/2021					
	Buffalo Scan 1	Buffalo Scan 2	N. Falls	Albany	Grand Total
Testing Summary					
Total Number of Events	246	290	4	2	542
<i>At or Above 4.5 Volts</i>	46	38	2	0	86
<i>Between 1.0 and 4.4 Volts</i>	200	252	2	2	456
Total NGRID Owned Events	246	290	4	2	542
<i>At or Above 4.5 Volts</i>	46	38	2	0	86
<i>Between 1.0 and 4.4 Volts</i>	200	252	2	2	456
Total Private Owned Events	71	24	0	86	181
<i>At or Above 4.5 Volts</i>	13	6	0	11	30
<i>Between 1.0 and 4.4 Volts</i>	58	18	0	75	151
Survey Percent Complete by City					
<i>Buffalo (Scan 1)</i>	1280				100.00%
<i>Buffalo (Scan 2)</i>		1272			100.00%
<i>Niagara Falls</i>			35		100.00%
<i>Albany</i>				204	100.00%
Total Miles To Be Scanned (estimates)	1,280	1,272	35	204	2,791
NY Stray Voltage Mobile Testing Repair Summary Report 2021					
11/5/2021					
	Buffalo Scan 1	Buffalo Scan 2	N. Falls	Albany	Grand Total
Repair Summary					
NGRID Repairs					
Required	246	290	4	2	542
Completed	243	241	4	0	488
Pending (All repairs)	3	49	0	2	54
Pending (De-energized streetlights)	0	0	0	0	0
Exceeding 45 Days	0	5	0	0	5
Percent Complete	98.78%	83.10%	100.00%	0.00%	90.04%
TOH Repairs	11	0	0	0	11
TOH Complete	8	0	0	0	8
TOH Pending	3	0	0	0	3
TOH Exceeding 90 Days	0	0	0	0	0
TOH Percent Complete	72.73%	100.00%	100.00%	100.00%	72.73%
Private Repairs					
Required	71	24	0	86	181
Completed	71	24	0	86	181
Pending	0	0	0	0	0
Exceeding 45 Days	0	0	0	0	0
Percent Complete	100.00%	100.00%	100.00%	100.00%	100.00%
Total Repairs Pending	3	49	0	2	54
Total Repairs Complete	243	241	4	0	488
Total Repairs Percent Complete	98.78%	83.10%	100.00%	0.00%	90.04%

Appendix B


Summary of Energized Objects - Mobile Testing - City of Niagara Falls							
 Data as of November 5, 2021	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	2	2	0	4	4	0	0
Metal Street Light Pole (971/981)	2	2	0	4	4	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	0	0	0	0	0	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	0	0	0	0	0	0	0
Totals	2	2	0	4	4	0	0
*Includes railing							
**Including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.							

Appendix C


Summary of Energized Objects - Mobile Testing - City of Albany							
 Data as of November 5, 2021	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	0	0	0	0	0	0	0
Metal Street Light Pole (971/981)	0	0	0	0	0	0	0
Traffic Signal Pole (991)	0	0	0	0	0	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	2	0	0	2	0	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	2	0	0	2	0	0	0
Totals	2	0	0	2	0	0	0
*Includes railing							
**Including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.							

While there were 88 findings detected during the scan in the City of Albany, streetlight mitigation efforts are performed by municipal contractors and therefore, not represented on Appendix C.

Appendix D

Summary of Energized Objects - Mobile Testing - City of Buffalo Scan 1							
 Data as of November 5, 2021	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	198	39	7	244	241	3	0
Metal Street Light Pole (971/981)	198	38	7	243	240	3	0
Traffic Signal Pole (991)	0	1	0	1	1	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	2	0	0	2	2	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	2	0	0	2	2	0	0
Totals	200	39	7	246	243	3	0
*Includes railing							
**Including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.							

Appendix E

Summary of Energized Objects - Mobile Testing - City of Buffalo Scan 2							
 Data as of November 5, 2021	Initial Readings				Readings After Mitigation		
	1 - 4.4 V	4.5 - 24.9 V	> 25 V	Total	< 1 V	1 - 4.4 V	> 4.5 V
Distribution Facilities	0	0	0	0	0	0	0
Pole (910)	0	0	0	0	0	0	0
Ground (914)	0	0	0	0	0	0	0
Guy (915)	0	0	0	0	0	0	0
Riser (916)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Underground Facilities	0	0	0	0	0	0	0
Handhole / Pull box (950)	0	0	0	0	0	0	0
Manhole (951)	0	0	0	0	0	0	0
Padmount Switchgear (952)	0	0	0	0	0	0	0
Padmount Transformer (953)	0	0	0	0	0	0	0
Vault – Cover/Door (954)	0	0	0	0	0	0	0
Pedestal	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Street Lights / Traffic Signals	249	32	6	287	238	0	0
Metal Street Light Pole (971/981)	248	32	6	286	237	0	0
Traffic Signal Pole (991)	1	0	0	1	1	0	0
Control Box (992)	0	0	0	0	0	0	0
Pedestrian Crossing Pole (993)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Substation Fences	0	0	0	0	0	0	0
Fence (995)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Transmission	0	0	0	0	0	0	0
Lattice Tower (931)	0	0	0	0	0	0	0
Pole (930)	0	0	0	0	0	0	0
Ground (933)	0	0	0	0	0	0	0
Guy (934)	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Miscellaneous Facilities	3	0	0	3	3	0	0
Sidewalk	0	0	0	0	0	0	0
Gate/Fence/Awning*	0	0	0	0	0	0	0
Control Box	0	0	0	0	0	0	0
Scaffolding	0	0	0	0	0	0	0
Bus Shelter	0	0	0	0	0	0	0
Fire Hydrant	0	0	0	0	0	0	0
Phone Booth	0	0	0	0	0	0	0
Water Pipe	0	0	0	0	0	0	0
Riser	0	0	0	0	0	0	0
Other**	3	0	0	3	3	0	0
Totals	252	32	6	290	241	0	0
*Includes railing							
**Including but not limited to manhole cover, sewer cover, no parking sign, parking meter, private sign, stop sign, storm grate.							

Appendix 9

NG-USA EOP G016 Equipment Elevated Voltage Testing

nationalgrid	ELECTRIC OPERATING PROCEDURE GENERAL	Doc. # NG-EOP G016 Page 1 of 21
	Equipment Elevated Voltage Testing	Version 5.0 – 10/01/21

INTRODUCTION

This procedure outlines the requirements for the equipment elevated voltage testing on National Grid Facilities in New York, Massachusetts and Rhode Island as required by:

1. New York Public Service Commission’s “Electric Safety Standards” issued on January 5, 2005, the New York Public Service Commission’s “Order Adopting Changes to Electric Safety Standards issued and effective on December 15, 2008.
2. New York Public Service Commission’s “Order Requiring Additional Mobile Stray Voltage Testing” issued and effective on July 21, 2010 and the New York’s Public Service Commission “Order Granting Petition In Part and Modifying Electric Safety Standards” issued and effective on March 22, 2013.
3. Rhode Island Public Utilities Commission in Docket 4237 “Order to Establish a Contact Voltage Detection, Repair and Reporting Program” issued on November 9, 2012, and the subsequent order issued on February 1, 2013.
4. Massachusetts Department of Telecommunications and Energy provided a series of recommendations on December 9, 2005, that have been included in this procedure.

While there are variances in requirements between New York, Massachusetts, and Rhode Island driven by regulatory requirements in each State, the minimum requirements are based on sound utility practice.

PURPOSE

This procedure applies to all personnel involved (employees or contractors) with or responsible for the testing, mitigation/repair and reporting of facilities designated by this EOP for equipment elevated voltage testing. It should be noted that the term “Contact Voltage” has been adopted and is used in the EOP (refer to EOP-DEF).

ACCOUNTABILITY

1. Electric Work Methods, Electrical Material & Design Standards
 - a. Update Procedure as Necessary
 - b. Provide personnel guidance and assistance as requested.
2. Operations – Inspection & Maintenance
 - a. Ensure the program as outlined in this EOP is implemented properly and timely.
 - b. Ensure that the program as outlined in the EOP is completed each year.
 - c. Provide qualified personnel to complete equipment elevated voltage testing.
 - d. Ensure all qualified personal have been trained on performing equipment elevated voltage testing.
3. Quality Assurance Quality Control
 - a. Ensure a QAQC program has been implemented as part of the mandatory requirements for New York and Massachusetts Regulators.

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- b. QAQC Inspector shall randomly audit elevated voltage testing performed to ensure testing completeness and accuracy.
- 4. Equipment Elevated Voltage Inspector
 - a. Demonstrate the ability to perform equipment elevated voltage testing per this procedure
 - b. Demonstrate the ability to become proficient in the use of the appropriate database.
 - c. Perform walking patrols, collect information, edit data, and guard unsafe facilities.
 - d. Attend the equipment elevated voltage training program and demonstrate competency with the equipment.
- 5. Distribution Asset Management
 - a. Provide input into program revisions.
 - b. Ensure the equipment elevated voltage program as outlined in this EOP is implemented, budgeted, and sanctioned properly and timely.

REFERENCES

NYPSC Order 04-M-0159
 NYPSC Order Adopting Changes to Electric Safety Standards
 NYPSC Order Requiring Additional Mobile Stray Voltage Testing
 RIPUC Docket 4237 Order 20871 (November 9, 2012) and Order 20950 (February 1, 2013)
 Proposed Rhode Island Electric Contact Voltage Program, Revised October 2, 2012 (Docket 4237)
 NYPSC Order Granting Petition in Part and Modifying Electric Safety Standards
 Applicable National Grid Safety Rules & Procedures
 Testing Equipment Operation Instructions

DEFINITIONS

All definitions can be found in [EOP Definitions](#)

TRAINING

Training is provided by Learning and Development through the National Grid training program.

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1.0 SAFETY

1.1 All work shall be performed in accordance with:

- 1.1.1 National Grid Employee Safety Handbook
- 1.1.2 Applicable National Grid Electric Operating Procedures (EOP)
- 1.1.3 Applicable National Grid Safety and Health Procedures (SHP)

1.2 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.3 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

- 1.3.1 Traffic control devices – Work Area Protection
- 1.3.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.4 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to [Employee Safety Handbook](#) Tables 2A, 2B and Appendix A for distances).

1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to [NG-EOP-G037 “Process Hazard Analysis”](#)

1.6 Identify if an ARC flash assessment is required. Refer to [NG-EOP G035 “ARC Flash Awareness and Mitigation”](#) and [Work Methods SharePoint](#) site for [Arc Flash Mitigation Tables](#) to determine working distance and energy levels.

2.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW YORK

2.1 Streetlights and Municipally Owned Facilities

2.1.1 Company owned metallic street lighting standards shall be one hundred percent (100%) tested for equipment elevated voltage annually.

a. This test is to be performed while the light is operating.

2.1.2 Municipally owned streetlight systems that National Grid directly provides energy to shall be one hundred percent (100%) tested for equipment elevated voltage annually.

a. National Grid is responsible to complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality.

b. This test is to be performed while the light is operating.

2.1.3 Municipally owned metallic traffic signal standards and accessible devices shall be one hundred percent (100%) tested annually for equipment elevated voltage.

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2.1.4 All streetlights identified on public thoroughfares regardless of ownership shall be one hundred percent (100%) tested annually for equipment elevated voltage.

2.1.5 All streetlights under a maintenance contract shall be one hundred percent (100%) tested annually for equipment elevated voltage.

a. Exceptions not requiring equipment elevated voltage testing:

- i. Private lighting, park associations, parking lots, fiberglass (or other non-conductive) streetlight standards.
- ii. Locations where streetlight standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

2.2 National Grid Electric Substation Fences

2.2.1 Metallic fencing surrounding substations with National Grid Facilities shall be tested for equipment elevated voltage annually. This fencing can be customer owned for customer stations, if a National Grid facility is part of the station.

2.3 Overhead Distribution Facilities

2.3.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

2.3.2 The following equipment on wood distribution poles requires equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

- a. Metallic riser guard or conduit (company or non-company).
- b. Uncovered or uninsulated down ground (company or non-company).
- c. Down guy wire (company or non-company).
- d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.

2.3.3 Exceptions: Customer meters and customer meter poles are excluded.

2.4 Overhead Transmission Facilities

2.4.1 Towers and/or metallic poles with transmission facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

2.4.2 The following equipment on wood transmission poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

- a. Metallic riser guard or conduit (company or non-company).
- b. Uncovered or uninsulated down ground (company or non-company).
- c. Down guy wire (company or non-company).

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- d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole or structure within reach from the ground.

2.5 Underground Facilities

- 2.5.1 Equipment elevated voltage testing is required on all of the following equipment where accessible to the public.
 - a. All metallic manhole covers, vault covers and grates, junction box covers, and handhole covers at an annual rate of one hundred percent (100%).
- 2.5.2 Pad-mounted transformers and switchgear are tested at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.
- 2.5.3 Starting in 2010 and continuing thereafter, unless changed by subsequent order of the NY Public Service Commission:
 - a. Two (2) mobile stray voltage surveys shall be conducted at an annual rate of one hundred percent (100%) in Buffalo
 - b. One (1) mobile stray voltage survey is required to be conducted at an annual rate of one hundred percent (100%) in Albany and Niagara Falls.
- 2.5.4 Exceptions: Non-metallic concrete or fiberglass pads, handholes or pull/splice boxes are not required to be tested.

2.6 Daily Job Site Test Requirements

- 2.6.1 Each job site where National Grid personnel or its contractors complete a work assignment, they shall perform the following:
 - a. Perform an equipment elevated voltage test at the start and at the end of the workday or at the start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.
- 2.6.2 Exceptions:
 - a. Electric substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.
 - b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

2.7 Exemptions

- 2.7.1 No testing is required inside a completely fenced in area where access is denied to the general public and where access is only achieved by climbing a fence. Good judgment is required by the tester in these scenarios.

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3.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – RHODE ISLAND

3.1 Company Owned Street Lights

- 3.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage on a three-year cycle.
- 3.1.2 Exceptions: Testing shall not be completed at locations where streetlight standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or the public.

3.2 Overhead Distribution Facilities

- 3.2.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.
- 3.2.2 The following equipment on wood distribution poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:
 - a. Metallic riser guard or conduit (company or non-company).
 - b. Uncovered or uninsulated down ground (company or non-company).
 - c. Down guy wire (company or non-company).
 - d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole or structure within reach from the ground.

3.3 Underground Facilities

- 3.3.1 Equipment elevated voltage testing at an annual rate of twenty percent (20%), to be completed on a five-year cycle:
 - a. Metallic manhole covers, vault covers and grates, junction box covers, handhole covers
 - b. Pad-mounted transformers, secondary pedestals, and pad-mounted switchgears.
- 3.3.2 Starting in Fiscal Year 2013 and continuing thereafter, unless changed by subsequent order of the Rhode Island Public Utilities Commission, mobile contact voltage surveys will be performed in designated Contact Voltage Areas (CVA).
- 3.3.3 The mobile surveys will be performed at an annual rate of twenty percent (20%), to be completed on a five-year cycle

 Exceptions: Non-metallic concrete or fiberglass pads, handholes or pull/splice boxes are not required to be tested.

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3.4 Daily Job Site Test Requirements

3.4.1 Each job site where National Grid personnel or its contractors complete a work assignment:

- a. An equipment elevated voltage test shall be taken at the start and at the end of the workday or at start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.

3.4.2 Exceptions

- a. Electric substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.
- b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

3.5 Exemptions

3.5.1 See Section 1.7.1

4.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – MASSACHUSETTS

4.1 Company Owned Street Lights

4.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage at an annual rate of twenty percent (20%) on a five-year cycle.

4.1.2 Exceptions: Testing shall not be completed at locations where streetlight standards are not publicly accessible, such as facilities located in the center of highways that cannot be accessed without stopping traffic or creating potentially hazardous situations for the worker and/or public.

4.2 Overhead Distribution Facilities

4.2.1 Towers and/or metallic poles with distribution facilities shall be tested for equipment elevated voltage at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle.

4.2.2 The following equipment on wood distribution poles or structures require equipment elevated voltage testing at an annual rate of twenty percent (20%) in conjunction with field inspections on a five-year cycle:

- a. Metallic riser guard or conduit (company or non-company).
- b. Uncovered or uninsulated down ground (company or non-company).
- c. Down guy wire (company or non-company).
- d. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.

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4.3 Underground Facilities

4.3.1 Equipment elevated voltage testing at an annual rate of twenty percent (20%), to be completed on a five-year cycle:

- a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers
- b. Pad-mounted transformers, secondary pedestals, and pad-mounted switchgears.

4.3.2 Exceptions: Non-metallic concrete or fiberglass pads or handholes or pull/splice boxes are not required to be tested.

4.4 Daily Job Site Test Requirements

4.4.1 Each job site where National Grid personnel or its contractors complete a work assignment:

- a. An equipment elevated voltage test shall be taken at the start and at the end of the workday or at the start and at the completion of the assignment. This testing requirement is considered good utility practice and does not require specific documentation.
- b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

4.4.2 Exceptions

- a. Substation fencing will not require equipment elevated voltage testing unless scheduled as part of the inspection program or if work was done on the fencing.
- b. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

4.5 Exemptions

4.5.1 See Section 1.7.1

5.0 TEST EQUIPMENT

5.1 A handheld device (proximity detection unit) that can detect voltage from 5 to 600 VAC.

5.2 A portable AC digital high impedance voltmeter must have the ability to take readings with and without an input load impedance of 500 ohms.

5.3 The handheld devices utilized shall be certified by an independent test laboratory as being able to reliably detect voltages from 5-600 VAC. The following units have been certified:

5.3.1 HD Electric Stray Voltage Detector model LV-5

5.3.2 Fluke 85

5.3.3 Fluke 87

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- 5.3.4 Fluke 170 series or equivalent
- 5.3.5 Fluke 175
- 5.3.6 Fluke 177
- 5.3.7 Fluke 179
- 5.3.8 Fluke 187
- 5.3.9 Fluke 189
- 5.4 Mobile Contact Voltage Detection Equipment:
 - 5.4.1 Narda 8950/10 Stray Voltage System
 - 5.4.2 SVD2000 Stray Voltage Mobile Detector

6.0 TEST PROCEDURE

- 6.1 Job Safety Requirements
 - 6.1.1 At minimum, the following information shall be communicated to all personnel at the beginning of each shift for equipment elevated voltage testing:
 - a. Structures are never to be touched with a bare hand while performing the tests, only the proximity detector or meter probe is to be used to make contact with the facilities.
 - b. Appropriate PPE shall be worn.
 - c. Each individual always needs to be aware of his/her surroundings.
 - d. Make sure to observe all traffic before entering a street.
 - e. Traffic safety vest (DOT Compliant Class III) shall always be worn when exposed to traffic. Be aware that when bending down, the visibility benefits of the traffic safety vest are diminished.
 - f. Obey all traffic control devices.
 - g. When working in the street, face oncoming traffic whenever possible.
- 6.2 Measurements for detecting elevated voltages will be performed in accordance with the following:
 - 6.2.1 Initial measurements for the presence of voltage shall be made using a certified proximity detection unit, refer to Section 4.3
 - a. To verify the proper operation of the proximity detector, follow operating instructions for the unit being utilized, this is to be done daily.
 - b. After verification that the detection unit is working, approach the area/equipment to be tested. The proximity detector will illuminate prior to touching the area/equipment being tested if voltage is present. If the proximity detector does not illuminate in close proximity to the

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area/equipment, touch the area/equipment to be tested with the probe of the unit.

- 6.2.2 If voltage is detected, re-test using a portable AC voltmeter (The 500-ohm resistor is NOT used in this initial test):
- a. Measurements with a portable AC voltmeter shall be taken on clean bare metallic surface (structure, ground wire, etc.)
 - b. When using a portable AC voltmeter, connection shall be made to suitable neutral or ground source with the common (black) lead.
 1. In locations where the neutral or ground point is at a distance in excess of the voltmeter lead length
 - i. The connection to the neutral/ground shall be made with up to 25 feet' of # 16 stranded copper lead wire (covered).
 - ii. The other end of which shall be securely connected to the common (black) probe of the meter.
 - iii. When using such "extension leads" appropriate care shall be taken in the placement of such leads to not create a physical hazard to workers, pedestrian or vehicular traffic.
 2. In locations where a system ground is not available, or the existing ground registered voltage upon the proximity test
 - i. A metal rod shall be firmly embedded into the earth to a minimum depth of 6" to create a ground reference point for the measurement to be taken.
 - ii. An alternate method is available for obtaining a ground reference point utilizing an aluminum plate in lieu of driving a ground rod. The reference point should be as close as practicable to the facility being tested to simulate an equipment elevated voltage touch potential situation (3' to 4'.) On occasion longer leads may be necessary to find undisturbed earth (up to 25'.)
 - c. The "live" meter (red) probe lead shall then be placed into contact with the structure under inspection to determine the voltage.
 1. Voltage readings greater than 30 volts AC shall be recorded in the database for the site.
 2. For voltage readings less than 30 volts, install a 500-ohm input load impedance resistor on the voltmeter. Take another voltage measurement and record this voltage in the database for the site.
- 6.2.3 Measurements for elevated voltages/contact voltage using mobile technology will be performed in accordance with the following:
- a. Mobile testing is performed by contract crews driving pre-determined routes in Contact Voltage Areas searching for elevated voltage levels.

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- b. The equipment used is mounted to vehicles and detects contact voltage levels greater than 1 volt while driving at speeds of up to 25 mph near underground facilities.
 - c. Once elevated voltages are detected the crew stops and performs a thorough check with certified manual testing equipment to determine if there is contact voltage present.
- 6.2.4 Any positive indications by either mobile testing or handheld tools shall be followed up with voltage measurements on the target structures.
- a. Voltage measurements shall be taken in accordance with Section 5.2.2 above.
 - b. The investigators shall verify that a suitable ground (i.e. a ground that is not energized) is used as a reference. Ground source location shall be marked with tape, paint or flag for future testing of repair work.
- 6.2.5 A Total Harmonic Distortion (THD) test method will be implemented as a pilot for Rhode Island mobile elevated voltage testing. THD will be determined using a Fluke Power Quality clamp meter or a Fluke scope meter both of which have the ability to measure THD.

7.0 CORRECTIVE ACTION REQUIREMENTS FOR EQUIPMENT ELEVATED VOLTAGE FINDINGS

7.1 Manual Testing

7.1.1 New York

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded by a person or a protective barrier until made safe by Company personnel or if municipally owned, made safe by the owner or company.

If the voltage measures less than 1 volt and is found to be consistent with system operation design (no visual evidence of a problem upon review)
No further action is required.

- a. If the voltage measures greater than or equal to 1 volt and less than 4.5 volts:
 - i. The asset can either be guarded in person or by a protective barrier that prevents public contact.
 - ii. Contact your supervisor for required action. Sound judgment shall be utilized in this application.
- b. If the voltage measures greater than or equal to 4.5 volts:
 - i. It shall be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities.

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- ii. Immediate response is required using the notification in Section 6.3.

7.1.2 Massachusetts and Rhode Island

If equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded by a person or a protective barrier until made safe by Company personnel or if municipally owned, made safe by the owner or company.

If the voltage is less than 4.5 volts and is found to be consistent with system operation design (no visual evidence of a problem upon review) **No further action is required.**

- a. If the voltage measures greater than 4.5 volts and less than 8 volts:
 - i. The asset shall be guarded in person or by a protective barrier that prevents public contact.
 - ii. Contact your supervisor for required action. Sound judgment shall be utilized in this application.
- b. If the voltage measurement is greater than 8 volts:
 - i. It shall be guarded by an equipment elevated voltage inspector or a Company employee who has been trained to stand by on energized facilities.
 - ii. Immediate response is required using the notification in Section 6.3.

7.2 Mobile Testing

7.2.1 Rhode Island Total Harmonic Distortion Pilot

Under the Total Harmonic Distortion (THD) pilot in Section 5.2.5, if during mobile testing of the Contact Voltage Area the voltage measures greater than 1 volt and less than 4.5 volts and has a total harmonic distortion of less than 10% the voltage will be considered contact voltage.

- a. These areas will be safeguarded from the public and permanent repairs will be made.
- b. If the total harmonic distortion is greater than 10% (no visual evidence of a problem upon review) **No further action is required.**

7.2.2 New York and Rhode Island

In the event of an elevated/contact voltage finding on an electric facility or a streetlight, all publicly accessible structures and sidewalks within a minimum 30-foot radius of the electric facility or streetlight must be tested for stray voltage.

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- 7.3 The following notification process for personnel to respond shall be utilized.
- 7.3.1 Notification by location:
- a. New York Regional Control Center 1-877-716-4996
 - b. New England Regional Control Center, North
 - 1. Western, Central, North & Granite 1-508-421-7879
 - c. New England Regional Control Center, South
 - 1. Southeast, South Shore & Ocean State (RI) 1-508-421-7885
- 7.3.2 Inform the System operator that this is an equipment elevated voltage call, and provide the following information:
- a. Inspector name, Company (if not National Grid)
 - b. Address where the problem is identified; include facility number, circuit number, ownership, type of equipment and unique ID.
 - c. Voltage found and whether they are physically guarding or leaving the site after flagging and installing a protective barrier. National Grid personnel or designee will be assigned to respond.
- 7.4 Temporary repairs may be used to mitigate the equipment elevated voltage thereby removing the need to guard the site.
- 7.5 Permanent repairs to the equipment shall be made within 45 days of the occurrence, except as noted in Section 6.6
- 7.6 If permanent repairs cannot be made within 45 days due to extraordinary circumstances, the company shall periodically perform site visits to monitor the condition of the temporary repair. For New York, all exceptions shall be identified and justified in the annual reporting of the program to the NYPSC.
- 7.7 The contractor and/or equipment elevated voltage Inspector may detect a minimal voltage level that is attributable to the design of the facility and not the result of an improper condition, no corrective action is required in this instance.
- 7.8 Angel Guards
- 7.8.1 Individuals conducting the equipment elevated voltage tests on streetlight standards shall have a supply of “Angel guards” available for installation if the cover is missing or wires are found to be exposed to the public at the time of testing.
 - 7.8.2 Angel guards shall only be installed after the testing of the streetlight standard is complete and there is no indication of equipment elevated voltage above 1 volt (NY) and 4.5 volts (RI and MA)
 - 7.8.3 Repairs have been completed to correct the equipment elevated voltage.
- 7.9 The equipment elevated voltage inspector shall report any potentially hazardous conditions found on National Grid facilities seen visually during the survey process.

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7.10 Customer Owned Equipment

7.10.1 Where the Company finds equipment elevated voltage above the allowable thresholds and identifies its source as customer-owned equipment:

- a. The Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists.
- b. The Company shall advise the customer or responsible person that the cause of the equipment elevated voltage shall be immediately remedied.

7.10.2 Company personnel are encouraged to work with the customer to determine and rectify the problem. If the customer agrees to accept the Company’s assistance, the Company may charge a reasonable cost for this effort.

- a. The Company may temporarily remove a customer’s meter or take such other actions as are appropriate and necessary to protect the public.

8.0 EQUIPMENT ELEVATED VOLTAGE DATABASE

8.1 The equipment elevated voltage database will be populated with information that is collected by the inspector using a hand-held device. The database shall be easily searchable for information and reporting.

8.2 The equipment elevated voltage inspector shall populate the following Information fields for manual testing:

Survey Date	Inspectors Name
Region	GPS Taken
District	Pre-load Match
Contractor	Equipment EV Test Required
GIS ID/Asset # (Unique ID)	Voltage Found Y/N
Facility Type	Voltage Measurement
Owner	Type of Equipment (Appendix A)
Feeder/Circuit	Immediate Action Taken
Line #	Person Notified
Tax District	Permanent Repair Date
Pole/Structure/Equipment ID	Type of Repair
Street Name	Person Responsible for repair (Employee ID)

8.3 Information fields required to be completed for facilities for mobile testing

Survey Date	Street Name
Region	GPS taken
District	Voltage Found Y/N
Contractor	Voltage Measurements
Facility Type	Type of Equipment (see Appendix A)
Owner	Immediate Action Taken
Pole/Structure/Equipment ID	Person Notified
Permanent Repair Date	Type of Repair

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9.0 NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS

- 9.1 Each Regional program supervisor shall provide certification to the program manager that the Region they supervise has complied with the equipment elevated voltage testing and inspection program as ordered by the PSC.
- 9.2 The program manager shall provide certification to the Vice President Distribution Network Strategy and the Senior Vice President of Customer Operations & Maintenance that the organization has complied with the equipment elevated voltage testing and inspection program as ordered by the PSC.
- 9.3 Written certification of the completion and results of every equipment elevated voltage test and inspection shall be completed, as well as a certification that all unsafe conditions identified have been remediated by appropriate company personnel.
- 9.4 The President or officer with direct responsibility for overseeing the equipment elevated voltage testing and inspection shall provide an annual certification to the NYPSC that the Company has tested all of its publicly accessible conductive surface electric facilities and all streetlights, as well as completed all required inspections.
- 9.5 The President or officer with direct responsibility for overseeing facility inspections shall provide an annual certification to the Commission that the utility is in compliance with its inspection program and has inspected the requisite number of electric facilities. Additionally, at the end of the five-year inspection cycle, the officer shall certify that all of the utility’s electric facilities have been inspected at least once.
- 9.6 The annual reporting and certification are required by February 15 of each year. In addition to certifications, it shall address the following:
 - 9.6.1 Details the results of equipment elevated voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year.
 - 9.6.2 Addresses the performance mechanism contained in Section 10 of the PSC Order Adopting Changes to Electric Safety Standard effective December 15, 2008 (December 15, 2008 Order).
 - 9.6.3 Contain certification described in 8.3, 8.4 and 8.5 of this section.
 - 9.6.4 Contain a breakdown of the voltage findings in a tabular format as detailed in Attachment 1 of the December 15, 2008 Order; for all findings that result in a reading of 1 V or more after completion of mitigation efforts, a detail report of company efforts shall be provided.
 - 9.6.5 Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.
 - 9.6.6 Discussion of the analysis undertaken on the causes of the stray voltage within the Company’s electric system, the conclusions drawn there from, the preventative and remedial measures identified, and the Company’s plan to implement those measures.

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- 9.6.7 Description of the priority levels used to gauge the severity of a deficiency, including repair timeframes, and details the requirements for training personnel to properly identify and categorize the deficiencies.
- 9.6.8 Contain a breakdown of facilities to be inspected, unique inspection conducted per year, and the cumulative number of unique inspections conducted to meet the five-year requirement.
- 9.6.9 Contain a breakdown of the deficiencies found, permanent repair actions taken by year, whether a repair was completed within the required timeframe, and the number of deficiencies awaiting repair. This information should be provided on a yearly basis by priority level and by equipment groupings as detailed in Attachment 3 of the December 15, 2008 Order.
- 9.6.10 Contain a review and analysis of the inspection results. The review should identify areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.
- 9.6.11 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.
- 9.6.12 Any additional information that is pertinent to the issues addressed by the safety standards should also be included.
- 9.7 The Company shall file reports on their mobile stray voltage testing with the Secretary of the New York PSC within 45 days after completion of the mobile testing or February 15, of each year. The filing shall include the historic results and costs associated with the manual test program in each area listed in Section 2 of this procedure.
- 9.8 The Company is required by the December 15, 2008 Order to have independence in the quality assurance program required by the order. The management and personnel performing the quality assurance activities shall be separate from those performing the required stray voltage testing and inspection activities.
- 9.9 The Company shall maintain its written certification and other documentary proof of its testing at its' Albany, Buffalo, and Syracuse office facilities. These documents shall be made available to the public for review upon request.

10.0 MASSACHUSETTS REPORTING REQUIREMENTS

- 10.1 National Grid shall submit an annual report that includes the following:
 - 10.1.1 Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.
 - 10.1.2 Number of equipment elevated voltage events detected by inspection personnel versus call-ins or notification by third parties.
 - 10.1.3 Variance reports on current year inspection targets.
 - 10.1.4 Equipment elevated voltage events detected on equipment that is not included in equipment elevated voltage equipment inspection schedules (which will enable

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the Massachusetts DPU to determine if the company is inspecting and testing the correct equipment).

- 10.1.5 Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts
- 10.1.6 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.

11.0 Rhode Island Reporting Requirements

- 11.1 National Grid shall submit an annual Contact Voltage Compliance report that includes the following in a searchable form:
 - 11.1.1 Event record number
 - 11.1.2 Location of testing
 - 11.1.3 Date and time of testing
 - 11.1.4 Company or customer asset
 - 11.1.5 Failed equipment type
 - 11.1.6 Voltage recorded
 - 11.1.7 Personal injuries to members of the public, pets or property damage
 - 11.1.8 Any other equipment involved and age
 - 11.1.9 Prior incidents at this location in the past five years
 - 11.1.10 Corrective actions taken at the location and date taken
 - 11.1.11 Number of customers if service is interrupted while making repairs
 - 11.1.12 Duration of interruption
 - 11.1.13 Summary of investigation into cause of the incident
 - 11.1.14 Number of calls to the company “shock” line
 - 11.1.15 Total repair costs by Contact Voltage Area
 - 11.1.16 All information as provided for in Section 8.3

The Company will provide a summary of the above information as part of the report. In addition, the Company will include a recommendation for which specific CVAs will be tested the following year, whether there are any recommended changes to the CVAs and whether there are any advances in technology for detection of elevated voltages.

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12.0 TYPE OF EQUIPMENT - APPENDIX A

TYPE	CODE	EQUIPMENT DESCRIPTION
Distribution	910	Pole
	911	Regulator
	912	Sectionalizer
	913	Recloser
	914	Ground
	915	Guy
	916	Riser
	917	Switch Handle Mechanical Operated
	929	Distribution – Other (use comments)
Transmission	930	Pole
	931	Tower
	932	Guy
	933	Ground
	934	Riser
	935	Switch Hand Mechanical Operator
	949	Transmission – Other (use comments)
Underground	950	Handhole
	951	Manhole
	952	Switchgear
	953	Transformer
	954	Vault – Cover/Door
	969	Underground – Other (use comments)
Streetlight	970	Handhole
	971	Standard
	979	Streetlight – Other (use comments)
Customer Street Light/Other	980	Handhole
	981	Standard
	989	Customer SL/Other – Other (use comments)
Traffic Control	990	Handhole
	991	Standard
	992	Control Box
	993	Pedestrian Crossing Pole
	999	Traffic control – Other (use comments)

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13.0 EXCEPTION APPROVALS

13.1 It is recognized that situations may arise that are not covered by this procedure

13.1.1 In a storm or emergency event, such as an MVA, 911 call or similar situation, approval to proceed can be obtained from the below individuals, superseding section 13.3.2. These exceptions should be documented and communicated to the Work Methods and Safety Managers as soon as possible following the emergency event.

- a. New York
 - 1. Regional OH/UG Manager
 - 2. Regional OH/UG Lead Supervisor
- b. New England
 - 1. Divisional OH/UG Manager
 - 2. Designated “On Call” OH/UG Team Lead
 - 3. Divisional OH/UG Lead Supervisor

NOTE: All individuals granting “the exception and approval to proceed’ shall be knowledgeable and proficient in the construction and operation of the Overhead or Underground electrical apparatus involved along with the associated hazards in specific duties pertaining to this electric operation procedure.

13.2 When this occurs, an exception may be approved

13.3 The person in charge of the work shall

13.3.1 Develop a work plan detailing

- a. The need for an exception to the EOP
- b. Additional safeguards to be employed

13.3.2 Provide the work plan to and obtain approval from all of:

- a. The manager in charge of the work
- b. The manager of T&D Work Methods
- c. A manager from Safety

13.3.3 Alternatively, approval may be obtained from a designee of any of the above

13.4 If agreement cannot be obtained at the manager level

13.4.1 The request shall be forwarded to the Director levels

- a. Director’s may assign a designee

13.5 After approval is obtained

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- 13.5.1 The work plan shall be reviewed with all workers who will participate in the job
 - a. All workers need to agree on the work plan
- 13.5.2 Document the exception on the job brief
- 13.6 If agreement cannot be obtained the department Steward, the Union Safety Advocate or Officer will be sought out for approval
- 13.7 T&D Work Methods shall publish a Memorandum documenting the approval
 - 13.7.1 A copy of the work plan shall be included
 - 13.7.2 Such memorandum shall be sent to all stakeholders and approvers
 - 13.7.3 The memo shall be stored for the record

14.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	04/01/11	This document supersedes document dated 08/17/09.
2.0	09/30/13	This document supersedes document date 04/01/11.
3.0	04/19/18	Revised the following: Formatting changes, broke paragraphs into subsections Accountability Section, added "Quality Assurance Quality Control" group and removed "Network Strategy" and replaced with "Asset Management" Removed the Definitions Section Section 1 Added new "Safety Requirements" section 2.0 Renumbered section to revised listing 2.1.1 – 2.14 Revised language to include the percent rate of 100% 3.3.1 Added percent rate of 20% for underground testing in Rhode Island 4.11 Added percent rate of 20% for streetlight testing in Massachusetts 4.3.1 Added percent rate of 20% for underground testing in Massachusetts 7.3.1b.c Revised phone numbers for Northborough control center 7.8 Added "Angel Guard" Tittle and revised subsections 8.0 Database requirements, added language and formatted facilities list 13.0 7. Added new Exception Approval Section
4.0	02/01/20	Exception Approval Language
5.0	10/01/21	Four-year Revision - Minor updates and changes, added link to definitions, updated safety section, updated copyright clause and sponsor information.

Appendix 10

NG-USA EOP D004 Distribution Line Patrol and Maintenance

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INTRODUCTION

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid Distribution feeders.

The inspection procedures shall be dictated by the individual state’s regulatory agency. If the regulatory agency in a specific state (MA & RI) does not require inspection procedures the inspections can still be performed in those states per this EOP but are not required.

The Distribution Maintenance Program was designed to provide for a patrol and inspection of each distribution feeder once every five (5) years. The patrols are conducted by a Distribution Inspector identifying all required maintenance on a *Windows®* based hand-held computer. The maintenance items identified through this patrol are separated into five priority levels 1, 2, 3, 4 and 9. The maintenance codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority levels are defined as follows:

Level 1 - An identified facility/component or tree condition that shall be repaired/replaced within 30 days for (NE) and 7 days for (NY).

Level 2 - Identified facility/component condition that shall be repaired/replaced within 1 year or as scheduled by Program Management for NE.

Level 3 – Identified facility/component condition that shall be repaired/replaced within 3 years or as scheduled by Program Management for NE.

Level 4 – This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

Level 9 – This priority category is to collect inventory information for temporary repairs made by operations to restore service or maintain public safety until permanent repairs can be made.

All Level 1 priority conditions identified in the field shall be called in by the Distribution Inspector as follows:

1. Notification by location:
 New York: System Operations Dispatch 1-877-716-4996
 NE North: Bay State West & Central: Northborough Control Center 1-508-421-7879
 NE North: North & Granite: Northborough Control Center 1-508-421-7879
 NE South: Bay State South & Ocean State (RI): Northborough Control Center 1-508-421-7885
2. Detailed information provided to the regional notification location:
 - a. Identify yourself as a Company Distribution Inspector and your work reporting area.
 - b. Details of the Level 1 Priority Condition:
 - i. Problem found.
 - ii. District, Feeder No., Line No., Tax District and Pole No.

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- iii. Street address and any additional information that would assist in finding the location of the problem.
- iv. If you are standing by or have secured the location.

3. Notify area Inspections Supervisor for follow-up.

PURPOSE

This procedure applies to all personnel involved with or responsible for the inspection and repair of Overhead (OH) Distribution and Sub Transmission facilities, Underground Residential Developments (URDs) and Underground Commercial Developments (UCDs).

ACCOUNTABILITY

1. Electric Work Methods
 - A. Update procedure as necessary
2. Electric Operations
 - A. Ensure the work generated by the Distribution Maintenance Program and assigned by Asset Strategy and Investment Planning is completed in the appropriate time frame.
 - B. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.
3. Distribution Line Contracting
 - A. At the request of Operations obtain, schedule and manage contractors to perform inspections and required maintenance.
 - B. Provide input into program revisions.
4. Distribution Inspector
 - A. Demonstrate the ability to identify maintenance concerns and the aptitude to become proficient in the use of a hand-held computer and desktop computer.
 - B. Demonstrate the understanding and requirements of this NG EOP D004.
 - C. Possess the ability to do walking patrols, collect information on a hand held, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database system.
5. Distribution Network Strategy
 - A. Select program codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
 - B. Approve changes to the maintenance code table.
 - C. Select circuits to be patrolled for a running five-year cycle.
 - D. Provide input into program revisions.
6. Inspections and Maintenance
 - A. Ensure circuits scheduled for patrol are completed each year.
 - B. Provide qualified personnel as inspectors to provide consistent and accurate identified maintenance concerns/problems.
 - C. Provide program management.
 - D. Report System Maintenance progress monthly by Division.
7. Process and Systems.
 - A. Provide and support database.

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REFERENCES

National Grid Safety Procedures
National Grid Employee Safety Handbook
NY PSC Order 04-M-0159
NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
Elevated Equipment Voltage Testing NG-EOP G016
Underground Inspection NG-EOP UG006
Work Methods Bulletin 11-14 Voltage Regulation Limits
Massachusetts DTE Directive 12/9/05

TRAINING

Provided by appropriate National Grid training program.

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1.0 SAFETY REQUIREMENTS

- 1.1 All work shall be performed in accordance with:
 - 1.1.1. National Grid Employee Safety Handbook
 - 1.1.2. Applicable National Grid Electric Operating Procedures (EOP)
 - 1.1.3. Applicable National Grid Safety and Health Procedures (SHP)
- 1.2. All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.
- 1.3. The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:
 - 1.3.1. Traffic control devices – Work Area Protection (WAP)
 - 1.3.2. Emergency Events: communication methods (code blue), first responders, and closest hospital.
- 1.4. Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).
 - 1.4.1. Use of DI Foot wear if MAD will be broken, according to NG-EOP G026 “Mechanized Equipment Grounding”
- 1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP G037 “Process Hazard Analysis”
- 1.6 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods Infonet site for Arc Flash Table to determine working distance and energy levels – see link below:

[Arc Flash Mitigation Tables](#)

2.0 DISTRIBUTION PATROL

- 2.1 New York
 - 2.1.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.
 - 2.1.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In NY, the patrols shall be completed by December 31 due to regulatory reporting.
 - 2.1.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.
 - 2.1.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011,

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Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.2 Rhode Island

- 2.2.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.
- 2.2.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In RI the patrols shall be completed by March 31. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status).
- 2.2.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.
- 2.2.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.3 Massachusetts

- 2.3.1 Distribution Patrols are conducted by a Distribution Inspector that has been trained to identify deficiencies or non-standard construction conditions on National Grid facilities.
- 2.3.2 Distribution patrols are scheduled in such a manner that each distribution feeder is examined in the field once every five (5) years. In MA, the patrols shall be completed by December 31 due to regulatory reporting. The most current Distribution Patrol schedule can be found in the Distribution Maintenance Program data base (RPT 1310 Feeder Patrol Status).
- 2.3.3 New Distribution Feeders added to the system will be incorporated through our Geographic Information System (GIS) system and added to the appropriate inspection cycle.
- 2.3.4 If the Distribution Inspector finds unmapped facilities from the information supplied from GIS, the inspector shall add the information into the *Windows*® based hand-held computer for maintenance tracking purposes. NG-EOP G011, Preparation and Distribution of Electric Facilities Records, identifies the correct procedure for updating GIS records, if needed.

2.4 Records

- 2.4.1 Distribution Patrol data is recorded by the Distribution Inspector on a *Windows*® based hand-held computer and downloaded to the Distribution Maintenance Program.

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- 2.4.2 The Distribution Inspector should also complete maintenance code 118 - stencil installed and maintenance code 220 - guy wire marker, maintenance code 660 - switchgear missing nomenclature, maintenance code 681- transformer missing nomenclature, and maintenance code 745 - enclosure missing nomenclature if found deficient upon inspection while at the site or enter the appropriate code as a Level 4 maintenance item including a comment.
- 2.4.3 Maintenance Codes are shown on the Distribution Field Survey Worksheet #NG0236 (Page 8). The Distribution Field Survey Worksheet can be used by the field to record maintenance items and is used for informational purposes only.
- 2.4.4 The latest distribution maintenance codes are downloaded to the hand-held computer each time there is a change that affects the maintenance code table contained in the Distribution Maintenance Database. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Distribution Maintenance Database.
- 2.5 The *Windows®* based hand-held computer is to be used as the primary vehicle for recording maintenance problems in the field. There may be times where it is not practicable to use the hand-held computer. In these cases, the person performing the inspection should record the information on the Distribution Field Survey Worksheet (#NG0236).

<https://teams.nationalgrid.com/sites/Syracuse/SitePages/Home.aspx>

Once complete, the Distribution Field Survey Worksheet information shall be input into the Distribution Maintenance Database by the inspector, clerk, or supervisor or their designee.

3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

- 3.1 This EOP requires the visual inspection of the following facilities as designated above for New York, Rhode Island or Massachusetts:
 - a. Wood Pole Mounted Street Light
 - b. Poles
 - c. Crossarms
 - d. Insulators
 - e. Primary
 - f. Transformers
 - g. Capacitor
 - h. Regulator
 - i. Sectionalizer
 - j. Recloser
 - k. Switches
 - l. Ground
 - m. Guy
 - n. Anchor
 - o. Secondary
 - p. Service
 - q. ROW
 - r. GIS
 - s. Spacer Cable
 - t. Cutout
 - u. Risers
 - v. Switchgear
 - w. Padmount Transformers
 - x. Enclosures

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4.0 DISTRIBUTION MAINTENANCE DATABASE

- 4.1 The Distribution Maintenance Database consists of information collected in the field downloaded from the *Windows*® based hand-held computer and data gathered from other sources entered from the desktop computer. The *Windows*® based hand-held computer can be downloaded to any National Grid desk top computer that is connected to the network by an employee that has been authorized to perform this function. The Distribution Maintenance Database is used by various departments throughout National Grid to generate maintenance reports and cost estimates.
- 4.2 The Distribution Maintenance Database contains information to be used by Asset Strategy and Investment Planning to track maintenance codes that may affect reliability (R), affect reliability that have a specific program in place to address (RP), or may not directly affect reliability (NR):

5.0 MAINTENANCE SCHEDULE

- 5.1 Maintenance activities are scheduled by maintenance codes. Maintenance codes are given a priority level to aide in the scheduling of work assuring a safe and reliable distribution system.
- 5.2 All “Level 1 Priority” conditions identified shall be repaired/corrected within:
- 5.2.1 New England – 30 days
- 5.2.2 New York – 7 days.
- 5.3 NY Only - all “Level 2 Priority” conditions identified shall be repaired/corrected within 1 year. In NE, work will be reviewed, prioritized and scheduled according to the Annual Work Plan
- 5.4 NY Only - All “Level 3 Priority” conditions shall be repaired within 3 years. In NE, work will be reviewed, prioritized and scheduled according to the Annual Work Plan
- 5.5 All Level 4 Priority is for inventory purposes only.
- 5.6 All Level 9 priority conditions should be completed within 90 days. Level 9 priority conditions not completed within 90 days, the company shall periodically perform site visits to monitor the condition of the temporary repair. Refer to NG-EOP G029 – Tracking Temporary Repairs to Electric System for details on Level 9 priority conditions.
- 5.7 NY Only - Once the Distribution Feeder is completed in the Distribution Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS. Expense maintenance work goes straight to scheduling while the capital work goes to Distribution Design. Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the field operations group for the area where the feeder is located.

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6.0 COMPLETION OF MAINTENANCE CODES

- 6.1 Level 1 priority maintenance codes completion process:
 - 6.1.1 Distribution Inspector contacts System Operations Dispatch (SOD) providing information on the Level 1 maintenance item and fills out a Level 1 Priority Report Form (page 11).
 - 6.1.2 SOD generates an ABB OMS order for Regional Control
 - 6.1.3 Inspections Supervisor captures ABB OMS ID # and details for Level 1 maintenance item status. Inspections Supervisor tracks Level 1 maintenance status with operations ensuring that the Level 1 item is completed within 30 days (NE) and 7 days (NY). Inspection Supervisor closes out the Level 1 maintenance item in the Distribution Maintenance Database by adding the ABB OMS ID # number to maintenance record.
- 6.2 NY Only - Level 2 and Level 3 priority maintenance codes are completed in the Distribution Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID DISTRIBUTION STANDARDS.

ALL MAINTENANCE WORK PERFORMED THAT WAS IDENTIFIED ON THE WORK ORDER OR DISCOVERED DURING THE REPLACEMENT/REPAIR/CORRECTION OF THE ORIGINAL MAINTENANCE PROBLEM SHALL BE LISTED ON THE DATABASE AND THEN CLOSED OUT WHEN COMPLETE.

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DISTRIBUTION FIELD SURVEY WORKSHEET



REGION	DISTRICT	EMPLOYEE ID	DATE
FEEDER	TAX DISTRICT/TOWN	MAP #	
LINE # / ROUTE #	POLE # / SUFFIX #		
LOCATION			
# MAIN LINE CATV ATTACHMENT 1 2 3 4 5	# MAIN LINE TELEPHONE ATTACHMENT 1 2 3 4 5	STREET LIGHT ATTACHED <input type="checkbox"/> Yes <input type="checkbox"/> No	
WOOD POLE MOUNTED STREET LIGHT	REGULATOR	SPACER CABLE	P/Q
098 1,2 (NR) <input type="checkbox"/> Street Light Hazard Cond.	170 1,2 (NR) <input type="checkbox"/> Oil Weeping	270 1,2,3,9 (R) <input type="checkbox"/> Damaged/Missing Spacer	/
099 2 (NR) <input type="checkbox"/> Not Bonded	171 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	271 1,2,3,9 (R) <input type="checkbox"/> Bracket Damage	/
POLE	172 2 (R) <input type="checkbox"/> Missing Ground Wire	272 3 (R) <input type="checkbox"/> Bracket Not Bonded	/
106 3,9 (NR) <input type="checkbox"/> DBI Wood-NG Trnsf Req'd	174 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	273 3 (R) <input type="checkbox"/> Messenger Not Bonded	/
107 4 (NR) <input type="checkbox"/> DBI Wood-Tel Trnsf Req'd	175 3 (R) <input type="checkbox"/> Improper/Missing Bond	274 3 (R) <input type="checkbox"/> Messenger Guard Missing	/
108 4 (NR) <input type="checkbox"/> DBI Wood-CATV Trnsf Req'd	176 3 (R) <input type="checkbox"/> Animal Guard Missing	275 3 (R) <input type="checkbox"/> Uncovered Splice	/
110 1,2,9 (RP) <input type="checkbox"/> Broken/severely damaged	177 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	CUTOUT	
111 1,2,3,4 (RP) <input type="checkbox"/> Visual Rotting Grd Line		280 2 (R) <input type="checkbox"/> Defective Cutout	/
112 1,2,3 (RP) <input type="checkbox"/> Woodpecker Holes - Replace	SECTIONALIZER	281 2 (R) <input type="checkbox"/> Potted Porcelain	/
113 3 (NR) <input type="checkbox"/> OutNap Treated Bltmark/Yr	180 1,2 (NR) <input type="checkbox"/> Oil Weeping	287 4 (NR) <input type="checkbox"/> 3 Phase Equip Mount	/
114 2 (R) <input type="checkbox"/> Woodpecker Holes	181 2 (R) <input type="checkbox"/> Bushings Broken/Cracked	288 3 (NR) <input type="checkbox"/> S&C SWD - 2D Power Fuse	/
115 1,2,3,9 (NR) <input type="checkbox"/> Riser Guard Req'd	182 2 (R) <input type="checkbox"/> Missing Ground Wire	RISER	
116 1,2,3,9 (RP) <input type="checkbox"/> Visual Rotting Pole Top	183 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	290 1,2,3,9 (NR) <input type="checkbox"/> Improper Cable Supp/Term	/
117 1,2 (NR) <input type="checkbox"/> Leaning Pole	184 3 (R) <input type="checkbox"/> Improper/Missing Bond	291 2 (R) <input type="checkbox"/> Improper/Missing Bond	/
118 4 P (NR) <input type="checkbox"/> Stencil / Correction Req'd	185 3 (R) <input type="checkbox"/> Animal Guard Missing	292 3 (R) <input type="checkbox"/> Animal Guard Missing	/
119 4 (NR) <input type="checkbox"/> Bird's Nest	186 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	293 2,3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	/
CROSSARM	RECLOSER	CONDUCTOR	
120 1,2,4,9 (R) <input type="checkbox"/> Damage Arm	190 1,2 (R) <input type="checkbox"/> Oil Weeping	300 4 (NR) <input type="checkbox"/> Pole Clearance	/
121 1,2,4,9 (NR) <input type="checkbox"/> Loose/Defective Pins	191 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	HANDHOLES	
122 3 (NR) <input type="checkbox"/> Wooden Pine 13.2kv	192 2 (R) <input type="checkbox"/> Missing Ground Wire	600 1,2,9 (NR) <input type="checkbox"/> Broken/Damaged/Unsecured	/
123 1,2,4,9 (R) <input type="checkbox"/> Loose Brace, Hrdwr	193 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	601 4 (NR) <input type="checkbox"/> Improper Grade	/
124 1,2,4,9 (R) <input type="checkbox"/> Damage DBI Crossarm	194 3 (R) <input type="checkbox"/> Improper/Missing Bond	602 P (NR) <input type="checkbox"/> Missing Nomenclature	/
125 1,2,4,9 (R) <input type="checkbox"/> Damage Alley Arm	195 3 (R) <input type="checkbox"/> Animal Guard Missing	603 1 (R) <input type="checkbox"/> Secondary Needs Repair	/
127 1,2 (R) <input type="checkbox"/> Primary On Arm	196 2,3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	604 4 (NR) <input type="checkbox"/> Other (use comments)	/
128 3,9 (R) <input type="checkbox"/> Loose Ridge Pin	197 2 (R) <input type="checkbox"/> Trip Saver - Light On	605 4 (NR) <input type="checkbox"/> Excessive Vegetation	/
INSULATOR	SWITCH	SWITCHGEAR	
130 1,2 (R) <input type="checkbox"/> Broken/Cracked/Flashed	203 1,2 (R) <input type="checkbox"/> Gang Oper'd Defective	651 1,2,3 (R) <input type="checkbox"/> Barrier Brkn/Dmgd/Unsec	/
131 1,2,9 (R) <input type="checkbox"/> Floating	204 1,2,3 (R) <input type="checkbox"/> Single Phase Defective	652 1,2 (NR) <input type="checkbox"/> Base Broken/Damaged	/
132 4 (NR) <input type="checkbox"/> 17 Aluminum Capped	205 3 (R) <input type="checkbox"/> Improper/Missing Bond	656 1,2,9 (R) <input type="checkbox"/> Door Broken/Damaged	/
133 3 (R) <input type="checkbox"/> Non-Standard Voltage	207 3,4 (R) <input type="checkbox"/> LA Blown/Missing/Improper	657 1 (NR) <input type="checkbox"/> Excessive Vegetation	/
134 4 (NR) <input type="checkbox"/> AL Cap Assoc w/Switch/Fuse	208 2 (NR) <input type="checkbox"/> Handle Not Bonded	660 P (NR) <input type="checkbox"/> Missing Nomenclature	/
PRIMARY	GROUND	661 4 (NR) <input type="checkbox"/> Other	/
140 1,2,9 (R) <input type="checkbox"/> Insuff. Gmd Clearances	210 1,2,9 (R) <input type="checkbox"/> Wire Broken/Loose	662 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
141 1,2,9 <input type="checkbox"/> Damaged Cond/Brkn Strands	211 1,2 (R) <input type="checkbox"/> Hazard Condition	PAD TRANSFORMER	
142 1 (NR) <input type="checkbox"/> Limbs on Primary	212 3 (NR) <input type="checkbox"/> Guard Req'd	673 1,2 (R) <input type="checkbox"/> Door Broken/Damaged	/
145 1,2,3 (R) <input type="checkbox"/> Dmg'd Straps/Connector	213 3,4 (NR) <input type="checkbox"/> Non Standard	676 4 (NR) <input type="checkbox"/> Excessive Vegetation	/
146 1,2,3 (R) <input type="checkbox"/> Improper Seg	214 3,9 (NR) <input type="checkbox"/> Not Bonded to Neutral	681 4 P (NR) <input type="checkbox"/> Missing Nomenclature	/
147 3 (R) <input type="checkbox"/> LA Missing Transition	GUY	684 1,2 (NR) <input type="checkbox"/> Oil Weeping	/
148 3 (R) <input type="checkbox"/> LA Missing End of Line	215 3 (NR) <input type="checkbox"/> Guy-Span Not In Compliance w/Code	685 1,2,3,4,9 (NR) <input type="checkbox"/> Pad Broken/Damaged	/
149 3 (R) <input type="checkbox"/> LA Blown	ANCHOR	686 4 (NR) <input type="checkbox"/> Protection (Ballards)	/
TRANSFORMER	220 4 P (NR) <input type="checkbox"/> Guy Wire Marker	687 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
150 1,2 (NR) <input type="checkbox"/> Oil Weeping	221 3 (NR) <input type="checkbox"/> Not In Compliance w/Code	688 1,2,9 (NR) <input type="checkbox"/> Pushed Off Base	/
151 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	222 3,9 (NR) <input type="checkbox"/> Excessive Slack	ENCLOSURES	
152 2 (R) <input type="checkbox"/> Missing Ground Wire	223 1,2,3,9 (R) <input type="checkbox"/> Broken Wire	740 1,2,3,4 (R) <input type="checkbox"/> Base Broken/Cracked	/
153 2,3,4 (R) <input type="checkbox"/> LA Blown/Missing/Improper	ANCHOR	741 1,2,3,9 P (R) <input type="checkbox"/> Door Brkn/Dmgd/Unsec	/
154 3,4 (NR) <input type="checkbox"/> Not in Use	226 1,2,3,9 (NR) <input type="checkbox"/> Req'd - Jt. Owned	743 4 (NR) <input type="checkbox"/> Excessive Vegetation	/
155 3,4 (R) <input type="checkbox"/> Animal guards required	227 1,2,3,9 (NR) <input type="checkbox"/> Req'd - Sole NG	745 4 P (R) <input type="checkbox"/> Missing Nomenclature	/
156 3 (NR) <input type="checkbox"/> Non Std Install of Gap	SECONDARY	746 4 (NR) <input type="checkbox"/> Rusted/Paint Peeling	/
157 2 (R) <input type="checkbox"/> Improper/Missing Bond	231 1 (NR) <input type="checkbox"/> Limb on Secondary	POLE INSPECTION	
CAPACITOR	232 1,2,9 (NR) <input type="checkbox"/> Improper Sag	801 1,2,3,4 (R) <input type="checkbox"/> Identified Priority Pole	/
160 1,2 (NR) <input type="checkbox"/> Oil Weeping	234 1,2,3,9 (NR) <input type="checkbox"/> Floating	802 1,2,3,4 (R) <input type="checkbox"/> Identified Reject Pole	/
161 1,2 (R) <input type="checkbox"/> Bulging	SERVICE	803 4 (NR) <input type="checkbox"/> Excessive Climbing	/
162 1,2 (R) <input type="checkbox"/> Bushings Broken/Cracked	240 1 (NR) <input type="checkbox"/> Ins. Loose from House	804 4 (NR) <input type="checkbox"/> Climbing Inspection	/
163 2 (R) <input type="checkbox"/> Missing Ground Wire	241 1 (NR) <input type="checkbox"/> Limb on Service		
164 2 (NR) <input type="checkbox"/> Blown Fuse	245 1,9 (NR) <input type="checkbox"/> Non Std/Unsecured		
165 3 (NR) <input type="checkbox"/> Improper/Missing Bond	ROW		
166 3 (R) <input type="checkbox"/> Animal Guard Missing	250 4 (NR) <input type="checkbox"/> Brush/Tree/Meshout		
167 3 (R) <input type="checkbox"/> LA Blown/Missing/Improper	GIS		
168 4 (NR) <input type="checkbox"/> Control Cab Height/Ground	260 4 (NR) <input type="checkbox"/> Map Doesn't Match Field		
169 4 (NR) <input type="checkbox"/> Capacitor Out of Service	261 4 (NR) <input type="checkbox"/> Pole/Line Numbering Error		
	262 4 (NR) <input type="checkbox"/> Equip/Hardware/Missing		
	263 4 (NR) <input type="checkbox"/> Equip Removed in Field		
	Remove From GIS		
	264 4 (NR) <input type="checkbox"/> Misc. Transmission Overbuilt		
	269 4 (NR) <input type="checkbox"/> Other GPS/GIS Errors		

NG0286 (02/15)

Comments:

KEY
P/Q = Priority / Quantity
NR = Maint. Code May Not Directly Affect Reliability
R = Maint. Code May Affect Reliability
RP = Maint. Code May Affect Reliability and Has Specific Program to Place to Address

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Level “1” & Elevated Voltage Priority Report Form

Any Level “1” Priority or Elevated Voltage condition found must be called into Dispatch.

Feeder: _____

Line #: _____

Pole #: _____

Closest Meter #: _____

Street Address: _____

City/Town: _____

Level “1” Priority/Elevated Voltage condition found.

◀ **Call Dispatch to inform that this is either an Elevated Voltage call or an Inspection issue.**

Dispatcher notified: _____

Date/Time: _____

Inspector: _____

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7.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	04/01/11	This document supersedes document dated 08/17/09.
2.0	04/27/15	This document supersedes document dated 12/03/14
3.0	04/25/17	Four-year revision, separated by state and removed priority levels 2 & 3 for MA & RI, NY Remains the same, Aligned with UG 006 for uniformity.
4.0	10/01/20	Updated Accountability section to reflect department name changes, Section 1: Added Safety Section, Introduction, Section 5.2, 6.1.3: Updated Repair time for New England.

File: NG-EOP D004 Distribution Line Patrol and Maintenance SMM	ORIGINATING DEPARTMENT: T&D Services	SPONSOR: Fawad Amjad
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Appendix 11

NG-USA EOP UG006 Underground Inspection and Maintenance

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	UNDERGROUND INSPECTION AND MAINTENANCE	Version 2.0 – 10/01/20

INTRODUCTION

The purpose of this procedure is to outline the requirements for the patrol and maintenance activities associated with National Grid’s Underground Transmission and Distribution facilities.

The inspection procedures shall be dictated by the individual states’ regulatory agency. If the regulatory agency in a specific state (MA & RI) does not require inspection procedures the inspections can still be performed in those states per this EOP but are not required.

This program is designed for the patrol and designated maintenance of underground facilities on a five (5) year schedule for New York only. Massachusetts and Rhode Island will perform working inspections on underground facilities each time work is performed. The Inspector or crew member will record all required maintenance on an approved National Grid database.

The underground distribution facility maintenance items identified through this patrol or working inspection are separated into four priority levels 1, 2, 3, and 4. The maintenance codes identified default to the appropriate priority level. The default priority level can be adjusted by the individual performing the inspection based on actual field conditions. These priority Levels are defined as follows:

Level 1 - All “Level 1 Priority” conditions identified shall be repaired / corrected within 7 days.

Level 2

New York - All “Level 2 Priority” conditions identified shall be repaired / corrected within 1 year.

New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan

Level 3

New York - All “Level 3 Priority” conditions shall be repaired within 3 years.

New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan

Level 4 – All “Level 4 Priority” conditions are for inventory purposes only.

All Level 1 priority conditions identified in the field by a contractor shall notify their PMCC contact. The PMCC contact shall notify dispatch and local underground supervision.

Any Level 1 priority conditions identified in the field by National Grid crews shall notify dispatch and their local supervision.

All Level 1 priority conditions identified in the field by the Underground Inspector shall be called in as follows:

1. Notification by location:

New York: System Operations Dispatch 1-877-716-4996

NE North: Bay State West & Central: Northborough Control Center 1-508-421-7879

NE North: North & Granite: Northborough Control Center 1-508-421-7879

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NE South: Bay State South & Ocean State (RI): Northborough Control Center 1-508-421-7885

2. Detailed information provided to the regional notification location:
 - a. Identify yourself as a Company Underground Inspector, Crew Member, Supervisor or PMCC contact and your work reporting area.
 - b. Details of the Level 1 Priority Condition:
 - i. Problem found.
 - ii. District, Circuit/Feeder No., Line No., Tax District and Manhole/Vault No.
 - iii. Street address and any additional information that would assist in finding the location of the problem.
 - iv. If you are standing by or have secured the location.

PURPOSE

This procedure applies to all personnel involved with or responsible for the inspection or maintenance of Underground Transmission and Distribution facilities.

ACCOUNTABILITY

1. Electric Work Methods
 - A. Update procedure as necessary.
 - B. Provide personal guidance and assistance as requested.
2. Operations
 - A. Ensure the components of the procedure are implemented.
 - B. Ensure workers are trained in this procedure.
 - C. Provide revision input as necessary.
 - D. Ensure the work generated by the Distribution Maintenance Program and assigned by Asset Strategy and Investment Planning is completed in the appropriate time frame.
 - E. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.
3. Distribution Line Contracting
 - A. At the request of Operations, obtain schedule and manage contractors to perform inspections and required maintenance.
 - B. Provide input into program revisions.
4. Distribution Network Strategy
 - A. Select program codes/circuits to be scheduled for maintenance repair work using data collected through Distribution Maintenance Program.
 - B. Approve changes to the maintenance code table.
 - C. Select circuits to be patrolled for a running five-year cycle.
 - D. Provide input into program revisions.
5. Inspections
 - A. Ensure circuits scheduled for patrol are completed each year.
6. Employees
 - A. Demonstrate the understanding of the procedure.
 - B. Comply with the requirements of the procedure.

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REFERENCES

NY PSC Order 04-M-0159
 NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
 National Grid Safety Procedures
 National Grid Employee Safety Handbook
 NG-EOP D004 Distribution Line Patrol and Maintenance
 NG-EOP G011 Preparation and Distribution of Electric Facilities Records
 NG-EOP G016 Elevated Equipment Voltage Testing
 NG-EOP UG001 Infrared Non-Contact Thermometer Inspection Requirement for Underground Equipment
 NG-EOP T007 Transmission Line Patrol and Maintenance
 Massachusetts DTE Directive 12/9/05
 US Sanction Paper, MA FY15 Distribution Inspection and Maintenance (I&M) Program USSC-14-080
 Signed by Lee S. Eckert 4/7/14

TRAINING

Provided by appropriate National Grid training program.

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1.0 SAFETY REQUIREMENTS

1.1 All work shall be performed in accordance with:

- 1.1.1 National Grid Employee Safety Handbook
- 1.1.2 Applicable National Grid Electric Operating Procedures (EOP)
- 1.1.3 Applicable National Grid Safety and Health Procedures (SHP)
- 1.1.4 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

1.2 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:

- 1.2.1 Traffic control devices – Work Area Protection (WAP)
- 1.2.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.

1.3 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).

- 1.3.1 Use of EH Overshoes if MAD will be broken, according to NG-EOP-26 “Mechanized Equipment Grounding”

1.4 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP-G037 “Process Hazard Analysis”

1.5 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods Infonet site for Arc Flash Table to determine working distance and energy levels – see link below:

[Arc Flash Table](#)

2.0 PATROLS

2.1 New York

- 2.1.1 Inspection of underground equipment will be scheduled in such a manner that each underground facility listed in section 3, will be examined once every five years. These patrols shall be completed by December 31st of the schedule year.
- 2.1.2 One-fifth (20%) of all underground utility components should be inspected each year.
 - a. URD and UCD facilities shall be inspected in accordance with NG-EOP D004 existing overhead distribution circuit schedule

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- b. All riser poles are inspected in accordance with NG-EOP T007 and NG-EOP D004.
 - c. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.
 - d. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.
 - e. Customer owned manholes and vaults that enclose National Grid equipment shall require the inspection of these National Grid facilities.
 - f. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the patrols are completed.
- 2.1.3 The Inspection group is responsible to create the patrol schedule for their respective Areas for the remainder of underground facilities.
- a. The Inspector uses a Windows® based hand-held computer to record information pertaining to the asset being inspected.
 - b. The Inspector shall capture the region, district, employee ID, feeder number, structure ID number, GPS location, tax zone, line number, comments and maintenance problem codes.
 - c. The Inspector while patrolling should also record missing nomenclature codes for the various UG facilities per form NG0244 – “Inspection program and maintenance codes.”
 - d. The Inspector will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.
 - e. If the Inspector finds unmapped facilities from the information supplied from the Geographic Information System (GIS), refer to NG-EOP G011.

2.2 Rhode Island

- 2.2.1 A working inspection on underground facilities is required each time a crew performs work at one of those facilities listed in section 3.
- a. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.
 - b. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.
 - c. Customer owned manholes and vaults that enclose National Grid equipment shall require a working inspection of National Grid facilities.
 - d. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the working inspections are completed.

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2.2.2 The crew shall record the following

- a. Region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes.
- b. The crew while inspecting, should also record missing nomenclature codes for the various UG facilities, if found deficient upon inspection.
- c. The crew will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.
- d. If the crew finds unmapped facilities from the information supplied from GIS, refer to NG-EOP G011, for required procedure for corrections.
- e. Crews shall perform working inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

2.3 Massachusetts

2.3.1 A working inspection on underground facilities is required each time a crew performs work at one of these facilities listed in section 3.

- a. Refer to NG-EOP UG001 for infrared, non-contact thermometer inspections of separable connectors.
- b. An elevated equipment voltage test shall be completed at each location, refer to NG-EOP G016.
- c. Customer owned manholes and vaults that enclose National Grid equipment shall require a working inspection of National Grid facilities.
- d. A manhole inspection sheet shall be completed per the patrol intervals as stated in section 6.0. Manhole inspection form NG0453, shall be filled out at the same time the working inspections are completed.

2.3.2 The crew shall record the following

- a. Region, district, employee ID, feeder number, structure ID number, GPS location, line number, comments and maintenance problem codes.
- b. The crew while inspecting, should also record missing nomenclature codes for the various UG facilities, if found deficient upon inspection.
- c. The crew will input the code into the Windows® based handheld as required, as well as completing the work unit in the handheld upon field completion while at the site.
- d. If the crew finds unmapped facilities from the information supplied from GIS, refer to NG-EOP G011, for required procedure for corrections.
- e. Crews shall perform working inspections by using either a handheld data entry unit or paper inspection logs requiring data entry by clerical support.

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3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

3.1 This EOP requires the visual inspection of the following facilities as designated above for New York, Rhode Island or Massachusetts and may require manhole pumping to assure a proper inspection:

- | | |
|-----------------------------------|----------------------------|
| a. Manholes | g. Pad-mounted switchgears |
| b. Vaults | h. Submersible equipment |
| c. Handholes: non-fiberglass | i. Handholes* |
| d. Splice boxes: non-fiberglass | j. Splice boxes* |
| e. Junction boxes: non-fiberglass | k. Junction boxes* |
| f. Pad-mounted transformers | |
- * Fiberglass Enclosures do not require opening*

3.2 Maintenance Codes are shown on the Underground Field Survey Worksheet (Form NG-0244). The Underground Field Survey Worksheet should be used by the field to record maintenance items. Printed copies of the latest maintenance code tables may be obtained by running a report on the look up tables from the Underground Maintenance Database.

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INSPECTION PROGRAM AND MAINTENANCE CODES - FORM NG0244

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UNDERGROUND FIELD SURVEY WORKSHEET																								
DATE:			INSPECTOR NAME:				EMPLOYEE ID																	
DIVISION			DISTRICT				FEEDER:																	
TOWN:		STREET:			POLE, MANHOLE, VAULT #		SUFFIX #																	
Handhole	Manhole	Net Protect	Net XFMR's	Switchgear	Transformer																			
Vault	Trench	Submersible	Pull Box	Other	Equipment #																			
MANHOLES, HANDHOLES, VAULT STRUCTURES					EV Test Required: <input type="checkbox"/> Yes <input type="checkbox"/> No Voltage Action Taken: <input type="checkbox"/> Repaired <input type="checkbox"/> De-energized																			
Water (in hole) <input type="checkbox"/> Yes <input type="checkbox"/> No					EV Found Voltage: <input type="checkbox"/> Yes <input type="checkbox"/> No																			
<table border="1"> <thead> <tr> <th colspan="2">Gas Monitor Readings</th> <th>Alarm Setting</th> </tr> </thead> <tbody> <tr> <td>Lower Explosive Limit (LEL)</td> <td></td> <td>10% or above</td> </tr> <tr> <td>Oxygen (O₂)</td> <td></td> <td>% below 19.5, above</td> </tr> <tr> <td>Carbon Monoxide (CO)</td> <td></td> <td>33 ppm</td> </tr> <tr> <td>Hydrogen Sulfide (H₂S)</td> <td></td> <td>10 ppm</td> </tr> </tbody> </table>					Gas Monitor Readings		Alarm Setting	Lower Explosive Limit (LEL)		10% or above	Oxygen (O ₂)		% below 19.5, above	Carbon Monoxide (CO)		33 ppm	Hydrogen Sulfide (H ₂ S)		10 ppm					
Gas Monitor Readings		Alarm Setting																						
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Hydrogen Sulfide (H ₂ S)		10 ppm																						
GIS			FC	SWITCHGEAR			FC																	
260 4 (NR) GIS map doesn't match field			/	657 F (NR) Excessive vegetation			/																	
261 4 (NR) GIS Pole/line numbering in error on GIS			/	659 2 (R) Missing ground			/																	
262 4 (NR) GIS equip/hardware missing in GIS			/	660 P (NR) Missing nomenclature			/																	
263 4 (NR) GIS equip removed in field, remove from GIS			/	661 4 (NR) Other			/																	
269 4 (NR) GIS Other GPS/GIS Errors			/	662 4 (NR) Rusted/Paint Peeling			/																	
HANDHOLES				TRANSFORMER																				
600 2 (NR) Broken/damaged/unsecured				/	672 1,2,3 (R) Bushing Broken/Cracked			/																
602 P (NR) Missing nomenclature				/	673 1,2,3 (R) Door Broken/damaged/unsecure			/																
603 1 (R) Secondary needs repair				/	675 1,2,3 (R) Elbows/tracking/burned			/																
604 4 (NR) Other (use comments)				/	676 F (NR) Excessive vegetation			/																
MANHOLE				680 1 (R) Missing Ground																				
610 2 (NR) Ground rods missing				/	681 P (NR) Missing nomenclature			/																
611 2 (R) Cable/Joint leaking				/	682 4 (NR) Mud/debris			/																
612 2 (NR) Cables bonded/grid defective				/	684 1,2 (NR) Oil Weeping			/																
614 1,2,3,4 (NR) Cracked/broken				/	685 1,2,3,4 (NR) Pad broken/damaged			/																
615 3 (R) Fire proofing				/	686 4 (NR) Protection (ballards) damage			/																
616 4 (NR) Improper grade				/	687 4 (NR) Rusted/Paint peeling			/																
617 P (NR) Missing nomenclature				/	688 1,2 (NR) Pad Pushed Off Base			/																
620 2 (NR) Rerack				/	TRENCH																			
621 1,2,3,4 (NR) Ring/cover repair/replace				/	690 1 (R) Exposed Cable			/																
622 1,4 (NR) Roof condition - use comments				/	692 4 (NR) Path - Sunken			/																
623 1,4 (NR) Chimney Condition - comments				/	VAULTS																			
624 4 (NR) Manhole needs cleaning				/	700 2 (NR) Cable missing bond			/																
625 1 (R) Secondary needs repair				/	702 1,2,3,4 (NR) Cracked/broken			/																
626 4 (NR) No Holes in Manhole Cover				/	703 1,2,4 (NR) Damaged/broken cover			/																
NETWORK PROTECTOR				704 1,2,4 (NR) Damaged/broken door																				
630 2 (R) Barriers broken/damage				/	705 1,2,4 (NR) Damaged/broken ladder			/																
632 1 (R) Oil leak				/	706 1,2,3,4 P (NR) Improper grade			/																
633 2 (NR) Worn/damaged gasket				/	707 4 P (NR) Improper nomenclature			/																
NETWORK TRANSFORMER				708 4 (NR) Light not working																				
635 2 (R) Bushing Broken/cracked				/	712 4 (NR) Sump pump broken			/																
637 2 (R) Low oil				/	713 1 (R) Secondary needs repair			/																
638 1 (NR) Missing ground				/	SUBMERSIBLE EQUIPMENT																			
639 P (NR) Missing nomenclature				/	720 1,2,3,4 (R) Excess Corrosion			/																
642 1, 2 (R) Oil Weeping				/	721 1,2,3,4 (R) Physical damage			/																
643 4 (NR) Rusted/paint peel				/	722 1,2 (R) Leaking			/																
SWITCHGEAR				ANODES																				
651 1,2,3 (R) Barrier broken/damaged/unsecure				/	730 3 (R) Missing			/																
652 1,2,3 (NR) Base broken/damaged				/	731 3 (NR) Need replacement			/																
654 2 (R) Cable not bonded				/	KEY																			
656 1,2,3 (R) Door Broken/Damaged				/	PQ = Priority Quantity																			
				NR = Maint. Code May Not Directly Affect Reliab.																				
				R = Maint. Code May Affect Reliability																				
				RP = Maint. Code May Affect Reliab. and Has Specific Program to Place to Address																				
Comments:																								

NG-0244 7/09

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File: NG-EOP UG006 Underground Inspection and Maintenance JAT	Originating Department: T&D Services	Sponsor: Fawad Amjad
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4.0 MAINTENANCE DATABASE

- 4.1 The Maintenance Database consists of data downloaded from the Windows® based hand -held and data entered from the desktop computer. The Windows® based hand-held used in the field, can be downloaded to any National Grid desk top computer that is connected to the network and the inspector or crew member is logged on as a valid user of the UG Maintenance program.
- 4.2 The National Grid desktop computer is also used to generate various reports and work tickets depending on the user’s need. These reports are utilized to schedule and accomplish distribution maintenance work.

5.0 MAINTENANCE SCHEDULE

- 5.1 Maintenance activities are identified by maintenance codes. Maintenance codes are given a priority level to aide in the scheduling of work assuring a safe and reliable underground system.
- 5.2 Level 1 Priority Conditions All “Level 1 Priority” conditions identified shall be repaired/corrected within 7 days.
- 5.3 Level 2 Priority Conditions
 - 5.3.1 New York - All “Level 2 Priority” conditions identified shall be repaired/corrected within 1 year.
 - 5.3.2 New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan.
- 5.4 Level 3 Priority Conditions
 - 5.4.1 New York - All “Level 3 Priority” conditions shall be repaired within 3 years.
 - 5.4.2 New England (RI/MA) -working inspections will be reviewed, prioritized and scheduled according to the Annual Work Plan.
- 5.5 All “Level 4 Priority” conditions are for inventory purposes only.
- 5.6 NY Only - Once the Underground sequence is completed in the Underground Maintenance Database,
 - 5.6.1 Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS.
 - a. Expense maintenance work goes straight to scheduling
 - b. Capital work is sent to Underground Engineering/Design.

6.0 COMPLETION OF MAINTENANCE CODES

- 6.1 The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee.

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6.2 Level 2 and Level 3 priority maintenance codes are completed in the Underground Maintenance database once the 699 requirement is completed in STORMS for the work request associated with the maintenance code.

ALL MAINTENANCE WORK IS TO BE COMPLETED PER NATIONAL GRID UNDERGROUND CONSTRUCTION STANDARDS.

7.0 MANHOLE INSPECTION SHEET – FORM NG0453

- 7.1 The Manhole Inspection Sheet (Form NG0453) shall be filled out for every manhole, heavy duty handhole, primary pull-box or network secondary or radial secondary handhole. The sheet can be filled out on a paper form or an electronic device.
- 7.2 A manhole inspection sheet shall be completed per the patrol intervals or during a working inspection as stated in section 2.0. The manhole inspection sheet shall be filled out at the same time the patrols or working inspections are completed.
- 7.3 Operations will determine who will complete the manhole inspections sheets. If the individual completing the manhole inspection sheet finds unmapped facilities or incorrectly mapped facilities, refer to NG-EOP G011, Preparation and Distribution of Electric Facilities Records, for the required procedure for corrections.
- 7.4 The integrity of the secondary cables is critical to the proper operation of the network secondary system. It is possible that any secondary cable is either burned open or has a limiter which has operated, thus the affected cable will not be carrying any current.
 - 7.4.1 When working in a manhole, heavy duty handhole, primary pull-box or network secondary or radial secondary handhole with network secondary conductors:
 - a. Visually inspect secondary conductors looking for any burned, overheated or otherwise damaged insulation.
 - b. Check temperature of secondary conductors using the heat gun. Extremes of temperature or differences between sets going in the same direction are of interest.
 - c. Take current readings on each phase in each set. All cables should have some current. Cables with no current are of interest as they are likely burned off or have an open limiter. This information should be logged on the manhole inspection sheet.
 - d. If an open limiter is found during the inspection the open limiter shall be reported to Operations. Operations shall replace the open limiters expeditiously.
- 7.5 The manhole inspection sheets shall be given to the local engineering department for that respective region.
- 7.6 The local engineering department shall review the details of the manhole inspection sheets and determine the status and/or corrective action needed for their regional system.

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nationalgrid

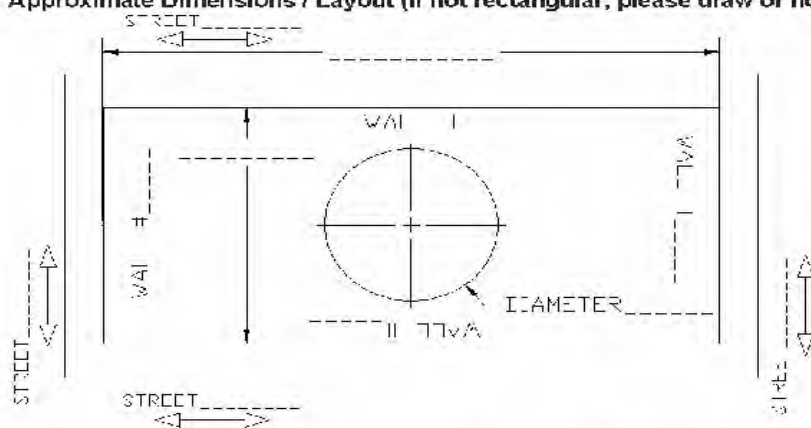
Manhole Inspection Sheet

Survey Date: _____ Manhole / Pullbox / Handhole Number _____

City / Town: _____ Streets / Intersect _____

Manhole / Pullbox / Handhole Construction (circle one): Brick Concrete Block Pre-cast

Approximate Dimensions / Layout (If not rectangular, please draw or note).



Manhole Cover:

Standard "NM"?

- Yes
- No

Standard Two - Piece?

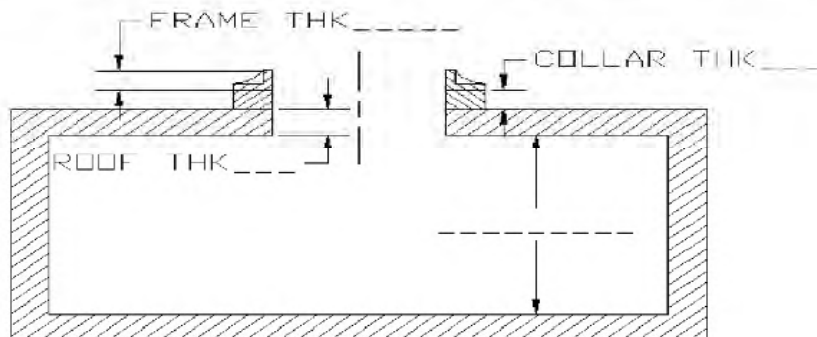
- Yes
- No

Flat Steel Covers?

- Yes
- No

If Yes, # of Covers? _____

Collar Material (circle one): Concrete Brick Other _____



NU3453 (CEP/4)

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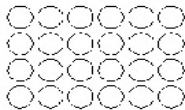
Wall # ____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes ____

Wall # ____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes ____

Wall # ____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes ____

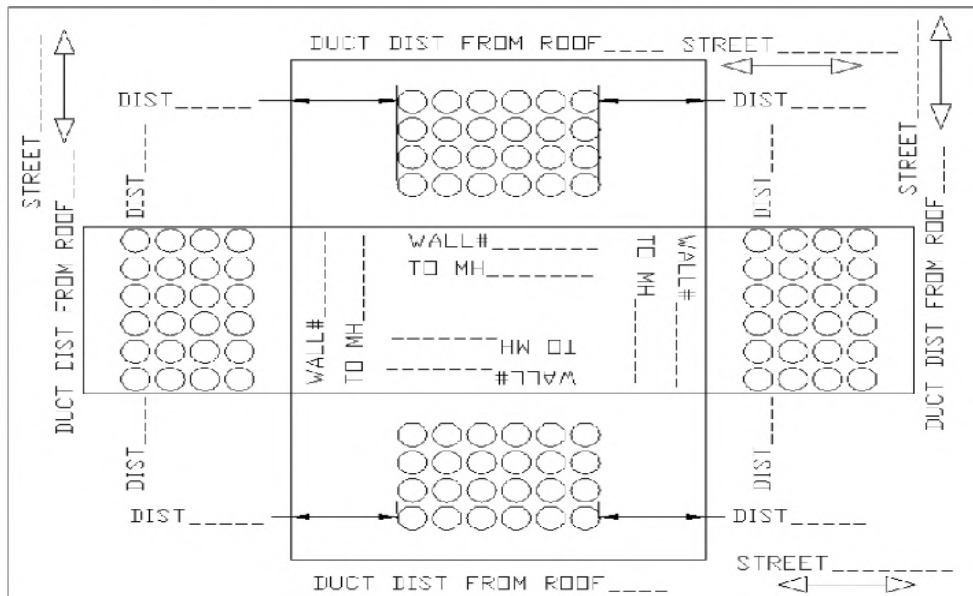
Wall # ____ Conduit Material (Circle One): Fiber Tile Steel PVC Conduit Sizes ____

Duct-line Configuration: Cross-out conduits in image below to illustrate configuration on each wall (2H4W example below). Additionally please fill in approximately measurements from duct-lines to roofs and walls. For multiple duct-lines, draw and note as appropriate.



Duct-line Occupancy Key:
A – Abandon Cable
E – Empty
P – Primary
S – Secondary
SL – Street Light
SV – Service Conductor
F – Fiber / Communications

When possible please note empty conduits, circuit #'s, and cable sizes.



N-50433 (08/14)

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Wall # _____

Secondary Sets:

PILC: # Sets _____ Conductor Size _____ Neutral Size _____

Lead Sheathed Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

EPR / Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

Customer / Building Services:

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Additional Comments / Other Work Required: _____

Wall # _____

Secondary Sets:

PILC: # Sets _____ Conductor Size _____ Neutral Size _____

Lead Sheathed Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

EPR / Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

Customer / Building Services:

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Additional Comments / Other Work Required: _____

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Wall # _____

Secondary Sets:

PILC: # Sets _____ Conductor Size _____ Neutral Size _____

Lead Sheathed Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

EPR / Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

Customer / Building Services:

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Additional Comments / Other Work Required: _____

Wall # _____

Secondary Sets:

PILC: # Sets _____ Conductor Size _____ Neutral Size _____

Lead Sheathed Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

EPR / Rubber: # Sets _____ Conductor Size _____ Neutral Size _____

Customer / Building Services:

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Address: _____ # Sets _____ Conductor Size / Type _____ Neutral Size _____

Additional Comments / Other Work Required: _____

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Secondary Bus Type:

Lead Wiped Secondary Splices: No Yes; if Yes # sets?_____

Crabs: No Yes

If Yes, Open Positions? No Yes # Open Positions_____

Moles: No Yes

If Yes; Open Positions? No Yes # Open Positions_____

Is there currently adequate space for Cable Limiters? Yes No

If there is not adequate space for Cable Limiters please note required work to accommodate installation (Mole Relocation, Civil Work, etc): _____

Is there Cathodic Protection currently installed? Yes No

Rack Insulators Required? (Broke or Missing) Yes No If Yes, How many?_____

Environmental Cleaning Required? Yes No

Amp Measurements Per Secondary Cable:

Phase	Phase	Phase

NG0453 (08/14)

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8.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	11/25/14	This document supersedes document dated 08/17/09.
2.0	10/01/20	Revised Introduction Section, updated contact phone numbers Revised Accountability, revised group titles, Deleted Definitions Section 1, Added Safety Template All Section broke up paragraphs to subsets

Appendix 12

NG-USA EOP T007.01 Transmission and Sub Transmission Ground Level Visual Inspection

nationalgrid	ELECTRIC OPERATING PROCEDURE TRANSMISSION and Sub TRANSMISSION	Doc. # NG-EOP T007.01
	GROUND LEVEL VISUAL INSPECTION and POST FAULT PATROL	Page 1 of 40 Version 3 – 04/16/21

INTRODUCTION

This document applies to all National Grid Transmission and Sub-Transmission assets as defined by NG-EOP T007.00. It also applies to anyone performing inspection and maintenance activities on these assets. This procedure shall be executed by qualified personnel as determined by training specific to the task.

PURPOSE

This procedure defines the requirements for the ground level visual inspection of Transmission and Sub-Transmission assets.

ACCOUNTABILITY

Specific planned work performed under this procedure will be coordinated by the following work groups via a work plan document to be released prior to the start of each fiscal year. The accountability does not apply if the EOP function is not performed by the work group.

- 1 **T&D Line Standards**
 - A Update procedure as necessary
 - B Provide personnel guidance and assistance as requested
- 2 **Transmission and Distribution Asset Management**
 - A Evaluate the overall conditions of Transmission and Distribution assets for the purpose of developing the annual work plan
 - B Create the inspection schedule, taking into account budget, resource availability and stakeholder input
 - C Analyze and develop work plan to address off cycle, walk-in or critical issues
- 3 **US Capital Delivery / Electric Operations / Transmission Inspection & Maintenance**
 - A Schedule and coordinate resources for transmission and distribution (above 15kV) asset inspections
 - B Ensure inspections as outlined in the fiscal year work plan are safely executed according to the stated procedures and performed in a timely manner
 - C Ensure worker understanding and comprehension of the requirements of this EOP
- 4 **Worker**
 - A Demonstrate the understanding of this procedure
 - B Comply with the requirements of this procedure

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COORDINATION

Specific planned inspections performed under this procedure will be coordinated by the following work groups via a work plan document to be released prior to the start of each fiscal year.

US Capital Delivery
 Transmission Inspection & Maintenance
 Electric Operations

REFERENCES

- National Grid Employee Safety Handbook
- NG-EOP G016 Elevated Equipment Voltage Testing
- NG-EOP T007.00 Line Inspections and Maintenance Activities
- NG-EOP T007.02 Aerial Visual Inspection
- NG-EOP T007.04 Steel Structure Foundation/Footer Inspection and Repair
- NG-EOP T007.05 Wood Pole Inspection and Treatment
- NG-TOP 18 TCC Post Interruption Line Patrol Procedure
- NY PSC Order 04-M-0159
- NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
- MA General Law #220 CMR 125, Section 20



TRAINING

Training Code: US_BD_ELE259 - Transmission Line Post Fault Inspections shall be taken prior to performing any post fault patrol and shall be reviewed annually.



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1.0 SAFETY

- 1.1 All work shall be performed in accordance with:
 - 1.1.1 National Grid Employee Safety Handbook
 - 1.1.2 Applicable National Grid Electric Operating Procedures (EOP)
 - 1.1.3 Applicable National Grid Safety and Health Procedures (SHP)
- 1.2 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.
- 1.3 The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:
 - 1.3.1 Traffic control devices – Work Area Protection (WAP)
 - 1.3.2 Emergency Events: communication methods (code blue), first responders, and closest hospital.
- 1.4 Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).
- 1.5 Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP-G037 “Process Hazard Analysis”
- 1.6 Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods Infonet site for Arc Flash Table to determine working distance and energy levels – see link below:

[Arc-Flash-Awareness-and-Mitigation](#)

2.0 GENERAL

- 2.1 All assets shall be physically visited and inspected

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File: NG-EOP T007.01 Ground Level Visual Inspection TPH	Originating Department: Transmission Line Engineering	Sponsor: Nicole Maglione (Nims)

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- 2.1.1 All potential defects can be identified
- 2.1.2 Inspected from ground level
 - a. Use binoculars or scopes as needed
- 2.1.3 Exceptions must have approval from the appropriate department manager and be documented in the MMS
- 2.1.4 Inspect structures in the order they exist
 - a. Use appropriate inspection procedure for the asset
- 2.2 Inspections recorded in Computapole
 - 2.2.1 This procedure arranged in same order as Computapole priority codes
 - 2.2.2 Some Computapole codes do not apply to this procedure
 - 2.2.3 Refer to Appendix J for a complete list of Computapole codes
 - a. Including valid levels and STORMS qualifiers

3.0 POST FAULT PATROL

- 3.1 Post fault patrols shall use Survey 123 for final Transmission Line Inspection submission of voltages 69kV and above.
- 3.2 Complete Survey 123 data entry during patrol
- 3.3 All defects in the defined area of the Post Fault Patrol shall be reported along with photos.
 - 3.3.1 Even if it is believed the defect has been previously reported
- 3.4 If no obvious cause for the fault is located, note that further investigation is required
 - 3.4.1 Transmission Asset Management will determine future actions
 - a. Potential future actions include
 - 1. Comprehensive Inspection of suspect area
 - 2. Capital or maintenance project(s) to address areas of concern.

4.0 INSPECT STEEL CONDITION

- 4.1 Grading Reference:
 - 4.1.1 Appendix B 'Steel Evaluation Ratings' (1-6)
 - a. Assign a Rating as appropriate
- 4.2 Inspect the following:
 - 4.2.1 Steel condition
 - 4.2.2 Weathering steel for excessive corrosion of joints

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- a. Report any excessive corrosion of weathering steel joints to Transmission Maintenance

4.3 Inspection Note:

4.3.1 Grade all steel collectively

- a. The overall rating shall be the worst 5% of
 - 1. Members on a tower
 - 2. Discrete area on a steel pole
- b. Or the rating of the worst critical members
 - 1. Tower legs
 - 2. Insulator attachment points

4.3.2 Rating of 4 and higher requires additional review

- a. Additional photos and notes shall be taken to assist the review

4.3.3 Rating of 6:

- a. Used at the discretion of the Inspector
 - 1. Due to special circumstances
 - 2. The reason shall be noted on the report

5.0 INSPECT STEEL GRILLAGE FOUNDATION

5.1 Grading Reference:

5.1.1 Appendix B – ‘Steel Evaluation Ratings’ (1-6)

- a. Assign a Rating as appropriate

5.2 Inspect the following:

5.2.1 Steel condition above grade

6.0 INSPECT CONCRETE FOUNDATION

6.1 Grading Reference:

6.1.1 Appendix C – ‘Concrete Evaluation Rating / Matrix’ (1-5)

- a. Assign a Rating as appropriate

6.2 Inspect for the following:

- 6.2.1 Poor workmanship, including honeycombing
- 6.2.2 Cracking, including pattern or solitary cracks
- 6.2.3 Disintegration and deterioration of concrete
- 6.2.4 Distortion/movement resulting in change in alignment of structure components

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- 6.2.5 Seepage – movement of water/fluids through pores
- 6.2.6 Spalling – development of fragments
- 6.2.7 Delamination
- 6.2.8 Degradation of steel/concrete interface
- 6.2.9 Excessive corrosion of reinforcement
- 6.2.10 Condition of anchor bolts
 - a. All hardware present and tight
- 6.3 Rating of 5:
 - 6.3.1 Used at the discretion of the Inspector
 - a. Due to special circumstances
 - b. The reason shall be noted on the report

7.0 INSPECT WOOD POLE AND STRUCTURE - OVERALL

- 7.1 Grading Reference:
 - 7.1.1 Appendix D – ‘Wood Structure Evaluation’ (Priority 1-4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
- 7.2 Inspect for the following:
 - 7.2.1 Code 510 – Broken
 - 7.2.2 Code 511 – Visual rotting/hollow sounding
 - a. Level 4 shall be assigned and
 - 1. Scheduled for Wood Pole inspection
 - b. Unless deemed an immediate failure risk
 - 7.2.3 Code 512 – Leaning
 - 7.2.4 Code 513 – Replace single arm
 - 7.2.5 Code 514 – Replace double arm
 - 7.2.6 Code 515 – Repair brace
 - 7.2.7 Code 516 – Replace brace
 - 7.2.8 Code 517 – Replace anchor
 - 7.2.9 Code 518 – Install anchor
 - 7.2.10 Code 519 – Repair/replace guy wire
 - 7.2.11 Code 521 – Tighten guy wire

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- 7.2.12 Code 522 – Replace guy shield
- 7.2.13 Code 524 – Guy bonding
- 7.2.14 Code 525 – Lightning damage
- 7.2.15 Code 526 – Woodpecker damage
- 7.2.16 Code 527 – Insects
- 7.2.17 Code 528 – Aerial number missing

8.0 INSPECT WOOD POLE – INDIVIDUAL

- 8.1 Grading Reference:
 - 8.1.1 Appendix E - ‘Individual Wood Pole Evaluation’ (Priority 1-4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
- 8.2 C-Truss
 - 8.2.1 Is considered a permanent repair
 - 8.2.2 Significant deterioration of pole shall be graded as if no C-Truss was installed
- 8.3 Identify pole inspection / repair
 - 8.3.1 Document tag left after Wood Pole Inspection and Treatment
 - a. EOP T007.05
 - 8.3.2 Level 4 only
- 8.4 Inspect for the following:
 - 8.4.1 Code 901 – Identified priority pole
 - 8.4.2 Code 902 – Identified reject pole
 - 8.4.3 Code 903 – Excessive checking
 - 8.4.4 Code 904 – Climbing inspection required
 - 8.4.5 Code 905 – No inspection tag

9.0 INSPECT STEEL POLE AND STRUCTURE

- 9.1 Grading Reference:
 - 9.1.1 Appendix F – ‘Steel Pole and Structure Evaluation’ (Priority 1-4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
- 9.2 Inspect for the following:

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- 9.2.1 Code 531 - Broken legs
- 9.2.2 Code 532 - Aerial number missing
- 9.2.3 Code 534 - Loose or missing bolts/hardware
- 9.2.4 Code 535 - Anti climb equipment damaged/missing
- 9.2.5 Code 536 - Vegetation on tower
- 9.2.6 Code 537 - Structure damage
- 9.2.7 Code 538 - Tower needs straightening
- 9.2.8 Code 539 - Arms damaged

10.0 INSPECT CONDUCTOR

- 10.1 Grading Reference:
 - 10.1.1 Appendix G – ‘Conductor and Line Hardware Evaluation’ (Priority 1- 4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
- 10.2 Inspect for the following:
 - 10.2.1 Code 541 - Conductor condition overall
 - 10.2.2 Code 542 - Static wire condition overall
 - 10.2.3 Code 543 - Ground wire condition overall
 - 10.2.4 Code 544 - Sleeve/splice/connector condition
 - 10.2.5 Code 546 - Clearance issues
- 10.3 Transmission Maintenance may revise Priority for conductor damage
 - 10.3.1 Based on mechanical and electrical loading

11.0 INSPECT INSULATORS / HARDWARE

- 11.1 Grading Reference:
 - 11.1.1 Appendix G – ‘Conductor and Line Hardware Evaluation’ (Priority 1- 4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
- 11.2 Multiple insulator strings shall be evaluated individually
- 11.3 Inspect for the following:
 - 11.3.1 Code 551 – Insulator damage
 - 11.3.2 Code 552 – Insulators out of plumb

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11.3.3 Code 553 - Hardware loose or damaged

11.3.4 Code 555 - Lightning arrestor issues

12.0 INSPECT FOUNDATION:

12.1 Grading Reference:

12.1.1 Appendix H – ‘Foundation Evaluation’ (Priority 1-4)

a. Use the indicated code

1. Assign a Priority to each item

12.2 Inspect for the following:

12.2.1 Code 563 – Erosion

13.0 INSPECT RIGHT OF WAY:

13.1 Grading Reference:

13.1.1 Appendix I – ‘ROW / Misc. / Switch / GIS Evaluation’ (Priority 1-4 or F)

a. Use the indicated code

1. Assign a Priority to each item

13.1.2 All Code 574 – Danger Trees rated as an “F”

13.2 Inspect for the following:

13.2.1 Code 571 – Erosion

13.2.2 Code 572 – Encroachments

13.2.3 Code 573 – Debris

13.2.4 Code 574 - Danger trees

a. Priority F

13.2.5 Code 575 - Broken gates

13.2.6 Code 576 - Oil/Gas/Hazmat situation

14.0 INSPECT MISCELLANEOUS:

14.1 Grading Reference:

14.1.1 Appendix I – ‘ROW / Misc. / Switch / GIS Evaluation’ (Priority 1-4 or P)

a. Use the indicated code

1. Assign a Priority to each item

14.2 Visually inspect for the following:

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- 14.2.1 Code 581 - Structure not marked – ground level
- 14.2.2 Code 582 - Switch damaged (see Section 14)
- 14.2.3 Code 583 - Switch grounding damaged (see Section 14)
- 14.2.4 Code 584 - Install warning sign
- 14.2.5 Code 585 - Replace warning sign
- 14.2.6 Code 586 - Remove steps
- 14.2.7 Code 587 - Add dirt and tamp
- 14.2.8 Code 589 - Bird Nest
- 14.2.9 Code 590 - Excessive bird perching

15.0 INSPECT SWITCH:

- 15.1 Grading Reference:
 - 15.1.1 Appendix I – ‘ROW / Misc. / Switch / GIS Evaluation’ (Priority 1-4)
 - a. Use the indicated code
 - 1. Assign a Priority to each item
 - 15.1.2 With the switch in service
 - a. Refer to EOP T006 for further information
 - 15.1.3 Single code is used for most of this inspection
 - a. Record problem details
- 15.2 Inspect for the following:
 - 15.2.1 Code 582 Noise
 - a. Arcing or other abnormal noise
 - 1. Leave the area immediately
 - 2. Contact the appropriate control center
 - 15.2.2 Code 582 Insulators
 - a. Surface contamination
 - b. Tracking
 - c. Damaged porcelain
 - 15.2.3 Code 582 Primary Connections
 - a. Overheating
 - 1. Discoloration of or heat rising from connections
 - b. Cracks

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- c. Loose connections
- 15.2.4 Code 582 Live Parts
 - a. Blades properly turned into jaws
 - b. Damaged, misaligned or missing arcing horns
 - c. Damaged, misaligned or missing parts
- 15.2.5 Code 582 Load Break Interrupters
 - a. Damage
 - b. Deterioration
- 15.2.6 Code 582 Operating Mechanism
 - a. Properly locked
 - b. Operating pipe / Interphase linkage
 - 1. Broken
 - 2. Bent
 - c. Manual operating mechanism for
 - 1. Damage
 - 2. Deterioration
 - 3. Missing parts
- 15.2.7 Code 583 Operating Mechanism Ground
 - a. Broken
 - b. Loose
 - c. Missing

16.0 DOCUMENT GIS DATA ISSUES

- 16.1 Grading Reference:
 - 16.1.1 Appendix I – ‘ROW / Misc. / Switch / GIS Evaluation’ (Priority 4 Only)
 - a. Use the indicated code
 - b. Include a note describing the problem / correction required
- 16.2 Document all mismatches between the GIS and the field:
 - 16.2.1 Code 760 - GIS map mismatch
 - 16.2.2 Code 761 - GIS – equipment stencil mismatch
 - 16.2.3 Code 762 - GIS – equipment/hardware missing
 - 16.2.4 Code 763 - GIS – equipment removed in field

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16.2.5 Code 769 - GIS – other GPS/GIS errors

17.0 ENGINEERING-SPECIFIC INSPECTION

- 17.1 Additional guidelines for Inspections related to engineering activities
 - 17.1.1 Not to be included in the regular Ground Level Visual Inspection
- 17.2 Guidelines below shall be used by engineers
 - 17.2.1 To complete and interpret field Inspection data
 - 17.2.2 As part of preliminary engineering as specified in SP.06.01.101 “Transmission Engineering and Design Services”
- 17.3 Guidance provided in Sections 16.4 and 16.5 shall be used in completing engineering analysis of lines
- 17.4 Priority Descriptions
 - 17.4.1 Priority 1 – Reserved for immediate and substantial threats to public safety and/or system reliability. These should generally be very rare.
 - 17.4.2 Priority 2 – Items which require repair due to a near term risk of failure, the repairs should not wait for the normal two-year project life cycle
 - 17.4.3 Priority 3 – Repairs are required, but a more deliberate approach can be taken over a two-year period
 - 17.4.4 Priority 4 – Repairs should be completed if the work is incidental to another project, but the item can wait for the next Inspection cycle for further assessment
- 17.5 The following information shall be determined and documented:
 - 17.5.1 Asset Information
 - a. Structure Number
 - b. Circuit
 - c. Tower/Pole ID#
 - 1. Include circuit according to National Grid nomenclature
 - d. Structure Location Latitude and Longitude
 - e. Structure Ground line elevation
 - f. Structure City or Town and State
 - 17.5.2 Inspection
 - a. Year Installed
 - b. Tower/Pole Size / Class
 - c. Structure Height (above grade)
 - d. Structure Type

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- e. Structure surface finish:
 - 1. Painted
 - 2. Galvanized
 - 3. Weathered
 - 4. Foundation type
- f. Structure condition and overall rating
- g. Steel distress or deterioration
- h. Concrete foundation condition and overall rating
- i. Concrete foundation distress or deterioration
- j. Concrete foundation surface mapping diagram
- k. Mechanical or fire damage
- l. Broken hardware
 - 1. Insulators
 - 2. Adversely impacted structural components
- m. Document adjacent roads, railroads, parks, etc
- n. Frequently accessible by the general public
- o. Unusual conditions or safety hazards
- p. Digital photographs
- q. Field sketches of foundation condition

18.0 TEMPORARY REPAIRS

- 18.1 Some defects may have been repaired temporarily
 - 18.1.1 Temporary repairs shall be inspected monthly by Transmission Inspections
 - 18.1.2 Until repairs made permanent
- 18.2 If an Inspector encounters a temporary repair
 - 18.2.1 Defect shall be reported with a note indicating a temporary repair

19.0 EXCEPTION APPROVALS

- 19.1 It is recognized that situations may arise that are not covered by this procedure
- 19.2 When this occurs, an exception may be approved
- 19.3 The person in charge of the work shall
 - 19.3.1 Develop a work plan detailing

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- a. The need for an exception to the EOP
 - b. Additional safeguards to be employed
- 19.3.2 Provide the work plan to and obtain approval from all of:
 - a. The manager in charge of the work
 - b. The manager of T&D Line Standards
 - c. A manager from Safety
- 19.3.3 Alternatively approval may be obtained from a designee of any of the above
- 19.4 If agreement cannot be obtained at the manager level
 - 19.4.1 The request shall be forwarded to the Director levels
 - a. Director's may assign a designee
- 19.5 After approval is obtained
 - 19.5.1 The work plan shall be reviewed with all workers who will participate in the job
 - a. All workers need to agree on the work plan
 - b. Document the exception on the job brief
- 19.6 T&D Line Standards shall publish a Memorandum documenting the approval
 - 19.6.1 A copy of the work plan shall be included
 - 19.6.2 Such memorandum shall be sent to all stakeholders and approvers
 - 19.6.3 The memo shall be stored for the record

20.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	06/01/15	Supersedes Transmission Line Maintenance Specification PR 06.01.601.001 dated 4/18/11. Re-number as part of EOP T007. Complete
2.0	05/01/19	Update Accountability; Remove Definitions; Add new Safety and Exception Approval Sections; Update Department Names and Sponsor
2.1	10/01/19	Code 551 – Line Hardware – Insulator Damage: Change to counting good insulators rather than counting damaged insulators
3.0	04/16/21	Add Section 3 for Post Fault Patrol; revise title, update department names; removed notes from table for Code 551





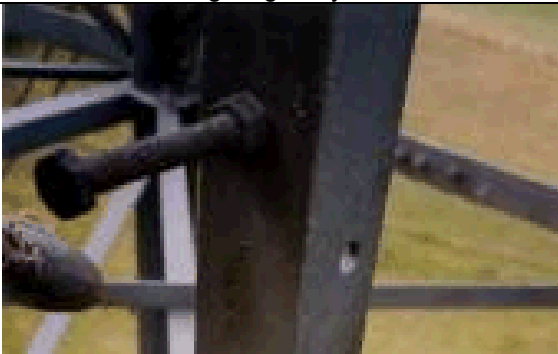
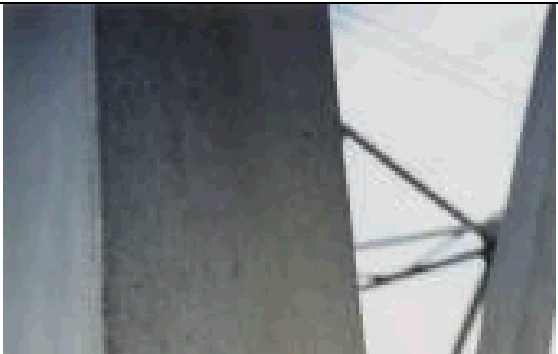
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APPENDIX A – TRANSMISSION FIELD SURVEY WORKSHEET

TRANSMISSION FIELD SURVEY WORKSHEET						
Patrolled Circuit/No.	Unique ID	Pole/Tower No.		Voltage	District	
Additional Circuit/No.	Unique ID					
Area	Between _____ Rd. And _____ Rd.	Date	Employee ID			
TYPE	<input type="checkbox"/> A) Single <input type="checkbox"/> B) H. Frame <input type="checkbox"/> C) 3 Pole <input type="checkbox"/> D) 4 Pole <input type="checkbox"/> E) 5 Pole <input type="checkbox"/> F) 6 Pole <input type="checkbox"/> G) Flex-Tower <input type="checkbox"/> H) Square-Tower <input type="checkbox"/> I) Hairpin <input type="checkbox"/> J) Other					
MATERIAL	<input type="checkbox"/> A) Wood (fill in information for each pole, i.e., 2 pole, 3 pole, 4 pole, etc.) Height _____ Class _____ Year Set _____ Manufacturer _____ Year Last Treated _____ Treatment <input type="checkbox"/> A) External <input type="checkbox"/> B) Internal <input type="checkbox"/> C) Both <input type="checkbox"/> D) Other <input type="checkbox"/> E) Unknown <input type="checkbox"/> F) None <input type="checkbox"/> B) Steel <input type="checkbox"/> C) Lattice					
CONFIGURATION	<input type="checkbox"/> Deadend <input type="checkbox"/> Tangent <input type="checkbox"/> Switch Structure <input type="checkbox"/> Davit Arm <input type="checkbox"/> Stand Off <input type="checkbox"/> Other					
STEEL/LATTICE CONDITION	(Circle One) 1 2 3 4 5 6		FOUNDATION: STEEL CONCRETE		(Circle One) 1 2 3 4 5 6 1 2 3 4 5	
POLE *	Sub. No.	Priority Qty	CONDUCTOR **		Circuit No.	Priority Qty
*Enter Sub No. if a Multiple Structure			**Enter Circuit No. if More Than Circuit on Pole			
510 1, 2 (R) <input type="checkbox"/> Broken		/	541 1,2,3 (R) <input type="checkbox"/> Conductor			/
511 1,4 (RP) <input type="checkbox"/> Visual Rotting		/	542 1,2,3 (R) <input type="checkbox"/> Static			/
512 1,2,3,4 (R) <input type="checkbox"/> Leaning		/	543 1,2,3 (R) <input type="checkbox"/> Ground Wire			/
513 1,2,3 (R) <input type="checkbox"/> Replace Single Arms		/	544 1,2,3 (R) <input type="checkbox"/> Sleeve/Conn.			/
514 1,2,3 (R) <input type="checkbox"/> Replace Double Arm		/	546 1,4 (NR) <input type="checkbox"/> Under 25 Ft.			/
515 1,2,3 (R) <input type="checkbox"/> Repair Braces		/	LINE HARDWARE			
516 1,2,3 (R) <input type="checkbox"/> Replace Braces		/	551 1,2,3,4 (R) <input type="checkbox"/> Insulators/Dam			/
517 1,2 (R) <input type="checkbox"/> Replace Anchor		/	552 4 (R) <input type="checkbox"/> Insulator Plumb			/
518 1,2,3,4 (R) <input type="checkbox"/> Install Anchor		/	553 1,2,3,4 (R) <input type="checkbox"/> Hardware Dam			/
519 1,2,3 (R) <input type="checkbox"/> Repair/Replace Guy Wire		/	555 2 (R) <input type="checkbox"/> Lightning Arrestor			/
521 2,3 (R) <input type="checkbox"/> Tighten Guy Wire		/	FOUNDATION – GENERAL			
522 P (NR) <input type="checkbox"/> Replace/Install Guy Shield		/	563 1,2,3,4 (R) <input type="checkbox"/> Erosion			/
524 4 (R) <input type="checkbox"/> Guy Not Bonded		/				
525 1,2,3,4 (RP) <input type="checkbox"/> Lightning Damage		/				
526 2,3,4 (RP) <input type="checkbox"/> Woodpecker Damage		/	RIGHT OF WAY			
527 2,4 (RP) <input type="checkbox"/> Insects		/	571 1,2,4 (NR) <input type="checkbox"/> Erosion			/
528 4 (NR) <input type="checkbox"/> Aerial Number Missing		/	572 4 (NR) <input type="checkbox"/> Encroachments			/
TOWER			573 4 (NR) <input type="checkbox"/> Debris			/
531 1,2 (R) <input type="checkbox"/> Tower Legs Broken		/	574 F (R) <input type="checkbox"/> Danger Tree			/
532 4 (NR) <input type="checkbox"/> Aerial Numbers Missing		/	575 4 (NR) <input type="checkbox"/> Gate Broke			/
534 1,2,3 (R) <input type="checkbox"/> Loose Bolts/Hard		/	576 4 (NR) <input type="checkbox"/> Oil/Gas Leak			/
535 4 (NR) <input type="checkbox"/> Repair Anti-Climb		/				
536 F (R) <input type="checkbox"/> Vegetation On Tower		/	MISCELLANEOUS			
537 1,2,3 (R) <input type="checkbox"/> Structure Damage		/	581 4,P (NR) <input type="checkbox"/> Stencil Liner Struct No. Ground level			/
538 1,2,3,4 (R) <input type="checkbox"/> Straighten Tower		/	582 1,2,3,4 (R) <input type="checkbox"/> Switch Damaged			/
539 1,2,3,4 (R) <input type="checkbox"/> Arms Damaged		/	583 2 (R) <input type="checkbox"/> Damaged Ground			/
POLE INSPECTION			584 4,P (NR) <input type="checkbox"/> Install/Replace Warning Sign			/
901 4 (RP) <input type="checkbox"/> Identified Priority Pole		/	586 4 (NR) <input type="checkbox"/> Remove Steps			/
902 4 (RP) <input type="checkbox"/> Identified Reject Pole		/	587 3,4 (R) <input type="checkbox"/> Add Dirt & Tamp			/
903 4 (RP) <input type="checkbox"/> Excess Checking		/	589 1,3,4 (R) <input type="checkbox"/> Bird Nest			/
904 4 (RP) <input type="checkbox"/> Climbing Inspection Req'd		/	590 4 (R) <input type="checkbox"/> Bird Perching			/
905 4 (RP) <input type="checkbox"/> No Inspection Tag		/	GIS			
NR–Maint. Code may not directly affect reliab. R–Maint. Code may affect reliability. RP – Maintenance Code may affect and has specific program in place to address. Comments on rear of sheet NG0237 (12/09)			760 4 (NR) <input type="checkbox"/> GIS Map Doesn't Match Field			/
			761 4 (NR) <input type="checkbox"/> GIS Equip. Stenciling In Error			/
			762 4 (NR) <input type="checkbox"/> GIS Equip/Hardware Missing			/
			763 4 (NR) <input type="checkbox"/> GIS Equip. Removed In Field Remove from GIS			/
			769 4 (NR) <input type="checkbox"/> GIS Other GPS/GIS Errors			/

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APPENDIX B – STEEL EVALUATION RATINGS

	
Rating 6 – “Very Severe Deterioration” Perforated Element – severe physical damage	Rating 5 – “Significant Pitting” Significant pitting – loss of section clearly visible, edges feathered/thinned
	
Rating 4 – “Light Pitting” Some very light edge roughening. Loss of greater majority of coating and zinc layers. Corroded surface would dominate surface preparation – remedial action using wire brush, scraper and brushed paint not sufficient to give greatly increase life	Rating 3 – “Light Corrosion” Very light surface corrosion, majority of coating intact
	
Rating 2 – “Intact” Paint coating over all surface – overcoat may not be intact and some very small areas (<1%) of light corrosion may be present. Galvanizing intact except for some very small areas (<1%) of light corrosion	Rating 1 – “Serviceable” Fully painted – overcoat and undercoat intact Fully galvanized – coating intact

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APPENDIX C – CONCRETE EVALUATION RATINGS & MATRIX

	
Honeycombing Construction faults, poor workmanship	Pattern Cracking
	
Disintegration Deterioration of concrete into small fragments	Erosion/Abrasion
	
Seepage Movement of water or other fluids through pores	Spalling Development of fragments
Distortion or Movement Change in alignment of the components of a structure	Delamination Degradation of steel/concrete interface

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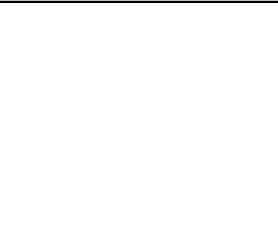

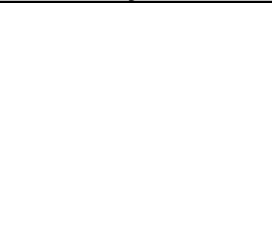
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		Overall Foundation Rating				
		Very Severe Deterioration 5	Severe Deterioration 4	Medium Deterioration 3	Light Deterioration 2	Serviceable 1
Concrete Foundation Condition Categories	Cracking	Wide cracks (over 0.08" width)	Medium Cracks (between 0.04" and 0.08" width)	Fine Cracks (0.04" width)	Negligible	Negligible
	Disintegration	Very Severe Disintegration (loss of mortar and coarse aggregate at a depth greater than 0.8")	Severe Disintegration (loss of mortar between 0.4" and 0.8" around coarse aggregate)	Medium Disintegration (loss of surface mortar between 0.2" and 0.4" and exposure of coarse aggregate)	Light Disintegration (no exposure of coarse aggregate)	Negligible
	Spalling	Large spall (greater than 0.8" in depth and greater than 6" in any dimension)	Small spall (not greater than 0.8" in depth or greater than 6" in any dimension)	Negligible	Negligible	Negligible

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APPENDIX D – WOOD STRUCTURE EVALUATION

Typical Pole Defects		
Bark Inclusion	Checking (Solitary)	Checking (Around Periphery of Pole)
		
The growth of the main stem around a dead branch	The separation of fibers parallel to the grain and extending towards the center of the pole	Multiple checks around entire pole circumference
Cross Break	Mechanical Damage	Split
		
The separation of fibers perpendicular or at an angle to the grain	Transportation and erection damage due to machinery such as chainsaws or cranes	The cracking of a pole due to mechanical connections or the intersection of checks
Dead Streak	Decay	Decay Knot
		
The growth of the main stem around the dead wood	The softening of the pole due to fungal growth	Knots which have decayed and can extend towards the center of the pole
Pocket		
A Solitary Check, a series of checks at one location, or area of decay at the surface of the wood pole		

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510 Pole – Broken

- Used when pole is broken due to impact, stress etc.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Damage poses significant risk of imminent failure	Damage is not an immediate threat to the integrity of the network or to public safety	N/A	N/A


511 Pole – Visual Rotting

Used for physical damage which compromises the strength and/or integrity of the pole (checking, dead streak, bark inclusion, cross break, decay, burning, hollow sounding pole)

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Damage poses significant risk of imminent failure	N/A	N/A	All Others

512 Pole – Leaning

Used when pole/structure is out of plumb(excludes raked angle structures which are intentionally out of plumb due to line angle)

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Leaning pole which in Inspector's judgment poses immediate and substantial threat to public safety and/or system reliability	Pole top deflection in Inspector's judgment poses a near-term risk to structure integrity	Slope > 2" per 10' pole height	All other leaning poles


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513 Pole – Replace Single Arm			
- Used for damaged single arms. Arm refers to any horizontal member extending out from the main structure generally to support the conductor.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Arm damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of arm causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A
514 Pole – Replace Double Arm			
- Used for damaged double arms.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Arm damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of arm causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A
515 Pole – Repair Braces			
- Used for damage to braces. Braces refer to intermediate members that connect parts of the structure.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Brace damage poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of brace causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A
516 Pole – Replace Braces			
- Used for damage to braces or missing braces. Braces refer to intermediate members that connect parts of the structure.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Brace damage or lack of brace poses immediate and substantial threat to public safety and/or system reliability	Substantial damage to cross section of brace or lack of brace causing the arm to deflect – failure may occur under non-extreme loading	Appreciable damage – failure may occur under extreme loading	N/A

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517 Pole – Replace Anchor			
- Used for damage to anchor rod or head or pull out of the anchor			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Guy failure poses immediate and substantial threat to public safety and/or system reliability	Anchor rod has corroded substantially or is broken, or anchor has pulled out and is no longer functioning as a structural member, or a guy should be present but is not	Appreciable damage – failure may occur under extreme loading	Superficial damage – but will not fail in 5 years
518 Pole – Install Anchor			
- Used when necessary anchor is missing			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damage poses immediate and substantial threat to public safety and/or system reliability	Damage is not an immediate threat to the integrity of the network or to public safety	N/A	N/A
519 Pole – Repair/Replace Guy Wire			
- Used when a guy wire or its associated hardware, included fiberglass or wood rods, are in need of repair or replacement			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Guy failure poses immediate and substantial threat to public safety and/or system reliability	Guy is broken or seriously compromised (e.g. broken strands)	Guy is currently structurally sound, but has been compromised by corrosion, damage, etc.	N/A
521 Pole – Tighten Guy Wire			
- Used when a guy wire has gone slack, as from anchor pull out, structure movement, etc.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
N/A	Slack guy is causing excessive structure deflection or overstress of other guys	Slack guy is not causing excessive structure deflection or overstress of other guys or the structure	N/A

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522 Pole – Replace Guy Shield
 - Used when guy shield is damaged. Inspector should install a new one.

All Priority Level "P" Perform




524 Pole – Guy Not Bonded
 - Used when guy bond is inadequate or missing

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Guy not bonded

525 Pole – Lightning Damage
 - Used when pole is damaged due to lightning.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Damage in Inspector's judgment poses immediate and substantial threat to public safety and/or system reliability	Non-serviceable Damage	Serviceable Damage	Superficial Damage

526 Pole – Woodpecker Damage
 - Used when pole is damaged by woodpeckers creating nests in pole

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
N/A	Several Large (>5") Diameter Holes	Single Large (>5") Diameter Holes	Several Small (<5") Diameter Holes

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527 Pole – Insects			
- Used when pole is damaged by insects			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damage poses significant risk of imminent failure	N/A	N/A	All other noticeable damage
528 Pole – Aerial Number Missing			
- Used when aerial numbers are not installed where required			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Aerial numbers are required at all road crossing, all structures ending in zero, and the first and last structures of a line.


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APPENDIX E – INDIVIDUAL WOOD POLE EVALUATION




901 Osmose – Identified Priority Pole			
- Used to document pole identified as a priority reject on Wood Pole Groundline Inspection			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All
902 Osmose – Identified Reject Pole			
- Used to document pole identified as a reject on Wood Pole Groundline Inspection			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All
903 Osmose – Inspect Excessive Check (not reject)			
- Used to document pole identified as having excessive checking on Wood Pole Ground Line Inspection			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All
904 Osmose – Climbing Inspection Required (not reject)			
- Used to document pole identified as needing a climbing inspection on Wood Pole Ground Line Inspection			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All
905 Osmose – No Inspection Tag			
- Used to document pole that has no evidence of prior Wood Pole Inspections. Not required for poles under 10 years old.			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	All

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APPENDIX F – STEEL POLE AND STRUCTURE EVALUATION

531 Tower – Tower Legs Broken- Used when tower legs are broken			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Leg damage which in Inspector’s judgment poses immediate and substantial threat to public safety and/or system reliability	Leg damage which in Inspector’s judgment poses a near-term risk to structure integrity	N/A	N/A
532 Tower – Aerial Number Missing- Used when aerial numbers are not installed where required			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Aerial numbers are required at all road crossing, all structures ending in zero, and the first and last structures of a line
534 Tower – Loose Bolts/Hardware- Used loose or missing connections on hardware			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Missing connections on members in judgment of Inspector pose an immediate and substantial threat to public safety and/or system reliability	Missing connections	Loose Connections	N/A
535 Tower – Repair Anti-Climb- Used to repair anti-climb device			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Anti-climbing device needs repair
536 Tower – Vegetation on Tower			
-Used when vegetation needs to be cleared from tower			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
All Priority Level “F” - Forestry			


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537 Tower – Structure Damage			
- Used for broken, bent or missing members on tower			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
Damage in judgment of Inspector poses and immediate and substantial threat to public safety and/or system reliability	Broken or nearly broken members	Damage/Excessive bending on minor members	N/A
538 Tower – Straighten Tower			
- Used when tower is out of alignment			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Leaning tower in judgment of Inspector poses immediate and substantial threat to public safety and/or system reliability	Substantial deflection, near-term risk to structural stability	Appreciable deflection, ability of tower to sustain extreme loading conditions may be compromised	Aesthetic only
539 Tower – Arms Damaged			
- Used when the arms on a tower are damaged			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Damaged arms in Inspector's judgment pose an immediate and substantial threat to public safety and/or system reliability	Arm damage poses a risk of failure under routine loading e.g. a near term risk of failure	Arm damage poses a risk of failure under heavy loading	Superficial damage only

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APPENDIX G – CONDUCTOR AND LINE HARDWARE EVALUATION

541 Conductor – Bird Caging (Add comment – Bird Caging)
 - Used to rate conductor bird caging.



Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 <p>Bird Caging</p>

541 Conductor – Broken (Add comment – Broken Conductor)
 - Used to rate conductor damage.
 Note: TransLOME may revise priority levels based on an engineering evaluation of factors such as mechanical and electrical loading.

230kV and Above

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 <p>Any broken conductors</p>	N/A	N/A	N/A

115kV and Below

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 <p>Significant percentage of broken strands</p>	 <p>Small percentage of broken strands</p>	N/A	N/A

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543 Conductor – Ground Wire

- Used for any damage to the ground leads on the structure

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Ground wire damage in judgment of Inspector poses an immediate and substantial threat to public safety and/or system reliability; this includes a loose ground wire near the top of the pole which may be a risk to contact the conductor	Ground wire missing or disconnected/broken on 3 or more adjacent structures	Ground wire missing or disconnected/broken on isolated structures only, or ground wire is loose near the base of the pole where there is no risk of contacting the conductor	N/A

544 Conductor – Sleeve/Connector

- Used for damage to splices or connectors on the shield/static wire or conductors

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Failure in judgment of Inspector poses an immediate and substantial threat to public safety and/or system reliability	Visible physical damage to connector/splice/conductor	Visible corrosion at splice/connector	N/A

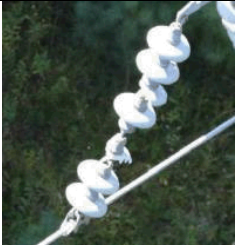


546 Conductor – Under 25 Feet

- Used for substandard clearances and conductors with excessive sag.

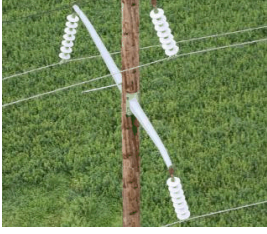
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Conductor poses significant risk of danger to the public	N/A	N/A	General Guidelines by Voltage: • 69kV – 115kV 25 ft • 230kV – 345kV 30 ft Clearances must meet requirements of latest National Electric Safety Code, as well as local requirements (e.g. MA CMR)

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551 Line Hardware – Insulator Damage

Nominal System Voltage kV	Number of Good Insulators per String			
	Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
69	Separated	4 or less	5	6 & up
115	Separated	4 or less	5	6 & up
230	Separated	7 or less	8-9	10 & up
345	Separated	10 or less	11-12	13 & up
450DC	Separated	16 or less	17-18	19 & up
Damaged Insulators			Separated Insulators	
				

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552 Line Hardware – Insulator Plumb			
- Used for insulators unintentionally out of plumb			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			
N/A	N/A	N/A	Usually a sign of high amplitude conductor movement, galloping.
553 Line Hardware – Hardware Damage			
Used for any damage to other line hardware			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Hardware damage in Inspector's judgment poses and immediate and substantial risk to public safety and/or system reliability	Structural Hardware damage which poses a near-term risk to structural integrity	Structural Hardware damage, e.g. damaged connections	Cosmetic Damage
555 Line Hardware – Lightning Arrestor			
Used when a lightning arrestor is damaged or has failed			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	Arrestor has failed. Lightning arrestors fail by disconnecting and falling away from the conductor	N/A	N/A


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APPENDIX H – FOUNDATION EVALUATION

563 Foundation – Erosion			
Used for any erosion around foundations			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Erosion in Inspector’s judgment poses and immediate and substantial risk to public safety and/or system reliability	Erosion is compromising structural integrity	Structure not yet at risk, but erosion appears to be progressing at a significant rate	Small erosion, may eventually become significant

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APPENDIX I – ROW / MISC. / SWITCH / GIS EVALUATION

571 Right of Way – Erosion			
Used for any overall erosion in ROW			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Erosion exposes counterpoise and presents a significant danger to public and/or vehicular traffic	Erosion exposes counterpoise and presents a danger to public	N/A	Any other ROW erosion, i.e. washed out road or culverts
572 Right of Way - Encroachments			
Used for any unapproved use of ROW or things too close to lines			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 Any encroachments
573 Right of Way – Debris			
Used for any debris in ROW			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Any debris in ROW blocking access
574 Right of Way – Danger Tree			
Used for any danger trees adjacent to lines			
REPORT ALL TO TRANSMISSION FORESTRY			
Voltage	Vertical or Lateral Clearance	All Priority Level “F” - Forestry	
23 – 46 kV			
69 kV			
115 kV			
230 kV			
345 kV			
575 Right of Way – Gate Broken			
Used for broken ROW gates			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Broken Gate

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576 Right of Way – Oil/Gas Leak			
-Used for any oil, gas leaks or other foreign substances in ROW. Notify System Delivery immediately			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
			Oil/Gas found in ROW
581 Misc – Stencil Line/Structure Number at Ground			
- Used when line/structure number is missing. Inspector to stencil structure			
Priority Level 1	Priority Level 2	Priority Level P	Priority Level 4
N/A	N/A	Inspector stencils number	Inspector cannot stencil number
582 Misc – Switch Damaged			
Used when switch is damaged			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
Visible arcing is present or condition could result in immediate failure.	Switch may fail, burning and other evidence of arcing	Switch may not be able to be operated, but likely won't fail and put the line out of service	Insignificant damage
583 Misc – Damaged Switch Ground			
Used for damaged switch grounds			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	Ground grid is exposed or lead is damaged	N/A	N/A
584 Misc – Install/Replace Warning Sign			
Used for damaged or missing warning signs. Warning signs required on both sides of all structures (2 signs total).			
Priority Level 1	Priority Level 2	Priority Level P	Priority Level 4
N/A	Install warning signs at all structures that are adjacent to roads, regularly traveled pedestrian thoroughfares, or places where persons frequently gather (such as schools or public playgrounds)	Sign installed/replaced by Inspector	Install/replace signs at a low risk location where public interaction is not likely.

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585 Misc – Replace Signs
 Used for missing aerial structure signs. Aerial circuit and structure ID is required on all structures at road crossings, the first and last structures of a line, and all structures ending in zero.

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Install/replace signs



586 Misc – Remove Steps
 Steps must be removed at least 10' from the ground line

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Remove steps


587 Misc – Add Dirt and Tamp
 Used on poles when fill dirt is insufficient

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4

589 Misc – Bird Nest
 Used when bird nests are found on line

Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
 Bird nest in Inspector's judgment poses and immediate and substantial risk to public safety and/or system reliability	N/A	 Limited risk of bird contact but nest should be removed	No risk of contact such as very small nests or those at bottom of structure.

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589 Misc – Bird Perching			
Used when bird perching could lead to problems			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	 <p>Birds perching on line or evidence of bird perching on line.</p>
760 GIS – Map Does Not Match Field			
Used when GIS map does not match field			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error
761 GIS – Equipment Stenciling in Error in GIS			
Used when equipment labels do not match GIS			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error
762 GIS – Equipment/Hardware Missing in GIS			
Used when equipment is missing in GIS			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error
763 GIS – Equipment Removed in field, Remove from GIS			
Used when equipment has been removed from the field but not in GIS			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error
769 GIS – Other GPS/GIS Errors			
Used for all other GIS errors			
Priority Level 1	Priority Level 2	Priority Level 3	Priority Level 4
N/A	N/A	N/A	Note error

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APPENDIX J COMPUTAPOLE CODES / PRIORITY LEVEL

Code	Description	Funding Notes: 6 & 7	Default Level Notes: 1 thru 5	Valid Levels Notes: 1 thru 5
501	Osmose – identified priority pole	C	3	2
502	Osmose – identified reject pole	C	3	3
503	Osmose – Insp excessive check (not reject)	C	4	4
504	Osmose – Climbing Insp req'd (not reject)	C	4	4
901	Osmose – identified priority pole	E	4	4
902	Osmose – identified reject pole	E	4	4
903	Osmose – Insp excessive check (not reject)	E	4	4
904	Osmose – Climbing Insp req'd (not reject)	E	4	4
510	Pole – Broken	C	2	1 2
511	Pole – Visual Rotting	C	3	1 4
512	Pole – Leaning	E	4	1 2 3 4
513	Pole – Replace Single Arm	C	3	1 2 3
514	Pole – Replace Double Arms	C	3	1 2 3
515	Pole – Repair Braces	E	3	1 2 3
516	Pole – Replace Braces	E	3	1 2 3
517	Pole - Replace Anchor	E	2	1 2
518	Pole – Install Anchor	C	3	1 2 3 4
519	Pole – Repair/Replace Guy Wire	E	3	1 2 3
521	Pole – Tighten Guy Wire	E	3	2 3
522	Pole – Replace/Install Guy Wire	E	P	P
524	Pole – Guy Not Bonded	E	4	4
525	Pole – Lightning Damage	C	3	1 2 3 4
526	Pole – Woodpecker Damage	E	3	2 3 4
527	Pole – Insects	E	3	1 4
528	Pole – Aerial Number Missing	E	4	4

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Code	Description	Funding Notes: 6 & 7	Default Level Notes: 1 thru 5	Valid Levels Notes: 1 thru 5
531	Tower – Tower Legs Broken	E	2	1 2
532	Tower – Aerial Number Missing	E	4	4
534	Tower – Loose Bolts/Hardware	E	3	1 2 3
535	Tower – Repair Anti-Climb	E	4	4
536	Tower – Vegetation on Tower	E	F	F
537	Tower – Structure Damage	E	3	1 2 3
538	Tower – Straighten Tower	E	3	1 2 3 4
539	Tower – Arms Damaged	E	3	1 2 3 4
540	Conductor – Infrared Problem	E	3	1 2 3
541	Conductor – Conductor	E	3	1 2 3
542	Conductor – Static	E	3	1 2 3
543	Conductor – Ground Wire	E	3	1 2 3
544	Conductor – Sleeve/Connector	E	3	1 2 3
546	Conductor – Under 25 ft.	E	4	1 4
547	Infrared Problem Identified	E	2	1 2 4
551	Line HDW – Insulator Damaged	E	3	1 2 3 4
552	Line HDW – Insulator Plumb	E	4	4
553	Line HDW – Hardware Damaged	E	3	1 2 3 4
555	Line HDW – Lightning Arrestor	C	2	2
556	Line HDW – Infrared Problem	C	3	1 2 3
563	Foundation – Erosion	E	3	1 2 3 4
571	Right of Way – Erosion	E	4	1 2 4
572	Right of Way – Encroachments	E	4	4
573	Right of Way – Debris	E	4	4
574	Right of Way – Danger Tree	E	F	F
575	Right of Way – Gate Broke	E	4	4
576	Right of Way – Oil/Gas Leak	E	4	4
581	Misc – Stencil Line/Structure Number at Ground	E	P	4 P

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File: NG-EOP T007.01 Ground Level Visual Inspection TPH	Originating Department: Transmission Line Engineering	Sponsor: Nicole Maglione (Nims)
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Code	Description	Funding Notes: 6 & 7	Default Level Notes: 1 thru 5	Valid Levels Notes: 1 thru 5
582	Misc – Switch Damaged	E	3	1 2 3 4
583	Misc – Damaged Switch Ground	E	2	2
584	Misc – Install/Replace Warning Sign	E	4	4 P
585	Misc – Replace Signs	E	4	4
586	Misc – Remove Steps	E	4	4
587	Misc – Add Dirt and Tamp	E	3	3 4
588	Switch – Infrared Problem	E	3	1 2 3
589	Misc – Bird Nest	E	3	1 3 4
590	Misc – Bird Perching	E	4	4
760	GIS – Map Doesn't Match Field	E	4	4
761	GIS – Equip. Stenciling In Error	E	4	4
762	GIS – Equip/Hardware Missing	E	4	4
763	GIS – Equip. Removed in Field	E	4	4
764	Remove from GIS	E	4	4
769	GIS- Other GPS/GIS Errors	E	4	4

NOTES

1. Level 1 code:
 Do not enter STORMS
 The defect shall be reported immediately
 The work shall be completed within a week
 A confirming work order shall be used to track costs
2. Level 2 and 3 codes:
 Pass through STORMS and Design
 Level 4 code:
 Are for notation only
 Do not enter STORMS
4. Level P code:
 Defect corrected by the inspector
5. Level F code:
 Go to Forestry
6. E is Expense
7. C is Capex

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Appendix 13

NG-USA EOP G017 Street Light Standard Inspection Program

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	STREET LIGHT STANDARD INSPECTION PROGRAM	Version 4.0 – 02/01/20

INTRODUCTION

The purpose of this procedure is to outline the requirements for the inspection cycle for Street Light Standard facilities owned by National Grid. The inspection shall include identifying and reporting the physical condition of street lighting equipment on street light pole standards. Street lights attached to wood poles are inspected as part of the Overhead Distribution Inspection Patrol covered by NG-EOP D004.

All street lighting equipment will be inspected for physical damage, potentially hazardous conditions or obvious deterioration.

Inspections will be recorded on a Windows® based hand-held computer. The maintenance items identified during this inspection will be separated into four priority levels 1, 2, 3, and 4. The maintenance codes identified will default to the appropriate priority level. The default level can be adjusted by the individual performing the inspection based on actual field conditions.

These priority levels are defined as follows:

Level 1 - An identified facility/component that shall be repaired/replaced within 1 week.

Level 2 - Identified facility/component condition that shall be repaired/replaced within 1 year.

Level 3 – Identified facility/component condition that shall be repaired/replaced within 3 years.

Level 4 – This priority category is to collect inventory information on actual field conditions to be used by Investment Strategy and Work Planning.

All Level 1 priority conditions identified in the field shall be called in by the Inspector as follows:

1. Notification by location
 - New York: System Operations Dispatch 1-877-716-4996.
 - NE North: Bay State West & Central: Northborough Control Center 1-508-421-7879
 - NE North: North & Granite: Northborough Control Center 1-508-421-7879.
 - NE South: Bay State South & Ocean State (RI): Northborough Control Center 1-508-421-7885
2. Detailed information provided to the regional notification location
 - a. Identify yourself as a Company Inspector and your work reporting area.
 - b. Details of the Level 1 Priority Condition
 - i. Describe the facility/component condition found.
 - ii. Street Address, District, Feeder No., Line No., Tax District and Pole No.
 - iii. If you are standing by or have secured the location.
 - iv. Any additional information that would assist in finding the location of the problem.
3. Notify area Inspection Supervisor for follow-up.

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PURPOSE

This procedure applies to all personnel involved with or responsible for the inspection and maintenance of street lighting pole standards and associated facilities owned by National Grid throughout the service territory.

ACCOUNTABILITY

1. T&D Services
 - A. Update procedure as necessary
 - B. Provide personnel guidance and assistance as requested.

2. Electric Operations – Inspection & Maintenance
 - A. Provide qualified and trained personnel as the distribution inspectors, to provide consistent and accurate data.

 - B. Request assistance from Distribution Line Contracting when necessary to complete work assigned in the appropriate time frame.

3. Distribution Line Contracting
 - A. At the request of Operations/Distribution Asset Management obtain, schedule and manage contractors to perform inspections and perform required maintenance.

4. Distribution Inspector
 - A. Demonstrate the ability to identify streetlight maintenance items and the aptitude to become proficient in the use of a hand-held computer and desktop computer.

 - B. Demonstrate the understanding and requirements of NG-EOP-G017.

 - C. Possess the ability to do walking patrols, collect information on a hand held, download to a desk top computer, edit data, provide requested information/reports/work tickets to supervision, and track/close out work completed in the database system.

5. Distribution Asset Management
 - A. Provide input into program revisions.
 - B. Ensure the program as outlined in this EOP is completed each year.
 - C. Develop and/or revise a five-year inspection schedule of all facilities covered by this EOP.
 - D. Develop Outdoor Lighting Asset Strategy.

6. Process and Systems
 - A. Provide and support database.

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REFERENCES

National Grid Safety Procedures
 National Grid Employee Safety Handbook
 NY PSC Order 04-M-0159
 NY PSC Order Adopting Changes to Electric Safety Standard, December 2008
 Elevated Equipment Voltage NG- EOP G016

TRAINING

Provided by appropriate National Grid training program.

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5.0 MAINTENANCE SCHEDULE..... 6

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7.0 EXCEPTION APPROVALS 7

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1.0 SAFETY REQUIREMENTS

- 1.1 All work shall be performed in accordance with:
 - a. National Grid Employee Safety Handbook
 - b. Applicable National Grid Electric Operating Procedures (EOP).
 - c. Applicable National Grid Safety and Health Procedures (SHP).
- 1.2 All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.

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2.0 STREET LIGHT INSPECTIONS

- 2.1 Street Lighting inspections will be performed as foot patrols and are conducted by a street light qualified worker or contractor.
- 2.2 The foot patrols are scheduled in such a manner that street lighting facilities are inspected once every five years for both New York and New England.
 - a. In New York & Massachusetts, the street light standards inspections scheduled for the year shall be completed by December 31.
 - b. In Rhode Island, the street light standards inspections scheduled for the year shall be completed by March 31.
- 2.3 The Outdoor Lighting group is responsible for creating and/or revising this schedule for the respective geographic areas.
- 2.4 The Inspector or qualified contractor uses a Windows® based hand-held computer to record the following
 - a. Employee ID, region, district, street lighting installation standard number, GPS location,
 - b. Priority Level 1, 2, 3 and 4 maintenance items, and comments.
- 2.5 Outdoor Lighting maintenance codes shown in Table I.
- 2.6 The inspector shall place the CSS-OL street light standard number on the facility if not found numbered during the foot patrol.

3.0 EQUIPMENT TO BE INSPECTED AND MAINTENANCE CODES

- 3.1 Luminaires
A complete lighting unit consisting of a housing, auxiliary electrical, components, reflector/refractor and lamp socket.
- 3.2 Luminaire Arm
A device used on Metal or Fiberglass pole to extend and hold the luminaire out over the roadway surface.
- 3.3 Pole Standards
Metal or fiberglass pole for post style luminaries
- 3.4 Foundations
A supporting structure for an anchor base pole – usually precast concrete.

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TABLE I

PRIORITY 1, 2 and 3 MAINTENANCE ITEMS FOR OUTDOOR LIGHTING

Category	CODE	Default Priority	Description
Luminaire	300	2	Light "ON" Day
	301	2	Replace Lens
	302	4	Clean
	303	4	Paint
	304	4	Replace Wattage Label
	305	2	Wires Exposed
	306	2	Damaged - Replace
	307	4	Missing
	308	4	Other - Comments
Arm	320	2	Damaged - Replace
	321	4	Damaged - Repair
	322	4	Rust - Paint
	323	4	Other - Comments
Pole Standard	330	4	Structure Damage - Replace
	331	4	Damaged/Leaning - Repair
	332	4	Paint/Maintenance
	333	P	Access Cover - Replace
	334	4	Bad Wiring - Repair
	335	4	Stencil Required
	336	2	Temporary Overhead *
	337	2	Ground - Repair
	338	4	Knockdown/Missing
	339	4	Other – Comments
	344	P	Standard Repair 1 Patch
	345	P	Standard Repair 2 Patches
	346	P	Standard Repair 3 Patches
	347	P	Standard Repair Wrap material applied
	348	P	Standard Repair Angel Guard
349	P	Knockdown Box/Cone Installed	
Foundation	350	4	Damaged/Leaning - Repair
	351	4	Anchor Bolts Damaged
	352	4	Elevated - Repair
	353	4	Other - Comments

Note: The default priority of Level 4 for missing luminaires and street light standards is utilized for informational use only. If the street light standard is missing or missing a luminaire, the item shall be reviewed with records, if found to be a required and an active asset it shall be changed to a Level 1 priority.

***Refer to EOP NG-EOP G029 (Tracking Temporary Repairs to Electric System) for tracking and reporting of temporary repairs.**

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4.0 STREET LIGHT MAINTENANCE DATABASE/REPORTS

- 4.1 The Street Light Maintenance Data Base consists of records downloaded from the hand-held computers and information entered from the desktop computers.
- 4.2 The records can be downloaded to the database through any desktop computer that is connected to the network and the inspector is logged on as a valid user of the Street Light Standard Inspection program.
- 4.3 The desktop computer is also used to generate various reports and work tickets, depending on the user's need. These reports/work tickets are utilized to schedule and accomplish distribution maintenance work.

5.0 MAINTENANCE SCHEDULE

- 5.1 Maintenance activities are scheduled by priority Levels.
 - a. All "Level 1 Priority" conditions identified shall be repaired/corrected within 1 week.
 - b. All "Level 2 Priority" conditions identified shall be repaired/corrected within 1 year.
 - c. All "Level 3 Priority" conditions must be repaired within 3 years. Level 4 Priority is for inventory purposes only.
- 5.2 Once the Street Light Patrol is completed in the Street Light Maintenance Database or 21 days have elapsed since the inspection, the Level 2 and Level 3 Priority maintenance codes are downloaded into STORMS.
 - a. Expense maintenance work goes straight to scheduling.
 - b. Capital work goes to Distribution Design and then scheduled.
 - c. Level 1 Priority maintenance codes are communicated by the Distribution Inspector directly to the field operations group for the area where the feeder is located.

6.0 COMPLETION

- 6.1 The completion of Level 1 priority maintenance codes is performed by the field operations Supervisor or their designee.
- 6.2 Level 2 & 3 priority maintenance codes are tracked in the Street Light Maintenance database and placed into STORMS.
 - a. STORMS work order initiated for level 2 & 3 work to be scheduled.
 - b. CSS-OL database is updated once the associated STORMS orders are complete for the work request associated with the maintenance code from the Street Light Database.
- 6.3 All maintenance work is to be completed per Nationalgrid Distribution Standards.

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- 6.4 All maintenance work performed that was identified on the STORMS work order or discovered during the replacement/repair/correction of the original maintenance problem shall be listed in the Street Light Maintenance database and closed out when complete.

7.0 EXCEPTION APPROVALS

7.1 It is recognized that situations may arise that are not covered by this procedure:

a. In a storm or emergency event, such as an MVA, 911 call or similar situation, approval to proceed can be obtained from the below individuals, superseding section 7.3.2. These exceptions should be documented and communicated to the Work Methods and Safety Managers as soon as possible following the emergency event.

a. New York

1. Regional OH/UG Manager
2. Regional OH/UG Lead Supervisor

b. New England

1. Divisional OH/UG Manager
2. Designated "On Call" OH/UG Team Lead
3. Divisional OH/UG Lead Supervisor

NOTE: All individuals granting "the exception and approval to proceed" shall be knowledgeable and proficient in the construction and operation of the Overhead or Underground electrical apparatus involved along with the associated hazards in specific duties pertaining to this electric operation procedure.

7.2 When this occurs, an exception may be approved

7.3 The person in charge of the work shall

- a. Develop a work plan detailing
 - a. The need for an exception to the EOP
 - b. Additional safeguards to be employed
- b. Provide the work plan to and obtain approval from all of:
 - a. The manager in charge of the work
 - b. The manager of T&D Work Methods
 - c. A manager from Safety
- c. Alternatively, approval may be obtained from a designee of any of the above

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- 7.4 If agreement cannot be obtained at the manager level
 - a. The request shall be forwarded to the Director levels
 - a. Director's may assign a designee
- 7.5 After approval is obtained
 - a. The work plan shall be reviewed with all workers who will participate in the job
 - a. All workers need to agree on the work plan
 - b. Document the exception on the job brief
- 7.6 If agreement cannot be obtained the department Steward, the Union Safety Advocate or Officer will be sought out for approval
- 7.7 T&D Work Methods shall publish a Memorandum documenting the approval
 - a. A copy of the work plan shall be included
 - b. Such memorandum shall be sent to all stakeholders and approvers
 - c. The memo shall be stored for the record

8.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	02/16/10	This document supersedes document dated 07/25/05.
2.0	08/07/15	This document supersedes document dated 02/16/10
3.0	06/10/19	Formatting changes, broke paragraphs into subsections. Accountability Section, updated group roles/responsibilities. Updated copyright information footer. 1.0 "Safety Requirements" added, 3.0 Revised "Equipment to be tested", 7.0, New section: "Exception Approvals" added
4.0	02/01/20	Exception Approval Language

Appendix 14

NG-USA EOP G004 Shock Complaints

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INTRODUCTION

This procedure describes the requirements for investigating and reporting on a customer's shock complaint. A shock complaint is a customer call that states a person has received an electric shock. When investigating a shock complaint, Company field personnel shall determine if the shock was caused by faulty customer equipment, a neutral-to-earth voltage associated with the Company's distribution system, or an external DC voltage source. Regardless of the cause, a shock complaint is considered an emergency and shall be dispatched and investigated as soon as possible. The appropriate Dispatch or Control Center shall be notified of all shock incidents by the field. Shocks that involve injury, require medical attention or are fatal, all communications shall be completed as required by National Grid Electric Operating Procedure NG-EOP G009 Personal Injury Accident/Newsworthy Event Reports.

PURPOSE

This document details specific steps that shall be followed when National Grid receives a shock complaint call.

ACCOUNTABILITY

1. Distribution Work Methods
 - A. Update procedure as necessary.
2. Management & Supervision
 - A. Ensure the components of the procedure are implemented.
 - B. Ensure workers are trained in this procedure.
 - C. Provide procedure revision input as necessary.
3. Employees
 - A. Demonstrate an understanding of this procedure.
 - B. Comply with the requirements of this procedure.

REFERENCES

National Grid Employee Safety Handbook
 National Grid Safety and Health Policies & Procedures
 NG-EOP G003 Neutral-to-Earth Voltage Complaint
 NG-EOP G009 Personal Injury Accidents/Newsworthy Event Reports
 Metering Services Department Procedure MS505 Shock Complaint
 Metering Services Department Procedure MS508 Warning Tag Electric
 National Grid OH Construction Standards

Forms Ordering: <https://teams.nationalgrid.com/sites/Syracuse>

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TRAINING

Provided by the employee’s supervisor or department head and appropriate National Grid Training Program.

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2.0 INVESTIGATION 3

3.0 REVISION HISTORY 7

1. SAFETY

- 1.1. All work shall be performed in accordance with:
 - 1.1.1. National Grid Employee Safety Handbook
 - 1.1.2. Applicable National Grid Electric Operating Procedures (EOP)
 - 1.1.3. Applicable National Grid Safety and Health Procedures (SHP)
- 1.2. All applicable and appropriate Personal Protective Equipment (PPE) shall be worn.
 - 1.2.1. Including but not limited to: (**default is not to list core PPE**)
- 1.3. The employee in charge of the work shall conduct a written pre-job brief with the employees involved prior to the start of each job. Using the Job Brief Form as an aide, discussions for performing the work should include:
 - 1.3.1. Traffic control devices – Work Area Protection (WAP)
 - 1.3.2. Emergency Events: communication methods (code blue), first responders, and closest hospital.
 - 1.3.3. Add other specific topics to be discussed.
- 1.4. Minimum Approach Distances (MAD) to energized lines or exposed live parts shall be maintained (refer to Employee Safety Handbook Tables 2A, 2B and Appendix A for distances).
- 1.5. Identify if a Process Hazard Assessment (PHA) is required. Refer to NG-EOP-G037 “Process Hazard Analysis”
- 1.6. Identify if an ARC flash assessment is required. Refer to NG-EOP G035 “ARC Flash Awareness and Mitigation” and Work Methods Infonet site for Arc Flash Table to determine working distance and energy levels – see link below:

http://us3infonet/sites/eng_delivery_svcs/Pages/ArcFlashMitigation.aspx#2015

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1.0 ORDER PROCESSING

- 1.1 Regardless of the cause, all shock complaints are considered an emergency order type that requires immediate dispatch. When the Customer Contact Center (CCC) receives a call from a customer stating that a person has received a shock, the CCC:
 - 1.1.1 Immediately transfers to Dispatch any calls from 911 officials with an associated emergency or life-threatening situation.
 - 1.1.2 Retrieves the customer's account information and verifies the customer's account information on the Account window.
 - 1.1.3 Informs the customer that someone needs to be present at the premise in order for the shock complaint to be investigated and Informs the customer that their service may be disconnected if no one is present at the premise and a problem is detected.
 - 1.1.4 Completes the Issue Investigation Order for Account or a Service Order Form (paper copy) in its entirety and faxes the completed form to the appropriate dispatch office when the Customer Service System is down.
 - 1.1.5 Calls Dispatch office to verify receipt of the Issue Investigation Order for Account or the faxed Service Order Form.

2.0 INVESTIGATION

- 2.1 The individual investigating a shock complaint (generally a field service representative) shall:
 - 2.1.1 Initiate Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1) <http://infonetus/formscatalogweb/forms/NG0024.pdf>
 - 2.1.2 Use this form on **every** shock complaint order, even when the individual conducting the investigation resolves the problem without involving outside departments.
 - 2.1.3 Make the first check with a National Grid approved testing device between a known ground source and the origin of the shock.
 - 2.1.4 If the test between the ground and the shock source indicates higher than secondary voltages:
 - a. Safely evacuate customer(s) from the premise.
 - b. Contact Customer Meter Services Supervisor and System Operations Dispatch from a remote location and request Electric Operations assistance.
 - c. Safeguard and keep the hazardous area clear until Electric Operations provides relief.
 - 2.1.5 If the test between ground and the source of the shock indicates secondary or lower voltages:

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- a. Connect an AC multi-range voltmeter (such as Fluke 87) that provides true RMS at the same location and observe the readings. Leave the voltmeter connected at this location.
- b. Check for proper bonding. If additional bonding is required, assist or advise the customer accordingly.
- c. Open the customer's main breaker(s)/fuse(s), remove the meter and observe the voltmeter.
 1. If voltage drops to zero, the problem is within the customer's equipment.
 - i. Reinstall meter and close main breaker(s)/fuse(s).
 - ii. Isolate the trouble circuit by opening each breaker/fuse one at a time until the voltage reading on the voltmeter drops to zero.
 - iii. Identify equipment and wiring on troubled circuit.
 - iv. Isolate and disconnect troubled equipment or wiring and issue an Electric Warning Tag Form NG0023 (Exhibit 2).
<http://infonetus/formscatalogweb/forms/NG0023.pdf>
 - v. The individual conducting the investigation shall inform the customer to contact a licensed electrician or appliance repair person to check out internal wiring or appliances.
 - vi. Record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1).
 2. If the voltage does not drop to zero, each customer on the same secondary shall be disconnected in the same manner as above. Any other customers in close proximity and with a common water supply may also have to be checked. In each case, the voltmeter should remain connected at the original complaint's premise.
 3. If voltage is still present after steps 1 & 2 have been completed, it will be necessary to determine if the condition is the result of a neutral-to-earth AC source or a DC voltage. Connect the AC-DC multi-range voltmeter that provides true RMS and use the DC scale to observe readings:
 - i. If DC voltage is measured, the problem is with a DC source (i.e., cable TV, telephone). Inform the customer that the problem is with a source that National Grid cannot correct or check.
 - ii. Record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1).
 - iii. Notify Communications Companies.
 4. If voltage is still present after steps 1 & 2 have been completed and the voltage is AC:

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- i. Further investigation is required by the Engineering Lab in NE or the Meter and Test Department in NY per NG-EOP G003 – Shock and/or Neutral-to-Earth Voltage Complaint.
- ii. Record this information on the Shock and/or Neutral to Earth Voltage Complaint Investigation Form NG0024 (Exhibit 1) and forward to the Engineering Lab in NE or the Meter and Test Department in NY.

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EXHIBIT 1

“Shock and/or Neutral-to-Earth Voltage Complaint Investigation Report” (Form #NG0024)

<http://infonetus/formscatalogweb/forms/NG0024.pdf>

**SHOCK AND/OR NEUTRAL TO EARTH
VOLTAGE COMPLAINT INVESTIGATION REPORT**



Customers's Name		Phone
Street, Road, Etc.	Circuit	Pole or Enclosure
City, Town, Village		

TEST LOCATION SKETCH

CIRCUIT CONFIGURATION	A.C. Volts		D.C. Volts		CORRECTIVE ACTION
	As Found	As Left	As Found	As Left	
Normal					
Meter Removed					

REMARKS

DATE: _____ BY: _____

NG0024 (11.06)

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EXHIBIT 2
“Warning Notice” Form #NG0023
<https://nationalgridplc.sharepoint.com/sites/GRP-INT-US-ElectricWorkMethods/Electric%20Work%20Methods/SitePages/Forms.aspx>

WARNING NOTICE

TO OUR CUSTOMER

In response to your request we have inspected your electric installation and found the cause of your service failure to be as follows:

- Short in _____
- Defective _____
- Overlooked Branch Circuit
- General Overload
- Over-fused Branch Circuit
- Other: _____

NOTE: Replacing of blown fuses will not correct the trouble listed above.

We recommend that you call your:

- Electrical Contractor
- Appliance Repairman

To make the necessary repairs

nationalgrid

SERVICE REP _____

DATE _____

NG0023(01.06)

3.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	07/14/11	This document supersedes document dated 02/01/07.
2.0	04/27/15	This document supersedes document dated 07/14/11.
3.0	10/01/19	This documnet supersedes document dated 04/27/15 Added section 1.0 Safety Template

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FILE: NG-EOP G004 SHOCK COMPLAINTS JWD	ORIGINATING DEPARTMENT: T&D SERVICES	SPONSOR: FAWAD AMJAD

Appendix 15

NG-USA EOP G029 Tracking Temporary Repairs To Electric System

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	TRACKING TEMPORARY REPAIRS TO ELECTRIC SYSTEM	Version 3.0 – 04/01/20

INTRODUCTION

The purpose of this procedure is to outline the steps to be taken when a temporary repair is made to the primary/secondary electric system to restore service or maintain public safety until a permanent repair can be made. Every effort should be made to make permanent repairs to the primary/secondary electric system within 90 days. For those rare exceptions when permanent repairs are not made within 90 days, special reporting and periodic site visits are required to monitor the temporary repairs until the permanent repairs are completed. In Upstate NY, Temporary residential repairs should be made permanent within ten (10) days.

PURPOSE

This procedure applies to all personnel who are responsible for initiating/inspecting/tracking temporary repairs along with employees who are responsible for designing, planning, scheduling and construction of permanent repairs made at locations where temporary repairs were made to restore service or maintain public safety.

ACCOUNTABILITY

1. Electric Work Methods
 - A. Update procedure as necessary.
2. Operations
 - A. Ensure the components of the procedure are implemented.
 - B. Ensure workers are trained in this procedure.
 - C. Provide revision input as necessary.
 - D. Submit Temporary Waiver Form to Customer Order Fulfillment
3. Workers
 - A. Demonstrate the understanding of the procedure.
 - B. Comply with the requirements of the procedure.
4. Inspections
 - A. Ensure components of this procedure are implemented.
 - B. Track temporary repairs identified by Inspections
 - C. Provide periodic inspections of temporary repairs greater than 90 days.
 - D. Compile and submit report to New York Public Service Commission (PSC).
5. Customer Order Fulfillment
 - A. Administer, distribute and file Temporary Residential Connection Agreement
 - B. Enter into CSS on customer account
 - C. Track and enforce terms of agreement enforcing the ten (10) period for receiving electrical inspection for permanent connection or issuing a disconnect order.

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REFERENCES

State of New York Public Service Commission Order 04-M-0159
 State of New York Public Service Commission Order 04-M-0159 Adopting Changes to Electric Safety Standards Effective December 15, 2008.

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1.0 TEMPORARY REPAIRS MADE BY OPERATIONS

- 1.1 Temporary repairs that are made by operations to restore service or maintain public safety until permanent repairs can be made should be forwarded to the Local Area Inspection Supervisor for tracking in the Maintenance Database.
- 1.2 Inspections Supervisor and/or his/her designee will enter the Temporary Repair into the Maintenance Database with the appropriate maintenance code and assign a priority of Level 9.
- 1.3 The Level 9 indicates that this is a temporary repair that shall be made permanent within 90 days.
- 1.4 Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days.
- 1.5 Level 9 codes that require design will be downloaded from the maintenance database and placed in the work queue of the Distribution Design Supervisor or Engineering Supervisor for the appropriate area.

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- 1.6 Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion within 90 days of the temporary repair.

2.0 TEMPORARY REPAIRS DISCOVERED BY INSPECTIONS GROUP

- 2.1 Temporary repairs discovered by Inspections group shall be recorded in the Maintenance Database with the appropriate maintenance code and with an assigned priority Level 9.
- 2.2 The Level 9 indicates that this is a temporary repair that should be made permanent within 90 days.
- 2.3 Level 9 codes associated with a maintenance item will be assigned directly to Scheduling to be scheduled within 20 business days.
- 2.4 Level 9 codes that require design will be downloaded from the maintenance database and placed in the work queue of the Distribution Design Supervisor or Engineering Supervisor for the appropriate area.
- 2.5 Scheduling will have 20 business days to schedule the Level 9 work request to the field for completion within 90 days of the temporary repairs.

3.0 TEMPORARY OVERHEAD REPAIRS (TOH)

- 3.1 Temporary overhead repairs (TOH) are utilized by operations to restore service while the underground cable that generally serves the facilities is being repaired.
- 3.2 TOH's that meet National Grid Overhead Standards for construction would not be considered a temporary repair that would need to be tracked under this procedure.
- 3.3 TOH's not meeting National Grid Overhead Standards for construction are required to be tracked under this procedure as a temporary repair and should follow the process outlined in paragraph 2.0 above.

4.0 TEMPORARY REPAIRS NOT MADE PERMANENT WITHIN 90 DAYS

- 4.1 Every effort should be made to make temporary repairs permanent within 90 days.
- 4.2 In extraordinary circumstances, which may include major storms, where permanent repairs may extend beyond 90 days (exceptions), the company shall periodically perform site visits to monitor the condition of the temporary repairs.
- 4.3 In Upstate New York, National Grid shall also report these exceptions as part of the reporting requirements outlined in the State of New York Public Service Commission Order 04-M-0159 Adopting Changes to Electric Safety Standards Effective December 15, 2008.
- 4.4 The Inspections group is responsible for tracking all temporary repairs that extend beyond 90 days.
- 4.5 The initial inspection should take place after 90 days and then periodic inspections should take place every 45 days until the permanent repair is made.

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- 4.6 The Inspection supervisor should run a report from the maintenance database for open Level 9 codes.
- 4.7 The periodic inspection time frame lines up with the periodic inspection requirements for the elevated voltage findings requirements and could be run at the same intervals.

It is strongly encouraged that these temporary repairs be made permanent as soon as practicable to limit the burden of tracking these repairs.

5.0 NYS PUBLIC SERVICE COMMISSION REPORTING (UPSTATE NY ONLY)

- 5.1 Temporary repairs that are beyond 90 days shall be identified and justified as part of the reporting requirements of the PSC Orders referenced below.
- 5.2 The 90-day time period commences on the day the temporary repair was made or the day the temporary repair was discovered.
- 5.3 The Inspections group will be responsible for consolidating the temporary repair information from operations and from the maintenance database in order to prepare the report that will be submitted to the PSC.
- 5.4 The report will identify the temporary repairs that exceeded 90 days, the periodic site visit information and the justification for the repair taking longer than 90 days.
- 5.5 The Inspections group shall file the report by February 15 each year.

6.0 TEMPORARY RESIDENTIAL SERVICE REPAIRS (UPSTATE NY ONLY)

- 6.1 Temporary electric service connections under emergency conditions will only be made for residential customers where the Premise Owner agrees to make permanent repairs and obtain an approved electrical inspection of the repairs within ten (10) business days.
 - 6.1.1 An exception may be permitted by the Customer Fulfillment Department for extension as a result of major storms.
 - 6.1.2 Temporary residential services repairs are valid for no more than 10 business days.
- 6.2 A Temporary Residential Electric Service Connection Agreement (Agreement) (See Appendix A) must be executed by the Owner, or their designee and a National Grid employee prior to installation of a temporary service.
- 6.3 Temporary residential electric service connections shall only be made under the following conditions:
 - 6.3.1 When inspection agency services are not available.
 - 6.3.2 In the event of customer-owned equipment failure when electrical repair services are not available, such as:

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- a. Failure of the residential customer’s overhead service attachment bracket.
 - b. Loss of customers service conductors (service entrance cable or underground service cable) between the service point and their service equipment.
- 6.3.3 Under no circumstances shall National Grid employees work on customer-owned equipment including, but not limited to, replacing service attachment brackets or performing any repairs on service equipment or meter sockets.
- 6.3.4 In the event of an emergency such as fire, flood, weather, or earth-related catastrophe, unless ordered otherwise by the local Fire Marshall.
- 6.4 Copies of the executed Agreement shall be distributed in accordance with the copy distribution outlined at the bottom of the Agreement. It will be the responsibility of the Customer Fulfillment Department to track and enforce the terms of the executed Temporary Residential Electric Service Connection Agreement.
- 6.5 Temporarily residential services are not subject to NY Public Service Commission Reporting requirements.

7.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	05/07/10	This is a new document.
2.0	04/19/18	Updated entire document to new format. Added Safety, Temporary Residential Service Repair (Upstate NY Only) and Exception Sections.
3.0	04/01/20	This document supersedes 2.0 dated 04/19/18. Remove Exception Approval, N/A Remove Safety Section, N/A

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APPENDIX A



Niagara Mohawk Power Corporation D/B/A National Grid

Temporary Residential Electric Service Connection Agreement

Subject to the terms and conditions of this Temporary Residential Electric Service Connection Agreement (the "Agreement"), Niagara Mohawk Power Corporation d/b/a National Grid (the "Company") agrees to temporarily reconnect this residential electric service at the Service Address specified below (the "Service Reconnection") for no more than ten (10) business days while the Owner secures the services of an electrician to make permanent repairs to the electric service (the "Repairs") and obtains an approved electrical inspection of those Repairs [unless either party is ordered otherwise by the Fire Marshall, Municipal Code Enforcement Agent, Authority Having Jurisdiction (AHJ), or a third party inspection agency operating under the authority of the AHJ.]

In consideration for the Company's implementation of the Service Reconnection, the Owner acknowledges and agrees to the following:

1. The Service Reconnection is a temporary service connection of an emergency nature and is not intended for the permanent or continued provision of service; and
2. The Company will disconnect the Service Reconnection if permanent Repairs are not made and an approved inspection thereof is not received within ten (10) business days of the Effective Date listed below; and
3. All Repairs must be inspected by the AHJ, or a third-party inspection organization acceptable to the AHJ within ten (10) business days of the Effective Date listed below; and
4. The Company is not responsible for any damages incurred as a result of the Service Reconnection or otherwise in connection with this Agreement; and
5. Any potential damage to the Owner's premises or otherwise that may occur as a result of the Service Reconnection without an approved inspection certificate may jeopardize the Owner's eligibility for fire and casualty insurance.
6. The Owner has read and understands the terms and conditions of this Agreement, which continue on the next page.

Owner Initials _____

Temporary Residential Service Address / Service City / Zip Code	
Effective Date ____/____/____	Repair and Inspection Deadline Date ____/____/____
Owner Name (Print)	Owner Name (Signature)
Owner Contact Telephone Number	
Owner's Electrician (to Make Repairs)	Electrical Inspection Agency
Company Employee Name (Print)	Company Employee Name (Signature)

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APPENDIX A



Terms and Conditions

- RELEASE AND DISCLAIMERS:** This Agreement is limited to emergency temporary electric service connections made by the Company at Owner's request when electrical repair and inspection agency services are not readily available due to emergencies arising from accidental damage, weather, or earth-related catastrophes.

THE SERVICE RECONNECTION IS BEING MADE AT OWNER'S EXPRESS REQUEST AND SHALL BE AT OWNER'S SOLE AND EXCLUSIVE RISK AND LIABILITY. OWNER FOREVER WAIVES, RELEASES AND DISCHARGES THE COMPANY, ITS PARENTS AND AFFILIATES, AND THEIR RESPECTIVE OFFICERS, DIRECTORS, MEMBERS, MANAGERS, EMPLOYEES, SERVANTS, REPRESENTATIVES, CONTRACTORS, AGENTS, SUCCESSORS, AND ASSIGNS (EACH, INDIVIDUALLY, A "COMPANY PARTY" AND, COLLECTIVELY, THE "COMPANY PARTIES") FROM ANY AND ALL CLAIMS, SUITS, CAUSES OF ACTION AND/OR LIABILITY WHATSOEVER (INCLUDING, WITHOUT LIMITATION, LIABILITY FOR ANY LOSS, INJURY, OR DAMAGE FOR DEATH, PERSONAL INJURY OR PROPERTY DAMAGE) WHICH THE OWNER MAY NOW OR HEREAFTER HAVE AGAINST THE COMPANY AND/OR ANY COMPANY PARTY ARISING OUT OF OR RELATING TO THE SERVICE RECONNECTION OR THIS AGREEMENT. OWNER HEREBY ASSUMES ANY AND ALL RISK AND LIABILITY OF ANY KIND ARISING FROM OR IN CONNECTION WITH THE SERVICE RECONNECTION OR THIS AGREEMENT.

In no event, whether as a result of breach of contract, tort (including negligence and strict liability), or otherwise shall Company be liable in connection with this Agreement or the Service Reconnection for any special, indirect, incidental, penal, punitive or consequential damages of any nature, whether or not (i) such damages were reasonably foreseeable or (ii) Company was advised or aware that such damages might be incurred. The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.
- NO WARRANTIES OR REPRESENTATIONS:** COMPANY MAKES NO COVENANTS, GUARANTEES, REPRESENTATIONS OR WARRANTIES, WRITTEN OR ORAL, STATUTORY, EXPRESS OR IMPLIED, WITH RESPECT TO THE SERVICE RECONNECTION OR THIS AGREEMENT (INCLUDING, WITHOUT LIMITATION, ANY COVENANTS, GUARANTEES, REPRESENTATIONS OR WARRANTIES WITH RESPECT TO QUALITY, SAFETY, SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE, THE ABSENCE OF ANY DEFECTS, WHETHER LATENT OR PATENT, OR COMPLIANCE WITH ANY FEDERAL, STATE OR LOCAL LAWS, RULES, REGULATIONS OR ORDINANCES) ALL OF WHICH ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED. THIS AGREEMENT (INCLUDING, WITHOUT LIMITATION, ANY PERFORMANCE HEREUNDER) DOES NOT CONSTITUTE AN ELECTRICAL INSPECTION NOR DOES IT REPRESENT ANY RECOMMENDATION ON THE PART OF THE COMPANY REGARDING IMPLEMENTATION OF THE SERVICE RECONNECTION.

The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.
- HOLD HARMLESS:** To the fullest extent permitted by applicable law, Owner shall at all times indemnify, defend (with counsel satisfactory to Company), and hold the Company, its parents and affiliates, and their respective officers, members, managers, directors, employees, servants, representatives, contractors, agents, successors, and assigns, harmless from and against any and all damages, costs (including, without limitation, reasonable attorney fees), expenses, losses, claims, demands, suits, recoveries, and liabilities (including, without limitation, liabilities to third parties and liabilities related to injury to, or death of, any person and damage to property), arising out of or relating to this Agreement, the Service Reconnection or the Company's performance or nonperformance of its obligations under this Agreement.

Owner shall take prompt action to defend and indemnify Company, its affiliates, parents, and their respective officers, members, managers, directors, employees, servants, representatives, contractors, agents, successors, and assigns, against claims, actual or threatened, but in no event later than notice by Company to Owner of the service of a notice, summons, complaint, petition or other service of process against Company alleging damage, injury, liability, or expenses that may be subject to indemnification hereunder. The Owner shall defend any such claim or threatened claim, including as applicable, engagement of legal counsel satisfactory to the Company, to respond to, defend, settle, or compromise any claim or threatened claim. Furthermore, Owner understands and agrees that it is responsible for any and all costs and expenses incurred by Company to enforce this indemnification provision.

The provisions of this Section shall survive termination, expiration, cancellation, or completion of this Agreement.
- MISCELLANEOUS:** This Agreement shall not be amended, superseded or modified, except in a writing signed by both parties. No term of this Agreement may be waived except in a writing signed by an authorized representative of the party against whom the amendment, modification, or waiver is sought to be enforced. Waiver of any provision herein shall not be deemed a waiver of any other provision herein, nor shall waiver of any breach of this Agreement be construed as a continuing waiver of other breaches of the same or other provisions of this Agreement. To the extent that any provision of this Agreement shall be held to be invalid, illegal or unenforceable, it shall be modified so as to give as much effect to the original intent of such provision as is consistent with applicable law and without affecting the validity, legality or enforceability of the remaining provisions of the Agreement. This Agreement shall be interpreted and enforced according to the laws of the State of New York and not those laws determined by application of New York's conflicts of law principles. Owner and Company each agree that there are no understandings, agreements, or representations, expressed or implied, with respect to the subject matter hereof other than those expressed herein. This Agreement supersedes and merges all prior discussions and understandings with respect to the subject matter hereof, and constitutes the entire agreement between the parties with respect to such subject matter.

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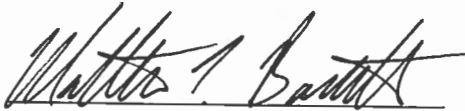
Appendix 16

Certifications

residential distribution (“URD”) facilities, overhead and underground transmission facilities, and substation fences owned by the Company at least once every five years (“Facilities”), all as identified through a good faith effort by the Company for stray voltage (the “Stray Voltage Testing Program”).

3. I am responsible for overseeing the Company’s Stray Voltage Testing Program.
4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Stray Voltage Testing Program for the Twelve-Month Period. Except for untested structures that are identified as inaccessible in the Company’s Annual Report and those Facilities that were already tested at least once during the five-year period ended December 31, 2021, the Company is unaware of any Facilities, Underground Distribution Facilities, or Streetlights that were not tested during the Twelve-Month Period in accordance with the Stray Voltage Testing Program.
5. I make this certification subject to the condition and acknowledgement that it is reasonably possible that, notwithstanding the Company’s good faith implementation and completion of the Stray Voltage Testing Program, there may be Facilities, Underground Distribution Facilities, and Streetlights that, inadvertently, may not have been tested or were not discovered or known after reasonable review of Company records and reasonable visual inspection of the areas of the service territory where Facilities, Underground

Distribution Facilities, and Streetlights were known to exist or reasonably expected to be found.



Matthew T. Barnett

Sworn to before me on this 15th day of February, 2022

Notary Public:



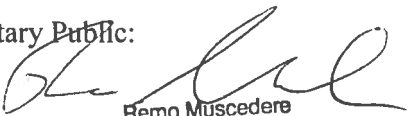
Remo Muscedera
Notary Public State of New York
Qualified in Schenectady Co. No. 01MU6087843
My commission expires February 24, 2023

3. I am responsible for overseeing the Company's Facility Inspection Program.
4. I hereby certify that, to the best of my knowledge, information, and belief the Company has implemented and completed its Facility Inspection Program to inspect approximately 20 % of its Facilities during calendar year 2021, to comply with the five-year inspection cycle required under the Orders.
5. I further certify that, to the best of my knowledge, information, and belief, the Company has inspected 100% of its Facilities for the five-year period ended December 31, 2021, except for those identified in the Company's Annual Report.


Matthew T. Barnett

Sworn to before me on this ^{15th} day of February, 2022

Notary Public:


Remo Muscedere
Notary Public State of New York
Qualified in Schenectady Co. No. 01MUG087843
My commission expires February 24, 20~~22~~²³