

October 2, 2012

**VIA HAND DELIVERY & ELECTRONIC MAIL**

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

**RE: Docket 4237 - Commission Investigation relating to Stray and Contact Voltage Occurring in Narragansett Electric Company Territories**  
**Revised Contact Voltage Program**

Dear Ms. Massaro:

On behalf National Grid<sup>1</sup>, I have enclosed ten (10) copies of the Company's proposed Contact Voltage Program, which has been revised to reflect changes to the program that the Company agreed to make after the original program was filed with the Commission on August 17, 2012. The Company is submitting a clean version and a version that is marked to show the revisions. This submission is being made in response to the Commission's request for an updated version of the proposed program document at the September 24, 2012 evidentiary hearing in this matter.

Thank you for your attention to this transmittal. If you have any questions, please feel free to contact me at (401) 784-7667.

Very truly yours,



Thomas R. Teehan

Enclosure

cc: Docket 4237 Service List  
Steve Scialabba  
Leo Wold, Esq.

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company").

Certificate of Service

I hereby certify that a copy of the cover letter and/or any materials accompanying this certificate were electronically transmitted to all individuals listed below. Copies of this transmittal will be hand delivered to the RI Public Utilities Commission.



October 2, 2012

**Docket No. 4237 – Commission’s Proceeding Relating to Stray and Contact Voltage Pursuant to Enacted Legislation  
Service List updated 9/20/12**

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National Grid

The Narragansett Electric Company

**Proposed Rhode Island  
Electric Contact Voltage  
Program**

Revised October 2, 2012

**Submitted to:**  
Rhode Island Public Utilities Commission  
R.I.P.U.C. Docket No. 4237

Submitted by:

**nationalgrid**

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**Rhode Island  
Proposed Electric Contact Voltage Program**

## **Section 1**

### **Introduction and Summary**

## **1. Introduction and Summary**

On June 6, 2012, R.I.G.L. §39-2-25 was signed into law. That statute directs the Rhode Island Public Utilities Commission (Commission) to establish a contact voltage detection, repair, and reporting program, which would be applicable to National Grid.<sup>1</sup> That program is to be designed to implement appropriate procedures to detect contact voltage on publicly accessible surfaces, such as sidewalks, roadways, storm drains and streetlights that can become energized by faults in the underground electric distribution system. The program is to establish designated contact voltage risk areas. Under the program, the Company is to conduct surveys within designated contact voltage risk areas for contact voltage on all conductive surfaces in the public rights-of-way, using equipment and technology as determined by the Commission. By June 30, 2013, the Company is to conduct an initial survey of no less than forty percent (40%) of designated contact voltage risk areas, and thereafter beginning July 1, 2013 to annually survey no less than twenty percent (20%) of designated contact voltage risk areas.<sup>2</sup> Additionally, the program is to include requirements that the Company repair electric system faults detected in its underground distribution system that result in contact voltage at a level determined by the Division.<sup>3</sup> National Grid must annually report to the Commission on its contact voltage survey findings and repair efforts, including information on both Company-owned assets and any customer-owned assets. Lastly, the statute provides that the costs of the program are to be fully recovered annually through a fully reconciling funding mechanism.

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (“National Grid” or the “Company”).

<sup>2</sup> R.I.G.L. §39-2-25 (b) (2) and (b) (3).

<sup>3</sup> R.I.G.L. §39-2-25 (b) (4).

This proposal addresses the statutory requirements for the contact voltage detection and repair program. Section 2 of this proposal describes the Company's existing elevated voltage testing procedures, including both overhead and underground systems, which the Company will continue to perform. Section 3 of this proposal describes the method the Company will use to identify the designated contact voltage risk areas that are to be surveyed by the Company under the statutory program. Section 4 includes a technical and cost analysis for the technology and equipment recommended for use by the Company. Section 5 identifies the specific electric facility assets that the Company will survey in each designated contact risk area, as well as those Company assets that will not be part of the surveys. This section also sets forth a schedule for completion of the surveys to meet the percentage requirements of the statute. Section 6 sets forth the reporting requirements for the annual filing with the Commission. Section 7 provides a description of the Company's proposed annual fully reconciling mechanism to recover the costs of the program. Section 8 provides updated information on the Company's estimate of contact voltage costs for the program, and Section 9 provides a preliminary discussion of customer rates and billing impacts.

## **Section 2**

# **Current Voltage Testing Procedures**

## **1. Current Voltage Testing Procedures**

Presently, the Company has electric operating procedures (EOP's) in place for the testing of overhead and underground facilities for stray or contact voltage. The details of the Company's EOP voltage testing procedures and protocols, EOP-G016, Equipment Elevated Voltage Testing, were included in this docket in Attachment 3 of the Company's response to Commission 1-3, but have since been revised (as indicated by arrows), and are included as Attachment 1 to this plan.

For overhead facilities, the Company conducts manual elevated voltage testing of Company-owned overhead distribution facilities over a five year cycle. In addition, the Company also conducts voltage testing for each job site where National Grid personnel or its contractors are working on an assignment, either at the end of the work day or when the assignment is completed. It is important to note that although overhead testing is not specifically addressed in R.I.G.L. §39-2-25, the Company will continue to follow these testing processes and procedures.

With respect to the elevated voltage testing of Company-owned underground facilities, currently the Company tests metallic items such as streetlights, padmount transformers, switchgear and metallic handhole covers over a five year cycle. Testing for equipment elevated voltages is also completed on underground facilities while completing working inspections. For street lighting, elevated voltage testing is also performed during each outage investigation of Company-owned street lights.

If an elevated voltage condition is found and verified, the site is guarded until it can be made safe by Company personnel or if private/municipally owned, made safe by the owner or municipality. Guarded is defined as guarded by a person or a protective barrier that prevents public contact if the elevated voltage found is greater than 4.5 volts. If the voltage measures greater than 4.5 volts and less than 8 volts it will either be guarded in person or by installation of a protective barrier that prevents public contact. If the voltage measurement is greater than 8 volts it is guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities; and an immediate maintenance and repair response is required.

R.I.G.L. §39-2-25 modifies and expands the scope and requirements of the Company's current underground voltage testing procedures. Specifically, the legislation requires contact voltage testing of underground facilities within specific designated contact voltage risk areas, and it accelerates the initial time period for contact voltage testing to 40 percent of designated contact voltage risk areas by June 30, 2013. Furthermore, the legislation requires a program designed to implement appropriate procedures for testing publicly accessible surfaces, such as sidewalks, roadways, storm drains and streetlights that can become energized by faults to the electric distribution system, which can include items other than Company-owned equipment. As such, the Company views R.I.G.L. §39-2-25 as an expansion of its current voltage testing procedures for underground facilities. The sections below discuss in more detail how the Company proposes to meet the requirements of the statute and explain how it plans to integrate those requirements into its existing underground voltage testing processes and procedures.

## **Section 3**

### **Designated Contact Voltage Risk Areas**

**1. Designated Contact Voltage Risk Areas**

R.I.G.L. 39-2-25 (b) (1) requires National Grid to identify areas of risk for contact voltage and to survey these locations as part of its contact voltage program. The boundaries of these designated contact voltage risk areas are to be determined by the presence of underground electrical distribution facilities situated in “pedestrian-dense” areas such as urban neighborhoods, commercial areas, central business districts, locations with large tourist areas or venues, and other places where pedestrians could be expected to be exposed to contact voltage.

The Company identified potential pedestrian dense areas by using land use data layers maintained by Rhode Island Geographic Information System (RIGIS). Table 1, below, shows the land use information available from RIGIS and identifies the layers that were used to identify pedestrian use areas which may potentially be pedestrian dense areas. An area was identified as a pedestrian use area if it fell within any of the checked land use data layers in the table.

**Table 1**

Description	Acres	Pedestrian Use Area
Deciduous Forest (>80% hardwood)	257,684	No
Mixed Forest	116,358	No
Softwood Forest (>80% softwood)	56,131	No
Medium Density Residential (1 to 1/4 acre lots)	48,558	Yes
Medium High Density Residential (1/4 to 1/8 acre lots)	41,698	Yes
Water	28,409	No
Cropland (tillable)	21,290	No
High Density Residential (<1/8 acre lots)	21,272	Yes
Medium Low Density Residential (1 to 2 acre lots)	14,172	Yes
Pasture (agricultural not suitable for tillage)	13,760	No
Wetland	13,500	No
Commercial (sale of products and services)	13,238	Yes
Developed Recreation (all recreation)	11,870	Yes
Low Density Residential (>2 acre lots)	7,702	No
Institutional (schools, hospitals, churches, etc.)	7,648	Yes
Industrial (manufacturing, design, assembly, etc.)	7,314	Yes
Brushland (shrub and brush areas, reforestation)	7,133	No
Roads (divided highways >200' plus related facilities)	5,167	Yes
Mines, Quarries and Gravel Pits	4,007	No
Power Lines (100' or more width)	2,960	No
Vacant Land	2,763	No
Orchards, Groves, Nurseries	2,671	No
Waste Disposal (landfills, junkyards, etc.)	2,578	No
Airports (and associated facilities)	2,102	No
Cemeteries	2,097	Yes
Transitional Areas (urban open)	1,829	Yes
Other Transportation (terminals, docks, etc.)	1,539	Yes
Beaches	1,459	No
Idle Agriculture (abandoned fields and orchards)	1,352	No
Commercial/Industrial Mixed	1,214	Yes
Railroads (and associated facilities)	792	Yes
Sandy Areas (not beaches)	664	No
Water and Sewage Treatment	439	No
Rock Outcrops	233	No
Mixed Barren Areas	88	No
Commercial/Residential Mixed	56	Yes
Confined Feeding Operations	6	No

The land use data was then overlaid with the Company's underground asset locations (manholes, handholes, vaults, and underground fed streetlights) and validated by National Grid Engineers familiar with the Rhode Island electricity distribution system to designate contact voltage risk areas. The communities and sections of communities with designated contact voltage risk areas included Providence, Pawtucket, Woonsocket, and Newport. While areas such as underground residential developments and underground commercial developments do exist in pedestrian use areas, these areas were not considered as pedestrian dense, and were not designated as contact voltage risk areas. However these areas will continue to be tested manually for elevated voltage as discussed in Section 2.

As discussed in more detail in Section 4 and Section 5 below, to comply with the statutory requirements of R.I.G.L. 39-2-25, the Company is proposing to utilize mobile voltage testing equipment to survey its designated contact voltage risk areas. Because primary and secondary overhead lines can interfere with this type of voltage detection equipment, resulting in "false positives" for voltage faults, the Company has used a 50 foot buffer to limit the designated contact voltage risk area to that area that is solely underground and not subject to interference by overhead facilities. Areas where the mobile technology cannot be used due to the presence of overhead facilities will continue to be tested manually, as discussed in Section 2. Likewise, areas which are tested with the mobile technology will not be included in the manual testing.

The proposed list of communities with designated contact voltage risk areas is shown below. Attachment 2 contains maps that identify the specific designated contact voltage risk areas within each community or section.

- Newport
- Pawtucket
- Providence, which is broken down into 10 designated contact voltage risk areas
  - College Hill
  - Downtown
  - Elmwood
  - Federal Hill
  - Lower South Providence
  - Olneyville
  - Smith Hill
  - Upper South Providence
  - Washington Park
  - West End
- Woonsocket

Attachment 2 contains maps that identify the specific designated contact voltage risk areas for which the Company is requesting the Commission's approval. At the same time, the Company recognizes that the identification of designated contact voltage risk areas is not static. Thus, the Company expects that in the future other areas of the state that meet the statutory definition of a pedestrian-dense area with underground facilities will need to be added to this list, or that additional streets may need to be added to these areas. Likewise, it is also possible that

certain areas of these communities identified above may appropriately be removed from survey testing if they no longer meet the necessary criteria.

## **Section 4**

### **Equipment and Technology Analysis**

## **1. Equipment and Technology Analysis**

Rhode Island's contact voltage statute directs the Commission to review and determine the specific equipment and technology that will be used by the Company for the contact voltage program. R.I.G.L. 39-2-25 (d). In addition, the statute directs the Division to establish the specific level for testing, maintenance and repair. R.I.G.L. 39-2-25 (b) (4). The Company seeks approval of its proposed plan provisions relating to both selection of equipment and technology as well as to establishing voltage levels. Those proposals are contained in the following subsections:

### **a. Mobile Equipment Technology**

To meet the directives of the statute, the Company proposes to introduce mobile equipment voltage testing technology into its existing survey process to identify electrical faults in designated contact voltage risk areas. Presently, the Company is aware of two major mobile technology companies that provide mobile survey and testing technology, (1) Premier Utility Locating Services, LLC (Premier) and (2) Power Survey LLC (Power Survey).

Premier uses the Narda 8950 Stray Voltage Detection System. The Narda system utilizes an E-field sensor that has a three axis design that allows detection from one or all sensors. The Narda 8950 has had testing witnessed by Underwriters Laboratories and is certified by NTS Laboratories. Power Survey uses the SVD2000 Stray Voltage Detection System. The SVD2000 employs a three dimensional antenna to sense un-shielded sources of electricity. The SVD2000 has been certified by Ergonomics Inc.

Each of these companies offers different technology capabilities and price options. As noted above, R.I.G.L. 39-2-25 (c) provides that the costs of the Company's contact voltage program are recoverable through a fully reconciling mechanism to be filed annually with the Commission for review and approval. Therefore, to determine the most accurate and cost effective vendor and technology for this program, the Company plans to issue a Request for Proposal (RFP) for mobile technology services for the contact voltage program.<sup>4</sup> Not only will the RFP provide the Company with more accurate information on mobile technology, but it will also provided the Commission and customers with assurance that the Company is receiving the most cost effective services.

To that end, as part of this RFP process, in addition to price information, the Company will request each vendor that responds to the RFP to survey an identical designated contact voltage risk area within a specific time period, and to provide the details of that survey as part of its RFP response. This testing will assist the Company in determining the accuracy of the vendors' technology and will be provided to the Commission as part of the Company's final equipment recommendation.

**b. Manual Voltage Testing**

In addition to the mobile technology, the Company will continue to utilize manual handheld devices for overhead inspections and underground inspections as discussed in Section 2, and detailed in NG-EOP G016, which is included as Attachment 1.

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<sup>4</sup> In addition, the Company's procurement guidelines require the Company to issue a RFP for major service purchases.

Presently, the Company conducts voltage testing utilizing hand held devices (proximity detection units) capable of detecting voltage from 5 volts to 600 volts. The Company also uses a portable AC digital high impedance volt meter which has the ability to take reading with and without an input load impedance of 500 ohms. The hand held devices are certified to a minimum level of 5 volts and to a maximum level of 600 volts by an independent laboratory. The following units have been certified for use by the Company:

HD Electric model LV-S-5 (5-600 volts)

Fluke 85  
Fluke 87  
Fluke 170 series or equivalent  
Fluke 175  
Fluke 177  
Fluke 179  
Fluke 187  
Fluke 189

The Company would recommend that the Commission also certify these handheld devices as part of its overall determination on the appropriate technology to use for its surveys in designated contact voltage risk areas.

**c. Total Harmonic Distortion (“THD”) Pilot**

As set forth in the Company’s response to Record Request # 4, which asked the Company to explain what, if any, additional actions it would undertake where a voltage measurement of 1 volt up to the 4.5 volts threshold is found, the Company proposed to conduct a pilot program to obtain additional information on a method to use total harmonic distortion (“THD”) levels to determine appropriate mitigation for elevated voltages. Specifically, the Company will use the

THD method as part of its initial forty percent (“40%”) voltage testing in Downtown, College Hill and Smith Hill in Providence and in Newport, Pawtucket, and Woonsocket. Under the pilot, if during testing of these areas 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. These areas will then be safeguarded from the public and permanent repairs will be made.<sup>5</sup> THD will be determined by the use of a Fluke power quality clamp meter or a Fluke scope meter both of which have the ability to measure THD. To implement this pilot program, the Company will modify and reissue its RFP and provide the results of this THD pilot program to the Division and the Commission within 45 days of completion of the testing.

**d. Voltage Levels**

Currently in New England, the Company utilizes a 4.5 volt baseline standard for its testing for stray and contact voltage. Specifically, if an elevated voltage condition is detected and verified, the Company’s EOP dictates that the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for this purpose is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 4.5 volts. If the voltage measures greater than 4.5 volts and less than 8 volts, the Company will either guard the site in person or by a protective barrier that prevents public contact. For a voltage measurement greater than 8 volts, the Company will guard the site by an equipment elevated voltage inspector or a Company

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<sup>5</sup> If the total harmonic distortion is greater than 10% and no visual defects are found, no further action will be required.

employee that has been trained to stand by on energized facilities; and will call for an immediate response to repair the site.

While there is no IEEE Standard for contact voltage thresholds, there is an IEEE Working Group, which is called the Working Group on voltages at publicly and privately accessible locations (DIST-1695 WG) (“Working Group”). The Company is participating on this Working Group. The Working Group is developing a Trial Use Guide focusing primarily on the presence of power frequency related voltages. The guide created by the Working Group will create necessary definitions; and will discuss causes, impacts, testing techniques, and mitigation. In the absence of such a standard, the Company believes that its current voltage benchmark and processes are appropriate for the contact voltage program. These current procedures were developed to enhance safety and reliability and reflect good utility practice. The 4.5 volt baseline is the same standard used by the Company in Massachusetts today. As part of the Massachusetts Department of Public Utilities (“DPU” or “Department”) Order on Distribution System Safety, issued on December 9, 2005, the DPU ordered utilities in Massachusetts to file plans to implement the recommendations contained in a report<sup>6</sup> by Navigant Consulting, Inc. (“Navigant”) which was part of the Stray Voltage and Manhole Safety Assessment performed by the Department. In this report, Navigant notes “[w]hile there is no strict definition (at this point) as to what constitutes harmful voltage levels, elevated voltages below 8 to 10 volts generally are not detected by humans; however, elevated voltages below 10 volts may cause discomfort to some animals, particularly for domestic pets, but may not always be harmful.” Furthermore, the

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<sup>6</sup> Independent Assessment of Stray Voltage in Underground Distribution Systems of Massachusetts Electric Companies, dated December 9, 2005, by Navigant Consulting, Inc.

report states that “[e]vidence and industry data suggest *potentially* hazardous voltages manifest at or above 20 volts.<sup>7</sup> Between 8 to 20 volts, stray voltages can be detected and considered an irritant by humans.” While both Maryland and New York utilize 1 volt thresholds in their contact voltage programs, New Jersey, in its recent order adopting a pilot contact voltage program, noted that “there is not sufficient data available to determine the risks arising from contact voltage in our State or the best practices to approach those possible risks in a cost effective manner”, and in the pilot program, has adopted an actionable contact voltage level of 5 volts.<sup>8</sup> Accordingly, the Company believes that the existing standard of 4.5 volts or greater is appropriate for protecting public safety while at the same time efficiently managing the costs to customers of this program.

Finally, as required by statute, the Company has discussed its current 4.5 volt standard and procedures with the Division as part of this program, and the Division has not recommend any modifications to the Company’s existing voltage standard or voltage testing procedures. On September 26, 2012, the Division submitted a letter to the Commission stating that a threshold level of 4.5 volts was the Division determination of a proper level for contact voltage for mediation and repair under R.I.G.L. §39-2-25 (b)(4). The Company agrees with this determination.

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<sup>7</sup> Navigant Report at 8-9

<sup>8</sup> New Jersey Board of Public Utilities, *Matter of the Issue of Contact Voltage*, Docket No. EO10100760 at 4. (2011)

## **Section 5**

### **Asset Survey Procedures**

## **1. Contact Voltage Facilities and Asset Survey Procedures**

The contact voltage statute requires National Grid to conduct surveys in the designated contact voltage risk areas approved by the Commission over a five year period. R.I.G.L. 39-2 (b) (2) (3) and (4) The statute directs that the Company initially survey at least 40 percent of designated contact voltage risk areas by June 30, 2013, and then beginning July 1, 2013, conduct annual surveys of at least 20 percent of the designated contact voltage risk areas.

### **A. Company Assets Exempted From Surveys**

As noted above in Section 3, because mobile technology utilize a magnetic field to detect voltage it is not possible to employ mobile technology where the Company has overhead facilities. Therefore, areas with overhead facilities within a 50 foot buffer area will not be considered as a designated contact voltage risk area for this program, but will continue to be tested manually in accordance with the Company's EOP procedures. Likewise, areas that are tested with mobile technology will not be included in the manual testing.

Additionally, the Company expects to encounter situations where its equipment and facilities are located in designated contact voltage risk areas where access to the public is prevented or located in areas where the public is reasonably not expected to be walking (median strips of limited access highways,). These areas will not to be designated contact voltage risk areas as they are not publicly accessible.<sup>9</sup> Similarly there may be temporary construction or

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<sup>9</sup> Although a location may not be considered a designated contact voltage risk area, to the extent that a survey using mobile technology registers a fault greater than 8 volts in such areas and that areas is accessible to Company personnel, the Company will take appropriate repair or maintenance action for Company-owned assets and notify the appropriate party for customer-owned assets.

other work activity that obstructs access to a particular facility for an extended period of time. In such cases, the Company will make note of the obstruction, however any repairs may need to be coordinated with the appropriate personnel at a later time.

Finally, the Company will not test in designated contact voltage risk areas where there is non-conductive equipment, such as concrete or fiberglass handholes, as these do not pose an electrical danger.

#### **B. Survey Schedule**

As discussed in more detail in Section 7 below, the Company proposes to accelerate its contact voltage survey process so as to complete the statutory percentage by no later than March 31 each year. This schedule is being proposed to align the Company's survey work with its fiscal year and to reconcile the contact voltage program with the Company's existing annual Infrastructure, Safety and Reliability (ISR) reconciliation filing.

Of the total 13 designated contact voltage risk areas, the Company proposes surveying six (6) in the first year to meet the 40 percent requirement, and then survey three (3) each year thereafter to meet the 20 percent per year requirement. Attachment 3 contains a list by year of those designated contact voltage risk areas in which the Company will conduct its surveys.

#### **C. Street Light Survey Procedures**

As part of the Division's September 18, 2012 comments on the Company's Contact Voltage Program, the Division recommended changing the Company's current manual elevated voltage cycle for street lights from a five year cycle to a three year cycle. The Company agrees

with this recommendation and will transition this program to a three year cycle. The Company proposes that it would be able to complete its first three year cycle by the end of FY 2014 by accelerating the remaining five year cycle inspections to FY 2014.

## **Section 6**

### **Contact Voltage Reporting**

## **1. Contact Voltage Reporting Requirements**

R.I.G.L. 39-2-25 (c) requires National Grid to maintain records of its contact voltage testing as well as subsequent maintenance and repairs and submit copies of these record to the Commission for public inspection. In addition, R.I.G.L. 39-2-25 (b) (6) requires the Company monitor, track and annually report to the Commission contact voltage events and corrective actions. At a minimum, the Company Grid must report the number and types of energized objects found both on Company-owned assets and on customer-owned assets found; voltage levels recorded; the number of shocks that occur to members of the public or to pets; the corrective action taken by the Company and any additional information that the Commission deems appropriate.

The Company proposes to file the following reporting information in its annual filing to the Commission, with copies to the Division. Where survey testing indicates a reading greater than 4.5 volts the Company will provide:

1. Event record number
2. Location of testing
3. Date and time of testing
4. Company or customer asset
5. Failed Equipment type
6. Voltage recorded
7. Personal injuries to public or pet or property damage
8. Any other equipment involved and age
9. Prior incidents at this location in the past five years
10. Corrective actions taken at the location
11. Number of customers if service is interrupted
12. Duration of the interruption
13. Summary of investigation into cause of the incident
14. Number of calls to the Company's "shock" line

The Company will provide a summary of the above information as part of the report. In addition, the Company will work with the Division to develop a format to include other data the Company tracks as outlined in EOP G016 which would be useful to the Division or Commission in a detailed appendix to the annual report. The Company proposes that the initial annual report for contact voltage cover the period October 2012 through March 31, 2013. Thereafter, the annual reports will cover the period April 1 through March 31 each year and be submitted to the Commission annually on August 1. As discussed in more detail in Section 7 below, this would allow the Company to reconcile the contact voltage program as part of its current ISR plan.

However, in order to meet the statutory requirement that the Company survey at least forty percent of designated contact voltage risk areas by June 30, 2013, the Company proposes for the first year to file a one-time annual report supplement with the Commission by no later than September 1, 2013 that will demonstrate that the forty percent threshold has been met.

## **Section 7**

### **Annual Reconciliation Mechanism**

### **Annual Reconciliation Mechanism**

R.I.G.L. 39-2-25 (c) provides that the costs of the Company's contact voltage program are fully recoverable through a fully reconciling mechanism to be filed annually with the Commission for review and approval. Because the proposed contract voltage program directly relates to safety and reliability, the Company proposes to reconcile and recover the costs of the contact voltage program, for surveying, testing and repairs, as part of its annual Electric ISR filings.

However, before the costs associated with the contact voltage program can be included as part of an annual ISR filing, it will be necessary to address and accommodate a number of timing issues in the short term. Currently, the Electric ISR reconciliation mechanism tracks capital and O&M costs on a fiscal year (April 1 through March 31) basis and reconciles those costs in an August 1 reconciliation filing with new rate factors that take effect October 1 each year. At the same time, the statute provides for a July to June survey period and dictates that the Company must complete an initial survey of forty percent of its designated contact voltage risk areas by June 30, 2013, and then twenty percent of its remaining areas each year.

At the evidentiary hearing on September 24, 2012, the Company addressed the recovery of program costs through the Electric ISR. Specifically, the Company indicated that it would seek to recover all Inspection & Maintenance ("O&M") costs, including the cost of the Contact Voltage Risk Program, through the Electric ISR. The Company also identified \$214,000 of test year O&M contact voltage inspection and maintenance costs that is currently included in its base rate proceeding in Docket 4323. The Company indicated that it would make an adjustment to

exclude those O&M costs in the FY 2013 Electric ISR reconciliation filing in August of 2013 and in all subsequent reconciliation filings. If this proposal is approved in October 2012, the Company would exclude 50 percent of the \$214,000 on the basis that the contact voltage program would be in effect for six months of the FY 2013 ISR reconciliation period. For all subsequent reconciliation filings, the Company will exclude the entire \$214,000. This would ensure that all O&M costs associated with O&M testing would be not be double recovered, and both customers and the Company would be whole.<sup>10</sup>

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<sup>10</sup> TR I, Docket No. 4237 at pages 126-133.

## **Section 8**

### **Contact Voltage Program Costs**

### **Program Costs**

In the Company's April 5, 2012 response to Commission 4-7, the Company provided its best estimate of the annual costs to implement the legislation that became R.I.G.L. 39-2-25. Specifically, the Company estimated that the testing costs associated with an annual inspection of underground assets as proposed in the statute were in the range of \$75,000 to \$1.09 million depending on the testing methods required by the law. Manual testing of all Company-owned underground and street lighting assets would cost approximately an additional \$75,000 based on then existing pricing from a Company vendor. The mobile testing costs of approximately \$1.09M were based on costs the Company has experienced with a vendor performing similar mobile inspections in Buffalo, New York. Repair estimates are dependent on the number of conditions found, and are not included in the estimates above.

A noted above in Section 6, the Company will amend its RFP to include a THD pilot program to obtain additional information on the use of this method in determine elevated voltage.

## **Section 9**

### **Customer Rates and Bill Impacts**

**1. Proposed Rates and Bill Impacts**

The Company has not developed proposed rates at this time. However, in the Company’s response to Commission 4-8 filed April 5, 2012, the Company did provide its best estimate of the monthly bill impact for a typical residential, commercial and industrial customer. Based on the estimated annual expense ranging from \$75,000 to \$1.09 million, the estimated monthly bill impacts for typical residential, commercial and industrial customers are set forth in Table 2 below:

**Table 2**

	<b>Annual Expense \$75,000</b>	<b>Annual Expense \$1.09M</b>
<b>Residential Customer (500 k Wh)</b>	<b>\$0.01 per month (0.01%)</b>	<b>\$0.07 per month (0.1%)</b>
<b>Commercial (30,000 kWh)</b>	<b>\$0.31 per month (0.01%)</b>	<b>\$4.38 per month (0.1%)</b>
<b>Industrial (500,000 kWh)</b>	<b>\$5.21 per month (0.01%)</b>	<b>\$72.92 per month (0.2%)</b>

Note: monthly bill impact includes the effect of gross earnings tax.

The Company believes that the actual costs and customer bill impacts for its proposed contact voltage program will fall within the ranges set forth above in Table 2. As shown on this table, even though the overall expense range is quite wide, the estimated annual bill impact of the Company’s contact voltage program on residential, commercial and industrial customers is expected to be minimal.

On September 21, 2012, the Company filed with the Commission the confidential bids that had been received from two vendors in response to the Company's RFP for the mobile testing of the Company's proposed Contact Voltage Risk areas. This filing provides updated pricing information for the mobile testing costs.

However, as noted above in Section 6, the Company plans to reissue its RFP to include the THD pilot program. In addition, the Company also plans to include any additional requirements or directives of the Commission in this updated RFP. The Company will make the final costs for the Contact Voltage Risk Program available to the Commission when they are available, and will provide an updated rate impact on customers at that time.

**ATTACHMENT 1**

**CURRENT ELECTRIC OPERATING PROCEDURES**

**EOP-G016 - Equipment Elevated Voltage Testing**

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## **INTRODUCTION**

The purpose of this procedure is to outline the requirements for the annual equipment elevated voltage testing on National Grid Facilities in New York as required by the 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 and the New York Public Service Commission's "Order Requiring Additional Mobile Stray Voltage Testing" issued and effective on July 21, 2010. Additionally the Massachusetts Department of Telecommunications and Energy provided a series of recommendations on December 9, 2005, that have been included in this procedure.

This procedure also outlines corporate requirements for equipment elevated voltage testing in New Hampshire and Rhode Island. The variance in requirements between New York, Massachusetts, New Hampshire, and Rhode Island is based on sound utility practice versus regulatory requirements.

## **PURPOSE**

This procedure applies to all personnel involved with or responsible for the testing of facilities designated by this EOP for equipment elevated voltage.

## **ACCOUNTABILITY**

1. Distribution Engineering Services
  - A. Update program as necessary.
  - B. Provide field support and training upon request.
  - C. Act as liaison with existing database vendor when required.
  
2. Inspections
  - A. Ensure the equipment elevated voltage 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 equipment elevated voltage testers have been trained.
  
3. C&MS Management
  - A. When requested by Field Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform equipment elevated voltage testing.
  - B. Ensure all equipment elevated voltage testers have been trained.
  - C. Manage contractual terms and conditions including all change orders and resource requirements.

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- D. Establish a process for the delivery of work, collection of data, invoice verification and payment, and reporting to local management and Distribution Network Strategy.
- E. Manage any established support processes such as back office support or data entry clerks.
- 4. Equipment elevated Voltage Inspector
  - A. Demonstrate the ability and proficiency to perform equipment elevated voltage testing per this EOP.
  - B. Demonstrate the ability to become proficient in the use of the appropriate database.
  - C. Possess the ability to do walking patrols, collect information, edit data, and guard unsafe facilities.
  - D. Attend equipment elevated voltage training program.
- 5. T&D Technical Training
  - A. Provide training upon request.
- 6. Distribution Network Strategy
  - A. Provide input into program revisions.
  - B. Ensure the equipment elevated voltage program as outlined in this EOP is implemented properly and timely.
  - C. Ensure the program as outlined in the EOP is completed each year.
  - D. Provide qualified personnel to complete equipment elevated voltage testing.
  - E. Ensure all equipment elevated voltage testers have been trained.
  - F. Provide program management.
- 7. Process and Systems
  - A. Provide and support database.

**REFERENCES**

NYPSC Order 04-M-0159  
 NYPSC Order Adopting Changes to Electric Safety Standards  
 NYPSC Order Requiring Additional Mobile Stray Voltage Testing  
 Applicable National Grid Safety Rules & Procedures  
 Testing Equipment Operation Instructions



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**DEFINITIONS**

**Stray Voltage:** As defined by NYPSC the term “Stray Voltage” means voltage conditions on electric facilities that should not ordinarily exist.

**Stray Voltage Testing:** The process of checking an electric facility for stray voltage using a device capable of reliably detecting and audibly and/or visually signaling voltages in the range of 6 to 600 volts.

**Proximity Detection Unit:** A low voltage hand held detector used to test exposed metallic surfaces and conductors for the presence of low voltage from 6V to 600V.

**Equipment Elevated Voltage Inspector:** The individual performing the equipment elevated voltage inspection.

**Handheld Computer:** An electronic Data recording device that is used in the field to create a record of conditions found.

**Equipment Elevated Voltage:** An A.C. rms voltage difference between utility equipment and the earth, or to nearby grounded facilities that exceeds the lowest perceptible voltage levels for humans.

**Finding:** Any confirmed voltage reading on an electric facility or streetlight greater than or equal to 1V measured using a volt meter and a 500 ohm shunt resistor.

**Mitigation:** Corrective actions performed by the utility to address the stray voltage finding.

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**1.0 FACILITIES WHERE EQUIPMENT ELEVATE VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW YORK**

- 1.1 Street Lights and Municipally Owned Facilities
  - 1.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage annually. This test is to be performed while the light is operating.
  - 1.1.2 Municipally owned street light systems that National Grid directly provides energy to must be tested for equipment elevated voltage annually. National Grid will complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality. This test is to be performed while the light is operating.
  - 1.1.3 Municipal owned metallic traffic signal standards and accessible devices are to be tested annually for equipment elevated voltage by National Grid.
  - 1.1.4 All street lights identified on public thoroughfares regardless of ownership are to be tested annually.
  - 1.1.5 All street lights under a maintenance contract are to be tested annually. Exceptions not requiring equipment elevated voltage testing: private lighting, park associations, parking lots, fiberglass (or other non-conductive) street light standards, and locations where street light 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.
- 1.2 National Grid Substation Fences
  - 1.2.1 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.
- 1.3 Overhead Distribution Facilities
  - 1.3.1 Towers and/or metallic poles with distribution facilities shall be tested annually for equipment elevated voltage.
  - 1.3.2 The following equipment on wood distribution poles requires annual equipment elevated voltage testing:
    - 1. Metallic riser guard or conduit (company or non-company).
    - 2. Uncovered or uninsulated down ground (company or non-company).
    - 3. Down guy (company or non-company).
    - 4. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.
  - 1.3.3 Exceptions: Customer meters and customer meter poles are excluded.

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- 1.4 Overhead Transmission Facilities
  - 1.4.1 Towers and/or metallic poles with transmission facilities shall be tested annually for equipment elevated voltage.
  - 1.4.2 The following equipment on wood transmission poles or structures require annual equipment elevated voltage testing:
    - a. Metallic riser guard or conduit (company or non-company).
    - b. Uncovered or uninsulated down ground (company or non-company).
    - c. Down guy (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.
- 1.5 Underground Facilities
  - 1.5.1 Annual equipment elevated voltage testing is required on all of the following equipment where accessible to the public.
  - 1.5.2 All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, and switchgear.
  - 1.5.3 Starting in 2010 and continuing thereafter, unless changed by subsequent order of the NY Public Service Commission, two mobile stray voltage surveys shall be conducted annually in Buffalo and one mobile stray voltage survey is required to be conducted annually in Albany and Niagara Falls.
  - 1.5.4 Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.
- 1.6 Daily Job Site Test Requirements
  - 1.6.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
  - 1.6.2 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.
- 1.7 Exemptions
  - 1.7.1 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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**2.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW HAMSHIRE AND RHODE ISLAND**

- 2.1 Company Owned Street Lights
  - 2.1.1 Testing will be performed during each outage investigation notification and the data will be recorded for each instance.
- 2.2 Overhead Distribution Facilities
  - 2.2.1 Wood distribution poles require testing to be completed on metallic risers in conjunction with the distribution patrol program covered by NG-USA EOP D004.
  - 2.2.2 Documentation is only required on metallic risers found to be at an elevated voltage requiring repair. Testing data is not required for a facility that is found to be operating as designed.
- 2.3 Underground Facilities
  - 2.3.1 Testing for equipment elevated voltage shall be done while completing scheduled inspections of underground equipment covered by NG-USA EOP UG006. Underground Inspection and Maintenance. The following items are to be tested on a five year cycle, padmount transformers, switchgears, and metallic handhole covers.
  - 2.3.2 Testing for equipment elevated voltage shall be completed on underground facilities while completing working inspections covered by NG-USA EOP UG006. The metallic items to be tested are manholes covers, vault covers, handhole covers, splice box covers, junction box covers, padmount transformers, switchgear, and submersible equipment covers.
- 2.4 Daily Job Site Test Requirements
  - 2.4.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
    - a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.
- 2.5 Exemptions
  - 2.5.1 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 – MASSACHUSETTS**

- 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 five year cycle.
  - 3.1.2 Exceptions: Testing shall not be completed at locations where street light 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.
- 3.2 Overhead Distribution Facilities
  - 3.2.1 Wood distribution poles require testing to be completed as noted below in conjunction with the distribution patrol program covered by NG-USA EOP D004.
  - 3.2.2 The following equipment on wood distribution poles requires annual equipment elevated voltage testing:
    - a. Metallic riser guard or conduit (company or non-company).
    - b. Uncovered or uninsulated down ground (company or non-company).
    - c. Down guy (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.
- 3.3 Underground Facilities
  - 3.3.1 Equipment elevated voltage testing is required on all of the following equipment where accessible to the public on a five year cycle.
    - a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, secondary pedestals, and switchgear.

Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.
- 3.4 Daily Job Site Test Requirements
  - 3.4.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
    - a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

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### 3.5 Exemptions

- 3.5.1 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.

## **4.0 TEST EQUIPMENT**

- 4.1 A hand held device (proximity detection unit) that is capable of detecting voltage from 6 volts to 600 volts.
- 4.2 A portable AC digital high impedance volt meter must have the ability to take readings with and without an input load impedance of 500 ohms.
- 4.3 The handheld devices utilized must be certified by an independent test laboratory as being able to reliably detect voltages of 6 – 600 volts. The following units have been certified:
- 4.3.1 HD Electric model LV-S-5 (5-600 volts).
- Fluke 85
  - Fluke 87
  - Fluke 170 series or equivalent
  - Fluke 175
  - Fluke 177
  - Fluke 179
  - Fluke 187
  - Fluke 189

## **5.0 TEST PROCEDURE**

### 5.1 Job Briefing

- 5.1.1 At minimum, the following information must 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 voltage detector or meter probe is to be used to make contact with the facilities.
  - b. Appropriate PPE must be worn.
  - c. Each individual needs to be aware of his/her surroundings at all times.
  - d. Make sure to observe all traffic before entering a street, either at intersections or any other point.
  - e. Traffic safety vest (DOT Compliant Class II) is to be worn at all times 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.

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5.2 Measurements for voltages will be performed in accordance with the following:

5.2.1 Initial measurements for the presence of voltage shall be made using a certified proximity detection unit as noted in the testing equipment certified equipment list in Section 4.0, 4.3.

- a. To verify the proper operation of the proximity detector, follow operating instructions for the particular certified 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 area/equipment touch the area/equipment to be tested with the probe of the unit.

5.2.2 If this test detects voltage, repeat the test with the 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, the connection to the neutral/ground shall be made with up to 25' of # 16 stranded copper lead wire (covered), the other end of which shall be securely connected to the negative (black) probe of the meter. When using such "extension leads" appropriate care shall be taken in the placement of such leads so as 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, a metal rod shall
  3. create a ground reference point for the measurement to be taken. 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 situation (3' to 4'.) On occasion longer leads may be necessary to find undisturbed earth (up to 25'.)
- c. The "live" meter probe lead shall then be placed into contact with the structure under inspection to determine the voltage.
  1. Voltages readings greater than 30 volts shall be recorded in the database for the site.

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2. For voltage readings less than 30 volts, install a 500 ohm input load impedance resistor on the volt meter. Take another voltage measurement and record this voltage in the database for the site.

## **6.0 CORRECTIVE ACTION REQUIREMENTS FOR ELEVATED VOLTAGE FINDINGS**

### 6.1

#### 6.1.1 New York

If an equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 1 volt. **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.** If the voltage measures greater than or equal to 1 volts and less than 4.5 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. It is expected that sound judgment shall be utilized in this application. If the voltage measurement is greater than or equal to 4.5 volts it must be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities, and immediate response is required using the notification in Section 6.3 below.

#### 6.1.2 New England

If an equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 4.5 volts. **If the voltage measures 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.** If the voltage measures greater than 4.5 volts and less than 8 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. It is expected that sound judgment shall be utilized in this application. If the voltage measurement is greater than 8 volts it must be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities; and immediate response is required using the notification in section 6.3 below

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

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nationalgrid	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>NG-EOP G016</b> Page 12 of 17
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- 6.3 The following notification process for personnel to respond shall be utilized.
- 6.3.1 Notification by location:
- a. New York: contact Systems Operations Dispatch 1-877-716-4996
  - b. Bay State West and North & Granite: Westboro Control Center 508-389-9032.
  - c. Bay State South and Ocean State: Lincoln Control Center 401-335-6075.
- 6.3.2 Inform the operator that this is an equipment elevated voltage call, giving inspector name, company (if not National Grid), unique ID, address where problem is identified, facility number, circuit number, ownership, type of equipment, 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.
- 6.4 Temporary repairs may be used to correct the equipment elevated voltage thereby removing the need to guard the site.
- 6.5 Except as noted in Section 6, 6.6, permanent repairs to the equipment shall be made within 45 days of the occurrence.
- 6.6 If permanent repairs can not 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 must be identified and justified in the annual reporting of the program to the NYPSC.
- 6.7 The Stray Voltage Tester/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.
- 6.8 The individuals conducting the equipment elevated voltage tests on street light 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. Angel guards shall only be installed after the testing of the street light standard is complete and 1) there is no indication of equipment elevated voltage above 1 volt, or 2) repairs have been completed to correct the equipment elevated voltage.
- 6.9 The equipment elevated voltage inspector shall report any potentially hazardous conditions found on National Grid facilities seen visually during the survey process.
- 6.10 Customer Owned Equipment
- 6.10.1 Where the Company finds equipment elevated voltage above 1 volt and identifies its source as customer-owned equipment, the Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists. The Company shall advise the customer or responsible person that the cause of the equipment elevated voltage must be immediately remedied.

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6.10.2 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.

**7.0 DATABASE REQUIREMENTS**

7.1 The database in use shall be easily searchable for information and reporting.

7.2 Information fields required to be completed for facilities:

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

**8.0 NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS**

8.1 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.

8.2 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.

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- 8.3 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.
- 8.4 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 street lights, as well as completed all required inspections.
- 8.5 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.
- 8.6 The annual reporting and certification is required by February 15 of each year. In addition to certifications, it shall address the following:
- 8.6.1 Details the results of stray voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year. (A separate report will be required for inspections from November 1 – December 31, 2008 to account for transition to calendar year reporting.)
- 8.6.2 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).
- 8.6.3 Contain certification describe in 8.3, 8.4 and 8.5 of this section.
- 8.6.4 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.
- 8.6.5 Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.
- 8.6.6 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.
- 8.6.7 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.
- 8.6.8 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.
- 8.6.9 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.

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- 8.6.10 Contain a review and analysis of the inspection results. Identifying areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.
- 8.6.11 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.
- 8.6.12 Any additional information that is pertinent to the issues addressed by the safety standards should also be included.
- 8.7 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, 2011, whichever is earliest, and in each subsequent year. The filing shall include the historic results and costs associated with the manual test program in each area listed in Section 1.5 of this procedure.
- 8.8 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.
- 8.9 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.

**9.0 MASSACHUSETTS REPORTING REQUIREMENTS**

- 9.1 National Grid shall submit an annual report that includes the following:
  - 9.1.1 Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.
  - 9.1.2 Number of equipment elevated voltage events detected by inspection personnel versus call-ins or notification by third parties.
  - 9.1.3 Variance reports on current year inspection targets.
  - 9.1.4 Equipment elevated voltage events detected on equipment that is not included in equipment elevated voltage equipment inspection schedules (which will enable the DTE to determine if the company is inspecting and testing the correct equipment).
  - 9.1.5 Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts.

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### 10.0 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)
Street Light	970	Handhole
	971	Standard
	979	Street light – 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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**11.0 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.

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**ATTACHMENT 2**

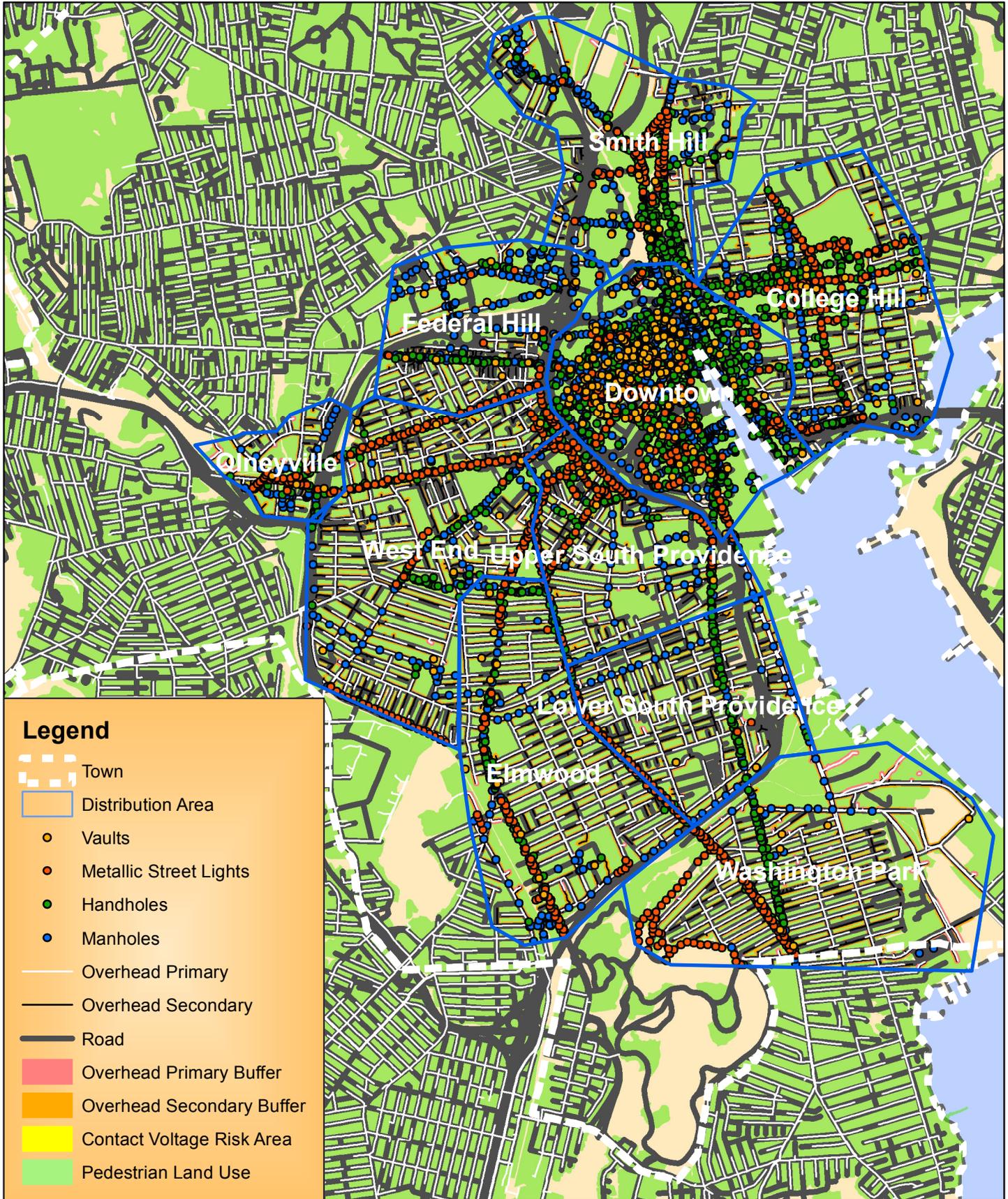
**DESIGNATED CONTACT VOLTAGE RISK AREAS**

**Revised October 2, 2012\***

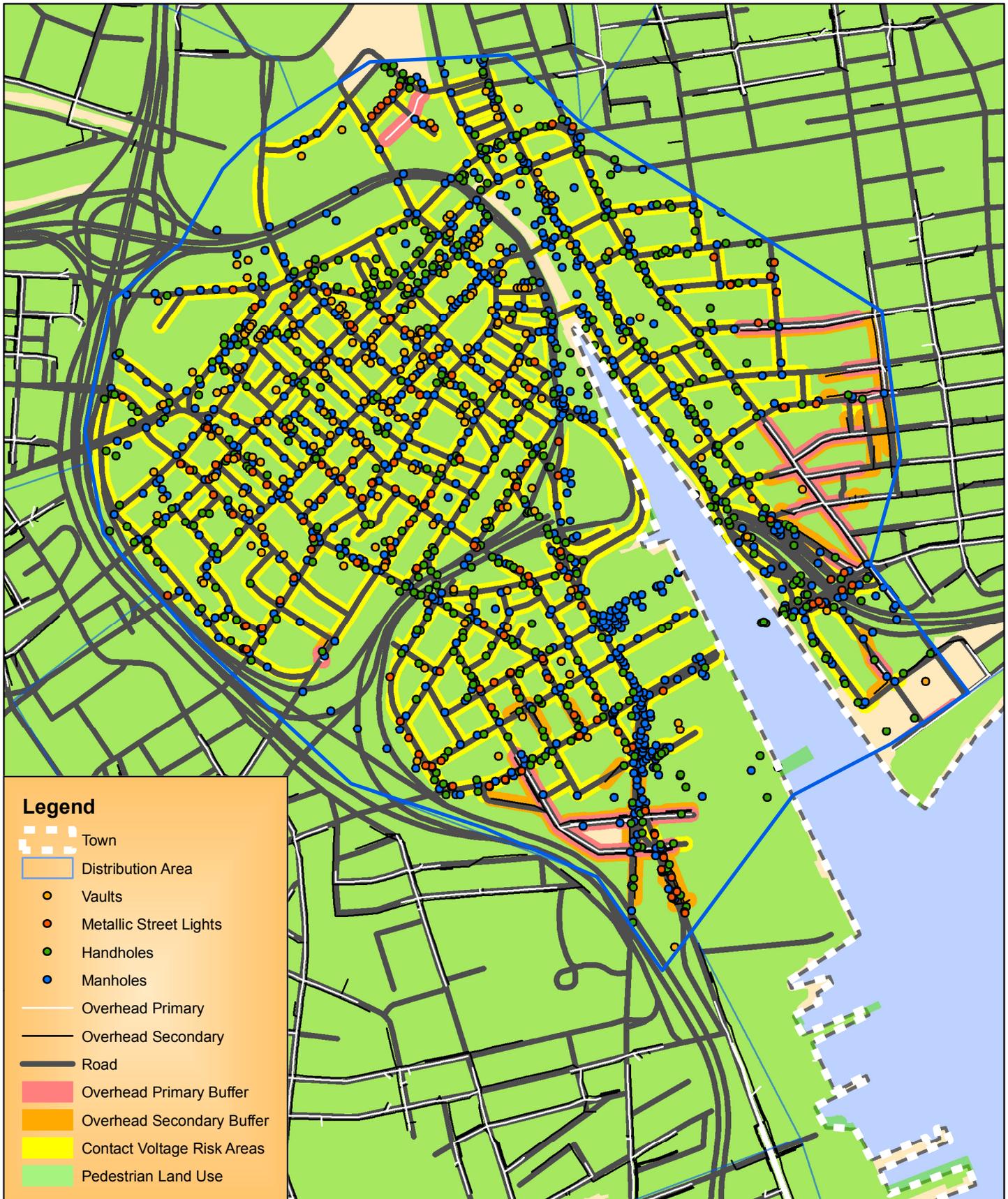
**\*Map title on page 1 of 14 has been amended to “Distribution Areas”**

**Map legends include a “Distribution Area” legend**

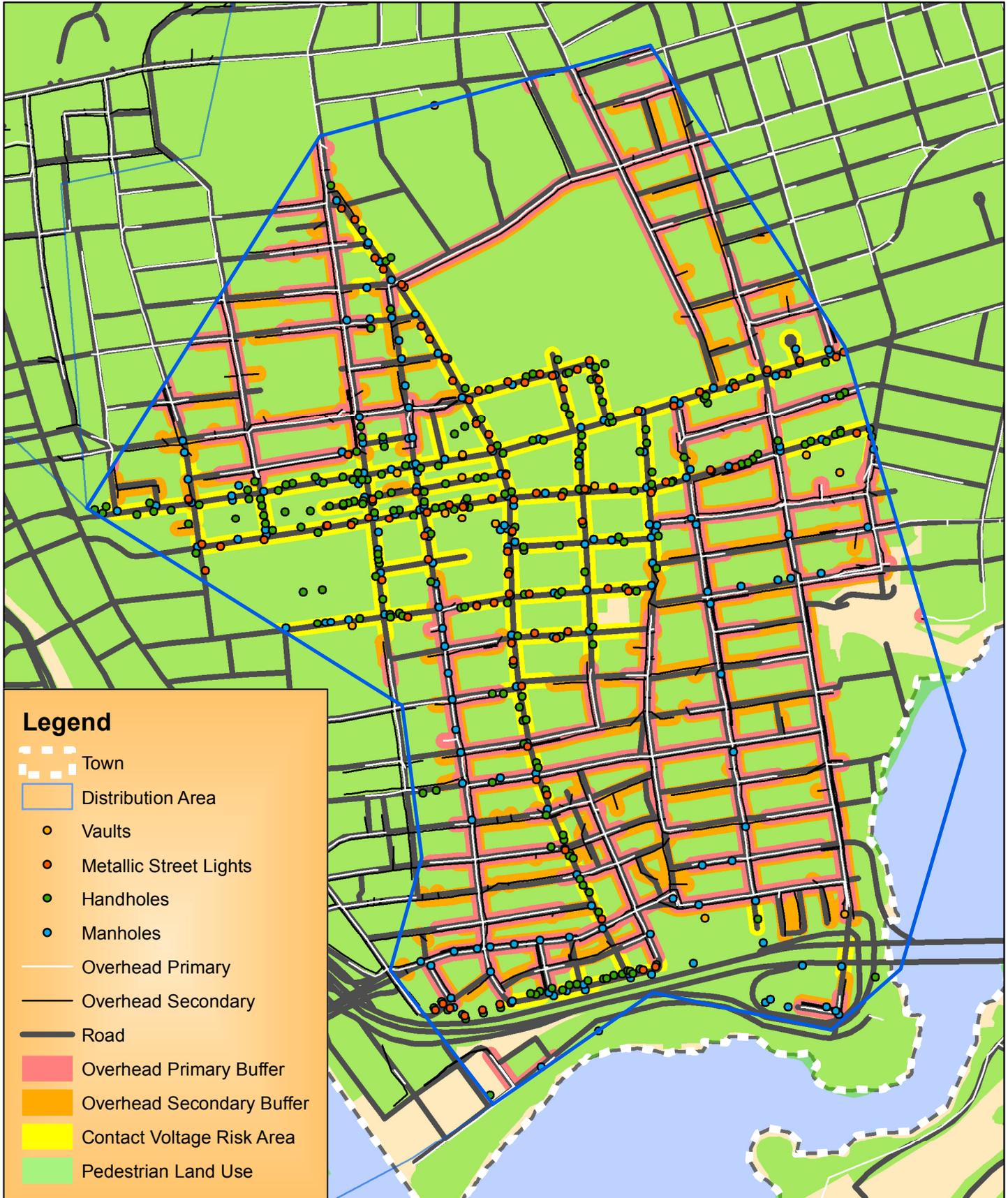
# Distribution Areas Providence, RI



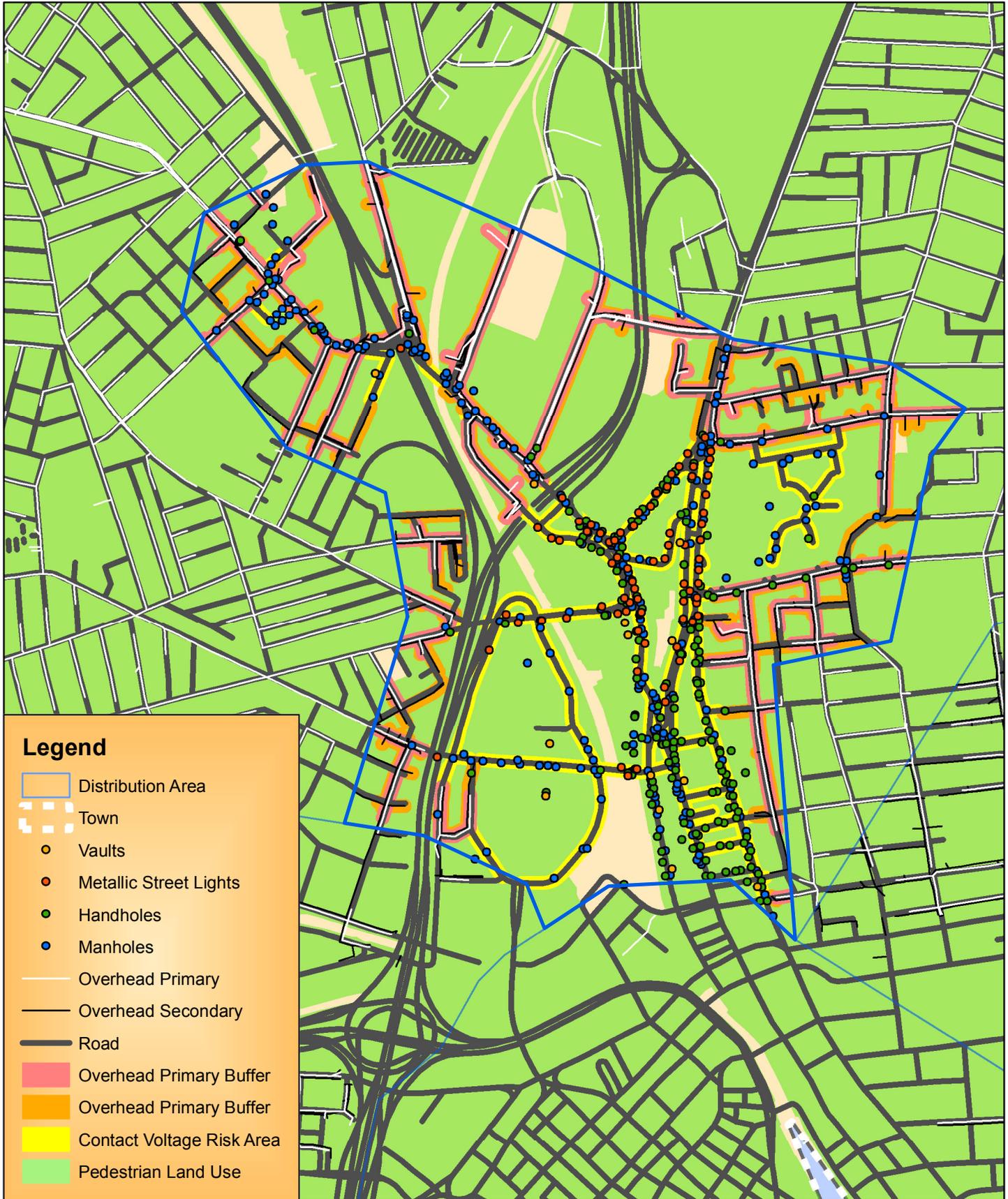
# Contact Voltage Risk Areas Downtown Providence, RI



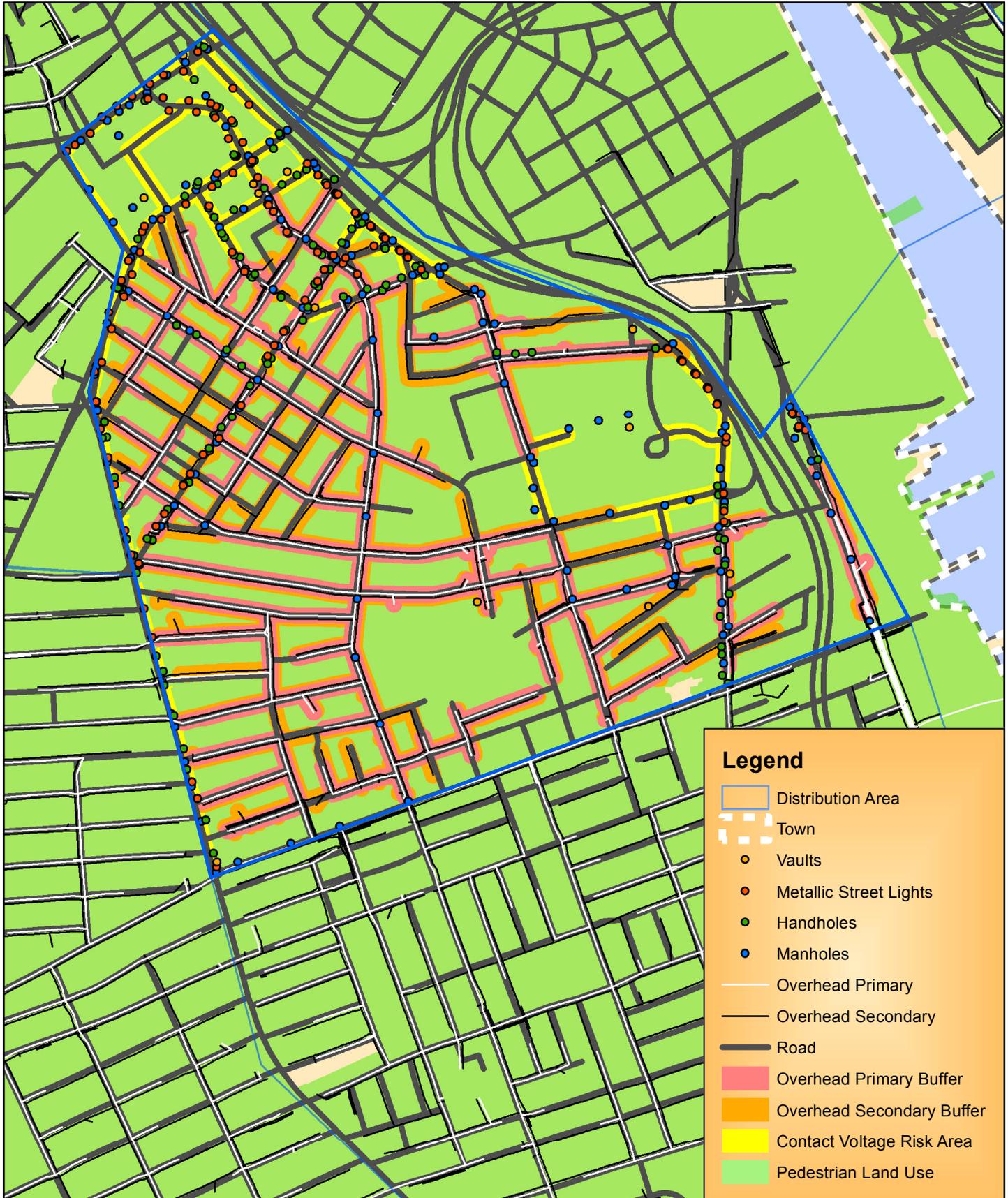
# Contact Voltage Risk Area College Hill, Providence, RI



# Contact Voltage Risk Area Smith Hill, Providence, RI



# Contact Voltage Risk Area Upper South Providence, RI



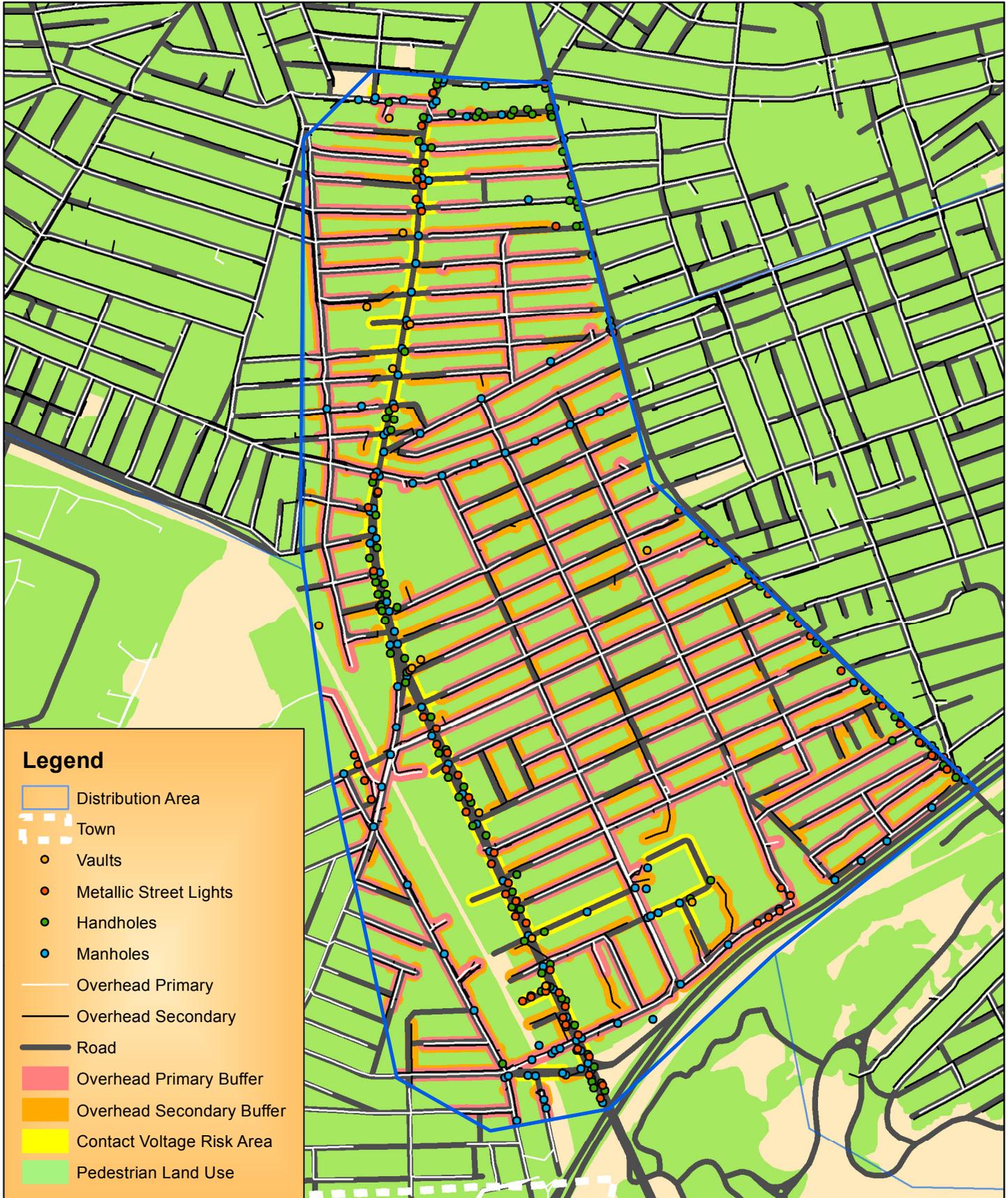
# Contact Voltage Risk Area Lower South Providence, RI



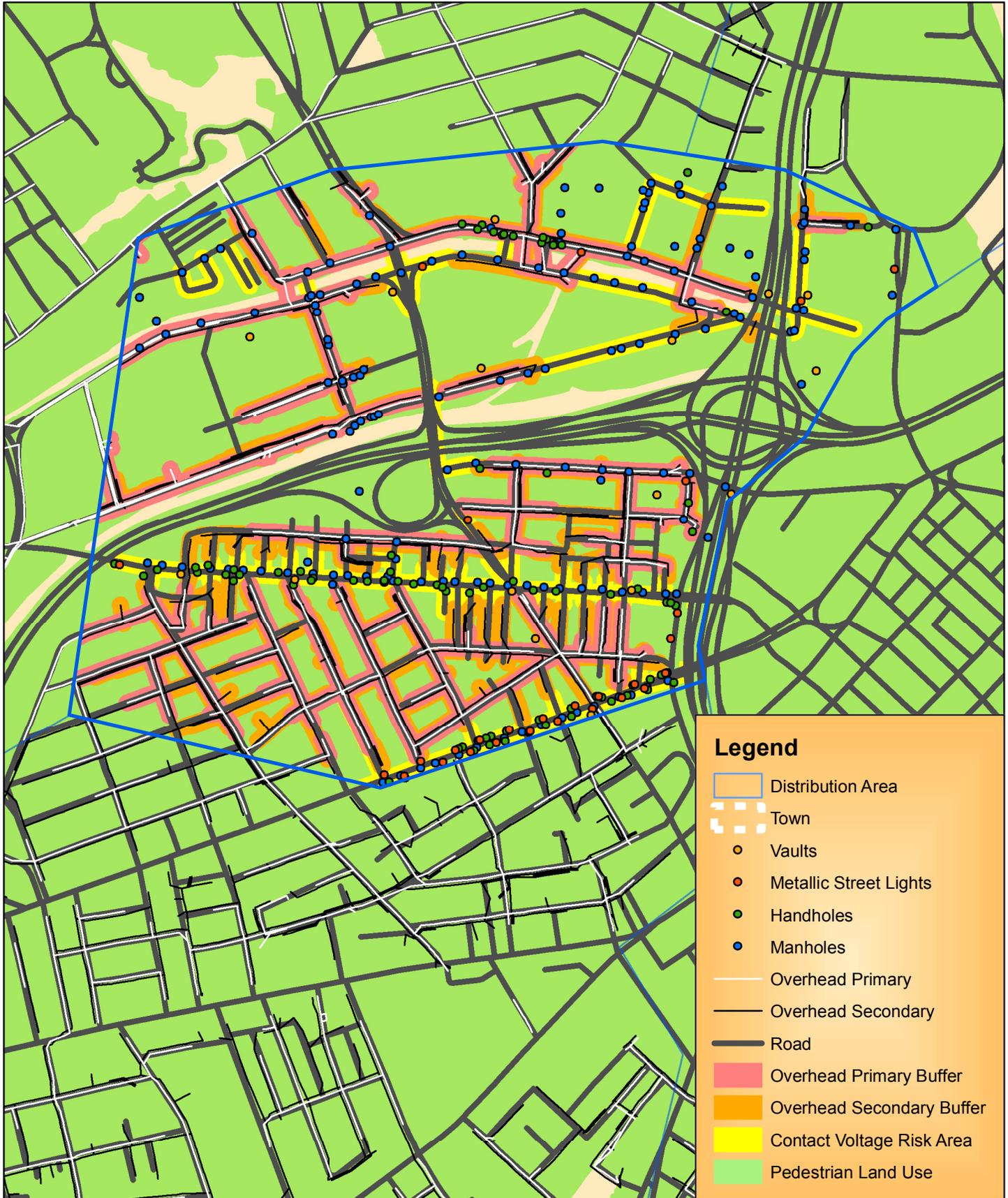
# Contact Voltage Risk Area Washington Park, Providence, RI



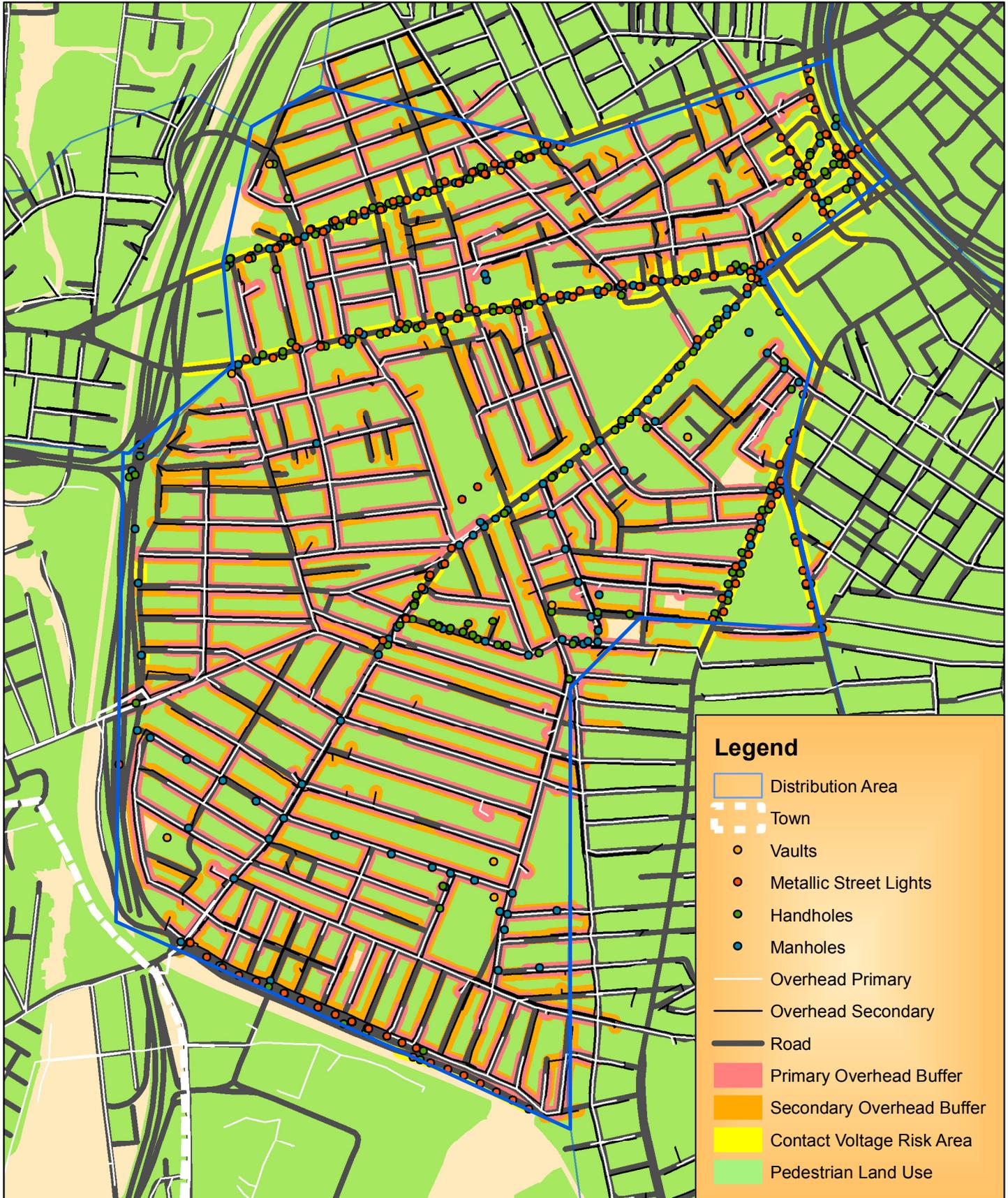
# Contact Voltage Risk Area Elmwood, Providence, RI



# Contact Voltage Risk Area Federal Hill, Providence, RI



# Contact Voltage Risk Area West End, Providence, RI



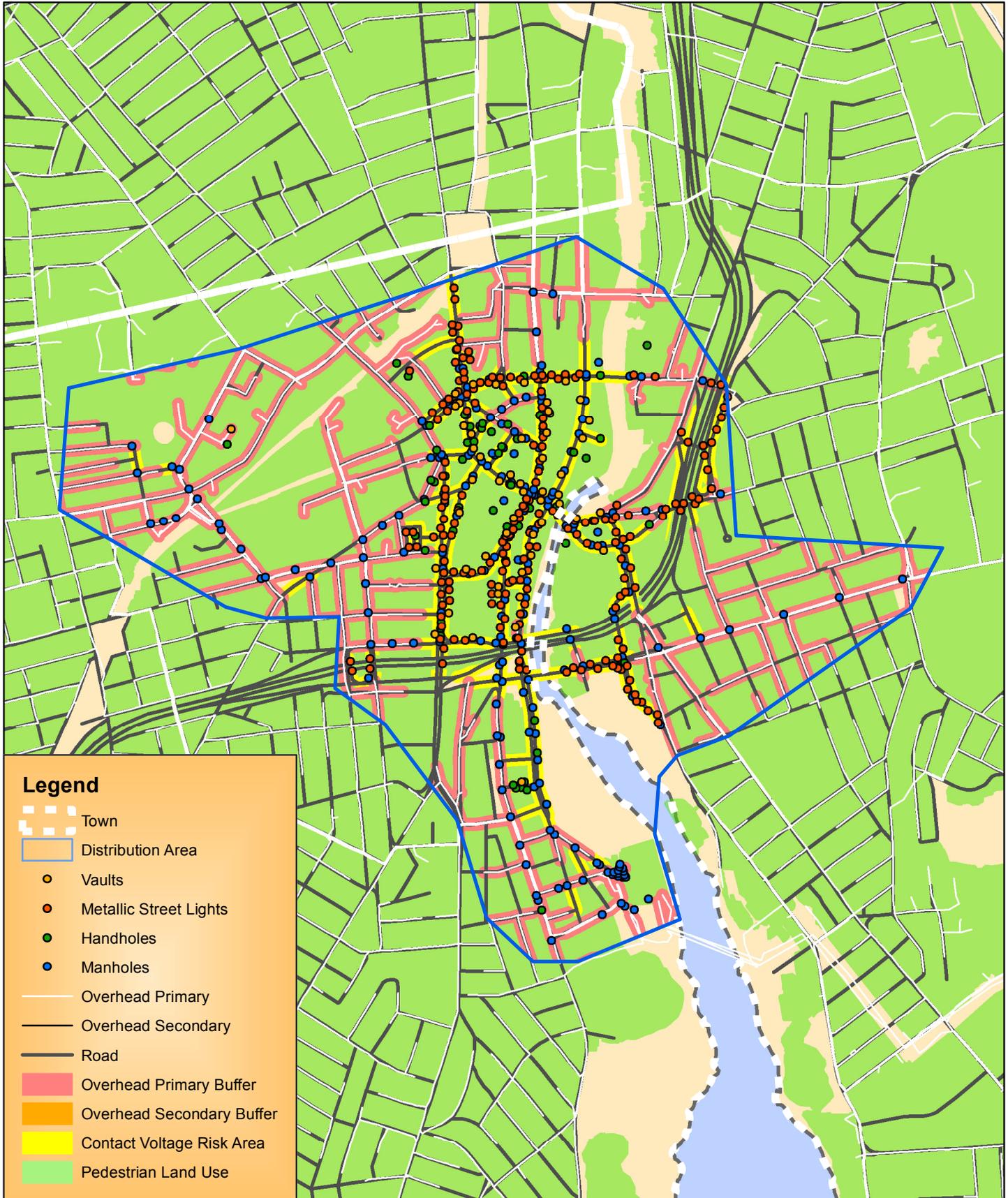
# Contact Voltage Risk Areas Olneyville, Providence, RI



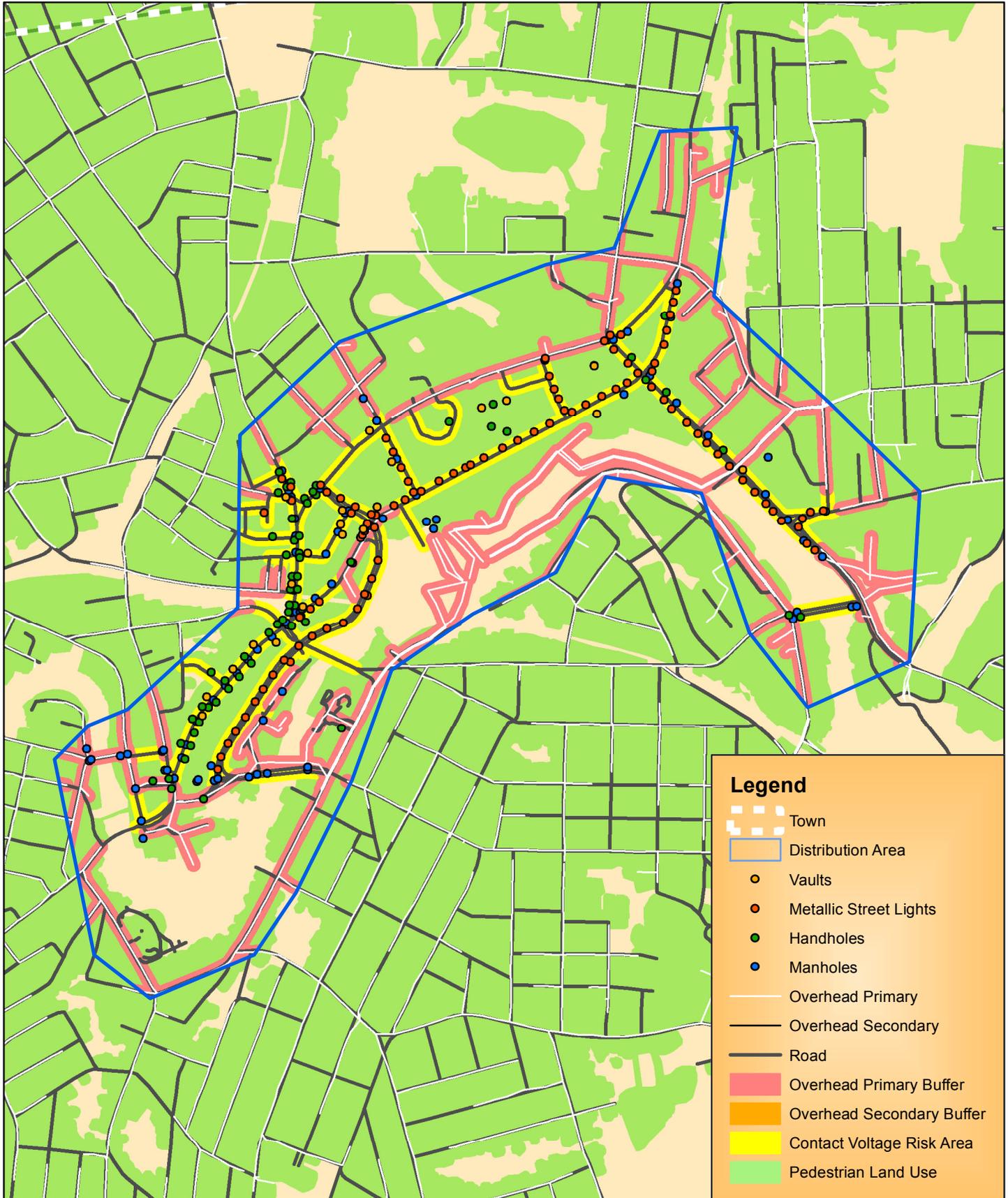
# Contact Voltage Risk Area Newport, RI



# Contact Voltage Risk Area Pawtucket, RI



# Contact Voltage Risk Area Woonsocket, RI



**ATTACHMENT 3**

**DESIGNATED CONTACT VOLTAGE RISK AREAS**

**SURVEY SCHEDULE**

## **DESIGNATED CONTACT VOLTAGE RISK AREAS**

### **SURVEY SCHEDULE**

**1. Initial Survey (October 4, 2012 to March 30, 2013)**

**Newport**

**Pawtucket**

**Providence:**

- College Hill
- Downtown
- Smith Hill

**Woonsocket**

**2. Year 2 (April 1, 2013 to March 30, 2014)**

**Providence:**

- Upper South Providence
- Lower South Providence
- Washington Park

**3. Year 3 (April 1, 2014 to March 30, 2015)**

**Providence:**

- Elmwood
- Federal Hill
- West End

**4. Year 4 (April 1, 2015 to March 30, 2016)**

**Providence:**

- Olneyville

Previous Survey results and other factors, such as incident reports, will be used to determine the additional 2 contact voltage risk areas to be scanned in Year 4 and the order to scan the other contact voltage risk areas annually thereafter.

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National Grid

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The Narragansett Electric Company

**Proposed Rhode Island  
Electric Contact Voltage  
Program**

Revised October 2, 2012

Deleted: August 17, 2012

**Submitted to:**  
Rhode Island Public Utilities Commission  
[R.I.P.U.C. Docket No. 4237](#)

Submitted by:  
**nationalgrid**

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**Rhode Island  
Proposed Electric Contact Voltage Program**

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## **Section 1**

### **Introduction and Summary**

## **1. Introduction and Summary**

On June 6, 2012, R.I.G.L. §39-2-25 was signed into law. That statute directs the Rhode Island Public Utilities Commission (Commission) to establish a contact voltage detection, repair, and reporting program, which would be applicable to National Grid.<sup>1</sup> That program is to be designed to implement appropriate procedures to detect contact voltage on publicly accessible surfaces, such as sidewalks, roadways, storm drains and streetlights that can become energized by faults in the underground electric distribution system. The program is to establish designated contact voltage risk areas. Under the program, the Company is to conduct surveys within designated contact voltage risk areas for contact voltage on all conductive surfaces in the public rights-of-way, using equipment and technology as determined by the Commission. By June 30, 2013, the Company is to conduct an initial survey of no less than forty percent (40%) of designated contact voltage risk areas, and thereafter beginning July 1, 2013 to annually survey no less than twenty percent (20%) of designated contact voltage risk areas.<sup>2</sup> Additionally, the program is to include requirements that the Company repair electric system faults detected in its underground distribution system that result in contact voltage at a level determined by the Division.<sup>3</sup> National Grid must annually report to the Commission on its contact voltage survey findings and repair efforts, including information on both Company-owned assets and any customer-owned assets. Lastly, the statute provides that the costs of the program are to be fully recovered annually through a fully reconciling funding mechanism.

---

<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (“National Grid” or the “Company”).

<sup>2</sup> R.I.G.L. §39-2-25 (b) (2) and (b) (3).

<sup>3</sup> R.I.G.L. §39-2-25 (b) (4).

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This proposal addresses the statutory requirements for the contact voltage detection and repair program. Section 2 of this proposal describes the Company's existing elevated voltage testing procedures, including both overhead and underground systems, which the Company will continue to perform. Section 3 of this proposal describes the method the Company will use to identify the designated contact voltage risk areas that are to be surveyed by the Company under the statutory program. Section 4 includes a technical and cost analysis for the technology and equipment recommended for use by the Company. Section 5 identifies the specific electric facility assets that the Company will survey in each designated contact risk area, as well as those Company assets that will not be part of the surveys. This section also sets forth a schedule for completion of the surveys to meet the percentage requirements of the statute. Section 6 sets forth the reporting requirements for the annual filing with the Commission. Section 7 provides a description of the Company's proposed annual fully reconciling mechanism to recover the costs of the program. Section 8 provides updated information on the Company's estimate of contact voltage costs for the program, and Section 9 provides a preliminary discussion of customer rates and billing impacts.

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## Section 2

# Current Voltage Testing Procedures

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## 1. Current Voltage Testing Procedures

Presently, the Company has electric operating procedures (EOP's) in place for the testing of overhead and underground facilities for stray or contact voltage. The details of the Company's EOP voltage testing procedures and protocols, EOP-G016, Equipment Elevated Voltage Testing, were included in this docket in Attachment 3 of the Company's response to Commission 1-3, but have since been revised (as indicated by arrows), and are included as Attachment 1 to this plan.

For overhead facilities, the Company conducts manual elevated voltage testing of Company-owned overhead distribution facilities over a five year cycle. In addition, the Company also conducts voltage testing for each job site where National Grid personnel or its contractors are working on an assignment, either at the end of the work day or when the assignment is completed. It is important to note that although overhead testing is not specifically addressed in R.I.G.L. §39-2-25, the Company will continue to follow these testing processes and procedures.

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With respect to the elevated voltage testing of Company-owned underground facilities, currently the Company tests metallic items such as streetlights, padmount transformers, switchgear and metallic handhole covers over a five year cycle. Testing for equipment elevated voltages is also completed on underground facilities while completing working inspections. For street lighting, elevated voltage testing is also performed during each outage investigation of Company-owned street lights.

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If an elevated voltage condition is found and verified, the site is guarded until it can be made safe by Company personnel or if private/municipally owned, made safe by the owner or municipality. Guarded is defined as guarded by a person or a protective barrier that prevents public contact if the elevated voltage found is greater than 4.5 volts. If the voltage measures greater than 4.5 volts and less than 8 volts it will either be guarded in person or by installation of a protective barrier that prevents public contact. If the voltage measurement is greater than 8 volts it is guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities; and an immediate maintenance and repair response is required.

R.I.G.L. §39-2-25 modifies and expands the scope and requirements of the Company's current underground voltage testing procedures. Specifically, the legislation requires contact voltage testing of underground facilities within specific designated contact voltage risk areas, and it accelerates the initial time period for contact voltage testing to 40 percent of designated contact voltage risk areas by June 30, 2013. Furthermore, the legislation requires a program designed to implement appropriate procedures for testing publicly accessible surfaces, such as sidewalks, roadways, storm drains and streetlights that can become energized by faults to the electric distribution system, which can include items other than Company-owned equipment. As such, the Company views R.I.G.L. §39-2-25 as an expansion of its current voltage testing procedures for underground facilities. The sections below discuss in more detail how the Company proposes to meet the requirements of the statute and explain how it plans to integrate those requirements into its existing underground voltage testing processes and procedures.

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## **Section 3**

### **Designated Contact Voltage Risk Areas**

## **1. Designated Contact Voltage Risk Areas**

R.I.G.L. 39-2-25 (b) (1) requires National Grid to identify areas of risk for contact voltage and to survey these locations as part of its contact voltage program. The boundaries of these designated contact voltage risk areas are to be determined by the presence of underground electrical distribution facilities situated in “pedestrian-dense” areas such as urban neighborhoods, commercial areas, central business districts, locations with large tourist areas or venues, and other places where pedestrians could be expected to be exposed to contact voltage.

The Company identified potential pedestrian dense areas by using land use data layers maintained by Rhode Island Geographic Information System (RIGIS). Table 1, below, shows the land use information available from RIGIS and identifies the layers that were used to identify pedestrian use areas which may potentially be pedestrian dense areas. An area was identified as a pedestrian use area if it fell within any of the checked land use data layers in the table.

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**Table 1**

<b>Description</b>	<b>Acres</b>	<b>Pedestrian Use Area</b>
Deciduous Forest (>80% hardwood)	257,684	No
Mixed Forest	116,358	No
Softwood Forest (>80% softwood)	56,131	No
Medium Density Residential (1 to 1/4 acre lots)	48,558	Yes
Medium High Density Residential (1/4 to 1/8 acre lots)	41,698	Yes
Water	28,409	No
Cropland (tillable)	21,290	No
High Density Residential (<1/8 acre lots)	21,272	Yes
Medium Low Density Residential (1 to 2 acre lots)	14,172	Yes
Pasture (agricultural not suitable for tillage)	13,760	No
Wetland	13,500	No
Commercial (sale of products and services)	13,238	Yes
Developed Recreation (all recreation)	11,870	Yes
Low Density Residential (>2 acre lots)	7,702	No
Institutional (schools, hospitals, churches, etc.)	7,648	Yes
Industrial (manufacturing, design, assembly, etc.)	7,314	Yes
Brushland (shrub and brush areas, reforestation)	7,133	No
Roads (divided highways >200' plus related facilities)	5,167	Yes
Mines, Quarries and Gravel Pits	4,007	No
Power Lines (100' or more width)	2,960	No
Vacant Land	2,763	No
Orchards, Groves, Nurseries	2,671	No
Waste Disposal (landfills, junkyards, etc.)	2,578	No
Airports (and associated facilities)	2,102	No
Cemeteries	2,097	Yes
Transitional Areas (urban open)	1,829	Yes
Other Transportation (terminals, docks, etc.)	1,539	Yes
Beaches	1,459	No
Idle Agriculture (abandoned fields and orchards)	1,352	No
Commercial/Industrial Mixed	1,214	Yes
Railroads (and associated facilities)	792	Yes
Sandy Areas (not beaches)	664	No
Water and Sewage Treatment	439	No
Rock Outcrops	233	No
Mixed Barren Areas	88	No
Commercial/Residential Mixed	56	Yes
Confined Feeding Operations	6	No

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The land use data was then overlaid with the Company's underground asset locations (manholes, handholes, vaults, and underground fed streetlights) and validated by National Grid Engineers familiar with the Rhode Island electricity distribution system to designate contact voltage risk areas. The communities and sections of communities with designated contact voltage risk areas included Providence, Pawtucket, Woonsocket, and Newport. While areas such as underground residential developments and underground commercial developments do exist in pedestrian use areas, these areas were not considered as pedestrian dense, and were not designated as contact voltage risk areas. However these areas will continue to be tested manually for elevated voltage as discussed in Section 2.

As discussed in more detail in Section 4 and Section 5 below, to comply with the statutory requirements of R.I.G.L. 39-2-25, the Company is proposing to utilize mobile voltage testing equipment to survey its designated contact voltage risk areas. Because primary and secondary overhead lines can interfere with this type of voltage detection equipment, resulting in "false positives" for voltage faults, the Company has used a 50 foot buffer to limit the designated contact voltage risk area to that area that is solely underground and not subject to interference by overhead facilities. Areas where the mobile technology cannot be used due to the presence of overhead facilities will continue to be tested manually, as discussed in Section 2. Likewise, areas which are tested with the mobile technology will not be included in the manual testing.

The proposed list of communities with designated contact voltage risk areas is shown below. Attachment 2 contains maps that identify the specific designated contact voltage risk areas within each community or section.

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- Newport
- Pawtucket
- Providence, which is broken down into 10 designated contact voltage risk areas
  - College Hill
  - Downtown
  - Elmwood
  - Federal Hill
  - Lower South Providence
  - Olneyville
  - Smith Hill
  - Upper South Providence
  - Washington Park
  - West End
- Woonsocket

Attachment 2 contains maps that identify the specific designated contact voltage risk areas for which the Company is requesting the Commission's approval. At the same time, the Company recognizes that the identification of designated contact voltage risk areas is not static. Thus, the Company expects that in the future other areas of the state that meet the statutory definition of a pedestrian-dense area with underground facilities will need to be added to this list, or that additional streets may need to be added to these areas. Likewise, it is also possible that

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certain areas of these communities identified above may appropriately be removed from survey testing if they no longer meet the necessary criteria.

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## Section 4

### Equipment and Technology Analysis

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## **1. Equipment and Technology Analysis**

Rhode Island's contact voltage statute directs the Commission to review and determine the specific equipment and technology that will be used by the Company for the contact voltage program. R.I.G.L. 39-2-25 (d). In addition, the statute directs the Division to establish the specific level for testing, maintenance and repair. R.I.G.L. 39-2-25 (b) (4). The Company seeks approval of its proposed plan provisions relating to both selection of equipment and technology as well as to establishing voltage levels. Those proposals are contained in the following subsections:

### **a. Mobile Equipment Technology**

To meet the directives of the statute, the Company proposes to introduce mobile equipment voltage testing technology into its existing survey process to identify electrical faults in designated contact voltage risk areas. Presently, the Company is aware of two major mobile technology companies that provide mobile survey and testing technology, (1) Premier Utility Locating Services, LLC (Premier) and (2) Power Survey LLC (Power Survey).

Premier uses the Narda 8950 Stray Voltage Detection System. The Narda system utilizes an E-field sensor that has a three axis design that allows detection from one or all sensors. The Narda 8950 has had testing witnessed by Underwriters Laboratories and is certified by NTS Laboratories. Power Survey uses the SVD2000 Stray Voltage Detection System. The SVD2000 employs a three dimensional antenna to sense un-shielded sources of electricity. The SVD2000 has been certified by Ergonomics Inc.

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Each of these companies offers different technology capabilities and price options. As noted above, R.I.G.L. 39-2-25 (c) provides that the costs of the Company's contact voltage program are recoverable through a fully reconciling mechanism to be filed annually with the Commission for review and approval. Therefore, to determine the most accurate and cost effective vendor and technology for this program, the Company plans to issue a Request for Proposal (RFP) for mobile technology services for the contact voltage program.<sup>4</sup> Not only will the RFP provide the Company with more accurate information on mobile technology, but it will also provided the Commission and customers with assurance that the Company is receiving the most cost effective services.

To that end, as part of this RFP process, in addition to price information, the Company will request each vendor that responds to the RFP to survey an identical designated contact voltage risk area within a specific time period, and to provide the details of that survey as part of its RFP response. This testing will assist the Company in determining the accuracy of the vendors' technology and will be provided to the Commission as part of the Company's final equipment recommendation. ▼

Deleted: The Company proposes to complete the RFP process, including the survey, by no later than September 17, 2012, and will make a final recommendation to the Commission on a vendor and technology by no later than September 21, 2012.

**b. Manual Voltage Testing**

In addition to the mobile technology, the Company will continue to utilize manual handheld devices for overhead inspections and underground inspections as discussed in Section 2, and detailed in NG-EOP G016, which is included as Attachment 1.

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<sup>4</sup> In addition, the Company's procurement guidelines require the Company to issue a RFP for major service purchases.

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Presently, the Company conducts voltage testing utilizing hand held devices (proximity detection units) capable of detecting voltage from 5 volts to 600 volts. The Company also uses a portable AC digital high impedance volt meter which has the ability to take reading with and without an input load impedance of 500 ohms. The hand held devices are certified to a minimum level of 5 volts and to a maximum level of 600 volts by an independent laboratory. The following units have been certified for use by the Company:

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HD Electric model LV-S-5 (5-600 volts)

Fluke 85  
Fluke 87  
Fluke 170 series or equivalent  
Fluke 175  
Fluke 177  
Fluke 179  
Fluke 187  
Fluke 189

The Company would recommend that the Commission also certify these handheld devices as part of its overall determination on the appropriate technology to use for its surveys in designated contact voltage risk areas.

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**c. Total Harmonic Distortion (“THD”) Pilot**

As set forth in the Company’s response to Record Request # 4, which asked the Company to explain what, if any, additional actions it would undertake where a voltage measurement of 1 volt up to the 4.5 volts threshold is found, the Company proposed to conduct a pilot program to obtain additional information on a method to use total harmonic distortion (“THD”) levels to determine appropriate mitigation for elevated voltages. Specifically, the Company will use the

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THD method as part of its initial forty percent ("40%") voltage testing in Downtown, College Hill and Smith Hill in Providence and in Newport, Pawtucket, and Woonsocket. Under the pilot, if during testing of these areas 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. These areas will then be safeguarded from the public and permanent repairs will be made.<sup>5</sup> THD will be determined by the use of a Fluke power quality clamp meter or a Fluke scope meter both of which have the ability to measure THD. To implement this pilot program, the Company will modify and reissue its RFP and provide the results of this THD pilot program to the Division and the Commission within 45 days of completion of the testing.

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#### **d. Voltage Levels**

Currently in New England, the Company utilizes a 4.5 volt baseline standard for its testing for stray and contact voltage. Specifically, if an elevated voltage condition is detected and verified, the Company's EOP dictates that the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for this purpose is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 4.5 volts. If the voltage measures greater than 4.5 volts and less than 8 volts, the Company will either guard the site in person or by a protective barrier that prevents public contact. For a voltage measurement greater than 8 volts, the Company will guard the site by an equipment elevated voltage inspector or a Company

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<sup>5</sup> If the total harmonic distortion is greater than 10% and no visual defects are found, no further action will be required.

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employee that has been trained to stand by on energized facilities; and will call for an immediate response to repair the site.

While there is no IEEE Standard for contact voltage thresholds, there is an IEEE Working Group, which is called the Working Group on voltages at publicly and privately accessible locations (DIST-1695 WG) (“Working Group”). The Company is participating on this Working Group. The Working Group is developing a Trial Use Guide focusing primarily on the presence of power frequency related voltages. The guide created by the Working Group will create necessary definitions; and will discuss causes, impacts, testing techniques, and mitigation. In the absence of such a standard, the Company believes that its current voltage benchmark and processes are appropriate for the contact voltage program. These current procedures were developed to enhance safety and reliability and reflect good utility practice. The 4.5 volt baseline is the same standard used by the Company in Massachusetts today. As part of the Massachusetts Department of Public Utilities (“DPU” or “Department”) Order on Distribution System Safety, issued on December 9, 2005, the DPU ordered utilities in Massachusetts to file plans to implement the recommendations contained in a report<sup>6</sup> by Navigant Consulting, Inc. (“Navigant”) which was part of the Stray Voltage and Manhole Safety Assessment performed by the Department. In this report, Navigant notes “[w]hile there is no strict definition (at this point) as to what constitutes harmful voltage levels, elevated voltages below 8 to 10 volts generally are not detected by humans; however, elevated voltages below 10 volts may cause discomfort to some animals, particularly for domestic pets, but may not always be harmful.” Furthermore, the

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<sup>6</sup> Independent Assessment of Stray Voltage in Underground Distribution Systems of Massachusetts Electric Companies, dated December 9, 2005, by Navigant Consulting, Inc.

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report states that “[e]vidence and industry data suggest *potentially* hazardous voltages manifest at or above 20 volts.<sup>7</sup> Between 8 to 20 volts, stray voltages can be detected and considered an irritant by humans.” While both Maryland and New York utilize 1 volt thresholds in their contact voltage programs, New Jersey, in its recent order adopting a pilot contact voltage program, noted that “there is not sufficient data available to determine the risks arising from contact voltage in our State or the best practices to approach those possible risks in a cost effective manner”, and in the pilot program, has adopted an actionable contact voltage level of 5 volts.<sup>8</sup> Accordingly, the Company believes that the existing standard of 4.5 volts or greater is appropriate for protecting public safety while at the same time efficiently managing the costs to customers of this program.

Finally, as required by statute, the Company has discussed its current 4.5 volt standard and procedures with the Division as part of this program, and the Division has not recommend any modifications to the Company’s existing voltage standard or voltage testing procedures. On September 26, 2012, the Division submitted a letter to the Commission stating that a threshold level of 4.5 volts was the Division determination of a proper level for contact voltage for mediation and repair under R.I.G.L. §39-2-25 (b)(4). The Company agrees with this determination.

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<sup>7</sup> Navigant Report at 8-9

<sup>8</sup> New Jersey Board of Public Utilities, *Matter of the Issue of Contact Voltage*, Docket No. EO10100760 at 4. (2011)

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## **Section 5**

### **Asset Survey Procedures**

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## **1. Contact Voltage Facilities and Asset Survey Procedures**

The contact voltage statute requires National Grid to conduct surveys in the designated contact voltage risk areas approved by the Commission over a five year period. R.I.G.L. 39-2(b) (2) (3) and (4) The statute directs that the Company initially survey at least 40 percent of designated contact voltage risk areas by June 30, 2013, and then beginning July 1, 2013, conduct annual surveys of at least 20 percent of the designated contact voltage risk areas.

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### **A. Company Assets Exempted From Surveys**

As noted above in Section 3, because mobile technology utilize a magnetic field to detect voltage it is not possible to employ mobile technology where the Company has overhead facilities. Therefore, areas with overhead facilities within a 50 foot buffer area will not be considered as a designated contact voltage risk area for this program, but will continue to be tested manually in accordance with the Company's EOP procedures. Likewise, areas that are tested with mobile technology will not be included in the manual testing.

Additionally, the Company expects to encounter situations where its equipment and facilities are located in designated contact voltage risk areas where access to the public is prevented or located in areas where the public is reasonably not expected to be walking (median strips of limited access highways,). These areas will not to be designated contact voltage risk areas as they are not publicly accessible.<sup>9</sup> Similarly there may be temporary construction or

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<sup>9</sup> Although a location may not be considered a designated contact voltage risk area, to the extent that a survey using mobile technology registers a fault greater than 8 volts in such areas and that areas is accessible to Company personnel, the Company will take appropriate repair or maintenance action for Company-owned assets and notify the appropriate party for customer-owned assets.

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other work activity that obstructs access to a particular facility for an extended period of time. In such cases, the Company will make note of the obstruction, however any repairs may need to be coordinated with the appropriate personnel at a later time.

Finally, the Company will not test in designated contact voltage risk areas where there is non-conductive equipment, such as concrete or fiberglass handholes, as these do not pose an electrical danger.

#### **B. Survey Schedule**

As discussed in more detail in Section 7 below, the Company proposes to accelerate its contact voltage survey process so as to complete the statutory percentage by no later than March 31 each year. This schedule is being proposed to align the Company's survey work with its fiscal year and to reconcile the contact voltage program with the Company's existing annual Infrastructure, Safety and Reliability (ISR) reconciliation filing.

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Of the total 13 designated contact voltage risk areas, the Company proposes surveying six (6) in the first year to meet the 40 percent requirement, and then survey three (3) each year thereafter to meet the 20 percent per year requirement. Attachment 3 contains a list by year of those designated contact voltage risk areas in which the Company will conduct its surveys.

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#### **C. Street Light Survey Procedures**

As part of the Division's September 18, 2012 comments on the Company's Contact Voltage Program, the Division recommended changing the Company's current manual elevated voltage cycle for street lights from a five year cycle to a three year cycle. The Company agrees

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with this recommendation and will transition this program to a three year cycle. The Company proposes that it would be able to complete its first three year cycle by the end of FY 2014 by accelerating the remaining five year cycle inspections to FY 2014.

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## Section 6

### Contact Voltage Reporting

## **1. Contact Voltage Reporting Requirements**

R.I.G.L. 39-2-25 (c) requires National Grid to maintain records of its contact voltage testing as well as subsequent maintenance and repairs and submit copies of these record to the Commission for public inspection. In addition, R.I.G.L. 39-2-25 (b) (6) requires the Company monitor, track and annually report to the Commission contact voltage events and corrective actions. At a minimum, the Company Grid must report the number and types of energized objects found both on Company-owned assets and on customer-owned assets found; voltage levels recorded; the number of shocks that occur to members of the public or to pets; the corrective action taken by the Company and any additional information that the Commission deems appropriate.

The Company proposes to file the following reporting information in its annual filing to the Commission, with copies to the Division. Where survey testing indicates a reading greater than 4.5 volts the Company will provide:

1. Event record number
2. Location of testing
3. Date and time of testing
4. Company or customer asset
5. Failed Equipment type
6. Voltage recorded
7. Personal injuries to public or pet or property damage
8. Any other equipment involved and age
9. Prior incidents at this location in the past five years
10. Corrective actions taken at the location
11. Number of customers if service is interrupted
12. Duration of the interruption
13. Summary of investigation into cause of the incident
14. Number of calls to the Company's "shock" line

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The Company will provide a summary of the above information as part of the report. In addition, the Company will work with the Division to develop a format to include other data the Company tracks as outlined in EOP G016 which would be useful to the Division or Commission in a detailed appendix to the annual report. The Company proposes that the initial annual report for contact voltage cover the period October 2012 through March 31, 2013. Thereafter, the annual reports will cover the period April 1 through March 31 each year and be submitted to the Commission annually on August 1. As discussed in more detail in Section 7 below, this would allow the Company to reconcile the contact voltage program as part of its current ISR plan.

However, in order to meet the statutory requirement that the Company survey at least forty percent of designated contact voltage risk areas by June 30, 2013, the Company proposes for the first year to file a one-time annual report supplement with the Commission by no later than September 1, 2013 that will demonstrate that the forty percent threshold has been met.

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## **Section 7**

### **Annual Reconciliation Mechanism**

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### Annual Reconciliation Mechanism

R.I.G.L. 39-2-25 (c) provides that the costs of the Company's contact voltage program are fully recoverable through a fully reconciling mechanism to be filed annually with the Commission for review and approval. Because the proposed contract voltage program directly relates to safety and reliability, the Company proposes to reconcile and recover the costs of the contact voltage program, for surveying, testing and repairs, as part of its annual Electric ISR filings.

However, before the costs associated with the contact voltage program can be included as part of an annual ISR filing, it will be necessary to address and accommodate a number of timing issues in the short term. Currently, the Electric ISR reconciliation mechanism tracks capital and O&M costs on a fiscal year (April 1 through March 31) basis and reconciles those costs in an August 1 reconciliation filing with new rate factors that take effect October 1 each year. At the same time, the statute provides for a July to June survey period and dictates that the Company must complete an initial survey of forty percent of its designated contact voltage risk areas by June 30, 2013, and then twenty percent of its remaining areas each year.

Deleted: The Company will address the recovery of program costs and how it proposes to reconcile these statutory timing requirements as part of its FY14 ISR plan filing.

At the evidentiary hearing on September 24, 2012, the Company addressed the recovery of program costs through the Electric ISR. Specifically, the Company indicated that it would seek to recover all Inspection & Maintenance ("O&M") costs, including the cost of the Contact Voltage Risk Program, through the Electric ISR. The Company also identified \$214,000 of test year O&M contact voltage inspection and maintenance costs that is currently included in its base rate proceeding in Docket 4323. The Company indicated that it would make an adjustment to

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exclude those O&M costs in the FY 2013 Electric ISR reconciliation filing in August of 2013 and in all subsequent reconciliation filings. If this proposal is approved in October 2012, the Company would exclude 50 percent of the \$214,000 on the basis that the contact voltage program would be in effect for six months of the FY 2013 ISR reconciliation period. For all subsequent reconciliation filings, the Company will exclude the entire \$214,000. This would ensure that all O&M costs associated with O&M testing would be not be double recovered, and both customers and the Company would be whole.<sup>10</sup>

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<sup>10</sup> TR I, Docket No. 4237 at pages 126-133.

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## Section 8

### Contact Voltage Program Costs

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## Program Costs

In the Company's April 5, 2012 response to Commission 4-7, the Company provided its best estimate of the annual costs to implement the legislation that became R.I.G.L. 39-2-25. Specifically, the Company estimated that the testing costs associated with an annual inspection of underground assets as proposed in the statute were in the range of \$75,000 to \$1.09 million depending on the testing methods required by the law. Manual testing of all Company-owned underground and street lighting assets would cost approximately an additional \$75,000 based on then existing pricing from a Company vendor. The mobile testing costs of approximately \$1.09M were based on costs the Company has experienced with a vendor performing similar mobile inspections in Buffalo, New York. Repair estimates are dependent on the number of conditions found, and are not included in the estimates above.

▼  
A noted above in Section 6, the Company will amend its RFP to include a THD pilot program to obtain additional information on the use of this method in determine elevated voltage.

Deleted: At this time, this estimated range of costs remains the Company's best view of the annual costs to implement R.I.G.L. 39-2-25 until the Company receives responses to the RFP. At that time, the Company will be able to more accurately refine its cost estimates. As noted above, the Company will make a final recommendation to the Commission on a vendor and technology by no later than September 21, 2012, including more specific information on the costs to implement the contact voltage program.

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## **Section 9**

### **Customer Rates and Bill Impacts**

**1. Proposed Rates and Bill Impacts**

The Company has not developed proposed rates at this time. However, in the Company’s response to Commission 4-8 filed April 5, 2012, the Company did provide its best estimate of the monthly bill impact for a typical residential, commercial and industrial customer. Based on the estimated annual expense ranging from \$75,000 to \$1.09 million, the estimated monthly bill impacts for typical residential, commercial and industrial customers are set forth in Table 2 below:

**Table 2**

	<b>Annual Expense \$75,000</b>	<b>Annual Expense \$1.09M</b>
<b>Residential Customer (500 k Wh)</b>	<b>\$0.01 per month (0.01%)</b>	<b>\$0.07 per month (0.1%)</b>
<b>Commercial (30,000 k Wh)</b>	<b>\$0.31 per month (0.01%)</b>	<b>\$4.38 per month (0.1%)</b>
<b>Industrial (500,000 k Wh)</b>	<b>\$5.21 per month (0.01%)</b>	<b>\$72.92 per month (0.2%)</b>

Note: monthly bill impact includes the effect of gross earnings tax.

The Company believes that the actual costs and customer bill impacts for its proposed contact voltage program will fall within the ranges set forth above in Table 2. As shown on this table, even though the overall expense range is quite wide, the estimated annual bill impact of the Company’s contact voltage program on residential, commercial and industrial customers is expected to be minimal.

On September 21, 2012, the Company filed with the Commission the confidential bids that had been received from two vendors in response to the Company's RFP for the mobile testing of the Company's proposed Contact Voltage Risk areas. This filing provides updated pricing information for the mobile testing costs.

However, as noted above in Section 6, the Company plans to reissue its RFP to include the THD pilot program. In addition, the Company also plans to include any additional requirements or directives of the Commission in this updated RFP. The Company will make the final costs for the Contact Voltage Risk Program available to the Commission when they are available, and will provide an updated rate impact on customers at that time.

**ATTACHMENT 1**

**CURRENT ELECTRIC OPERATING PROCEDURES**

**EOP-G016 - Equipment Elevated Voltage Testing**

nationalgrid	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>NG-EOP G016</b> Page 1 of 17
	<b>Equipment Elevated Voltage Testing</b>	Version 1.0 – 04/01/11 Attachment 1

**INTRODUCTION**

The purpose of this procedure is to outline the requirements for the annual equipment elevated voltage testing on National Grid Facilities in New York as required by the 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 and the New York Public Service Commission's "Order Requiring Additional Mobile Stray Voltage Testing" issued and effective on July 21, 2010. Additionally the Massachusetts Department of Telecommunications and Energy provided a series of recommendations on December 9, 2005, that have been included in this procedure.

This procedure also outlines corporate requirements for equipment elevated voltage testing in New Hampshire and Rhode Island. The variance in requirements between New York, Massachusetts, New Hampshire, and Rhode Island is based on sound utility practice versus regulatory requirements.

**PURPOSE**

This procedure applies to all personnel involved with or responsible for the testing of facilities designated by this EOP for equipment elevated voltage.

**ACCOUNTABILITY**

1. Distribution Engineering Services
  - A. Update program as necessary.
  - B. Provide field support and training upon request.
  - C. Act as liaison with existing database vendor when required.
  
2. Inspections
  - A. Ensure the equipment elevated voltage 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 equipment elevated voltage testers have been trained.
  
3. C&MS Management
  - A. When requested by Field Operations/Distribution Network Strategy obtain, schedule and manage contractors to perform equipment elevated voltage testing.
  - B. Ensure all equipment elevated voltage testers have been trained.
  - C. Manage contractual terms and conditions including all change orders and resource requirements.

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FILE: NG-EOP G016 EQUIPMENT ELEVATED VOLTAGE TESTING MGA	ORIGINATING DEPARTMENT: DISTRIBUTION ENGINEERING SERVICES	SPONSOR: PATRICK HOGAN

nationalgrid	<b>ELECTRIC OPERATING PROCEDURE GENERAL</b>	Doc. # <b>NG-EOP G016</b> Page 2 of 17
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- D. Establish a process for the delivery of work, collection of data, invoice verification and payment, and reporting to local management and Distribution Network Strategy.
- E. Manage any established support processes such as back office support or data entry clerks.
- 4. Equipment elevated Voltage Inspector
  - A. Demonstrate the ability and proficiency to perform equipment elevated voltage testing per this EOP.
  - B. Demonstrate the ability to become proficient in the use of the appropriate database.
  - C. Possess the ability to do walking patrols, collect information, edit data, and guard unsafe facilities.
  - D. Attend equipment elevated voltage training program.
- 5. T&D Technical Training
  - A. Provide training upon request.
- 6. Distribution Network Strategy
  - A. Provide input into program revisions.
  - B. Ensure the equipment elevated voltage program as outlined in this EOP is implemented properly and timely.
  - C. Ensure the program as outlined in the EOP is completed each year.
  - D. Provide qualified personnel to complete equipment elevated voltage testing.
  - E. Ensure all equipment elevated voltage testers have been trained.
  - F. Provide program management.
- 7. Process and Systems
  - A. Provide and support database.

**REFERENCES**

NYPSC Order 04-M-0159  
 NYPSC Order Adopting Changes to Electric Safety Standards  
 NYPSC Order Requiring Additional Mobile Stray Voltage Testing  
 Applicable National Grid Safety Rules & Procedures  
 Testing Equipment Operation Instructions

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**DEFINITIONS**

**Stray Voltage:** As defined by NYPSC the term “Stray Voltage” means voltage conditions on electric facilities that should not ordinarily exist.

**Stray Voltage Testing:** The process of checking an electric facility for stray voltage using a device capable of reliably detecting and audibly and/or visually signaling voltages in the range of 6 to 600 volts.

**Proximity Detection Unit:** A low voltage hand held detector used to test exposed metallic surfaces and conductors for the presence of low voltage from 6V to 600V.

**Equipment Elevated Voltage Inspector:** The individual performing the equipment elevated voltage inspection.

**Handheld Computer:** An electronic Data recording device that is used in the field to create a record of conditions found.

**Equipment Elevated Voltage:** An A.C. rms voltage difference between utility equipment and the earth, or to nearby grounded facilities that exceeds the lowest perceptible voltage levels for humans.

**Finding:** Any confirmed voltage reading on an electric facility or streetlight greater than or equal to 1V measured using a volt meter and a 500 ohm shunt resistor.

**Mitigation:** Corrective actions performed by the utility to address the stray voltage finding.



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**1.0 FACILITIES WHERE EQUIPMENT ELEVATE VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW YORK**

- 1.1 Street Lights and Municipally Owned Facilities
  - 1.1.1 Company owned metallic street lighting standards are required to be tested for equipment elevated voltage annually. This test is to be performed while the light is operating.
  - 1.1.2 Municipally owned street light systems that National Grid directly provides energy to must be tested for equipment elevated voltage annually. National Grid will complete this testing unless assurances of the completion of required testing and transfer of such test data are made by the appropriate municipality. This test is to be performed while the light is operating.
  - 1.1.3 Municipal owned metallic traffic signal standards and accessible devices are to be tested annually for equipment elevated voltage by National Grid.
  - 1.1.4 All street lights identified on public thoroughfares regardless of ownership are to be tested annually.
  - 1.1.5 All street lights under a maintenance contract are to be tested annually. Exceptions not requiring equipment elevated voltage testing: private lighting, park associations, parking lots, fiberglass (or other non-conductive) street light standards, and locations where street light 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.
- 1.2 National Grid Substation Fences
  - 1.2.1 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.
- 1.3 Overhead Distribution Facilities
  - 1.3.1 Towers and/or metallic poles with distribution facilities shall be tested annually for equipment elevated voltage.
  - 1.3.2 The following equipment on wood distribution poles requires annual equipment elevated voltage testing:
    - 1. Metallic riser guard or conduit (company or non-company).
    - 2. Uncovered or uninsulated down ground (company or non-company).
    - 3. Down guy (company or non-company).
    - 4. Any other publicly accessible conductive piece of equipment (company or non-company) on the pole within reach from the ground.
  - 1.3.3 Exceptions: Customer meters and customer meter poles are excluded.

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- 1.4 Overhead Transmission Facilities
  - 1.4.1 Towers and/or metallic poles with transmission facilities shall be tested annually for equipment elevated voltage.
  - 1.4.2 The following equipment on wood transmission poles or structures require annual equipment elevated voltage testing:
    - a. Metallic riser guard or conduit (company or non-company).
    - b. Uncovered or uninsulated down ground (company or non-company).
    - c. Down guy (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.
- 1.5 Underground Facilities
  - 1.5.1 Annual equipment elevated voltage testing is required on all of the following equipment where accessible to the public.
  - 1.5.2 All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, and switchgear.
  - 1.5.3 Starting in 2010 and continuing thereafter, unless changed by subsequent order of the NY Public Service Commission, two mobile stray voltage surveys shall be conducted annually in Buffalo and one mobile stray voltage survey is required to be conducted annually in Albany and Niagara Falls.
  - 1.5.4 Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.
- 1.6 Daily Job Site Test Requirements
  - 1.6.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
  - 1.6.2 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.
- 1.7 Exemptions
  - 1.7.1 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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**2.0 FACILITIES WHERE EQUIPMENT ELEVATED VOLTAGE TESTING/DOCUMENTATION IS REQUIRED – NEW HAMSHIRE AND RHODE ISLAND**

- 2.1 Company Owned Street Lights
  - 2.1.1 Testing will be performed during each outage investigation notification and the data will be recorded for each instance.
- 2.2 Overhead Distribution Facilities
  - 2.2.1 Wood distribution poles require testing to be completed on metallic risers in conjunction with the distribution patrol program covered by NG-USA EOP D004.
  - 2.2.2 Documentation is only required on metallic risers found to be at an elevated voltage requiring repair. Testing data is not required for a facility that is found to be operating as designed.
- 2.3 Underground Facilities
  - 2.3.1 Testing for equipment elevated voltage shall be done while completing scheduled inspections of underground equipment covered by NG-USA EOP UG006. Underground Inspection and Maintenance. The following items are to be tested on a five year cycle, padmount transformers, switchgears, and metallic handhole covers.
  - 2.3.2 Testing for equipment elevated voltage shall be completed on underground facilities while completing working inspections covered by NG-USA EOP UG006. The metallic items to be tested are manholes covers, vault covers, handhole covers, splice box covers, junction box covers, padmount transformers, switchgear, and submersible equipment covers.
- 2.4 Daily Job Site Test Requirements
  - 2.4.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
    - a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.
- 2.5 Exemptions
  - 2.5.1 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 – MASSACHUSETTS**

- 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 five year cycle.
  - 3.1.2 Exceptions: Testing shall not be completed at locations where street light 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.
- 3.2 Overhead Distribution Facilities
  - 3.2.1 Wood distribution poles require testing to be completed as noted below in conjunction with the distribution patrol program covered by NG-USA EOP D004.
  - 3.2.2 The following equipment on wood distribution poles requires annual equipment elevated voltage testing:
    - a. Metallic riser guard or conduit (company or non-company).
    - b. Uncovered or uninsulated down ground (company or non-company).
    - c. Down guy (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.
- 3.3 Underground Facilities
  - 3.3.1 Equipment elevated voltage testing is required on all of the following equipment where accessible to the public on a five year cycle.
    - a. All metallic manhole covers, vault covers and grates, junction box covers, handhole covers, pad mount transformers, secondary pedestals, and switchgear.

Exceptions: Non-metallic concrete or fiberglass pads or handholes are not required to be tested.
- 3.4 Daily Job Site Test Requirements
  - 3.4.1 Each job site where National Grid personnel or its contractors complete a work assignment shall be tested for equipment elevated voltage at the end of the work day or the completion of the assignment. **This testing requirement is considered good utility practice and does not require specific documentation.**
    - a. In a storm situation, where mutual aid is required, testing by other than National Grid personnel will not be required.

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3.5 Exemptions

- 3.5.1 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.

**4.0 TEST EQUIPMENT**

- 4.1 A hand held device (proximity detection unit) that is capable of detecting voltage from 6 volts to 600 volts.
- 4.2 A portable AC digital high impedance volt meter must have the ability to take readings with and without an input load impedance of 500 ohms.
- 4.3 The handheld devices utilized must be certified by an independent test laboratory as being able to reliably detect voltages of 6 – 600 volts. The following units have been certified:
- 4.3.1 HD Electric model LV-S-5 (5-600 volts).  
 Fluke 85  
 Fluke 87  
 Fluke 170 series or equivalent  
 Fluke 175  
 Fluke 177  
 Fluke 179  
 Fluke 187  
 Fluke 189

**5.0 TEST PROCEDURE**

5.1 Job Briefing

- 5.1.1 At minimum, the following information must 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 voltage detector or meter probe is to be used to make contact with the facilities.
  - b. Appropriate PPE must be worn.
  - c. Each individual needs to be aware of his/her surroundings at all times.
  - d. Make sure to observe all traffic before entering a street, either at intersections or any other point.
  - e. Traffic safety vest (DOT Compliant Class II) is to be worn at all times 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.

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5.2 Measurements for voltages will be performed in accordance with the following:

5.2.1 Initial measurements for the presence of voltage shall be made using a certified proximity detection unit as noted in the testing equipment certified equipment list in Section 4.0, 4.3.

- a. To verify the proper operation of the proximity detector, follow operating instructions for the particular certified 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 area/equipment touch the area/equipment to be tested with the probe of the unit.

5.2.2 If this test detects voltage, repeat the test with the 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, the connection to the neutral/ground shall be made with up to 25' of # 16 stranded copper lead wire (covered), the other end of which shall be securely connected to the negative (black) probe of the meter. When using such "extension leads" appropriate care shall be taken in the placement of such leads so as 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, a metal rod shall
  3. create a ground reference point for the measurement to be taken. 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 situation (3' to 4'.) On occasion longer leads may be necessary to find undisturbed earth (up to 25'.)
- c. The "live" meter probe lead shall then be placed into contact with the structure under inspection to determine the voltage.
  1. Voltages readings greater than 30 volts shall be recorded in the database for the site.

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2. For voltage readings less than 30 volts, install a 500 ohm input load impedance resistor on the volt meter. Take another voltage measurement and record this voltage in the database for the site.

**6.0 CORRECTIVE ACTION REQUIREMENTS FOR ELEVATED VOLTAGE FINDINGS**

6.1

6.1.1 New York

If an equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 1 volt. **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.** If the voltage measures greater than or equal to 1 volts and less than 4.5 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. It is expected that sound judgment shall be utilized in this application. If the voltage measurement is greater than or equal to 4.5 volts it must be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities, and immediate response is required using the notification in Section 6.3 below.

6.1.2 New England

If an equipment elevated voltage condition is found and verified by the Test Procedure in Section 5.0, the site is to be guarded until made safe by Company personnel or if municipally owned, made safe by the owner or company. Guarded for the purpose of this EOP is defined as guarded by a person or a protective barrier that prevents public contact if the equipment elevated voltage found is greater than 4.5 volts. **If the voltage measures 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.** If the voltage measures greater than 4.5 volts and less than 8 volts it can either be guarded in person or by a protective barrier that prevents public contact, contact your supervisor for required action. It is expected that sound judgment shall be utilized in this application. If the voltage measurement is greater than 8 volts it must be guarded by an equipment elevated voltage inspector or a Company employee that has been trained to stand by on energized facilities; and immediate response is required using the notification in section 6.3 below

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

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- 6.3 The following notification process for personnel to respond shall be utilized.
- 6.3.1 Notification by location:
- a. New York: contact Systems Operations Dispatch 1-877-716-4996
  - b. Bay State West and North & Granite: Westboro Control Center 508-389-9032.
  - c. Bay State South and Ocean State: Lincoln Control Center 401-335-6075.
- 6.3.2 Inform the operator that this is an equipment elevated voltage call, giving inspector name, company (if not National Grid), unique ID, address where problem is identified, facility number, circuit number, ownership, type of equipment, 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.
- 6.4 Temporary repairs may be used to correct the equipment elevated voltage thereby removing the need to guard the site.
- 6.5 Except as noted in Section 6, 6.6, permanent repairs to the equipment shall be made within 45 days of the occurrence.
- 6.6 If permanent repairs can not 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 must be identified and justified in the annual reporting of the program to the NYPSC.
- 6.7 The Stray Voltage Tester/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.
- 6.8 The individuals conducting the equipment elevated voltage tests on street light 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. Angel guards shall only be installed after the testing of the street light standard is complete and 1) there is no indication of equipment elevated voltage above 1 volt, or 2) repairs have been completed to correct the equipment elevated voltage.
- 6.9 The equipment elevated voltage inspector shall report any potentially hazardous conditions found on National Grid facilities seen visually during the survey process.
- 6.10 Customer Owned Equipment
- 6.10.1 Where the Company finds equipment elevated voltage above 1 volt and identifies its source as customer-owned equipment, the Company shall guard the site and notify the customer or a responsible person, as appropriate, that a potentially hazardous situation exists. The Company shall advise the customer or responsible person that the cause of the equipment elevated voltage must be immediately remedied.

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6.10.2 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.

**7.0 DATABASE REQUIREMENTS**

7.1 The database in use shall be easily searchable for information and reporting.

7.2 Information fields required to be completed for facilities:

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

**8.0 NEW YORK ANNUAL REPORTING AND CERTIFICATION REQUIREMENTS**

8.1 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.

8.2 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.

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- 8.3 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.
- 8.4 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 street lights, as well as completed all required inspections.
- 8.5 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.
- 8.6 The annual reporting and certification is required by February 15 of each year. In addition to certifications, it shall address the following:
- 8.6.1 Details the results of stray voltage test results and inspections conducted over the 12-month period ending December 31 of the prior calendar year. (A separate report will be required for inspections from November 1 – December 31, 2008 to account for transition to calendar year reporting.)
- 8.6.2 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).
- 8.6.3 Contain certification describe in 8.3, 8.4 and 8.5 of this section.
- 8.6.4 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.
- 8.6.5 Contain a breakdown of the shock reports received from the public as detailed in Attachment 2 of the December 15, 2008 Order.
- 8.6.6 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.
- 8.6.7 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.
- 8.6.8 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.
- 8.6.9 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.

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- 8.6.10 Contain a review and analysis of the inspection results. Identifying areas of concern along with remedial actions or future plans to alleviate inadequacies in current program assets.
- 8.6.11 Description of the quality assurance program along with the results from quality assurance activities conducted during the year.
- 8.6.12 Any additional information that is pertinent to the issues addressed by the safety standards should also be included.
- 8.7 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, 2011, whichever is earliest, and in each subsequent year. The filing shall include the historic results and costs associated with the manual test program in each area listed in Section 1.5 of this procedure.
- 8.8 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.
- 8.9 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.

**9.0 MASSACHUSETTS REPORTING REQUIREMENTS**

- 9.1 National Grid shall submit an annual report that includes the following:
  - 9.1.1 Annual reports that list inspection and testing data, including number of inspections conducted by equipment type.
  - 9.1.2 Number of equipment elevated voltage events detected by inspection personnel versus call-ins or notification by third parties.
  - 9.1.3 Variance reports on current year inspection targets.
  - 9.1.4 Equipment elevated voltage events detected on equipment that is not included in equipment elevated voltage equipment inspection schedules (which will enable the DTE to determine if the company is inspecting and testing the correct equipment).
  - 9.1.5 Number of exceptional or non-routine events that required reporting to OSHA or other government organizations due to injuries or other substantive impacts.

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**10.0 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)
Street Light	970	Handhole
	971	Standard
	979	Street light – 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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**11.0 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.

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**ATTACHMENT 2**

**DESIGNATED CONTACT VOLTAGE RISK AREAS**

**Revised October 2, 2012\***

**\*Map title on page 1 of 14 has been amended to “Distribution Areas”**

**Map legends include a “Distribution Area” legend**

**ATTACHMENT 3**

**DESIGNATED CONTACT VOLTAGE RISK AREAS**

**SURVEY SCHEDULE**

## **DESIGNATED CONTACT VOLTAGE RISK AREAS**

### **SURVEY SCHEDULE**

**1. Initial Survey (October 4, 2012 to March 30, 2013)**

**Newport**

**Pawtucket**

**Providence:**

- College Hill
- Downtown
- Smith Hill

**Woonsocket**

**2. Year 2 (April 1, 2013 to March 30, 2014)**

**Providence:**

- Upper South Providence
- Lower South Providence
- Washington Park

**3. Year 3 (April 1, 2014 to March 30, 2015)**

**Providence:**

- Elmwood
- Federal Hill
- West End

**4. Year 4 (April 1, 2015 to March 30, 2016)**

**Providence:**

- Olneyville

Previous Survey results and other factors, such as incident reports, will be used to determine the additional 2 contact voltage risk areas to be scanned in Year 4 and the order to scan the other contact voltage risk areas annually thereafter.