REPORT OF THE JOINT TASK FORCE ON ELECTRICAL SAFETY

Presented by:
City of Boston • NSTAR Electric • Massachusetts Department of Telecommunications & Energy • Local 369 UWUA • Walk Boston • Animal Rescue League of Boston • Cosentini Construction • Guide Dog Users, Inc.

July 2005

City of Boston
Thomas M. Menino

NSTAR

City of Boston
Thomas M. Menino

July 2005

Dear Bostonian:

This past March, we appointed a task force to examine the issue of electric safety in the City of Boston, with a particular focus on stray voltage. The Joint Task Force on Electric Safety is comprised of labor union, regulatory, construction, and advocacy group members, in addition to City and NSTAR representatives. We are pleased to receive the report of the Joint Task Force and to share their important findings and recommendations with you.

At the outset of the Joint Task Force process, we began a comprehensive inspection program of all electrical infrastructure in Boston's public realm. We are pleased to report that City and NSTAR workers have completed a visual inspection of all electrical equipment on our streets and sidewalks and have tested the vast majority of that equipment using voltage indicators.

In addition, the Joint Task Force has developed a series of recommendations to look at new and innovative approaches to prevention and detection of electric-safety issues, as well as protocols to coordinate responses to electric-safety matters by City and NSTAR departments.

We thank the Joint Task Force for their dedication and commitment to developing this comprehensive report and for providing a blueprint from which to work in the future. We pledge our continued commitment to work together to ensure electrical safety in Boston.

Sincerely,

Mayor Thomas M. Menino
City of Boston

Thomas J. May, Chairman, President & CEO
NSTAR

Letter From the Joint Task Force Co-Chairs

Electrical Safety Is Our Collective Responsibility...

July 2005

Dear Mayor Menino and Chairman May:

Earlier this year, you appointed the Joint Task Force on Electrical Safety to address the issue of electrical safety in the City of Boston. We thank you for your leadership and foresight in calling together such an impressive group of dedicated individuals with wide ranging experience and expertise.

Since March, the Joint Task Force has been working diligently to examine the complex issues surrounding our electrical infrastructure in the City of Boston. We have drawn on our individual knowledge, and upon that of numerous experts in the field, to develop a plan of action that we believe will significantly improve electrical safety in the City of Boston and strengthen public confidence in the use of public areas.

On behalf of the Joint Task Force on Electric Safety, we are pleased to present you with this Report, which documents our findings and outlines 15 specific recommendations that should be implemented by the City of Boston, NSTAR Electric and other utilities, private contractors, and the general public in our efforts to enhance electrical safety in the City of Boston. These recommendations are carefully crafted to proactively address the issue of electrical safety, with a particular focus on the issue of stray voltage, through prevention, detection and remediation, as well as continued public-education and outreach measures.

As co-chairs of the Joint Task Force, we would like to extend our appreciation to our fellow members and their representatives who dedicated themselves to examining this important issue. Together we have developed a comprehensive plan of action that will improve the quality of life and the visitor experience in Boston. It is our belief that we must all work to implement these recommendations and to engage the general public in this important issue because electrical safety is our collective responsibility.

Sincerely,

James W. Hunt, III
Chief of Environmental and Energy Services
City of Boston

Joseph R. Nolan, Jr.
Senior Vice President
Customer & Corporate Relations
NSTAR

City of Boston
Thomas M. Menino

REPORT OF THE JOINT TASK FORCE ON ELECTRICAL SAFETY
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Special Advisors to the Joint Task Force on Electric Safety

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REPORT OF THE JOINT TASK FORCE ON ELECTRICAL SAFETY

Executive Summary

The Joint Task Force on Electrical Safety was convened by Boston Mayor Thomas M. Menino and NSTAR Chairman, President and Chief Executive Officer Thomas J. May to draw on the combined resources and expertise of task force participants in order to address the issue of electrical safety in the City of Boston with a particular focus on the issue of stray voltage. Over the past months, participants in the Joint Task Force have joined their resources and worked to chart a course of action that will achieve the mission of the Joint Task Force and strengthen public confidence in the use of public ways by people, their household pets and other animals. This report outlines the activities and recommendations of the Joint Task Force and lays the blueprint for future success in the detection and prevention of electrical-safety issues.

To fulfill its mission, the Joint Task Force commenced a multi-disciplined examination of electrical-safety issues with a focus on minimizing the potential for stray voltage events. These events have the potential to occur in locations where electrical wiring becomes exposed as a result of damage, vandalism, natural deterioration, or improper installation or removal of electrical equipment. In those circumstances, electrical current could be released into an area where it is not normally anticipated and where environmental conditions converge to create a conductive path for the current. Electrical equipment that may be affected is typically (1) located at or above-grade, (2) subject to environmental factors such as rain, snow and the corrosive effects of road salt, and (3) susceptible to accidental or purposeful damage by third parties. This type of electrical equipment includes privately owned outdoor electrical equipment (such as outdoor lighting equipment and holiday lighting not in conformance with code) and electrical facilities owned and maintained by cable companies, telephone companies, public transit systems and electric utilities, as well as state and municipal-owned infrastructure (such as street lights and traffic signals).

The investigation conducted by the Joint Task Force included consideration of a wide-range of information relating to electrical operations and preventive-maintenance work practices, electric industry research and development efforts, experience from other urban areas outside of the New England area, Massachusetts Dig Safe requirements and enforcement mechanisms, as well as other pertinent information. In all of its efforts, the Joint Task Force focused intently on the establishment of a plan to address electrical safety issues in a meaningful and sustainable manner so that the public is reassured that streets and sidewalks within the City of Boston are safe and secure.

Based on its investigation, the Joint Task Force developed 15 recommendations to be implemented by the City of Boston,[1] NSTAR Electric and other utilities, as well as public and private owners of electrical infrastructure and contractors working on water, sewer, transportation and other services located in the public ways within the City of Boston.

The recommendations put forth by the Joint Task Force are aimed at three critical objectives, which are:

- **"Find It – Fix It":** These recommendations are designed to lead to the identification of locations where electrical safety issues may exist so that the repairs necessary to ensure the public safety are completed;
- **"See It – Report It"**: These recommendations are designed to educate the public about the need to bring known or suspected damage to outdoor electrical equipment to the attention of NSTAR Electric, the City of Boston and other owners of electric infrastructure as soon as possible, so that electrical safety issues are addressed; and
- **Enforcement and Monitoring Measures:** These recommendations are designed to create incentives for contractors performing work around electrical infrastructure in the City of Boston to take care to avoid damaging electrical equipment and to report damage to the appropriate authorities in the event that it occurs. These recommendations also involve ongoing review of technology alternatives to assist in electrical safety.

1. For the purposes of this Report, the "City of Boston" includes a variety of departments and service divisions that own, operate, or regulate outdoor electrical infrastructure. These departments and divisions include, but are not limited to, the Boston Inspectional Services Department, Boston Public Works Department, Boston Fire Department, Boston Parks and Recreation Department and the Boston Transportation Department.

The specific recommendations developed in each of these categories are as follows:

"Find It — Fix It"

- **Inspections and Testing:** Immediate assessment, inspection and testing of electrical infrastructure under the supervision and control of the City of Boston and NSTAR Electric.
- **Recurring Testing:** Periodic inspections by the City of Boston and NSTAR Electric of electrical infrastructure under their ownership and control on a rolling three-year basis.
- **Testing Protocols:** Establishment of uniform voltage testing and reporting protocols to maximize testing effectiveness.
- **Response Procedure:** Establishment of a coordinated response procedure for addressing reports of damaged electrical infrastructure and potential electrical-safety issues.
- **Temporary Repairs:** Development of a standard operating procedure to temporarily secure damaged infrastructure until permanent repairs are completed.
- **Historical Records Check:** Review of historical records to identify potential electrical-safety hazards and development of an asset-management database to track equipment in the future.

"See It — Report It"

- **Public Awareness:** Public outreach efforts to customers, residents, large property managers, contractors, and municipal officials designed to raise public awareness and ensure the safety of people and their household pets or other animals.
- **Dig-Safe Outreach:** Enhanced outreach efforts by Dig Safe participants to bring attention to the need to identify and repair damaged electrical equipment.
- **Outreach to Private Owners:** Outreach to private property managers regarding the need for periodic inspections and voltage testing of electrical infrastructure and equipment under their ownership and control.

Enforcement and Monitoring Provisions

- **City Participation in Dig Safe:** Participation by the City of Boston in the Dig Safe program.
- **Dig Safe Rewards and Penalties:** Evaluation of revised penalty structures and whistleblower provisions to encourage reports of damage to municipal or utility infrastructure.
- **Salt Alternatives:** Exploration of alternatives to salt for melting ice and snow on public sidewalks and roadways.
- **Installation of Non-Conductive Streetlight Covers:** Use of non-conductive streetlight hand-hole covers and insulators for new streetlight pole installations or repairs in the City of Boston.
- **Technology Innovations:** Ongoing evaluation of technology innovations that will help to avoid, detect and or mitigate the potential for stray voltage.
- **Task Force Monitoring:** Continued monitoring by the Joint Task Force through follow-up meetings to review implementation progress and update interested participants and supporters.

Based on the combined experience and expertise of the Joint Task Force participants, the implementation of these recommendations will strengthen capabilities to identify and remediate electrical-safety issues, will proactively mitigate the potential for safety issues to occur in the future and will educate the public on the causes of stray voltage and the steps that can be taken to minimize those events. The Joint Task Force views these recommendations as critical steps in ensuring the safety of the public and their household pets or other animals as they use and enjoy the public roadways and sidewalks in the Boston public realm.

This Report is organized as follows: Section II provides an overview of the Joint Task Force and details the activities that were conducted to forge an electrical-safety plan. Section III provides a technical overview of the causes of stray voltage and identifies the circumstances where it has the greatest potential to occur. Section IV sets forth the recommendations of the Joint Task Force and outlines the steps necessary to implement those recommendations.

Overview of the Joint Task Force Activities

At its inception, members of the Joint Task Force established four primary working groups to conduct an in-depth evaluation of specific electrical-safety issues and to identify action items that would represent productive and meaningful initiatives in the effort to ensure the safety of the public and their household pets or other animals. The subcommittee working groups are as follows:

- Inspections and Testing Subcommittee
- Data Collection and Information Sharing Subcommittee
- Public Education and Outreach Subcommittee
- Regulatory and Policy Changes Subcommittee

Inspections and Testing Subcommittee

The **Inspections and Testing Subcommittee** was charged with making recommendations related to ongoing damage inspections and periodic voltage-indication testing of above-grade electrical facilities, including those owned and maintained by the City of Boston and NSTAR Electric, as well as other utilities and private and public entities that own and maintain outdoor lighting and electrical equipment.

The work agenda for the Inspections and Testing Subcommittee covered three primary topics: (1) the completion of visual (damage) inspections and voltage-indication testing to develop a baseline status assessment; (2) development of an ongoing program of periodic voltage-indication testing; and (3) establishment of uniform voltage-indication testing and reporting protocols for future testing efforts.

The recommendations of the Inspections and Testing Subcommittee with supporting policy statements and implementation schedule are set forth in Section IV.

Data Collection and Information Sharing Subcommittee

The **Data Collection and Information Sharing Subcommittee** was charged with making recommendations related to: (1) the sharing, review and assessment of historical data records to provide leads as to possible locations where electrical wiring should be inspected, and if necessary, de-energized as a precautionary measure to avoid or remediate the occurrence of stray voltage, and (2) the establishment of future arrangements to share and catalog information regarding existing or former service locations where there is a potential for stray voltage to occur.

The work agenda for the Data Collection and Information Sharing Subcommittee included two primary activities: (1) the exchange, review and assessment of historical records between NSTAR Electric and the City of Boston to identify potential electrical-safety issues; and (2) an evaluation of the feasibility of developing asset-management databases to catalog electrical equipment inventories, equipment locations, construction permits, mark-outs and damage reports so that locations with a potential for stray voltage can be identified. With respect to the review and assessment of historical records, the City of Boston and NSTAR Electric exchanged and reviewed information relating to: (1) electrical-equipment damage reports resulting from vehicle accidents and vandalism, (2) building demolitions, and (3) streetlight conveyances and retirements. As explained in Section IV, below, this information was used by NSTAR Electric and the City of Boston to generate area-survey lists that were given priority status for voltage testing.

The recommendations of the Data Collection and Information Sharing Subcommittee with supporting policy statements and implementation schedule are set forth in Section IV.

Public Education and Outreach Subcommittee

The **Public Education and Outreach Subcommittee** was charged with developing a strategy to raise public awareness and educate specific audiences on the causes of stray voltage and the preventative steps that can be taken to alert responsible parties to the need to repair and/or remediate situations that have the potential to create electrical-safety issues. The paramount objective of the Public Education and Outreach Subcommittee was to develop a communications strategy to provide a real and lasting benefit in terms of protecting the public and their household pets or other animals as they use and enjoy the public ways within the City of Boston.

The work agenda for the Public Education and Outreach Subcommittee focused on the development of a public outreach campaign that will commence with the release of the Joint Task Force Report and will encompass repeated and broad dissemination of information (by website, mailings and media) regarding the importance of reporting damage and/or deterioration to outdoor electrical infrastructure.

The recommendations of the Public Education and Outreach Subcommittee with supporting policy statements and implementation schedule are set forth in Section IV.

Regulatory and Policy Changes Subcommittee

The **Regulatory and Policy Changes Subcommittee** was charged with making recommendations as to changes in law or regulation that should be implemented to strengthen and target Dig Safe enforcement, curtail improper or unauthorized electric uses or to ensure that damage to electrical facilities is minimized and is brought to the attention of responsible parties quickly when it does occur.

The work agenda for the Regulatory and Policy Changes Subcommittee encompassed substantial discussion on the incentives and disincentives that exist in current law and regulation regarding the reporting of damage to electrical infrastructure. The Subcommittee also discussed ways in which utilities and public and private owners of electrical infrastructure can be required or motivated to implement measures aimed at minimizing the opportunities for electrical-safety issues to occur.

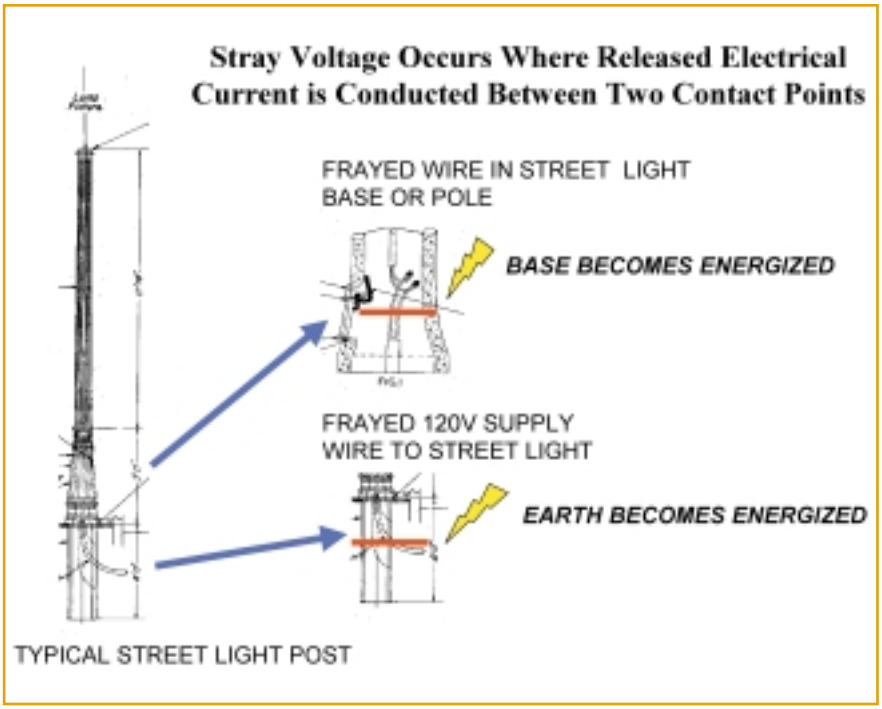
The recommendations of the Regulatory and Policy Changes Subcommittee with supporting policy statements and implementation schedule are set forth in Section IV.

Technical Overview

What Is Stray Voltage?

In its most basic terms, stray voltage is electrical current that: (1) is released into the environment because of a breach or "fault" in the insulation covering an electrical cable, and (2) is conducted between two contact points (*i.e.*, a conductive contact point and ground). In these circumstances, electrical current is found at a location and voltage level that is undesirable or unanticipated by the system design.

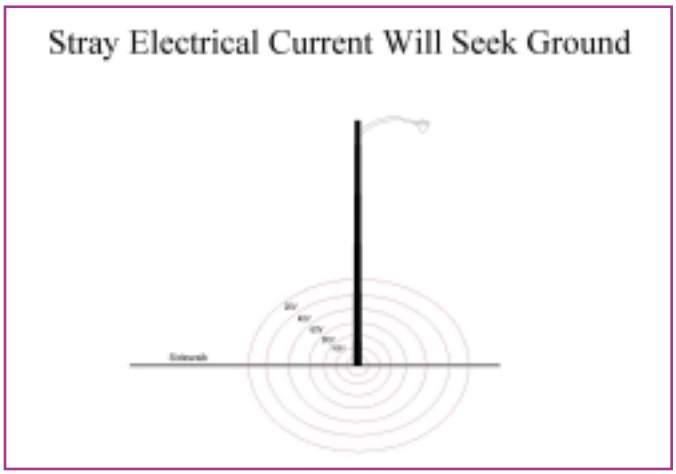
Normally, electrical systems such as outdoor lighting fixtures, streetlights, traffic control boxes, transit systems, public telephones or even residential household systems are contained, with electricity delivered into a closed system at a constant voltage level. When there is a breach or fault in the insulation covering an electrical cable delivering electricity into the system, electrical current is released and, depending upon the specific circumstances, the current may be conducted away from the wire. For example, if a wire supplying electricity into or within a streetlight is damaged, electrical current may be conducted between the wire and the metal base of the streetlight, thereby energizing the streetlight base, or between the



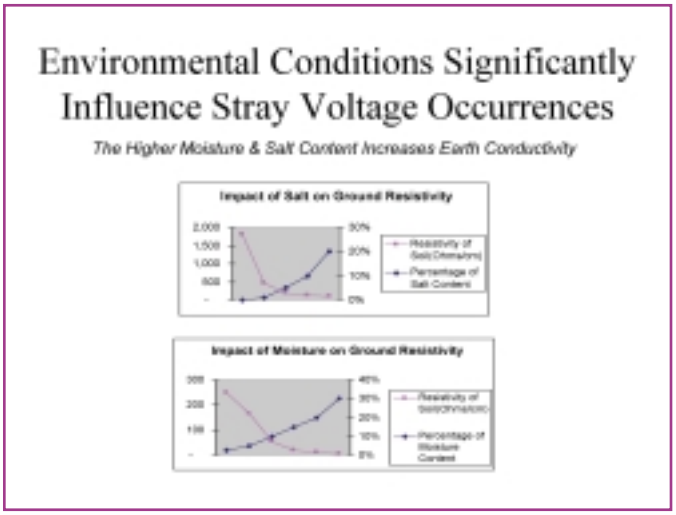
wire and the earth beneath the base where it is conducted to a ground point as a result of moisture or conductive elements existing in the soil.

When electrical current is released, it will naturally flow to a grounding point. Because electrical current flows over a path of lower resistivity as it seeks ground, a danger for household pets and other animals is created by the difference in voltage between the originating source and ground. In those circumstances, household pets and other animals can serve as a conductive path for the electricity when they come in contact with the electrical current that is seeking a path to ground. Animals are most susceptible to this phenomenon because (1) their feet are not covered by footwear, which breaks the conductive path; and (2) with four points of contact on the ground, it is more likely that their feet will come in contact with differing resistivity levels creating a conductive path.

A significant factor in the creation of stray voltage is the environmental conditions present at the point that electrical current is released. For example, if the insulation on a cable serving a streetlight is breached, the conductor within the cable may come in contact with the earth, or in some cases, with the steel or iron pipe encasing the cable. As a result, the conductor energizes the pipe and causes electricity to flow to the streetlight (as planned), but also to flow along the pipe conduit. The presence of certain environmental factors such as water and moisture greatly increases the potential for stray voltage to occur because these factors create a highly conductive path for the released electrical current.



With the presence of moisture and/or salt, materials such as dirt, cement and wood can conduct electricity into areas where it is not expected to be. This accounts for the fact that stray voltage events in the City of Boston have generally occurred at the end of winter when salt content and moisture on the streets and public ways is highest. This past winter was particularly harsh in terms of the amount of snow and ice removal required within the City of Boston with the 5th heaviest snowfall on record. This created a critical need to rely on salting and sanding throughout the winter months to protect the safety of the motorists and pedestrians, which is of paramount importance to the City of Boston. Although the use of road salt to make safe public roadways during the winter months is a necessity, an unavoidable impact is that the conductivity of soil increases in direct relation to the increase in salt and moisture present on the ground.



As discussed in the Joint Task Force recommendations set forth in Section IV, the impact of environmental conditions on the creation of stray voltage is an important factor in structuring a schedule and approach for periodic inspections and voltage-indication testing.

Types and Location of Electric Equipment that May Be Affected

Undetected stray voltage can occur in any location where there is a physical break in the protective covering or insulation of an electrical cable, which exposes the conductor wire and allows electrical current to leave the cable. When electrical current is released from the cable, it will seek the path of least resistance to ground thereby creating the potential for stray voltage. Physical breaks in the protective covering of electrical wiring result from contractor or third-party damage, vandalism, deterioration or improper installation or removal of electrical equipment. Stray voltage can also occur where illegal service hook-ups or other improper installation or removal of electric-service points have occurred and the electric utility or responsible City department are not notified or aware of this improper activity.

Outdoor electrical equipment that is located at or above-grade and is open to the environment is most susceptible to the creation of electrical-safety risks. This is because this equipment: (1) is vulnerable to accidental or purposeful damage by third parties (*e.g.*, motor vehicles and snow plows), which in many instances goes unreported to the owner of the electrical equipment (2) is exposed to the weather and other environmental elements; and (3) is generally unattended so that variations in current resulting from a fault are undetected. This type of electrical equipment includes all types of publicly and privately owned outdoor electrical equipment (such as outdoor lighting equipment in store fronts, bus shelters and outdoor kiosks) and electrical facilities owned and maintained by cable companies, telephone companies (public telephones), public transit systems, and electric utilities, as well as state and municipal-owned infrastructure (such as street lights, traffic signals and parking meters). As discussed in detail below, periodic inspections and voltage testing of electrical equipment, along with damage reporting by contractors and the general public, will be beneficial in detecting and preventing stray voltage occurrences in the future.

Although above-grade electrical structures are most susceptible, stray voltage also has the potential to occur on below-grade electrical facilities as a result of damage, dig-ins or faults on energized underground secondary cables. Secondary voltage cables are the part of the distribution system that come in contact with the service point, and therefore, these types of faults are normally detectable when they occur because the customer load served by the secondary cable is likely to experience a voltage problem and/or a service outage. For example, when there is a fault on a secondary cable serving a customer residence, it is likely that the customer's lights will flicker or go out, thereby alerting the homeowner to a voltage problem that is addressed before any safety concern arises.

There is the possibility that damage to a secondary cable causing the cable to become energized or to energize adjacent structures may go undetected, especially if the secondary cable is supplying a non-attended service point, such as a streetlight or control box location. Because the electric system is constructed and maintained so as to guard against secondary voltage cable faults and the creation of any related safety hazards, it is generally unreported damage to the underground distribution system (*i.e.*, dig-ins, third-party damage or improper alterations to customer services) that have the greatest potential to create a public safety issue.

Although the Joint Task Force did not focus on below-grade or manhole infrastructure in detail, there is only a low probability that undetected stray voltage will be present on an

electric utility manhole cover. This is for several reasons. First, the distribution cables that leave the underground duct bank and enter the manhole are encased in fully insulated, protective sheaths that cover the cable segments and the splices that join those segments in the manhole. The cables within each manhole are bonded and grounded and are isolated well below street level. Because of the cable insulation and the location of the cables within the manhole, there is no electric path that is accessible to, or in direct contact, with pedestrians. Thus, unless a component of the underlying system is compromised, the intended effect of the manhole design is to ensure that the manhole cover will not experience adverse stray voltage.

Similarly, primary distribution cables do not normally present a public stray voltage concern because, voltage levels are high, *i.e.*, in the range of 4,000 to 25,000 volts, and therefore, fault protection devices are able to detect changes in current flow. When a fault occurs on a primary distribution cable, the relay in the substation breaker is able to detect this failure on the cable, and a circuit breaker "trips" or opens up and de-energizes the circuit. Other protective devices such as automatic switches and fuses are used within the distribution system to protect against faults on primary distribution components, and depending on the location of a fault on the system, these components serve to limit the number of customers affected by the outage. Because the fault or failure of a primary voltage cable causes an immediate failure of the distribution system, faults are quickly detected and addressed.

The situation is different when electric-utility secondary cable systems or electrical wiring systems associated with above-grade electrical equipment are involved because the voltages for that equipment are relatively low (*i.e.*, 120 volts). When a breach in the protective insulation occurs on low-voltage wiring, there may be insufficient current flow to allow a fault-protection device to consistently and reliably differentiate between the increased current associated with a fault and the normal load associated with the use of the electrical equipment. Consequently, the use of a fault-protection device on outdoor utility-grade electrical infrastructure can have the effect of impairing functionality because the fault-protection device could activate continuously and prohibit usage by the equipment that is

intended to be supplied. Ground-fault protection technologies (such as "GFI") that are readily available for indoor use in homes and businesses, are not deployed by utilities and municipalities for use on streetlights and above-grade, low-voltage electrical systems. For this reason, as discussed in Recommendation #14 of the Joint Task Force, innovations in ground-fault protection technology are of continuing interest to the Joint Task Force.

Findings of the Joint Task Force

Based on the technical assessment, the Joint Task Force focused its attention and recommendations on three types of situations that have the greatest potential to cause an electric-safety concern. These situations include:

(1) Above-grade electrical facilities that are damaged, vandalized, or otherwise deteriorated and have the potential to experience faults on the electrical wiring supplying the above-grade electrical facilities;

(2) Below-grade secondary cables that are energized and linked to active service points with no indication that the protective insulation has been compromised or damaged; and

(3) Below-grade secondary cables that are energized and connected to service points that are non-active because of damage, demolition or retirement.

The implementation of recommendations focused on these situations will proactively mitigate the potential for electrical-safety issues to occur in the future.

Recommendations of the Joint Task Force

Based on an examination of the technical issues involved with maintaining electrical safety, the Joint Task Force has developed a series of recommendations to be implemented by the City of Boston, NSTAR Electric and other utilities and public and private owners of electrical infrastructure. The recommendations put forth by the Joint Task Force fall into three categories aimed at: (1) finding and fixing potential safety issues ("Find It – Fix It"); (2) instilling a heightened public awareness and involvement in bringing attention to damaged electric facilities of all types so that repairs can be made ("See It – Report It"), and (3) ramping up enforcement of existing laws designed to protect the integrity of underground utility systems and monitoring technology developments that could assist in maintaining electrical safety ("Enforcement and Monitoring").

To provide some context, each recommendation set forth below includes: (1) a policy statement discussing the reasoning and basis for the recommendation; (2) proposals for action for other utilities and public or private entities that own and maintain outdoor or underground electrical facilities and have not participated in the Joint Task Force, and (3) an implementation plan for the City of Boston and NSTAR Electric to put in place the recommendation of the Joint Task Force.

Category I: Find It – Fix It

Recommendations in this category are designed to lead to the identification of locations where electrical safety issues may exist so that the repairs necessary to ensure the public safety are completed.

Recommendation #1

The Joint Task Force recommends that all appropriate City of Boston agencies, NSTAR Electric and other private, public and utility owners of electric infrastructure perform a comprehensive assessment of stray voltage potential on all electrical infrastructure located in Boston's public realm through visual (damage) inspections and voltage-indication testing.

Policy Discussion

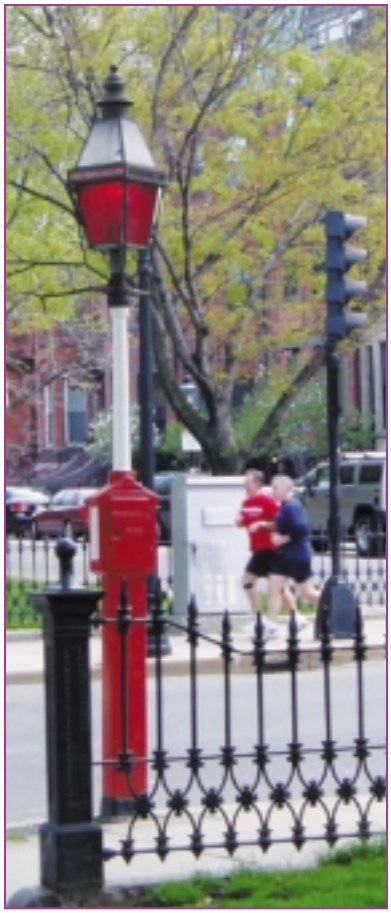
As discussed above in Section III, above-grade electrical facilities such as outdoor lighting fixtures, streetlights, traffic control boxes or other outdoor electrical equipment, which are damaged, vandalized, or otherwise deteriorated, have the greatest potential to experience electric wiring faults that could lead to the creation of stray voltage. In addition, energized

below-grade secondary cables have the potential to cause stray voltage if (1) the cables are energized and linked to active service points with no indication that the lines have been compromised or damaged or (2) the cables are energized and connected to service points that are non-active because of damage, demolition or retirement.

Accordingly, the Joint Task Force determined that the first step in achieving a level of confidence that the potential for stray voltage is minimized should be the immediate inspection for damage to above-grade electrical facilities within Boston's public realm, followed up by voltage-indication testing of all at or above-grade facilities whether or not in damaged condition. The Joint Task Force found fast-tracked inspections and testing to be advisable because it would create a "baseline" assessment of the status of electrical infrastructure within the City.

Proposal for Action by Non-Participants in the Joint Task Force

Although the City of Boston and NSTAR Electric have made significant progress in implementing a program to inspect and test for stray voltage on the electrical equipment subject to their control, the potential for stray voltage remains on electrical equipment that is owned and maintained by other utilities and public and private entities within Boston's public realm. Therefore, the Joint Task Force recommends that all other electric utilities, municipal utilities and public and private entities perform inspections and voltage-indication testing of electrical infrastructure within their ownership and control to further the City's important public-safety objectives. Testing should be performed on all manholes, service boxes, transformer vaults, pad-mounted transformers, streetlights and other at- and above-grade electrical facilities that are readily accessible to the public.



Implementation Plan for NSTAR Electric and the City of Boston

Implementation of this recommendation by the City of Boston and NSTAR Electric commenced simultaneously with the creation of the Joint Task Force. Although a complex undertaking for both the City of Boston and NSTAR Electric, completion of visual damage inspections and voltage-indication testing of electrical infrastructure equipment under the ownership and control of the City of Boston and NSTAR Electric is a critical first step in ensuring the safety of the public using streets and walkways.

Table 1-1

CITY OF BOSTON IMPLEMENTATION STATUS					
Responsible Department	**Equipment**	**Visual Damage Inspection**	**Voltage Testing**	**Findings**	**Current Status**
Boston Public Works	Inspect and test 93,000 streetlights, pull-box covers and controllers	Complete	Complete	Voltage detected on 62 units, all units made safe	Complete
Boston Transportation Department	Inspect and test 6,500 poles and boxes; 135 school-zone flashers and 805 control cabinets	Complete	3,877 units tested (n.1)	No voltage detected	To be completed by September 30, 2005 (n.2)
Boston Fire Department	Inspect and test 1,359 fire call boxes	Complete	Complete	No voltage detected	Complete
Boston Parks and Recreation Department	Inspect and test 897 light poles and control boxes	Complete	Complete	No voltage detected	Complete
NSTAR ELECTRIC IMPLEMENTATION STATUS					
Responsible Department	**Equipment**	**Visual Inspection & Voltage Testing**	**Cut Off Verification**	**Findings**	**Current Status**
NSTAR Electric Operations	Conduct voltage testing and verify cut-off status of 3,368 retired streetlights, including 736 fed by overhead system and 2,632 fed by underground system	Complete	Complete	No voltage detected on NSTAR equipment. Voltage detected at 2 locations fed by U/G and 1 fed by O/H both non-NSTAR equipment	Complete
NSTAR Electric Operations	Conduct voltage testing and verify cut-off status of 1,425 retired streetlights fed by underground system	Complete	70% Complete	No stray voltage detected to date. Verified cut-off status in 87% of streetlights inspected to date	Voltage testing complete. Cut-off verification to be completed by August 19, 2005
NSTAR Electric Operation	Inspect and voltage-test 6,349 streetlights maintained by NSTAR Electric on behalf of private and public entities	Complete	Not Applicable	No voltage detected. Replaced missing base plates and repaired damage	Complete
NSTAR Electric Operations	Within City of Boston, conduct voltage testing on 22,000 manholes and at-grade distribution facilities and metal structures within 15 feet.	114 Manholes Complete	Not Applicable	Testing commenced July 1, 2005. No voltage detected to date.	To be completed by October 1, 2005 (n.3)
NSTAR Electric Operations	Verify cut-off status of service cables to 3,000 building demolitions within the City of Boston	N/A	N/A	Testing and inspections will commence September 1, 2005	To be completed by December 31, 2005

n.1 This includes 3,428 poles and bases, 15 school-zone flashers and 434 control boxes.

n.2 Voltage testing of traffic signals requires additional time because testing must continue through each light cycle at each pole. However, traffic signals are equipped with additional safety features such as grounding, circuit breakers, conflict monitors and malfunction management units that monitor irregularities.

n.3 NSTAR Electric completed voltage-indication testing in August 2004 of 45,000 manhole locations, and approximately 100,000 metal and electrical structures within 10 feet of the manhole locations, that are located throughout the NSTAR Electric service territory.

The status of inspections and voltage-indication testing by the City of Boston and NSTAR Electric is set forth in Table 1-1, above. As shown in the Table 1-1, the City of Boston departments that own or operate electrical infrastructure have completed visual damage inspections of the electrical infrastructure under their respective control. Any damage that was found was immediately repaired or made safe through a temporary repair and inventoried for permanent repair. Virtually all City of Boston agencies have completed their voltage-indication testing. NSTAR Electric is completing a multi-phased program to target its inspections and testing to areas and equipment that have the greatest potential to experience stray voltage issues.

As part of the implementation plan for Recommendation #13, which is discussed below, the review and sharing of historical data records by the City of Boston and NSTAR Electric is ongoing and will continue beyond the issuance of the Joint Task Force Report. Accordingly, NSTAR Electric will conduct, inspect and test any removed or retired streetlight locations or building demolition sites identified through the on-going data-sharing exercise with the City in addition to those noted above.

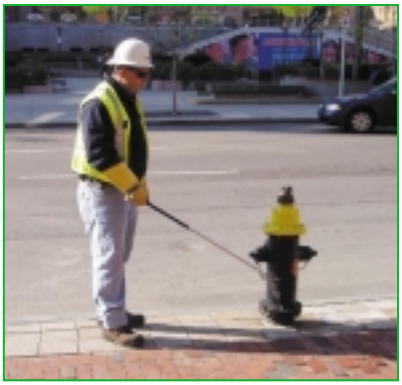
Recommendation #2

The Joint Task Force recommends that all responsible City of Boston agencies, NSTAR Electric and other utility owners of electric infrastructure continue to perform voltage-indication testing of their respective electric facilities on a three-year rolling basis. Testing for stray voltage should also occur at times that preventive maintenance or corrective maintenance is performed on electrical equipment.

Policy Discussion

As discussed above, undetected stray voltage can occur at any time, and in any location, where there is a cable fault resulting from a physical break in the protective covering or insulation of the cable, thereby exposing the conductor wire and allowing current to leave the cable. Physical breaks in the protective covering of electrical wiring can result from contractor or third-party damage, vandalism, deterioration or improper installation or removal of electrical equipment, which are inevitable events. The Joint Task Force found that, because these events will continue to occur and, in many cases, will go unreported unless discovered by the entity that owns and/or maintains the affected electrical equipment, a proactive program of ongoing voltage-indication testing is advisable.

Therefore, in addition to a public awareness campaign aimed at **"See It – Report It"** and other educational efforts to be implemented by NSTAR Electric and the City of Boston, the Joint Task Force further determined that periodic voltage-indication testing on a rolling three-year cycle (in addition to testing that is performed during preventive and corrective maintenance activities) is feasible and appropriate. This will ensure that facilities are routinely tested and that the condition of above-grade electrical equipment is known. Ideally, periodic voltage-indication testing should be performed by all utilities and public and private entities owning electrical infrastructure with the potential to create stray voltage on the streets and walkways within the City.



Proposal for Action by Non-Participants in the Joint Task Force

Although the City of Boston and NSTAR Electric have made significant commitments in terms of performing ongoing voltage-indication testing on the electrical equipment subject to their control, the potential for stray voltage remains on electrical equipment that is owned and maintained by other utilities and public and private entities within Boston's public realm. Therefore, the Joint Task Force calls on other utilities and public and private entities to voluntarily adopt a periodic program of voltage-indication testing of above-grade electrical infrastructure within their ownership and control to further the important public-safety objectives of the City of Boston

Implementation Plan for NSTAR Electric and the City of Boston

Through the Joint Task Force process, the City of Boston and NSTAR Electric have committed to perform voltage-indication testing on all electrical infrastructure that they own and/or maintain on a three-year rolling basis. NSTAR Electric and the City of Boston will follow the uniform testing and reporting protocol set forth in Appendix 1 to this Report, which was established as part of the implementation for Recommendation #3. From an overall perspective, this protocol outlines how voltage testing should be performed, the types of structures to be tested and the steps to be taken if voltage is detected.

Recommendation #3

The Joint Task Force recommends that all responsible City of Boston agencies, NSTAR Electric and other utility owners of electric infrastructure develop and adopt a uniform testing and reporting protocol aimed at (1) structuring a testing schedule and process that will most effectively detect stray voltage and (2) ensuring that data regarding the detection of stray voltage is centrally collected and compiled for assessment purposes.

Policy Discussion

Through its deliberations, the Joint Task Force found that environmental conditions are a significant factor in the creation of stray voltage. For example, as discussed above in Section III, the conductivity of soil and other surfaces increases in direct proportion to the increase in salt and moisture present on the ground. In addition, for certain types of electrical equipment

(primarily outdoor lighting), it may be beneficial to perform voltage-indication testing at night when the equipment is in use. Therefore, the Joint Task Force found it advisable to adopt a uniform testing protocol that would incorporate the experience gained through recent testing initiatives in order to assure maximum effectiveness.

To address the environmental and time-of-day issues, the Joint Task Force recommend that the City of Boston and NSTAR Electric develop a uniform testing protocol based on both seasonal and time-of-day considerations. In addition, a reporting protocol should be established with the City's Inspectional Services Department ("ISD") to serve as a clearinghouse of information relating to known occurrences of stray voltage. To ensure that the reported data is comparable among reporting entities, all reporting entities should follow the uniform testing protocol. Any differences in the testing procedure followed by the reporting entity should be noted in the report. ISD will work with NSTAR Electric to produce an annual report summarizing the reported findings in order to (1) provide a basis for evaluating the effectiveness of the implemented recommendations and (2) put to use the experience and knowledge gained over time to mitigate the potential for stray voltage and ensure the public safety on the streets and walkways of Boston.

Proposal for Action by Non-Participants in the Joint Task Force

Although the City of Boston and NSTAR Electric have made significant commitments in terms of adopting a uniform testing and reporting protocol, the potential for stray voltage remains on electrical equipment that is owned and maintained by other utilities and public and private entities within Boston's public realm. Therefore, the Joint Task Force recommends that other utilities and public and private entities adopt a periodic program of voltage-indication testing of above-grade electrical infrastructure within their ownership and control, and to adhere to the uniform testing and reporting protocol adopted by the City of Boston and NSTAR Electric. In particular, the submission of reports on detected instances of stray voltage will facilitate the City's ability to evaluate the effectiveness of the Joint Task Force recommendations and to tailor the inspection program in the future to enhance its value and, ultimately, to further important public-safety objectives.

Implementation Plan for NSTAR Electric and the City of Boston

Through the Joint Task Force process, the City of Boston and NSTAR Electric have agreed on the following components of a *uniform testing protocol*: (1) the City of Boston and NSTAR Electric will perform voltage-indication testing at 24 volts or less; (2) the City of Boston and

NSTAR Electric will perform periodic testing on all electrical infrastructure that they own and/or maintain; (3) the City of Boston and NSTAR Electric will target annual voltage-indication testing to the winter months and early spring (*i.e.*, the 1st and 4th quarters of each year); and (4) the City of Boston and NSTAR Electric will test streetlighting and other lighting equipment when it is energized or in use to detect the presence of stray voltage.[2]

In terms of *reporting protocols*, the City of Boston and NSTAR Electric have agreed on the following components: (1) the City of Boston and NSTAR Electric will record instances in which stray voltage is detected through the inspection process; (2) the City of Boston and NSTAR Electric will report instances of stray voltage detection found during the inspection program to ISD; (3) such reports will include the date of detection, the location, the known or suspected cause of the stray voltage, identification of the entity that owns and/or maintains the equipment, and the method used to make the situation safe. In addition, the City of Boston, NSTAR Electric and other interested parties will meet on a semi-annual basis to discuss testing results, updates in their efforts to mitigate stray voltage and other related topics.

The generic testing and reporting protocol developed by the Joint Task Force is presented in Appendix 1.

Recommendation #4

The Joint Task Force recommends that the City of Boston and NSTAR Electric develop a joint protocol to facilitate interaction and coordinate responses to reported damage of electrical infrastructure. The Mayor's Hotline (617-635-4900) should serve as a clearinghouse of information, coordination, data collection, and tracking of remedial response actions.

Policy Discussion

As discussed above in Section III, the Joint Task Force has determined that damage to outdoor electrical equipment is a major contributing factor in creating the potential for stray voltage. Therefore, the Joint Task Force has concluded that a broad-based public education and outreach effort should be implemented to raise public awareness as to the need to detect and report damage to outdoor electrical equipment accurately and quickly.

2. The majority of the City's streetlights are fed by a control box, which allows for daytime testing.

A consequence of the outreach effort will be that the caller will not likely be aware of the ownership of the equipment for which the damage report is being made. Damage reports are likely to be phoned in to any one of the available numbers (*i.e.*, Mayor's Hotline or NSTAR Electric's 800 number) and those reports may not relate to equipment that is owned or maintained by the entity receiving the damage report. Similarly, calls to the various hotlines may involve stray voltage reports, which need to be addressed quickly by the responsible party in order to protect the public safety. Accordingly, the City of Boston and NSTAR Electric should put in place a process to: (1) respond to urgent and emergency situations in order to protect the safety of the public; and (2) convey damage and stray voltage reports to the entity with responsibility for the equipment that is the subject of the damage report.

Implementation Plan for NSTAR Electric and the City of Boston

As part of the Joint Task Force process, NSTAR Electric and the City of Boston are instituting a public-awareness campaign that will urge the general public to phone in reports of (1) damage or suspected damage to outdoor electrical infrastructure, and/or (2) potential stray voltage events to the following telephone numbers:

- NSTAR Electric (1-800-592-2000)
- City of Boston 911 operation
- Mayor's Hotline (617-635-4500)

However, calls may also come in to a number of City departments (*e.g.*, Public Works, Transportation, Police, Fire) or to other NSTAR Electric customer-service numbers or other third parties. Regardless of any specific actions that the entity taking the call elects to take, NSTAR Electric and the City of Boston will follow the response protocol established by the Joint Task Force.

The recommended response procedure developed by the Joint Task Force is presented in Appendix 2.

Recommendation #5

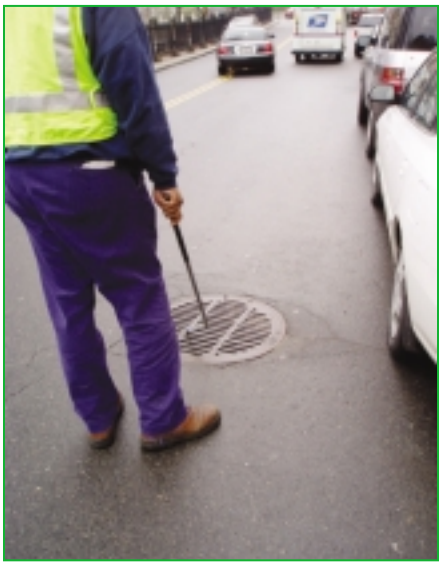
The Joint Task Force recommends that the City of Boston and NSTAR Electric develop a standard operating procedure for temporarily securing damaged infrastructure, which includes replacement of temporary repairs with the permanent repairs necessary to eliminate the potential for stray voltage.

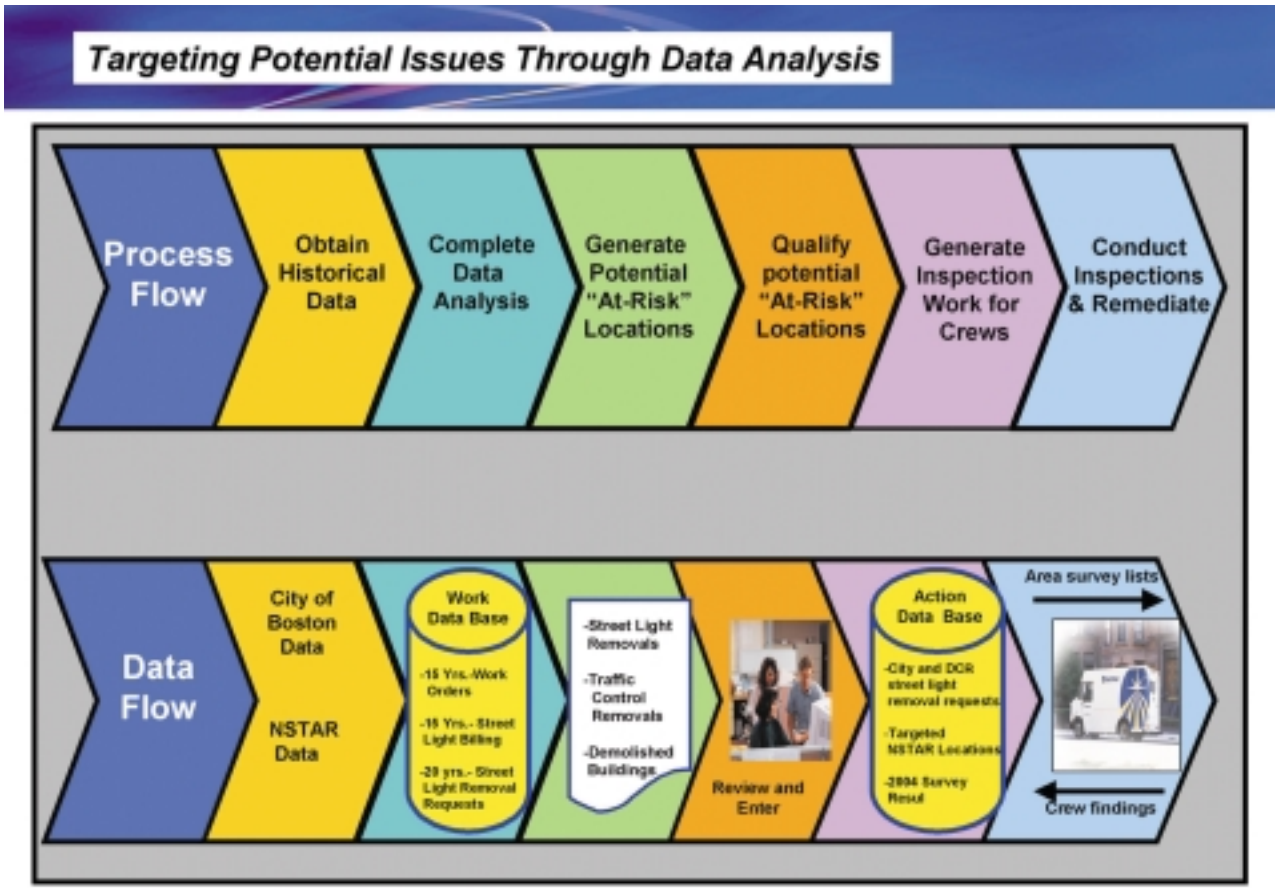
Policy Discussion

Once damage to above or below-grade electrical infrastructure is brought to the attention of the City of Boston, NSTAR Electric or any other party that owns or maintains electrical equipment that is damaged and has the potential to be a source for stray voltage, necessary steps must be taken to secure the electrical structure and make the situation safe. Because it is not always feasible to immediately complete a permanent repair, a procedure should be put in place to provide for a temporary repair until such time that the responsible party is made aware of the situation and/or is able to complete the permanent repairs necessary to eliminate public safety risks. The Joint Task Force has determined that it would be beneficial to have a uniform practice to secure electric equipment in these situations in the most efficient and effective manner possible. A standard operating procedure will facilitate coordination between the City of Boston and NSTAR Electric in making the situation safe where stray voltage is detected or has the potential to occur.

Implementation Plan for NSTAR Electric and the City of Boston

Through the Joint Task Force process, the City of Boston and NSTAR Electric agreed to establish a protocol for temporarily securing all facilities where stray voltage is present requiring the facility to be continuously guarded until the condition is made safe. To make the situation safe, NSTAR Electric and the City of Boston will utilize an appropriate device or method (IEEE, UL, ANSI-tested or other approved testing standards) to insulate, seal and protect wires that must be disconnected from damaged infrastructure (*e.g.*, streetlight poles, traffic signals) to increase public safety protection. If additional follow-up activities are necessary to eliminate the potential for stray voltage to occur, NSTAR Electric and the City of Boston will use best efforts to complete those activities within 45 days.





Recommendation #6

The Joint Task Force recommends that NSTAR Electric and the City of Boston review, assess and share historical data records to provide leads as to possible locations where underground electrical wiring should be inspected. The City of Boston and NSTAR Electric should also establish future arrangements and protocols to share and catalog information regarding existing or former equipment locations where there may be a potential for stray voltage to occur.

Policy Discussion

As noted in Section III, above, in addition to above-ground electrical facilities, stray voltage also has the potential to occur on below-grade electrical facilities as a result of faults on energized underground secondary cables. In particular, there is the possibility that damage to a secondary cable causing the cable to become energized or to energize adjacent structures may go undetected, especially if the secondary cable is serving a non-attended service point, such as a streetlight or control box location.

Because the electric system is constructed and maintained so as to guard against secondary voltage cable faults and the creation of any related safety hazards, it is generally unreported damage to the underground distribution system (*i.e.*, dig-ins, third-party damage or improper alterations to customer services) that have the greatest potential to create a public safety issue relating to stray voltage. Accordingly, NSTAR Electric and the City of Boston should take steps to: (1) exchange, review and assess historical records to identify locations where equipment may have been removed or retired so that an area survey can be performed; and (2) evaluate the feasibility of developing asset-management databases to catalog electrical equipment inventories, equipment locations, construction permits, mark-outs and damage reports so that locations with a potential for stray voltage can be identified in the future.

Implementation Plan for NSTAR Electric and the City of Boston

As part of the Joint Task Force process, the City of Boston and NSTAR Electric commenced a two-pronged process to leverage data and information systems to identify locations where there is a potential for stray voltage to occur. First, NSTAR Electric and the City of Boston exchanged and reviewed historical information relating to: (1) electrical-equipment damage reports resulting from vehicle accidents and vandalism, (2) building demolitions, and (3) streetlight conveyances and retirements. This information was used by NSTAR Electric and the City of Boston to generate area-survey lists that were given priority status for voltage testing.

On a parallel track, NSTAR Electric and the City of Boston worked to develop an Incident Database Management system that would be used to compile and track information relating to damaged electrical equipment, dig-ins, demolition sites and other events that have the potential to result in damage to electrical wires and the creation of stray voltage. Information recorded in the database would include the description of incidents causing damage to electrical structures, physical location of the equipment, date and name of person reporting the incident, the response routing, and the date and specific steps involved in resolution of the incident.

To implement the database system, NSTAR Electric and the City of Boston will train call-handlers on the procedures for recording data and routing a response. In addition, NSTAR Electric and the City of Boston will provide call handlers with emergency contact numbers, contact numbers for other utilities owning equipment in the area, and other information necessary to expedite resolution of the damage report.

Category II: See It – Report It

Recommendations in this category are designed to instill a heightened public awareness as to the need to report damage or vandalism to outdoor electric facilities of all types so that the repairs necessary to ensure the public safety are completed.

Recommendation #7

The Joint Task Force recommends that the City of Boston and NSTAR Electric commence a public education and outreach campaign for the general public and targeted audiences on the topic of stray voltage and how to report suspected stray voltage and/or damage to electrical infrastructure—i.e., *"See it, report it!"* To further this campaign, the Joint Task Force Report should be made readily available to the public.

Policy Discussion

As discussed in the Technical Overview (Section III), the Joint Task Force determined that outdoor electrical equipment that is located at or above-grade and is open to the environment is most susceptible to the creation of stray voltage because this equipment: (1) is vulnerable to accidental or purposeful damage by third parties (*e.g.*, motor vehicles and snow plows), which in many instances may go unreported to the owner of the electrical equipment; (2) is exposed to the weather and other environmental elements, and (3) is generally unattended so that variations in current resulting from a fault are detected. Therefore, the Joint Task Force has concluded that, in addition to periodic testing, a significant factor in the mitigation of stray voltage will be public education and outreach to raise public awareness as to the need to report damage to outdoor electrical equipment accurately and quickly.

In particular, public awareness should be raised in relation to the type of electrical equipment that may be affected, which includes all types of privately owned outdoor electrical equipment (such as outdoor lighting equipment in store fronts, bus shelters and outdoor kiosks) and electrical facilities owned and maintained by cable companies, telephone

companies (public telephones), public transit systems, and electric utilities, as well as state and municipal-owned infrastructure (such as street lights, traffic signals and parking meters).

The Joint Task Force Report is an important component of the public awareness campaign. Therefore, the public communication efforts implemented by NSTAR Electric and the City of Boston should include distribution of the Joint Task Force Report and initiatives to ensure that copies of the Report are available to the public on the Internet and through a variety of public forums.

Proposal for Action by Non-Participants in Joint Task Force

As noted above, the Joint Task Force has found that a significant factor in the mitigation of stray voltage will be public education and outreach to raise public awareness as to the need to detect and report damage to outdoor electrical equipment accurately and quickly. Therefore, in addition to the efforts undertaken by the City of Boston and NSTAR Electric, the Joint Task Force recommends that the Massachusetts Department of Telecommunications & Energy (MDTE) require utilities within its jurisdiction to undertake efforts to educate the general public about stray voltage issues and the need to report known or suspected damage to electrical facilities.

Implementation Plan for NSTAR Electric and the City of Boston

The City of Boston and NSTAR Electric have agreed that a public education and outreach campaign should commence with the release of the Joint Task Force Report because it will provide an important opportunity for broad distribution of information to the general public (*i.e.*, via websites, the media and dissemination of the written report). In addition, the City of Boston and NSTAR Electric will maintain periodic communication with the public on an annual basis (with increased focus during the higher-risk winter season) to ensure that the public is informed at the time that environmental conditions converge to raise the possibility of a stray voltage occurrence. Lastly, NSTAR Electric and the City of Boston will take steps to ensure that the Joint Task Force Report is broadly available to the public through a

variety of forums, including websites, libraries, government officials, humane societies, public advocacy organizations, and by mail upon request.

More specifically, following the publication of the Joint Task Force Report, the City of Boston and NSTAR Electric will develop informational materials and a mailing to all NSTAR Electric customers, as well as to certain targeted audiences to establish a **"See It – Report It"** campaign and to alert these audiences as to the causes of stray voltage and the need to report suspected damage to electric infrastructure. As a general guideline, the message content for these audiences should be as follows:

General Public— A generally applicable message will explain how to report suspected stray voltage or damage to electrical infrastructure such as streetlights, traffic signals, fire alarm pull boxes and similar facilities. The message should direct the persons who want to report damage or have a question on stray voltage issues to the Mayor's Hotline (617-635-4500) and NSTAR Electric (1-800-592-2000). The message will also direct interested persons to the Joint Task Force website for more information. Communication tools may include small inserts ("buck slips") in NSTAR Electric bills and canine license renewal mailings. Also, the Joint Task Force web page should continue to remain linked to the website for the City of Boston, NSTAR Electric and the MDTE. The Joint Task Force website should be updated periodically.

Large Property Managers—Because there are numerous privately owned properties that may own electrical infrastructure within the public realm of Boston, including significant outdoor electrical infrastructure (such as lighting on sidewalks or light poles in parking lots), these property managers should be notified about the potential for stray voltage, the need to inspect outdoor electrical infrastructure on a periodic basis, and the need to repair damage in a timely manner. This audience should be reached through bill messages and/or inserts in NSTAR Electric utility bills or through a postcard mailer.

Contractors—Because many stray voltage incidents have been traced to damage from contractors working in proximity to electrical infrastructure, the City of Boston and NSTAR Electric should develop a targeted brochure to emphasize the risks of stray voltage, the importance of reporting damage to electrical infrastructure to the entity that owns the damaged equipment, and the penalties associated with non-reporting. The MDTE and NSTAR Electric should also work through the Dig Safe organization to distribute information on the causes of stray voltage to contractors working in the streets of Boston.

In addition, the City of Boston and NSTAR Electric are evaluating whether it would be feasible to develop stickers displaying the telephone numbers to call to report damage. To the extent feasible, these stickers could be affixed to equipment or posted in areas where electrical equipment is located to provide the hotline telephone numbers.

Sample "buck slip" language is presented in Appendix 3.

Recommendation #8

The Joint Task Force recommends that current participants in the Dig Safe program conduct outreach to contractors and other entities performing construction and excavation activities near electrical infrastructure to encourage the use of trained and experienced personnel and safe work practices when excavating in the City of Boston.

Policy Discussion

The Dig Safe Program is a public-interest effort to protect underground utilities from damage that can occur during excavation activities performed by contractors or other entities or individuals. The Massachusetts Dig Safe law is set forth at M.G.L. Chapter 82, Sections 40, 40A through 40E. The Dig Safe Law applies to anyone who excavates anywhere in Massachusetts, including homeowners or business-owners excavating on their own property. The Dig Safe Program is overseen by the MDTE. The Dig Safe law requires any contractor or other entity planning to excavate to first contact Dig Safe (1-800-DIGSAFE), which in turn, will notify the relevant utility companies as to the pending excavation so that utility facilities can be protected. Before work commences, the excavator must have underground utilities "pre-marked" and the excavator must wait 72 hours before starting excavation once Dig Safe is notified. More importantly, the excavator is required by Dig Safe law to use adequate precaution when digging, to maintain marks identifying underground utility equipment and to notify the utility immediately if a facility is damaged. For their part, utility companies must accurately mark the underground

utilities in the proposed site within 72 hours, must use the proper color code in marking and must report all suspected violations of the Dig Safe law to the MDTE within 30 days.

The Joint Task Force recognizes that the Dig Safe organization can play a critical role in raising awareness among contractors and other individuals regarding the potential impact of (a) damaging underground electrical infrastructure, and (b) failing to report that damage to the proper authorities at the time that it happens so that electrical-safety risks can be eliminated. The Joint Task Force has identified that increased outreach to contractors that perform excavation work may have a benefit in terms of encouraging safe work practices and increased reporting of damage if, and when, it occurs.

Implementation Plan for NSTAR Electric and the City of Boston

Following the issuance of the Joint Task Force Report, NSTAR Electric will work in cooperation with the City of Boston and the MDTE to develop a targeted outreach effort to be implemented through the Dig Safe organization to raise awareness among contractors and other excavators regarding the need to avoid and/or report damage to electrical infrastructure.

Recommendation #9

The Joint Task Force recommends that NSTAR Electric provide educational workshops tailored for private property owners that utilize outdoor electrical lighting and other equipment, indicating the importance of periodic testing and inspection.

Policy Discussion

In addition to the public education and outreach efforts implemented as part of Recommendation #4, a series of more comprehensive and focused education/outreach efforts would be beneficial in terms of reaching private owners of outdoor electrical infrastructure. More comprehensive measures may include educational sessions, specialized information on the NSTAR Electric website, mailings and discussion in various public forums.

Implementation Plan for NSTAR Electric

Following the issuance of the Joint Task Force Report, NSTAR Electric will develop an outreach program aimed at raising the awareness of private owners of outdoor electrical structure. NSTAR Electric will utilize internal resources including the community relations team and the technology center to scope, develop and conduct outreach activities. For private property owners within the City of Boston, NSTAR Electric may also solicit the assistance of ISD or other relevant City departments to conduct outreach activities.

Category III: Enforcement and Monitoring Measures

Recommendations in this category are designed to lead to stronger enforcement of Dig Safe laws, which are aimed at protecting the integrity of underground utility systems and to provide for the ongoing monitoring of technology developments that could assist in maintaining electrical safety.

Recommendation #10

The Joint Task Force recommends that the City of Boston join the Dig Safe organization on a voluntary basis, or develop an equivalent program, to ensure the proper marking and protection of electrical and other public infrastructure whenever excavation work is being performed in the City of Boston.

Policy Discussion

Although above-grade electrical infrastructure is most susceptible to damage, vandalism and environmental elements, stray voltage also has the potential to occur on below-grade electrical facilities as a result of faults on energized underground secondary cables. Secondary voltage cables are used to supply streetlights that are owned and maintained by the City of Boston. Where a service point, such as a streetlight or control box is unattended, there is a possibility that damage to an underground secondary cable could cause a breach in the insulation, which would allow a release of electrical current to energize the earth, the streetlight base or adjacent structures. Because the electric system is constructed and maintained so as to guard against secondary voltage cable faults and the creation of any related safety hazards, it is generally unreported damage to the underground distribution system (*i.e.*, dig-ins, third-party damage, connection of holiday lighting, or improper alterations to customer services) that have the greatest potential to create a public safety issue relating to stray voltage.

Accordingly, the City of Boston should evaluate the feasibility of participating in the Dig Safe Program, which is aimed at pre-marking underground facilities, identifying and cataloguing pending excavation work and assessing penalties on parties that perform excavation work without meeting the requirement of the Dig Safe laws. Public utilities (like NSTAR Electric) are required to joint Dig Safe under Massachusetts General Laws, Chapter 82, Sections 40, 40A through

40E. However, municipalities are exempt from the Dig Safe laws by statute. Therefore, the City of Boston's participation in the Dig Safe program would be voluntary. Participation in the Dig Safe program would provide the City of Boston with an additional tool to ensure that excavation in Boston's public realm is performed with awareness of the location of underground facilities.

Implementation Plan for the City of Boston

The City of Boston will investigate the feasibility of joining the Dig Safe organization through the Public Works Department. To the extent that the City of Boston has the opportunity to participate in the Dig Safe program, appropriate personnel from each City department will be provided with information on Dig Safe requirements and the procedures to be followed to mark underground facilities prior to the commencement of excavation and to carry out enforcement measures.

Recommendation #11

The Joint Task Force recommends that the MDTE (1) evaluate its fines and penalties structures to ensure that there is an incentive to self-report violations, (2) consider increasing penalties under Dig Safe for failure of contractors to report damage to infrastructure and other violations, and (3) consider establishing a whistle blower reward system allowing workers to report damage to municipal and/or utility infrastructure without fear of retribution from employer. The City of Boston's Inspectional Services Department should also examine the fines and penalty provisions available in the state building code and recommend increases and/or other regulatory changes where appropriate.

Policy Discussion

In addition to raising public awareness about the need for damage on electrical infrastructure to be reported and repaired, the Joint Task Force has determined that it would be beneficial to establish appropriate incentives for contractors or other parties to report damage to electrical infrastructure in a timely and responsible manner. In that regard, the Joint Task Force discussed the potential for both increased fines and penalties and rewards for "whistle-blower" damage reports. Since the contemporaneous reporting of damage would be most advantageous in terms of allowing for quick repairs and the mitigation of stray voltage potential, these types of mechanisms could be useful in encouraging responsible reporting.

In addition, to discourage and prevent damage to City-owned electrical infrastructure, NSTAR

Electric and the City of Boston should work in cooperation with the MDTE and the Department of Public Safety to develop a targeted inspection and enforcement effort to ensure compliance with laws and regulations when work involving or in the vicinity of electrical infrastructure. The City of Boston and the MDTE should use information from Notices of Probable Violation filed with MDTE to identify repeat offenders of Dig Safe laws. Continued violations by specific contractors should be shared with the Department of Public Safety under its licensing authority for contractors, and should also be used in informing a contractor's eligibility for state and municipal public works projects under the procurement process of the City of Boston and the Commonwealth.

Implementation Plan for NSTAR Electric and the City of Boston

The Joint Task Force, through its City of Boston and NSTAR Electric representatives, will request that the MDTE re-examine its fines and penalties structure to ensure that there is an incentive for contractors excavating near electrical systems to self-report violations under the Dig Safe laws. The City of Boston and NSTAR Electric will ask the MDTE to consider increased penalties for failure of contractors to report damage to infrastructure and other Dig Safe violations. The City of Boston and NSTAR Electric will also recommend that the MDTE consider establishing a whistleblower reward system allowing workers to report damage to municipal and/or utility infrastructure without fear of retribution from their employer. The City of Boston's Inspectional Services Department will examine the fines and penalty provisions available in the state building code and recommend increases and changes where necessary.

Recommendation #12

The Joint Task Force recommends that the City's Public Works Department (PWD) examine alternatives to the use of salt for snow-melting purposes due to its corrosive and conductive characteristics. In performing this examination, the PWD should ensure that any alternatives considered provide the same or an increased level of safety to motorists and pedestrians, while also protecting the environment. As no clear alternative may exist at this time, the Joint Task Force recognizes that this examination will be ongoing.

Policy Discussion

As noted in the Technical Overview (Section III), above, a factor in the creation of adverse stray voltage is the set of environmental conditions present at the point that electrical current is released. In particular, the presence of certain environmental factors such as water, moisture and road salt

increases the potential for stray voltage to occur because these factors create a highly conductive path for the released electrical current. With the presence of moisture and/or salt, materials such as dirt, cement, bricks, and wood can conduct electricity away from the cable fault.

At the end of winter, salt content and moisture on the streets and public ways is at its highest thereby creating a potential for stray voltage events. However, although the use of salt on public roads and sidewalks may create a conductive environment for stray current, the Joint Task Force recognizes that the use of salt to clear roadways of ice and snow is vital to the safety of motorists and pedestrians. Furthermore, the Joint Task Force is concerned that chemical alternatives to salt may pose additional risks to public health and the environment. All of these public policy considerations should factor into the City of Boston's continued evaluation of alternatives to road salt.

Implementation Plan for the City of Boston

Through its involvement with the American Public Works Association and other industry organizations, the Boston Public Works Department will track industry research and practices to monitor whether safe and effective alternatives become available for use on roads and sidewalks instead of salt. Any substitute materials should also be safe to the environment. These efforts would be geared toward reducing environmental factors that, in combination with other conditions, can increase the potential of electrical current conductivity when wires become exposed.

Recommendation #13

The Joint Task Force recommends that the Boston Public Works Department convert all metal covers and plates used on light poles and sidewalks to a non-conductive composite material during new pole installation or repairs, and should continue its "hand hole" insulation installation program.

Policy Discussion

As noted in the Technical Overview (Section III), above, undetected stray voltage can occur in any location where there is a failure or "fault" in an electric cable resulting from a physical break in the protective covering or insulation of the cable, thereby exposing the conductor wire and allowing current to leave the cable. When the electric current leaves the cable, it will seek the path of least resistance to ground creating the potential for stray voltage. In that regard, outdoor electrical equipment that is located at or above-grade and is open to the environment is most susceptible to the creation of stray voltage. This is because this equipment: (1) is vulnerable to accidental or purposeful damage by third parties (*e.g.*, motor vehicles and snow plows), which in many instances goes unreported to the owner of the electrical equipment (2) is exposed to the weather and other environmental elements;

and (3) is generally unattended so that variations in current resulting from a fault are undetected. When there is damage, the metal components of the electrical fixture have the potential to conduct electricity away from the cable fault, thereby creating the potential for stray voltage to occur.

Through its hand-hole installation program, the Boston Public Works Department has installed 12,000 plastic hand-hole insular inserts to date and expects to complete installations across the entire system by next year. The Boston Public Works Department also distributed 600 insular, hand-hole inserts to electrical contractors involved in the installation of new lighting systems in the City of Boston. The Joint Task Force finds it advisable for the City of Boston to convert metal covers and plates used on pole boxes and sidewalks to a non-conductive composite material during new pole installation or repairs.

Implementation Plan for the City of Boston

The Boston Public Works Department is testing a non-conductive composite material frame and cover and has submitted specifications to the Boston Inspectional Services Department Structure Division for review and comment. If the Inspectional Services Department determines the frame and cover meet their requirements, the Public Works Department will include that equipment in its contract requirements for construction work by the end of 2005.

Recommendation #14

The Joint Task Force recommends that the City of Boston and NSTAR Electric continue to explore and evaluate new technologies and preventive maintenance work practices to be used in mitigating future electrical-safety issues.

Policy Discussion

The detection of stray voltage is a difficult task because it has the potential to occur in any location where there is an electrical "system" or electrical equipment. Over time, physical breaks in the protective covering of electrical wiring can result from contractor or third-party damage, vandalism, deterioration or improper installation or removal of electrical equipment. The mitigation of stray voltage occurrences therefore, is a function of (1) the ability to identify damage or deterioration in electric equipment before the opportunity for stray voltage arises; and (2) the ability to detect stray voltage on an effective and efficient basis.

Neither of these objectives is unique to the City of Boston or NSTAR Electric. Within the electric industry, research and development efforts are underway to identify equipment technologies, technical solutions and work practices, or other approaches that would

enhance capabilities to identify damage or deterioration in electric equipment before stray voltage is created and to detect stray voltage on an effective and efficient basis. NSTAR Electric participates in these efforts through technical organizations such the Electric Power Research Institute ("EPRI") and the Edison Electric Institute ("EEI"). These efforts have the potential to produce technology advances that may be implemented in the Boston area. Accordingly, the Joint Task Force recommends that the City of Boston and NSTAR Electric continue to investigate whether new technologies have become available that could provide a benefit to efforts to mitigate the potential for stray voltage occurrences.

Implementation Plan for NSTAR Electric and the City of Boston

As an electric distribution utility, NSTAR Electric is continually involved in efforts to investigate technology approaches and best practices that would help to minimize the occurrence of stray voltage and/or to detect the presence of stray voltage when it may occur. These efforts include coordination with other electric utilities, industry research bureaus and participation in technical conferences and forums relating to underground distribution systems. Some of the initiatives that are underway include research and development on the development of ground-fault protection for utility-grade outdoor infrastructure such as streetlights and control boxes. In addition, research and development efforts are underway to design voltage-testing equipment that is more sensitive, easier to use or more efficient in covering larger areas with a higher degree of precision that current technologies.

Another technology that is in its most rudimentary stages is vehicle-mounted voltage-testing equipment. NSTAR Electric recently took delivery of a vehicle-mounted voltage tester, which is part of a long-term research and development project undertaken by the Sarnoff Corporation in Princeton, New Jersey. The unit on loan to NSTAR Electric is an experimental prototype currently under evaluation by NSTAR Electric.

NSTAR Electric will continue to participate actively in these and other research and development efforts that may offer strategies and technologies to mitigate the potential for stray voltage and enhance capabilities to detect its presence when it does occur. NSTAR Electric will share its research and development findings with the City of Boston as information becomes available.

Recommendation #15

The Joint Task Force recommends that the City of Boston and NSTAR Electric convene a meeting with Joint Task Force members and other interested parties within the next six to nine months (i.e., during the winter season) to review the status of implementation efforts on the recommendations made in this Report and to evaluate whether changes should be made or additional measures taken.

Policy Discussion

Because the detection and mitigation of stray voltage will be an ongoing task, and because implementation of the recommendations set forth herein is not yet complete, the Joint Task Force finds it advisable to meet on a semi-annual basis to update participants of the status of implementation and to evaluate any new information that may factor into a decision to modify a course of action adopted as a result of this Report. In addition, the Joint Task Force will then have an opportunity to review any new developments to determine whether additional benefits may be achieved through the implementation of a course of action not outlined herein.

Implementation Plan

The Joint Task Force will meet in the winter of 2005/2006 to: (1) review and assess the implementation efforts conducted following the issuance of the Joint Task Force Report; (2) review any new developments to determine whether additional benefits are available in the effort to minimize electrical-safety issues; and (3) ensure preparedness for the post-winter season when road salt and moisture combine to increase concerns regarding electrical safety.

Conclusion

As described in this Report, participants in the Joint Task Force have established a course of action designed to ensure public safety and, ultimately, to strengthen public confidence in the use of public ways by people and animals. The investigation conducted by the Joint Task Force included consideration of a wide-range of information relating to electrical operations and preventive-maintenance work practices, electric industry research and development efforts, experience from other urban areas outside of the New England area, Massachusetts Dig Safe requirements and enforcement mechanisms, and other pertinent information. In all of its efforts, the Joint Task Force focused intently on the founding of a plan to address electrical safety issues in a meaningful and sustainable manner so that the public is reassured that streets and sidewalks within the City of Boston are safe and secure.

APPENDIX 1
Frequently Asked Questions on Voltage Testing

1. What is stray voltage?

In its most basic terms, stray voltage is electrical current that: (1) is released into the environment because of a breach or "fault" in the insulation covering an electrical cable, and (2) is conducted between two contact points (*i.e.*, a conductive contact point and ground). In these circumstances, electrical current is found at a location and voltage level that is undesirable or unanticipated by the system design. Voltage testing is most efficient when targeted at locations where damage or breakdown in the protective insulation of an electrical cable system is identified.

2. Where does stray voltage occur?

Stray voltage has the potential to occur in any location where electrical wiring becomes exposed as a result of damage, vandalism, natural deterioration or improper installation or removal of electrical equipment. In those circumstances, electrical current may be released in an area where it is not normally anticipated. Electrical equipment located at or above-grade and open to the environment or accidental or purposeful damage by third parties is most susceptible to damage. This type of electrical equipment includes privately owned outdoor electrical equipment (such as outdoor lighting equipment and holiday lighting not in conformance with code) and electrical facilities owned and maintained by cable companies, telephone companies, public transit systems, and electric utilities, as well as state and municipal-owned infrastructure (such as street lights and traffic signals).

3. What type of environmental conditions contribute to the occurrence of stray voltage?

A significant factor in the creation of stray voltage is the environmental conditions present at the point that electrical current is released. For example, if the insulation on a cable serving a streetlight is breached, the conductor within the cable may come in contact with the earth, or in some cases, with the steel or iron enclosure in which the wire is encased. The presence of certain environmental factors such as water and moisture greatly increases the potential for stray voltage to occur because these factors create a conductive path for the released current. With the presence of moisture and/or salt, materials such as dirt, cement, bricks and wood can conduct electricity away from the cable fault. Significantly, the conductivity of soil increases in direct relation to the increase in salt and moisture present on the ground. Therefore, voltage testing is most effective if conducted when these circumstances are present.

4. What type of equipment should be used to ensure reliable testing results?

There are several devices that are commercially available for use in voltage-detection testing. The most well-known testers are manufactured by Santronics, Fluke and HD Electric Company.

Item	Part Number
Santronics "Sensor" Low AC Voltage Sensor	3215
"FLUKE" Low VoltAlert	1LAC-A
"HD Elec. Co." – LV-S-5 Stray Voltage Detector	LV-S-5/K01

Figure 1 – Low AC Voltage Sensor

Figure 2- HD Electric Co Voltage Detector

5. Are there safety considerations involved in voltage testing?

Yes. Manufacturers' literature should be reviewed for recommended safety precautions and testing should be conducted by qualified electrical workers. Before testing is performed, a visual inspection of the equipment should be conducted. If any exposed wires or other hazards are found, the equipment should be de-energized immediately and needed repairs should be completed by qualified electrical personnel as soon as possible.

Recommended Voltage-Testing Procedure

Testing Precautions - Low AC Voltage Sensors

- Class "0" or higher low voltage gloves shall be worn when using the Low AC Voltage Sensors, unless the detector is used with a wand attachment.
- When used as recommended, these sensors will indicate the presence or absence of 24-600 volts in an electrical or electronics system. The voltage sensors shall not be used to detect potential voltage sources greater than 600 volts. Contacting voltage above 600 volts may lead to electric shock, severe injury or death.

Equipment should be energized as normal during testing.

Operating and Testing Procedure - Low AC Voltage Sensors

- To ensure proper operation and battery function prior to each use, the "Santronics Low AC Locator" should be checked by rubbing the probe tip on an article of clothing. This creates a static discharge that causes the LED in the tip to flicker, indicating a properly functioning instrument.
- To check locations for voltage, touch the plastic light tip (of the sensor) on, or in close proximity to, the structure being tested. Note that a wand attachment is available and can be fastened to the equipment allowing easier reach and testing.
- If 24-600 volts AC are present, an LCD in the probe will glow bright red.
- See section below titled "Corrective Actions," if stray voltage is detected.

Testing Precautions - HD Electric Co. – LV S-5 Stray Voltage Detector

- The voltage sensors shall not be used to detect potential voltage sources greater than 600 volts. Contacting voltage above 600 volts may lead to electric shock, severe injury or death.
- Equipment should be energized as normal during testing.
- Test the detector with PT-LV-5 Low Voltage Detector Tester before and after each use.

Operating and Testing Procedure - HD Electric Co. – LV S-5 Stray Voltage Detector

- When used as directed, this tester indicates the presence or absence of 5-600 volts in an electrical or electronics system.
- The detector is designed to be handheld (without wearing low voltage gloves) and to detect AC voltage on any metallic surface or conductor that is in direct contact with the metallic tip of the detector. The presence of AC voltage greater than 5 volts is indicated by a flashing red light.
- See section below titled "Corrective Actions" if stray voltage is detected.

Types of structures to be tested:

- Outdoor electrical outlets;
- Metal pole streetlights;
- Metal handhole or service boxes;
- Meter pans;

- Other area lighting devices such as flood lights, recessed lights and signs;
- Metal fences;
- Any other metallic structures in close proximity (10′–20′) to electrical facilities.

Corrective actions to be taken if voltage is detected:

- Restrict the area from people and animals by using warning tape, cones and barriers as necessary. Personnel shall remain at the site until the source of the stray voltage area is adequately secured and de-energized.
- Turn off power supply to the device where the voltage indication occurred.
- Corrective action shall be taken to eliminate the source of the stray voltage. The course of action to be taken depends upon the unique circumstances. Only qualified electrical workers should perform the corrective action. All repair work should be completed in accordance with the National Electrical Safety Code and other applicable codes.

Frequency of testing:

Routine periodic testing for stray voltage is recommended as well as visual inspections for any potential hazards that can develop involving electrical facilities. Depending on the facilities involved and their accessibility (*i.e.*, whether the equipment is susceptible to physical damage from cars, vandals and environmental factors), an inspection cycle of approximately three years is recommended. However, a visual inspection and voltage-indication test should be completed each time electrical equipment is accessed (*i.e.*, during regular maintenance and when performing system upgrades).

APPENDIX 2
Coordinated Response Procedure

Overview:

The Joint Task Force has determined that it would be beneficial to develop a system to track and coordinate a response to reports of (a) stray voltage events, and/or (b) damage or suspected damage to outdoor electric infrastructure.

Information regarding these issues in Boston could be received at a number of telephone answering locations (including the City's 911 emergency call center, NSTAR Electric, Mayor's 24 Hour Service hotline) or by a number of city departments (*e.g.*, Public Works, Transportation, Police, Fire). When a call is received, there are four priorities:

Determining whether there is an immediate public-safety concern and, if so:

- Making the situation safe; and
- Providing a permanent resolution to the issue.
- Referring non-emergency calls for follow-up action by the responsible party.

To ensure that these priorities are addressed, it is necessary to have direct and coordinated communication between the City of Boston and NSTAR Electric. Accordingly, regardless of any specific action that may be taken by the entity receiving the call, NSTAR Electric and the City of Boston will adhere to the following protocol:

Procedure:

1. Incoming Calls

Any city department receiving a report of electric infrastructure damage or stray voltage will forward the call to the Mayor's 24 Hour Service (617-635-4500).

When the Mayor's 24 Hour Service ("City") or NSTAR Electric ("NSTAR") receives a call of this type, the call-taker will ask a scripted set of questions to determine (a) whether an immediate public-safety risk exists and (b) the location and nature of the problem. Information to be obtained will include:

- the nature of the problem, *e.g.*, stray voltage, damage to equipment or exposed wires;
- whether police or fire have been contacted or are needed;
- whether an individual or animal has been injured;

- the location and type of equipment;
- any other relevant information based on the caller's responses.

2. Immediate Response

When a determination is made based on the information received that there is a need for an immediate response—or when the information is not sufficient to rule out the need for an immediate response—the following steps will be taken:

Call Received By City:

- Alert police and/or fire agencies as necessary;
- Contact the Public Works Department to dispatch a crew to the site to make the situation safe;
- Conference NSTAR into the call to (a) provide information on the situation and actions taken, and (b) allow the caller to provide additional information directly to both organizations;
- If necessary, NSTAR will dispatch a crew to cut-off power to the site and assist in making the situation safe;
- The City will enter the information on the situation into the work-order database, which will be used to ensure required follow-up actions are completed. The database will also be used to generate reports on incidents of this type.
- If the reported situation involves stray voltage or a problem not clearly identified by the caller, the City will contact ISD to dispatch an electrical inspector to the site as needed.
  - The inspector will work with NSTAR (as necessary) and Public Works Department crews to identify the problem and the most expedient solution and to ensure that the situation is made safe.
  - The inspector will report back to the City on short and long-term steps to be taken to make the immediate situation safe and to provide a permanent solution.
- If there is a need to disseminate information to the public or if there have been media requests, the City will contact the Mayor's Press Office.
- As necessary, the City will also contact the Office of Neighborhood Services representative for that location and provide information on the situation.
- If the situation involves damage to underground cables or conduit by a contractor, the MDTE will be notified so it can review Dig Safe records.

Call Received By NSTAR:

- Alert police and/or fire agencies as necessary.
- Dispatch a crew to the site to make the location safe as needed.
- Conference the City into the call to (a) provide information on the situation and actions taken, and (b) allow the caller to provide additional information directly to both organizations.
- The City will then take necessary actions as described above.

3. REFERRAL FOR FOLLOW-UP ACTION OR NON-EMERGENCY WORK

If, based on the information obtained from the caller, the reported problem does not require an immediate response or if additional work will be required after the situation is made safe to institute a permanent solution, then referral for follow-up action is required.

All reports will generate a City work order. Based on the initial response, the next step(s) could be as follows:

- **No Further Action:** The action taken to make the situation safe provided a permanent resolution (*e.g.*, exposed wires at the base of a traffic signal resolved by installing a properly fitted cover).
- **Made Safe, Further Repair Required:** If the equipment is owned by the City or NSTAR, a date for completion will be entered and tracked through the work-order system and a report forwarded to the City when complete.
  - If the equipment belongs to a third party, ISD will identify the responsible party, write a complaint, monitor the work on the repair and provide a report to the City when completed.
- **Made Safe, Replacement Required:** If the equipment is owned by the City or NSTAR, a target date for replacement will be entered and tracked through the work-order system and a report forwarded to the City when complete.
  - If the equipment belongs to a third party, ISD will identify the responsible party, write a complaint, monitor the work on the repair and provide a report to the City when completed.

4. MAINTENANCE OF A DATABASE

Through the use of the City's work-order forms, all complaints involving damage to outdoor electric infrastructure will be entered into a central database. Summary reports will be generated on a monthly/quarterly basis and provided to NSTAR, the Public Works Department, MDTE and ISD for review and a determination as to whether further action may be necessary.

APPENDIX 3
Public Outreach

Recommendation #7 of the Joint Task Force is to establish a public education and outreach campaign to commence with the release of the Joint Task Force Report. Through this effort, the City of Boston and NSTAR Electric have committed to conduct a targeted communication on an annual basis (with increased focus during the higher-risk winter season) to ensure that the public is informed at the time that environmental conditions converge to raise the possibility of a stray-voltage occurrence. This communication will involve a mailing to all NSTAR Electric customers, as well as to other specific audiences to promote the **"See It – Report It"** campaign, which is designed to alert these audiences as to the causes of stray voltage and the need to report suspected damage to electric infrastructure.

Drafts of the NSTAR Electric mailing are set forth below:

General Public:

Reporting Damaged Electrical Equipment

If you happen to see a streetlight, traffic light, fire alarm box or any other electrical equipment in your neighborhood that looks like it has been damaged, or has exposed wires, please report it to **NSTAR Electric**. Damage to electrical equipment located on sidewalks or streets can be caused by motor vehicle accidents and construction equipment. Incidents like this don't always get reported, so your help is needed in maintaining the safety of your neighborhood. Your information will be held in the strictest confidence.

www.cityofboston.gov/electricalsafety

1-800.592.2000
NSTAR Electric Safety Hotline

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Large Property Owners:

A Reminder to Keep Your Outdoor Electric Equipment Safe

It's important for the safety of your tenants, customers, and general public to ensure outdoor electrical equipment on your premises is inspected and maintained on a regular basis. Equipment such as outdoor lighting, traffic signals, electronic signs, and parking garage equipment can become damaged if they are struck by a vehicle or construction crews. If incidents like this go unreported, it can create an unsafe condition and should be repaired immediately. If you would like to learn more about electric safety and your outdoor equipment, please visit www.cityofboston.gov/electricalsafety. Thank you.

DRAFT

Contractors Brochure:

Working Safely Around Utility Lines

For the safety of your employees and the general public it's important to remember critical guidelines when it comes to digging around utility lines on public or private property. This brochure has been created as a guideline and reminder to state and federal digging laws for digging around utility lines.

The Dangers of Damaged Utility Lines

Here are just some of the dangers that can result if utility lines are damaged:

- If a natural gas line is damaged it can cause an explosion or fire.
- If a damaged electric line goes unreported it can result in the release of electrical current in the surrounding area.
- If a water main is damaged there is risk of flooding and significant property damage.
- If a telecommunications line is damaged it can cause information outages for millions of customers including public safety facilities.

Safety Reminders

Before excavating, it's the law to call Dig Safe® at 1-888-DIG-SAFE at least 72 business hours prior to digging. The appropriate utility will mark the locations of their lines.

Check with local public officials or agencies about notification procedures for all work near, or damage caused to, underground utility pipes or cables.

If you are working near underground or overhead utility lines, please follow all safe digging laws so that you, or someone else, doesn't get hurt.

Be sure to abide by Dig Safe markings to avoid damaging utility lines

If you damage, or encounter a damaged utility line, stop working and contact the appropriate utility immediately. Its' very important that this is brought to the utility's attention so a potentially dangerous situation can be fixed immediately and no one is injured.

www.DigSafe.com and the area's major utility companies have more details about digging safely in and around utility lines.

Penalties for Damaging Utility Lines

Entities violating state and federal laws designed to protect the integrity of utility infrastructures will be prosecuted to the full extent of the law.

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Important Contact Information

City of Boston:	617-635-4500
NSTAR:	1-800-592-2000
MDTE	1-617-305-3500

General Information

City of Boston:	www.cityofboston.gov
NSTAR:	www.nstaronline.com
MDTE	www.mass.gov/dte
Dig Safe:	www.digsafe.com
Animal Rescue League:	www.arlboston.org
Walk Boston :	www.walkboston.org
The Joint Task Force:	www.cityofboston.gov/electricalsafety

Designed by:

C4 design

617.306.8094