The Infrared Electrical System Survey will be performed for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at their facility(s) at the following location(s):

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Survey shall cover high and/or low voltage electrical equipment as directed by site representative personnel.

The purpose of the survey is to locate and identify potential problems in an attempt to avoid failures and power disruptions. The Infrared Electrical System Survey is performed under normal conditions following current industry standards. The Survey shall document all problems detected during an Infrared Electrical System Survey. These will include, but not be limited to, the following:

* Loose Connections
* Faulty Equipment
* Overloaded Circuits
* Unbalanced Loads

The list of equipment to be included in the survey is attached as Appendix A.

**Equipment to be Used**

 Thermal imaging radiometer with a minimum of the following specifications:

* Temperature range: -20°C to 650°C
* Sensitivity: <0.05°C at 30°C
* Pixels: 320 x 240
* Appropriate wave length imager to be used
* Imager, including any optical lens used in this project, to be in calibration
* Level and gain controls must be able to be adjusted independently by the operator to specific temperature values. Imagers which feature only automatic gain control, commonly referred to as “Auto Image”, are not sufficient

 Full safety equipment including PPE/FRC

**Personnel Shall Meet the Following**

 Infraspection Institute Certified Level III Infrared Thermographer®

 OSHA 10 training – proof to be provided

 Government issued background check, such as TWIC or SWAC

 Current drug screening to include 10 panel test or DISA

**Company Shall Meet the Following**

* Primary business is commercial and industrial Infrared Thermography
* In business performing this work for over 10 years
* Written safety manual available for review upon request
* Company is to have at least one (1) Infraspection Institute Master Thermographer® on staff
* Provide references for similar projects
* Provide evidence of acceptable commercial insurance (Certificate of Insurance)

**Standards to Follow**

ASNT - SNT-TC-1A – Personnel Qualification and Certification in Nondestructive Testing

ASTM E 1213 – Standard Test Method for Minimum Resolvable Temperature Difference of Thermal Imaging Systems

ASTM E 1311 – Standard Test Method for Minimum Detectable Temperature Difference of Thermal Imaging Systems

ASTM E 1316 – Terminology for Nondestructive Examinations

ASTM E 1543 – Standard Test Method for Noise Equivalent Temperature Difference of Thermal Imaging Systems

ASTM E 1862 – Standard Test Methods for Measuring and Compensating for Reflected Temperature Using Infrared Imaging Radiometers

ASTM E 1897 – Standard Test Methods for Measuring and Compensating for Transmittance of an Attenuating Medium Using Infrared Imaging Radiometers

ASTM E 1933 – Standard Test Methods for Measuring and Compensating for Emissivity Using Infrared Imaging Radiometers

**Standards to Follow (Continued)**

ASTM E 1934 – Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography

Infraspection Institute - Standard for Infrared Inspection of Electrical Systems and Rotating Equipment

Infraspection Institute - Standard for Measuring and Compensating for Reflected Temperature Using Infrared Imaging Radiometers

Infraspection Institute - Standard for Measuring and Compensating for Emittance Using Infrared Imaging Radiometers

Infraspection Institute - Standard for Measuring and Compensating for Transmittance of an Attenuating Medium Using Infrared Imaging Radiometers

Infraspection Institute - Standard for Measuring Distance/Target Size Values for Infrared Imaging Radiometers

NETA ATS – Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NETA MTS – Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems

NFPA 70B – Recommended Practice for Electrical Equipment Maintenance

NFPA 70E – Standard for Electrical Safety Requirements for Employee Workplaces

NFPA 79 – Electrical Standard for Industrial Machinery

Occupational Safety and Health Standards for General Industry Part 1910

Occupational Safety and Health Standards for Construction Part 1926

**Deliverable Report Format**

Report will be provided in a written, as well as electronic, format and will include the following information:

* Introduction will cover the basic procedures followed and provide information to assist understanding the report, including priority assessment for problems.
* Comments will discuss the areas surveyed, number of problems identified and special notation of any serious problems. Make, model and serial number of the imager used, and the name and certification number of the thermographer performing the work will be included.
* Database provides a detailed list of all equipment surveyed, including location, type of equipment, identification, status at the time of the survey, and notation of problems along with their severity.
* All exceptions will be documented with a Thermogram, control photograph with an arrow indicating the problem(s), and a description that includes the following information:
* Equipment name and location
* Ambient temperature (°C and/or °F)
* Temperature rise over similar equipment (°C and/or °F)
* Ammeter readings (where appropriate)
* Detailed comments concerning each problem
* The Avoided Cost Analysis, based on insurance industry statistics, provides documentation of the potential cost savings associated with your specific survey.

**Proposal Format**

Proposal documents are to include the following:

* Quotation based on a daily rate or lump sum
* Proof of thermographer training for Infrared and OSHA
* List of equipment with current calibration statements
* Safety Manual Table of Contents
* Company profile
* Certificate of Insurance
* List of three references
* Sample report

The proposal is due by (time of day) on (date). Please send the proposal to the following:

 Name, Title

 Telephone

 Company

 Street Address

 City, St Zip

Should you have any questions, require further information, or want to arrange a site visit, please contact the following:

 Name, Title

 Telephone

 Email

**Appendix A – List of Electrical Equipment**

|  |  |  |
| --- | --- | --- |
| **Equipment Type** | **Abv** | **Notes** |
| Air Circuit Breakers | ACB |  |
| Air Handler Units | AHU |  |
| Automatic Transfer Switches | ATS |  |
| Battery Racks | BATT |  |
| Bus Ducts | BUS |  |
| Capacitors | CAP |  |
| Circuit Breakers | CB |  |
| Control Cabinets | CC |  |
| Control Power Transformers | CPT |  |
| Current Transformers | CT |  |
| Disconnect Switches | DISC |  |
| Distribution Panels | DP |  |
| Elevators | ELEV |  |
| Emergency Distribution Panels | EDP |  |
| Emergency Power Panel | EPP |  |
| Emergency Power Transformers | EXFMR |  |
| Environmental Control Units | ECU |  |
| Fire Pump Panels | FPP |  |
| Generators | GEN |  |
| Incoming Lines | IL |  |
| Junction Boxes | JB |  |
| Lightning Arrestors | LA |  |
| Lighting Contacts | LC |  |
| Metering Cabinets | MET |  |
| Motors | MTR |  |
| Motor Control Centers | MCC |  |
| Motor Controllers | MC |  |
| Oil Circuit Breakers | OCB |  |
| Overhead Lines | OL |  |
| Peckerheads | PKHD |  |

**Appendix A – List of Electrical Equipment (Continued)**

|  |  |  |
| --- | --- | --- |
| **Equipment Type** | **Abv** | **Notes** |
| Potential Transformers | PT |  |
| Power Distribution Units | PDU |  |
| Power Panels | PP |  |
| Power Transformers | PT |  |
| Roof Top Units | RTU |  |
| Substations | SUB |  |
| Switchgear | SG |  |
| Transformers | XFMR |  |
| Uninterruptable Power Supply | UPS |  |
| Variable Speed Drive | VSD |  |
| Variable Frequency Driv | VFD |  |
| Voltage Regulator | VP |  |
| Voltage Transformers | VT |  |