MID ATLANTIC INFRARED SERVICES, INC.
5309 Mohican Rd. Bethesda, Md. 20816 • 301-320-2870
www.midatlanticinfrared.com • 301-320-2873 fax

# Predictive Testing Report

**CLIENT**: MAJOR WIDGETS

**ADDRESS:** 100 Main Street
Washington, DC 20001

**DATE:** May 25, 2009

**SUBJECT:** Infrared, vibration and ultrasonic survey of electrical and mechanical equipment

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May 25, 2009

Fred Allen
Major Widgets
100 Main Street
Washington, DC 20001

Dear Mr. Allen:

This document presents the results of our infrared, vibration and ultrasonic survey of electrical and mechanical equipment at your facility. Six problems are identified in this report.

We recommend that an annual infrared, vibration and ultrasonic inspection be conducted of electrical distribution, motor control and mechanical equipment.

Please call me if you have any questions concerning this report. We look forward to working with you in the future.

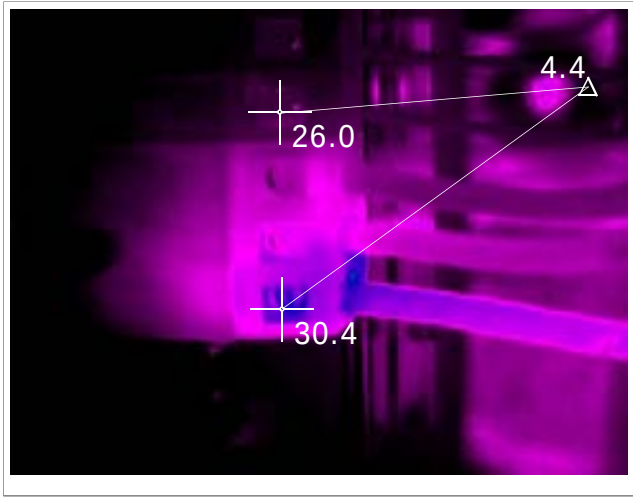
Very truly yours,

Stephen A. Seeber

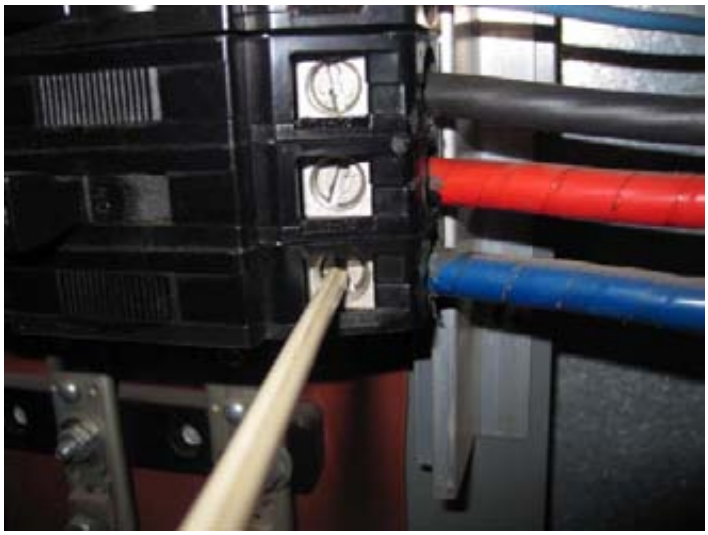
MID ATLANTIC INFRARED SERVICES INFRARED ANALYSIS

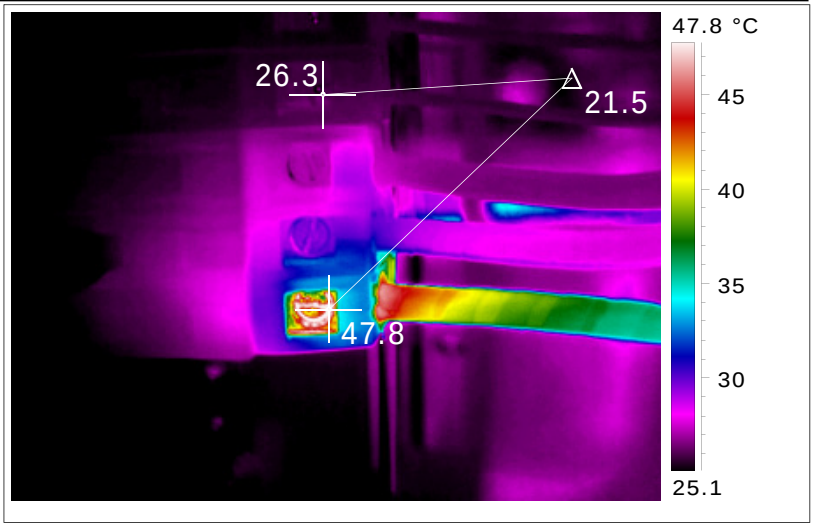
| | |
|---|---|
| **CLIENT** | Major Widgets |
| **PROBLEM NUMBER** | 1 |
| **EQUIPMENT** | Main electric room, emergency lighting panel |

**PROBLEM DESCRIPTION** 3 pole breaker 20-24, #24, load side, shows excessive heat. FOP test shows a loose connection.




**RECOMMENDATION** Problem repaired No further action required.






Repaired by: _____Date: _____

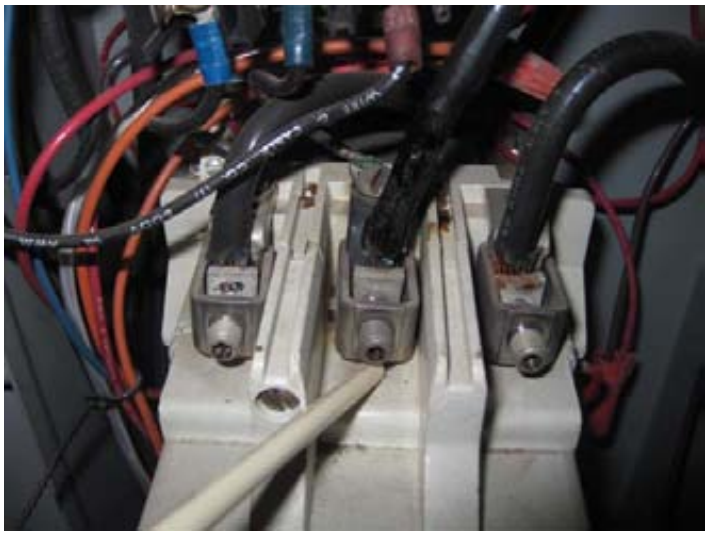
MID ATLANTIC INFRARED SERVICES INFRARED ANALYSIS

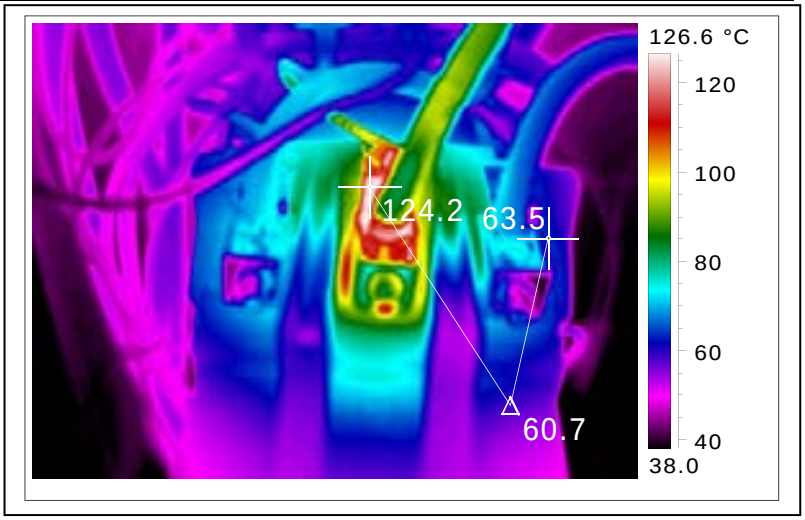
| | |
|---|---|
| **CLIENT** | MAJOR WIDGETS |
| **PROBLEM NUMBER** | 2 |
| **EQUIPMENT** | Penthouse, pump 2 contactor |

**PROBLEM DESCRIPTION** Contactor, line side, B phase, shows excessive heat. FOP test shows poor internal contact. Feed is damaged from heating.

**RECOMMENDATION** Open contactor. Check internal connections. Check contact surfaces. Reassemble, using FOP test to ensure proper operation. Repair damaged feeder.

**HIGH PRIORITY: Yes**



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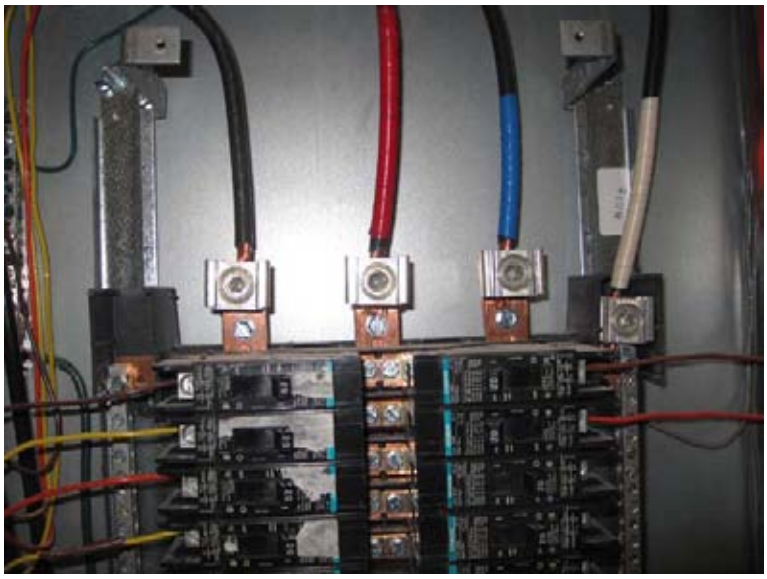
MID ATLANTIC INFRARED SERVICES INFRARED ANALYSIS

| | |
|---|---|
| **CLIENT** | MAJOR WIDGETS |
| **PROBLEM NUMBER** | 3 |
| **EQUIPMENT** | 15059, 5th floor, west electric room, Panel EH5 |

**PROBLEM DESCRIPTION** Main feeds In 480V panel are color coded for 208V. This Is a code violation.

**RECOMMENDATION** Install proper phase/voltage colors on the feeders.

**HIGH PRIORITY:** **No**



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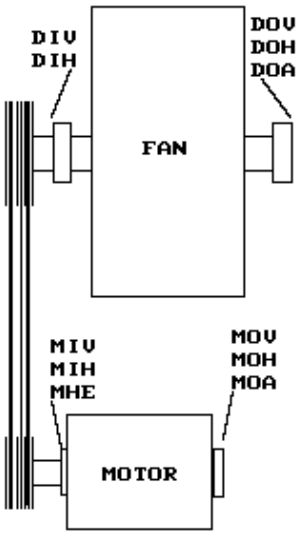
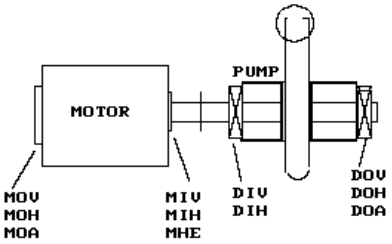
# VIBRATION TESTING REPORT

Vibration analysis was conducted on rotating equipment. A brief discussion of each machine exhibiting high vibration levels, along with suggested repairs, is presented on the following pages. Illustrative spectral data for each problem are included. Measurement points are as follow and are illustrated below:

**MOV**--Motor outboard vertical
**MOH**--Motor outboard horizontal
**MOA**--Motor outboard axial
**MIV**--Motor inboard vertical
**MIH**--Motor inboard horizontal
**MEH**--Motor high resolution for electrical faults or high frequency resolution

**DIV**--Driven machine inboard vertical
**DIH**--Driven machine inboard horizontal
**DOV**--Driven machine outboard vertical
**DOH**--Driven machine outboard horizontal
**DOA**--Driven machine outboard axial




Note that vibration patterns can often be produced by more than one type of mechanical deficiency. Our evaluations present the most likely solution for each vibration problem. However, precise diagnoses often require more detailed machine testing that is beyond the scope of the present survey. We are available to provide such detailed testing and additional services such as multi-plane balancing or reverse dial indicator machine alignment. Please give us a call if further assistance or information is required.

# Last Monitored Machine List

**********

Database: Major Widgets
Station: MACHINES
Report Date: 30-Mar-10 18:46
Report Interval: 28-Feb-10 To 30-Mar-10

PERIODIC VIBRATION TECHNOLOGY

Collected Machine...

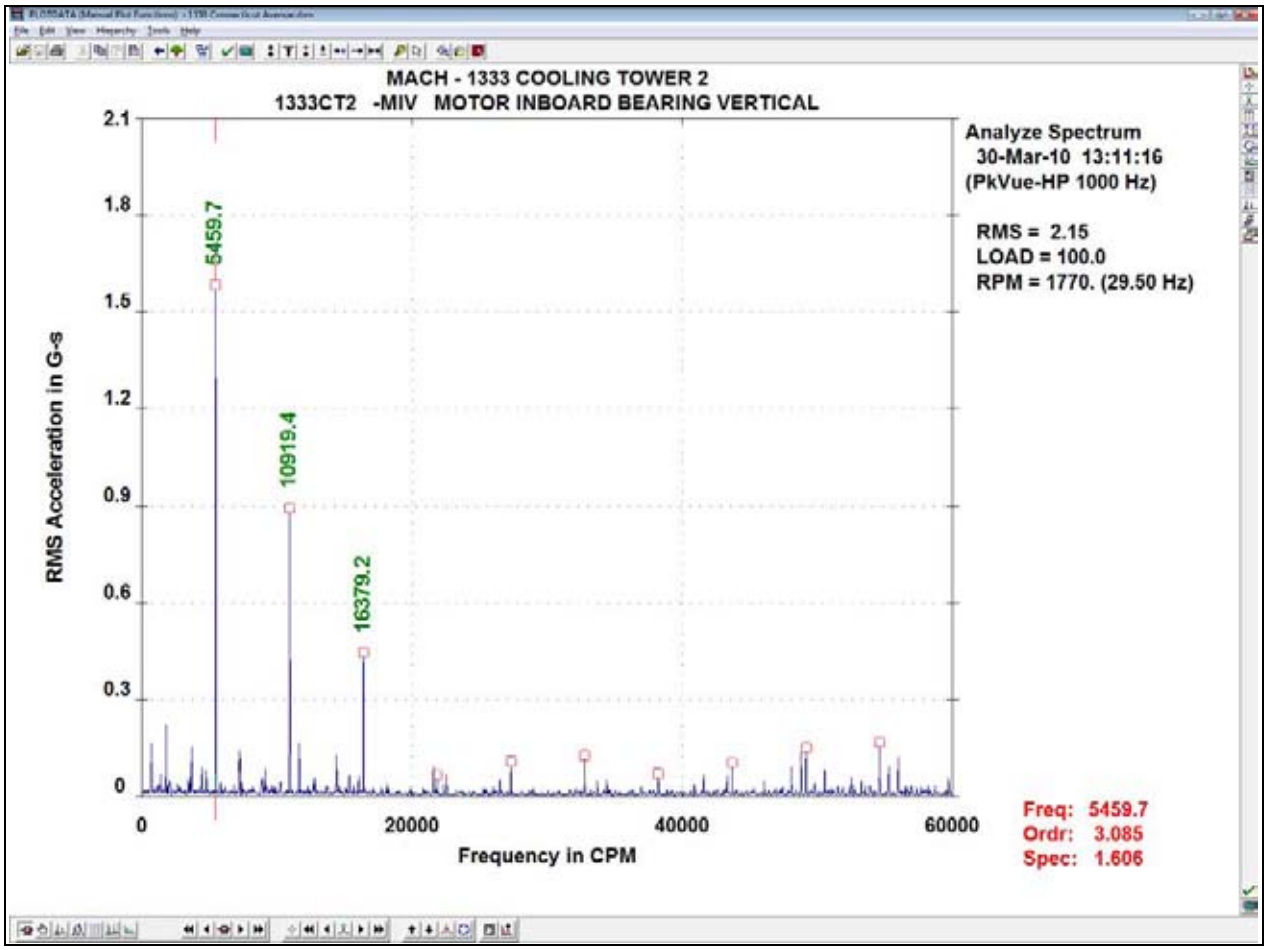
| MACHINE ID | DESCRIPTION | NUMBER OF POINTS | LATEST DATE |
|---|---|---|---|
| 1333P1 | 1333 PUMP 1 | 9 OUT OF 11 | 30-Mar-10 |
| 1333P2 | 1333 PUMP 2 | 9 OUT OF 11 | 30-Mar-10 |
| 1333P3 | 1333 PUMP 3 | 9 OUT OF 11 | 30-Mar-10 |
| 1333CT1 | 1333 COOLING TOWER 1 | 10 OUT OF 11 | 30-Mar-10 |
| 1333CT2 | 1333 COOLING TOWER 2 | 10 OUT OF 11 | 30-Mar-10 |
| 1333CT3 | 1333 COOLING TOWER 3 | 10 OUT OF 11 | 30-Mar-10 |
| 1330 TP1 | 1330 TOWER PUMP 1 | 9 OUT OF 11 | 30-Mar-10 |
| 1330TP2 | 1330 TOWER PUMP 2 | 9 OUT OF 11 | 30-Mar-10 |
| 1330CDWP1 | 1330 CONDENSER PUMP 1 | 9 OUT OF 11 | 30-Mar-10 |
| 1330CDWP2 | 1330 CONDENSER PUMP 2 | 9 OUT OF 11 | 30-Mar-10 |
| 1330CDWP3 | 1330 CONDENSER PUMP 3 | 9 OUT OF 11 | 30-Mar-10 |
| 1330CDWP4 | 1330 CONDENSER PUMP 4 | 9 OUT OF 11 | 30-Mar-10 |
| Twr1Cell1 | 1330 Tower 1 Cell 1 | 8 OUT OF 11 | 09-Mar-10 |
| Twr1Cell2 | 1330 Tower 1 Cell 2 | 8 OUT OF 11 | 09-Mar-10 |
| Twr2Cell1 | 1330 Tower 2 Cell 1 | 9 OUT OF 11 | 09-Mar-10 |
| Twr2Cell2 | 1330 Tower 2 Cell 2 | 8 OUT OF 11 | 09-Mar-10 |

Monitored Point Total = 144 OUT OF 502
Monitored Machine Total = 16 OUT OF 46

# VIBRATION TESTING REPORT

**MACHINE:** 1333 Cooling Tower 2

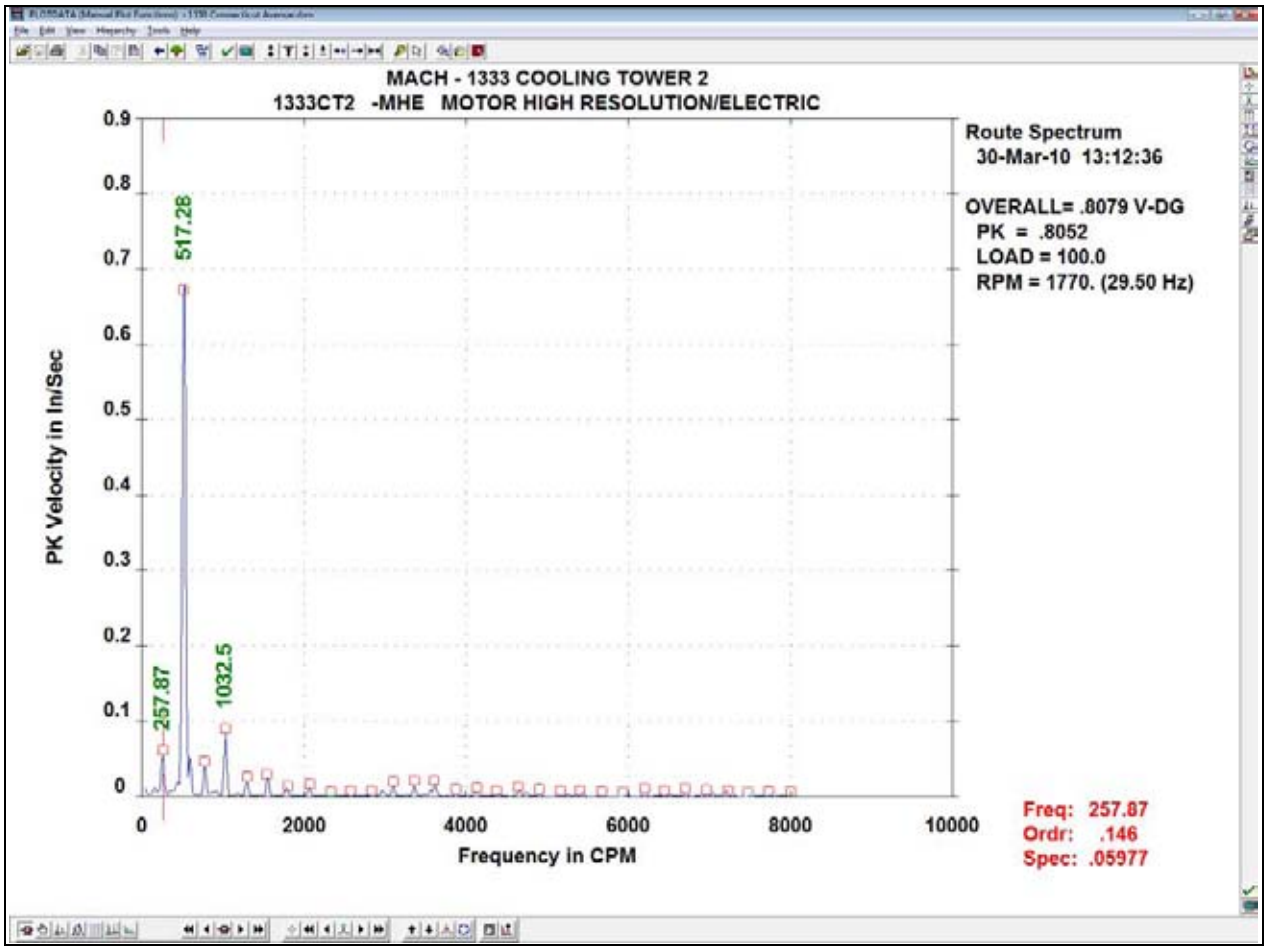
**PROBLEM DISCUSSION:** A bearing defect is present in the motor. It is unclear whether it is the inboard or outboard bearing, since bearing fault frequencies are found at both locations and with similar amplitudes. Both bearings should be changed.



# ***VIBRATION TESTING REPORT***

**MACHINE:** 1333 Cooling tower 2

**PROBLEM DISCUSSION:** High belt vibration is present at the motor. Check the belts for wear and tension. Check the sheave alignment between the two fans and the motor.



# Infrared Survey Equipment Inventory

**Major Widgets**

*06-May-10*

| Equip Type | Floor | Room | Equip Name | Manufacturer | Volts | Amps | KVA |
|---|---|---|---|---|---|---|---|
| **Equipment Type:** Air Handler | | | | | | | |
| Air Handler | 1 | MAIN ELEC RM | AHU27 | Liebert | 480 | 60 | 0 |
| Air Handler | 1 | MAIN ELEC RM | AHU28 | Liebert | 480 | 60 | 0 |
| Air Handler | 1 | MAIN ELEC RM | AHU29 | Liebert | 480 | 60 | 0 |
| **Total=** | 3 | | | | | | |
| **Equipment Type:** Bus Disconnect | | | | | | | |
| Bus Disconnect | 1 | CENTER ELEC RM | H1 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 1 | CENTER ELEC RM | L1 | Cutler Hammer | 480 | 150 | 0 |
| Bus Disconnect | 1 | CENTER ELEC RM | AC1 | Cutler Hammer | 480 | 200 | 0 |
| Bus Disconnect | 1 | CENTER ELEC RM | H1A | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 2 | CENTER ELEC RM | H2 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 2 | CENTER ELEC RM | L2 | Cutler Hammer | 480 | 150 | 0 |
| Bus Disconnect | 2 | CENTER ELEC RM | AC2 | Cutler Hammer | 480 | 225 | 0 |
| Bus Disconnect | 3 | CENTER ELEC RM | H3 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 3 | CENTER ELEC RM | L3 | Cutler Hammer | 480 | 150 | 0 |
| Bus Disconnect | 3 | CENTER ELEC RM | AC3 | Cutler Hammer | 480 | 225 | 0 |
| Bus Disconnect | 4 | CENTER ELEC RM | AC4 | Cutler Hammer | 480 | 225 | 0 |
| Bus Disconnect | 4 | CENTER ELEC RM | L4 | Cutler Hammer | 480 | 150 | 0 |
| Bus Disconnect | 4 | CENTER ELEC RM | H4 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 5 | CENTER ELEC RM | L5 | Cutler Hammer | 480 | 150 | 0 |
| Bus Disconnect | 5 | CENTER ELEC RM | H5 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 5 | CENTER ELEC RM | AC5 | Cutler Hammer | 480 | 225 | 0 |
| Bus Disconnect | 6 | CENTER ELEC RM | H6 | Cutler Hammer | 480 | 400 | 0 |
| Bus Disconnect | 6 | CENTER ELEC RM | AC6 | Cutler Hammer | 480 | 225 | 0 |
| Bus Disconnect | 6 | CENTER ELEC RM | L6 | Cutler Hammer | 480 | 150 | 0 |
| **Total=** | 19 | | | | | | |
| **Equipment Type:** Disconnect | | | | | | | |
| Disconnect | 1 | MAIN ELEC RM | 1E2 | GE | 480 | 125 | 0 |
| Disconnect | PH | ELEV PH | ELEV 4 | Cutler Hammer | 480 | 60 | 0 |
| Disconnect | PH | ELEV PH | ELEV 2 | Cutler Hammer | 480 | 60 | 0 |
| Disconnect | PH | ELEV PH | ELEV 3 | Cutler Hammer | 480 | 60 | 0 |
| Disconnect | PH | ELEV PH | ELEV 1 | Cutler Hammer | 480 | 60 | 0 |
| Disconnect | PH | PUMP RM | ELEV SHUNT | Cutler Hammer | 480 | 350 | 0 |
| Disconnect | PH | PUMP RM | ELEV SHUNT 1 | Cutler Hammer | 480 | 60 | 0 |
| Disconnect | PH | ROOF | PUMP 1 | GE | 480 | 150 | 0 |
| Disconnect | PH | ROOF | PUMP 2 | GE | 480 | 150 | 0 |
| **Total=** | 9 | | | | | | |
| **Equipment Type:** Emerg. Disconnect | | | | | | | |
| Emerg. Disconnect | 1 | BLDG MAIN ELEC R | EML1 | Cutler Hammer | 208 | 100 | 0 |
| Emerg. Disconnect | 1 | BLDG MAIN ELEC R | EMPL | Cutler Hammer | 208 | 100 | 0 |
| Emerg. Disconnect | 1 | BLDG MAIN ELEC R | EMPH | Cutler Hammer | 480 | 100 | 0 |
| Emerg. Disconnect | 1 | BLDG MAIN ELEC R | EM DISC | Cutler Hammer | 480 | 200 | 0 |
| Emerg. Disconnect | 1 | BLDG MAIN ELEC R | FA XFMR | Cutler Hammer | 480 | 20 | 0 |