



# THE WATER GARDEN CASE STUDY

**WATER GARDEN | GARAGE & RISER BREAKER REPLACEMENTS 2015**

# PROJECT BACKGROUND

ABM, a leader in facility maintenance services, manages the Water Garden facility in Santa Monica, California. ABM is an independent full service electrical solutions provider with expertise in life extension and system upgrades, testing and maintenance services, as well as, full service engineering and consultation services.

ABM conducted a short circuit study as part of their regular maintenance service plan and discovered a higher than normal GFR failure rate. Unless there is a functioning circuit breaker to interrupt this condition the results can be catastrophic; including loss of property, equipment, and life.

## THE PROBLEM

### Short Circuit Study

A short circuit study analyzes the electrical system to determine the magnitude of current flowing through an electrical fault. These values are compared to the equipment ratings. After these values are determined; a protection coordination study is performed to determine the optimal ratings and settings for the power system's protective devices. When conducting short-circuit and protection coordination studies, it generally consists of the following steps:

- Data Collection:** During a field visit collect all data on the components within the system. Additional information can be obtained from the manufacturer, the electrical utility, or field data. It is very important to have the equipment ratings to determine if the results of the short-circuit test are within normal range.
- One-line Diagram:** The current "power system diagram" must be current and up to date. This diagram identifies all electrical components and how they are connected. Additional data for study purposes, such as cable impedance can be obtained from this diagram as well.
- Computer Analysis:** There are several computer programs available for analyzing data from the short-circuit testing. The system data is input into the computer system and the short-circuit currents for various points in the system are calculated.
- Tabulate Results:** Typically the data output is a table comparison of the computer analysis data points compared to the equipment manufacturers ratings. If a short-circuit current exceeds the short-circuit rating of the equipment at any point, then the location should be flagged as inadequately protected.
- Final Report:** The report contains the full scope of the study, how the data was collected, the methods used for calculating currents, the tabulated results, any assumptions, and the final recommendation for any corrective actions required should be published at the conclusion of the study.

**ABM  
saved  
58%**

**in equipment  
costs alone  
using Advanced  
Electrical &  
Motor Control's  
solution vs.  
replacing with  
new equipment.**

## **ADVANCED ELECTRICAL & MOTOR CONTROLS**

**specializes in Life  
Extension programs  
for obsolete electric  
equipment  
incorporating new  
components in new  
manufactured  
equipment which  
can be accomplished  
with very little  
down time.**

### **Reason for Upgrade**

ABM's knowledge of computational methods for power systems analysis allowed engineers to troubleshoot, plan, and design an effective ground fault protection system for the Water Garden's circuit breaker upgrade project. Essentially, the study revealed that the previously installed remote ground fault relays were failing. ABM's solution for the failing GFRs was to upgrade the circuit breakers to all Solid State LSIG ground fault protection.

## **PROPOSED SOLUTIONS**

Once ABM completed the short-circuit and protection-coordination studies they determined the best solution was to install Solid State Trip Units. Based on the recommendation by AEAMC, the GE Spectra Series, and Powerbreak II Circuit Breakers were chosen. The GE Circuit Breakers utilize the GE Entelliguard Trip Unit.

However, ABM had a major hurdle to overcome because of the age of the system it could not accept the new modern style breakers without completely upgrading the infrastructure, which would more than double the cost of repairs. AEAMC was able to provide a simple inexpensive solution that would allow the solid state circuit breakers to be installed.

Advanced Electrical & Motor Controls was able to design custom installation kits for the various switchboards, including a Single and Group Mounted Design. The Main Pringle Switches have been upgraded with General Electric Power Break II Circuit Breakers, reducing the opening and closing speed of the units. A feature of the Entelliguard Trip Unit is the Reduced Energy Let Through Function [RELT]. This reduces the arc flash incident energy levels, allowing the maintenance personnel to work safely on the equipment.

In addition, the existing GE Armorclad Bus Plugs had similar issues, the original system used an external Ground Fault Relay that was no longer reliable. AEAMC was able to engineer a retrofit kit that would allow installation of a new GE Spectra Circuit Breaker with Integral Ground Fault. The retrofit only required new bus adapter kits, and did not require any modifications to the bus plug itself.

### **Competitor's Solution**

ABM also solicited competitors for equipment design solutions. The competition's solution involved upgrading the entire infrastructure in order to install the new equipment into the aging system. Other competitors told ABM there was no other solution. The cost of the equipment alone was approximately 58% higher than the AEAMC solution.

# ABOUT AEAMC

Advanced Electrical & Motor Controls is your supplier for Low Voltage Power Distribution Equipment. We specialize in LV Switchboards, Insulated Case & Molded Case Circuit Breakers, Motor Controls, UL-98 Panelboard Switches and UL-508A Industrial Control Panels. We provide Life Extension services for discontinued Circuit Breakers and MCC Buckets. Our designs install into the original equipment without any modification, reduce downtime and extend the life of your equipment.

We can manufacture UL-508A Industrial Control Panels from customer supplied drawings or provide a custom solution.

Our QMQB™ brand of panelboard switches can replace the following manufacturers; FPE, Challenger, Frank Adams, Sylvania, and Zinsco switches without any modification to the existing switchboard.

## **Advanced Electrical & Motor Controls offers a host of electrical solutions including:**

- Complete MCC Sections
- Upgrades to Existing Equipment
- New Replacement Bucket Assemblies
- Replacement Contact Kits & Parts
- Replacement Stab Assemblies
- Custom Life Extension Solutions
- Insulated-case and Molded-case Circuit Breakers
- Low-Voltage Switchboards
- Industrial Control Panels
- QMQB™ Brand Panelboard Switches

# CONCLUSION

It is always the goal of Advanced Electrical & Motor Controls to provide innovative cost effect solutions to our customers. Businesses today operate in a globally competitive market and constantly have their eye on the bottom-line. AEAMC is very aware of this and takes great pride in offering high quality solutions at an affordable price.

AEAMC's commitment to quality and value saved our customer several hundred thousand dollars, unnecessary downtime, and upgraded their existing equipment; extending the life of the electrical system another thirty years. Call us today for a custom designed solution to your electrical maintenance challenges.



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