



STATE OF WASHINGTON  
DEPARTMENT OF ENTERPRISE SERVICES

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DATE: June 07, 2021 (revised from March 11, 2021)  
TO: Washington State Legislative Fiscal Committees  
FROM: Bill Frare, Assistant Director, Facility Professional Services  
RE: **Campus-Wide Electrical Panel Arc Flash Study (40000151) - SHB 1102.SL**

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### EXECUTIVE SUMMARY

The Department of Enterprise Services (DES) received appropriations in the amount \$1,000,000 for the **Campus-Wide Electrical Service Panels - Arc Flash Study (40000151)** in Sec 1086 of the 19-21 Capital Budget (SHB 1102.SL). These appropriations were subject to the following conditions and limitations:

- 1) The appropriations in this section are provided solely for a campus-wide ARC flash hazard analysis study to assess safety risks and improve worker safety.
- 2) Funding must be used to at least conduct a full on-site evaluation, evaluate the need for specialized personal protective equipment (PPE) requirements, identify electrical repairs from the electrical service entry to the subpanels for code and safety compliance, and identify panel labeling deficiencies and solutions, fiscal costs, and recommendations to resolve safety risks.
- 3) The department must submit preliminary status report to the legislative fiscal committee by December 31, 2019 on at least:
  - a. The estimated duration of the study, and when it will begin and end;
  - b. How many staff will be trained and by when; and
  - c. How much the personal protective equipment costs per person that was identified as necessary, and how many staff need this equipment.
- 4) The study is due to the legislative fiscal committees by November 30, 2020.

DES retained the services of Electrical Safety Specialists to perform this project and the campus-wide ARC flash hazard analysis study began in January 2020. Following delays associated with Covid-19, all aspects of the study were completed in December 2020.

In fulfilling its services, Electrical Safety Specialists assessed the safety of high-risk electrical panels at the 41 facilities managed by DES on the State Capitol Campus. They evaluated the required PPE and its related costs, identified code or safety violations, provided training to staff, identified risks and hazards at each panel, and relabeled them to better identify associated risks and hazards to inform workers of appropriate Personal Protective Equipment (PPE).

A summary of the services provided include:

- 1. Arc Flash Analysis:** During this process, data was collected to provide necessary information on the Capitol's electrical system to assist on-site electricians with proper procedures for safe electrical work. This audit allowed the on-site employees to prepare and improve their overall electrical safe-work practices should a similar audit be performed by Occupational Safety and Health Administration (OSHA).
- 2. Infrared Scan:** This preventative measure allowed identification of any underlying electrical issues that otherwise could not be seen during normal inspection. This process also allowed the identification of underlying issues to prevent damage or injury and provided the ability to prevent future failures based on findings delivered in the reports.
- 3. Electrical Code Audit:** During the infrared scan, a code audit of obvious National Electrical Code violations was also conducted. This allowed the on-site technicians to correct some of these issues at the time of inspection. Issues that were not corrected were passed on to the on-site electricians to be corrected at a later time.
- 4. Training:** At the conclusion of the Arc Flash Analysis process, the technician performed an on-site Qualified Electrical Worker Training. This training allowed the electricians to expand on their knowledge of OSHA and NFPA 70E regulations. The training included a skilled understanding of the electrical panel labeling system and single-line diagrams provided by the technician. This labeling system allows electricians to safely perform the necessary work on energized equipment, as well as the proper process to de-energize equipment to perform necessary maintenance.
- 5. Electrical Safe Work Program (ESWP):** The Electrical Safety Specialists provided an updated Electrical Safe Work Program. This program allows DES electricians to stay compliant with OSHA guidelines and gives them all the necessary tools and documentation to safely perform most electrical tasks.
- 6. PPE Recommendation:** Each electrical panel has a rating to identify the level of PPE required to work on the panel based on its calorie (cal) rating. The cal identifies the heat level that could potentially be generated in an ARC Flash, an electrical discharge incident that can result in serious injury. These levels are identified on the labels for the panels as well as in the report for each building. Most electrical panels on campus have a 12 cal rating. The cost range per person for PPE to work on these panels is \$500 to \$700. Some panels on campus reach a 40 cal rating. PPE to safely work on these panels costs \$1,300 to \$2,000. There are

currently seven employees in need of this level of PPE. The 40 cal suit would also be used for any work on panels between 12 and 40 cal. Any panels above 40 cal. must be de-energized before work can begin.

The complete **Campus-wide Arc-Flash Hazard Analysis Study** is comprised of 41 individual facility-specific reports and has of over 13,300 pages of information. The study was developed on a “per facility” basis for ease of future reference when performing studies or planned work at a single facility.

Each individual report includes the following sections:

- a. Introduction
- b. Arc Flash Methodology and Reference Manual
- c. General Disclaimer
- d. Arc Flash Evaluation Report per IEEE 1584
- e. Fault Analysis Input Report
- f. Fault Contribution Brief Report
- g. Fault Contribution Complete Report
- h. Utility Information
- i. One Line Drawings
- j. Thermal Imaging
- k. Engineering

DES has completed its review of the individual reports and summarized the findings. It should be noted that deficiencies were identified and corrections were performed during inspections and investigations. All observed or known deficiencies in the electrical panels were corrected at the time of discovery and no further action will be required to address existing electrical arc-flash conditions upon completion of this study.

**A listing of the individual reports for the 41 properties:**

- Alaska Street-83 pages
- Archives Building-812 pages
- Ayer Press House-68 pages
- Capitol Court-88 pages
- Capitol Lake Dam-110 pages
- Carolyn Press House-68 pages
- Centennial Park-68 pages
- Columbia Garage-72 pages
- Department of Transportation-793 pages
- Employment Security Building-365 pages
- GA Building-509 pages
- Governor’s Mansion-1,490 pages
- Governor’s Mansion EV Charging Station-71 pages
- Green House Conservatory-74 pages
- Helen Sommers-587 pages
- Heritage Park-85 pages
- Highway License Building-826 pages
- Insurance Building-240 pages
- Interpretive Center-74 pages
- Irving Newhouse-86 pages
- Isabella Bush-94 pages
- James M Dolliver-74 pages
- Joel Pritchard-128 pages
- John A. Cherberg-218 pages
- John O’Brien-300 pages
- Kelso-119 pages
- Legislative Building-1,509 pages
- Marathon Park-85 pages

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- Medium Voltage Campus System-90 pages
- Modular Building-332 pages
- Natural Resources Building-611 pages
- OB2 Building-2,131 pages
- Off Campus Olympia – Small Buildings-84 pages
- Old Capitol Building-199 pages
- Plaza Garage-254 pages
- Power House-227 pages
- Sylvester Park-68 pages
- Temple of Justice-119 pages
- Visitors Center-67 pages
- Washington Building-71 pages
- Yakima Building-87 pages

For copies of the individual reports or information relative to the findings outlined in the individual reports, please contact the Department of Enterprise Services, Facility Professional Services Division, Planning and Project Delivery Team.

Thank you for funding this opportunity and providing for a safer work environment.