

**UNIVERSITY OF WISCONSIN - PLATTEVILLE
COMPREHENSIVE MASTER PLAN**

ELECTRICAL LOAD FLOW STUDY

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ATTACHMENT 1:	Campus One-Line Diagram Left Half
ATTACHMENT 2:	Campus One-Line Diagram Right Half
APPENDIX A:	Text Base Load Flow "Low"
APPENDIX B:	Text Base Load Flow "High"
APPENDIX C:	Text Phase 1 Load Flow "High"
APPENDIX D:	Text Phase 2 Load Flow "High"
APPENDIX E:	Text Phase 3 Load Flow "High"

Introduction

A load flow study has been prepared for the base and future phases of University of Wisconsin - Platteville (UWP) Comprehensive Campus Master Plan (CCMP).

Load Flow Study

The purpose of a Load Flow study is to determine where system components could be possibly overloaded now, and as the CCMP moves forward through the phases.

This Load Flow study looks at the campus 12.470 kV medium voltage distribution system. The system includes the feed from Alliant Energy, the switchgear, the capacitor bank, the emergency power distribution system in the Physical Plant, sectionalizing switches, conductors, transformers, and the loads of each building. Where available, exact characteristics of the electrical components were utilized; when information was unavailable, industry standard models were substituted with the closest matching characteristics.

Alliant Energy is in the planning phase of upgrading the Pioneer Substation that supplies electricity to the campus. After this upgrade is complete, the available fault current available for the campus will increase. This upgrade will be completed before Phase 1 begins. Therefore, the base design is shown with two simulations; the first showing the immediate fault current, this is defined as "Low", and the future fault current, this is defined as "High".

The Appendices in this report are the text output from SKM Power Tools for Windows. The Load Flow report is titled as Text Phase Load Flow "High" or "Low". At the bottom of the Load Flow report is the summary which details out the calculated values for each component.

Deficiencies are identified by exceeding the equipment's ampacity rating. Minor deficiencies are considered to be any value above 100% up to and including 115%. Major deficiencies are considered any value above 115.1%.

Software

The study was completed using SKM Power Tools for Windows Version 6.5.2.7 (Build 2).

Sources of Data

University of Wisconsin System Administration

Greg Wanek, PE - Senior Electrical Engineer

One-line, power loads

University of Wisconsin - Platteville

Doug Stephens - Senior Campus Planner

Pete Davis, PE - Director of Facilities Management

John Niehaus - Head Campus Electrician

Equipment data, conductor data

Alliant Energy

Troy Pittz - Account Manager

Barry Bauman, PE - Distribution Engineer

Utility data

Affiliated Engineers expresses a professional opinion, such a statement of opinion does not constitute a warranty, either expressed or implied. AEI followed the guidelines derived from these calculations and distribution system issues may or may not exist. A specific study, encompassing all components, characteristics and specifications in the related system would need to be completed.

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Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade)

Major Deficiencies

TDIS-0341 - 255.63%

The 282 kVA transformer supplying power to Gardner and Brigham Halls appears to be severely overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. Further, monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

TDIS-0351 - 241.71%

The 112.5 kVA transformer supplying power to Warner Hall appears to be severely overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. Further, monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

Minor Current Deficiencies

TDIS-0371 - 113.79%

The 150 kVA transformer supplying power to Dobson Hall appears to be slightly overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. This is temporary overload condition is capable of being supported for short time periods during peak loading with little effect on the life of the transformer. Continued operation in this loading range will diminish the life of the transformer. Further monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

TDIS-0361 - 110.14%

The 112.5 kVA transformer supplying power to Wilgus Hall appears to be slightly overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. This is temporary overload condition is capable of being supported for short time periods during peak loading with little effect on the life of the transformer. Continued operation in this loading range will diminish the life of the transformer. Further monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

TDIS-0071 - 105.51%

The 400 kVA transformer supplying power to Williams Fieldhouse appears to be slightly overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. This is temporary overload condition is capable of being supported for short time periods during peak loading with little effect on the life of the transformer. Continued operation in this loading range will diminish the life of the transformer. Further monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

Base Campus Electrical Distribution System (After Alliant Energy Pioneer Substation Upgrade)

Major Deficiencies

TDIS-0341 - 255.11%

TDIS-0351 - 241.19%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

Minor Current Deficiencies

TDIS-0371 - 113.57%

TDIS-0361 - 109.92%

TDIS-0071 - 105.30%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

Phase 1 Campus Electrical Distribution System

Major Deficiencies

TDIS-0341 - 259.67%

TDIS-0351 - 245.69%

TDIS-0371 - 115.53%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

CABL-UTIL-0100 - 120.05%

The main feeder from Alliant Energy Pioneer Substation appears be overloaded at the completion of Phase 1. This value is based on the summation of each existing building's peak load and new buildings expected load. It is very unlikely that these peak loads would be coincidental. Given that the likelihood of all buildings operating at peak load coincidentally is very small, we do not believe the reported value to be accurate when compared to actual load at this location. AEI recommends using metering at the main campus switchgear and loads acquired from Alliant Energy to verify the campus falls within the capacity of the incoming feeder.

Minor Current Deficiencies

TDIS-0361 - 111.82%

TDIS-0071 - 107.14%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

Phase 2 Campus Electrical Distribution System

Major Deficiencies

TDIS-0341 - 259.67%

TDIS-0351 - 245.69%

TDIS-0371 - 116.48%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

CABL-UTIL-0100 - 131.72%

Refer to Phase 1 Campus Electrical Distribution System explanation.

TDIS-0951 - 130.92%

The existing 300 kVA Glenview Commons transformer appears to be severely overloaded. Demolition of this transformer should be included in the demolition of Glenview Commons. The new transformer would need to be sized for the new loads for Student Housing R4 and R5.

Minor Current Deficiencies

TDIS-0361 - 112.65%

TDIS-0071 - 107.89%

Refer to Base Campus System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

TDIS-0411 - 100.63%

The 150 kVA transformer supplying power to Pickard Hall appears to be slightly overloaded. AEI recommends verifying the size of the transformer and peak load from the buildings. This is temporary overload condition is capable of being supported for short time periods during peak loading with little effect on the life of the transformer. Continued operation in this loading range will diminish the life of the transformer. Further monitoring the load at the transformer may be required. If trends determine the transformer to be undersized for the load, consider upgrading the size of the transformer.

Phase 3 Campus Electrical Distribution System

Major Deficiencies

TDIS-0351 - 245.69%

TDIS-0341 - 168.18%

Refer to Base Campus Electrical Distribution System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

CABL-UTIL-0100 - 157.72%

Refer to Phase 1 Campus Electrical Distribution System explanation.

TDIS-0951 - 133.00%

Refer to Phase 2 Campus Electrical Distribution System explanation.

TDIS-0371 - 118.35%

Refer to Base Campus System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

Minor Current Deficiencies

TDIS-0361 - 114.43%

TDIS-0071 - 109.45%

Refer to Base Campus System (Before Alliant Energy Pioneer Substation Upgrade) explanation.

TDIS-0411 - 102.23%

Refer to Phase 2 Campus Electrical Distribution System explanation.

Summary

Considering the size of the UW-Platteville campus, the instances of potential issues identified in this report are relatively minor. It is important to note that peak loads and in some cases, calculated demand loads were used as a basis for this report in lieu of typical demand meter readings. Though this information can be useful, it can be very conservative when looking for potentially overloaded equipment in a campus wide distribution system. As recommended throughout this report, if actual meter readings can be taken at busses that serve multiple buildings, some of the deficiencies identified in this report may be eliminated.