

EE/CprE/SE 492 BI-WEEKLY REPORT 4

3/10/24 - 3/30/24

Group number: sdmay24-18

Project title: 115/34.5 kV Solar Substation & Design

Client &/Advisor: Black&Veatch/Dr. Ajarapu

Team Members/Role:

Eli Schaffer / Team Leader

Baylor Clark / Team Organizer and Testing

Liam Gossman / Client Correspondent

Eduardo Jimenez-Tzompaxtle / Submission, Research and Testing Leader

Chicheng Tang / Research and Testing Leader

Siti Mohd Ratzi (Bell) / Recorder and Testing

○ **Weekly Summary**

- Eduardo
- In the past two weeks, the group has made AC Load calculations for a battery charger. The group has started to create bills of materials for the solar array and substation components. A sheet dedicated to lightning protection was added while other previous AutoCAD drawings were updated from the comments of Black & Veatch. The group also worked with Etap by adding all the parameters for the solar array and the substation before the simulation could start, and MATLAB was used to confirm calculations for Etap. The group saw a video from another group to give and receive feedback during class time.

○ **Past week accomplishments**

- Eli: Updated AutoCAD drawings, started a bill of materials and found pricing links, added a table for cable type and length
- Baylor: Researched conductors and selected DC Cable for PV farm, helped in forming the bill of materials for the project, updated ETAP model with component selection
- Liam: Completed AC and DC loading calculations. Worked on DC battery charging calculations and bill of materials data.
- Eduardo: Updated AutoCAD drawings, worked on the control center, created components drawings
- Bell: Finalize grounding, bus, AC Load and DC battery sizing calculations
- Chicheng: Updated ETAP model based on the AutoCAD drawings, verified ETAP Power Flow analysis with Matlab and hand calculations. Test the ETAP substation model

completeness.

○ **Pending issues**

- Eli: Ratios for CBs to make sure they are compatible with relays, scaling issues on drawings to make sure we have the correct size of our equipment.
- Baylor: Selecting and finding information for the AC conductor for the solar farm
- Liam: Find data sheets, pricing, and part numbers for substation equipment for the bill of materials.
- Eduardo: Checking sizing for each component in the substation, sizing for the control house
- Bell: Racking sizing for the batteries
- Chicheng: The equipment data sheet didn't type into ETAP.

○ **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours these weeks</u>	<u>HOURS Cumulative This Semester</u>
Eli	AutoCAD drawings, BOM, Equipment searching	14	58
Baylor	ETAP, BOM, component selection	7	20
Liam	AC and DC load calculations, equipment data sheets/pricing, and battery charger sizing	7	37
Eduardo	AutoCAD Drawing, Components Sizing searching	14	58
Bell	Calculation and battery sizing	6	52
Chicheng	ETAP	6	52

○ **Plans for the upcoming week**

- Eli: Continue working on AutoCAD, BOM, additional equipment if needed, trench sizing for conduit.
- Baylor: Select the AC conductor and enter the information into ETAP. Finalize data for the ETAP simulation and begin to run power flow simulations
- Liam: Find remaining equipment information for the bill of materials, assist with relay protection systems and equipment specifications.
- Eduardo: Create another component drawing for low voltage circuit breaker, resize the

control house for battery storage, and find the correct sizing for each component on the substation.

- Bell: Cost analysis calculation and filling up design documents
- Chicheng: keep updating the ETAP model to fit our design. Combine the substation model and array model in ETAP.

○ **Summary of weekly advisor meeting** (maybe)

- Baylor
 - The group had a planned meeting with our advisor this past Tuesday but he did not attend and has not contacted us since that meeting.

Midterm Feedback

- Summarize the feedback you received (both written and verbal).
 - Overall we received very positive feedback from our peer review team. Almost everyone on sdmay24-30 commented on how well our drawings were. We did get some questions about the thermal capabilities of our equipment and we are looking to address those concerns in the coming weeks.
- Describe any new insights your team generated based on this feedback.
 - We are looking for more data when searching for and selecting equipment. We are thinking about the real implementation of this project as well and trying to see if this project can be transferred to another location.
- What steps are you taking based on the feedback?
 - We are keeping in mind the thermal capabilities and overall equipment compatibility when moving forward with this project. We want to ensure that we select compatible parts that are able to operate in the heat of New Mexico.