

EE 492 Status Report 6

04/03/2025 to 04/17/2025

Team 41

115/34.5kV Solar Plant & Substation

Client: Black & Veatch

Faculty Advisor: Ajarapu Venkataramana

Team Members:

Andrew Chizek -- Communications

David Ntako -- Lead/Start BV Meeting

Ben Palkovic -- Meeting Recorder

Mohamed Sam -- Submissions

Sergio Sanchez Gomez -- Team Leader

Dallas Wittenburg -- Communications

Weekly Summary:

Over the past two weeks, our team has made lots of great progress on our project. Our team has focused on refining our substation physical layout, section views, grounding analysis, AC calculations, and DC calculations. Our team has also been working on running a simulation using ETAP. We had sent our client, Black & Veatch a 40% package including all of our current AutoCAD drawings and calculations from our project and received constructive feedback from them. We also discussed what is expected in standard industry practices to help improve our AutoCAD drawings. We created a preliminary ground grid layout following NEC guidelines and working on ensuring compatibility with industry practices. We are continuing to make steady progress on our overall design, supported by our advisor, Dr. Venkataramana Ajjarapu and collaboration with Black & Veatch.

Past Week Accomplishments

- Ran ETAP simulation
- Updated DC and AC calculation spreadsheets and submitted to client
- Finalized preliminary ground grid layout with 10-ft spacing
- Created initial grounding grid drawing, located grid 18" below surface
- Revised section views A, B, and C:
 - Rotated bus in Section A by 90°
 - Added surge arrestor
 - Adjusted bus distances and component alignment
 - Flipped disconnect in Section C for better switching layout
- Added SEL relaying to AutoCAD drawings
- Continued work on IEEE 485 battery sizing using alternative methods due to Enersys tool issues
- Identified industry practice conflicts for grounding rod placement under equipment foundations
- Shared spreadsheets for grounding, AC, and DC with client
- Gathered insights from Black & Veatch on infinite bus and Simulink-based studies

Pending Issues

- IEEE 485 website tool (Enersys) is still down, continuing work on excel-based method
- Need to finalize layout for conduit routing and control house placement

Individual Contributions

Name	Contribution	Hours this Week	Total Hours
Andrew	Continued to update physical layout and section views based on the comments left by our clients. Also, helped look into fixing the ETAP simulation to get the results we wanted	8	38
David	Continued to update physical layout and section view B based on the comments left by our clients.	7	36
Ben	Updated One-Line according to BV comments, developed an AC panel drawing using the AC calculations.	7	42
Mohamed	Research on Load Flow Analysis - IEEE 3002.2 and utilizing ETAP and simulation of load flow and short circuit analysis	6	37
Sergio	Worked on the Bill of Materials (BOM) and conducted ETAP simulations to resolve overload issues in the PV modules and inverters	6	36
Dallas	Created an AutoCAD drawing for grounding grid layout, researched NEC standards for placement of grounding rods	6	38

Plans for Coming Week

- Finalize and refine our task for the upcoming presentation.
- Review our progress and ensure all documentation is complete.
- Meet with our advisor once he is available to receive feedback.
- Attend our scheduled client meeting to discuss any updates or new tasks.
- Collaborate as a team to stay on track with project goals and deadlines.
- Address any missing details or improvements needed before the presentation.
- Prepare for next package to send to our client
- Finalize grounding calculations and validate layout against NEC/IEEE standards

Action Items for Client

- Begin working on a Bill of Materials (BOM)
- Add client's comments to section view drawings
- Re-run ETAP simulations with corrected input values
- Begin organizing next design package for submission
- Keep working and improving our key plan for substation design
- Finalize Control House location