

## ***EE/CprE/SE 492 STATUS REPORT 4***

***2/28–3/13***

***Group number: sdmay25-02***

***Project title: Ames Microgrid Evaluation and Substation Consulting***

***Client &/Advisor: Adam Arnold (Burns & McDonnell) and Dr. Zhaoyu Wang***

### ***Team Members/Role:***

- Sean Carver - Transmission Team (Substation)
- Bethany Danley - Distribution Planning Team
- Thomas Edwards - Distribution Planning Team
- Nathan Kallal - Distribution Planning Team
- Mina Khalil - Transmission Team (Substation)
- MacKenzie Woods - Transmission Team (Substation)

### **o Weekly Summary**

This past week, the Transmission Team met with the client, updated the Semester 2 schedule, and completed deliverables such as LLBOM REV 2 while continuing work on GA. Due to scaling issues in ACAD, the team is transitioning to Bluebeam for physical drawings, with Sean setting up a Studio Session before his trip to Italy over spring break. Meanwhile, the Distribution Planning Team created a geographic campus map with load values, explored efficient solar panel mapping, and discussed model development with Adam Arnold. Adam suggested overlaying load coordinates onto the campus map for accuracy and varying power factor values based on IEEE research. The team also discovered new solar tools in Google Earth to assess panel placement feasibility. The goal is to finalize the base model and solar integration by March 24th, leading into an April proposal for potential upgrades, including battery storage and cost-benefit analyses.

### **o Past week accomplishments**

- Transmission Team:
  - Met with client, updated Semester 2 schedule and reviewed completed deliverables/revisions
  - Elevation REV 1, REV 2
  - Cable and Conduits REV 1
  - LLBOM REV 2 (Completed Deliverable)
  - Continued work on GA
- Distribution Planning Team:
  - Met with the client to discuss progress
  - Created geographic map of campus and load kvar/kw values

- Figured out efficient way to map solar panels onto campus buildings

o **Pending issues**

- Transmission Team:
  - Switching from ACADE to Bluebeam due to scaling issues in ACADE
  - Student Access to Bluebeam, must renew licensing as well as ensure and get set up with Bluebeam Studio Sessions Access
- Distribution Planning Team:
  - Continuing to experiment with OpenDSS and Google Earth Solar panel view

o **Individual contributions**

<b><u>NAME</u></b>	<b><u>Individual Contributions</u></b>	<b><u>Hours this week</u></b>	<b><u>HOURS cumulative</u></b>
Sean	This week I researched how to scale in autoCAD I found that the way I was trying to do it was just scaling the annotations. I think the models we were given can't be scaled the way we want them to so we are moving to blue beam.	5	55
Bethany	In these two weeks I have continued to work on the line number for the OpenDSS model. I also attended the meeting with Adam on 3/3 to set deadlines for the OpenDSS model.	5	57
Thomas	I have worked on researching commercial power factor standards to justify a variance in the loads on campus, as well as more model development in OpenDSS.	5	71
Nathan	I have worked on getting Solar feasibility studies for the approximately 15 buildings we flagged as suitable for rooftop solar using an experimental Google Earth Program	6	56
Mina	I worked on picking up comments for the Bill of Materials and getting it done for now. I also worked on getting the binder put together for the cable and conduits.	5	57
MacKenzie	Completed work on REV. 1 Elevation and started work on REV. 2. Took detailed meeting minutes of the Substation Meeting.	5	67

o **Comments and extended discussion** *(Optional)*

Regarding non-technical concerns, there are currently no issues. Our team is collaborating effectively, and communication has been smooth across meetings and tasks. We feel confident in our ability to continue working together successfully as we move forward with the project.

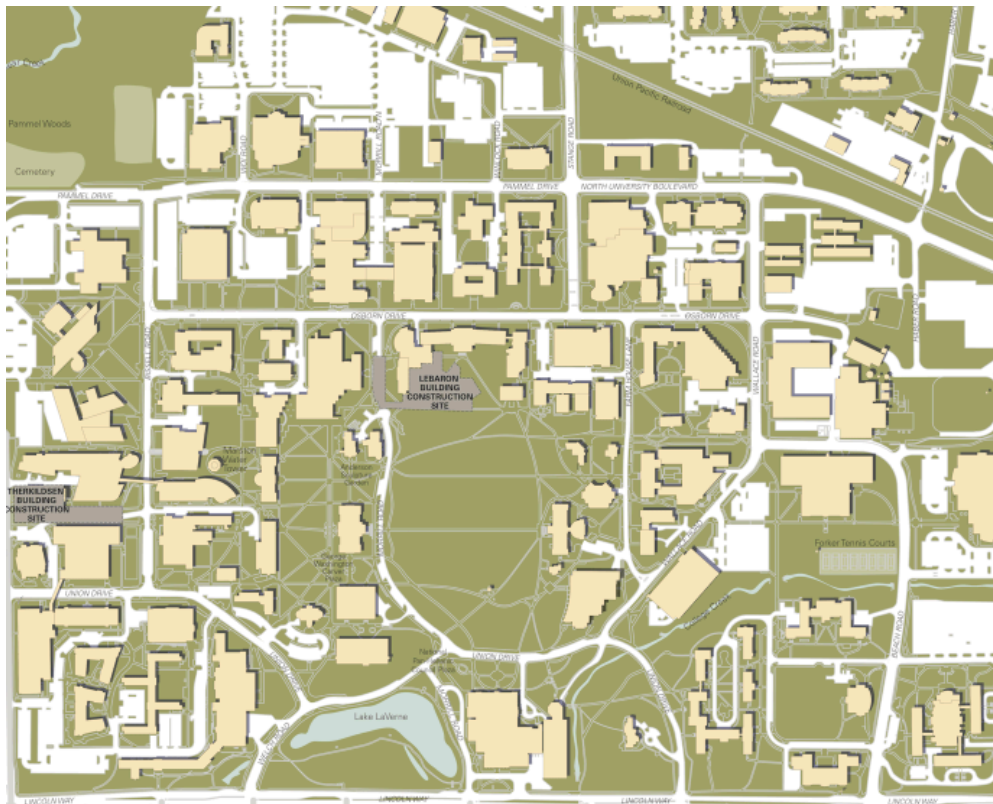
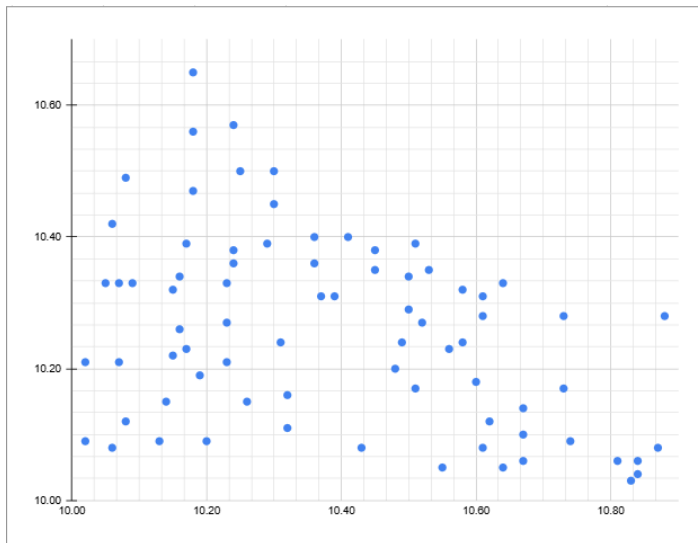
o **Plans for the upcoming week**

- Sean: Coordinate with Mina to get the Bluebeam version of the GA up and running. We have to recreate the GA so it might be tricky.
- Bethany: I will continue to work on the model in OpenDSS to have it ready for the March 24 date.
- Thomas: I plan on continuing model development in OpenDSS to reach the goal of having a preliminary model complete on Monday, March 24th.
- Nathan: I will continue performing the solar feasibility studies for the different campus buildings and charting my findings. Working to have a majority if not all done by the preliminary model completion date of March 24th.
- Mina: I will work on picking up any further comments on the cable and conduits, if there are any. I will coordinate with Seam to take over the GA while he is out.
- MacKenzie: I will continue to work on Elevations and become more familiar with Bluebeam. I will have revision 2 of Elevation and have the other views completed by this Friday, March 14th.

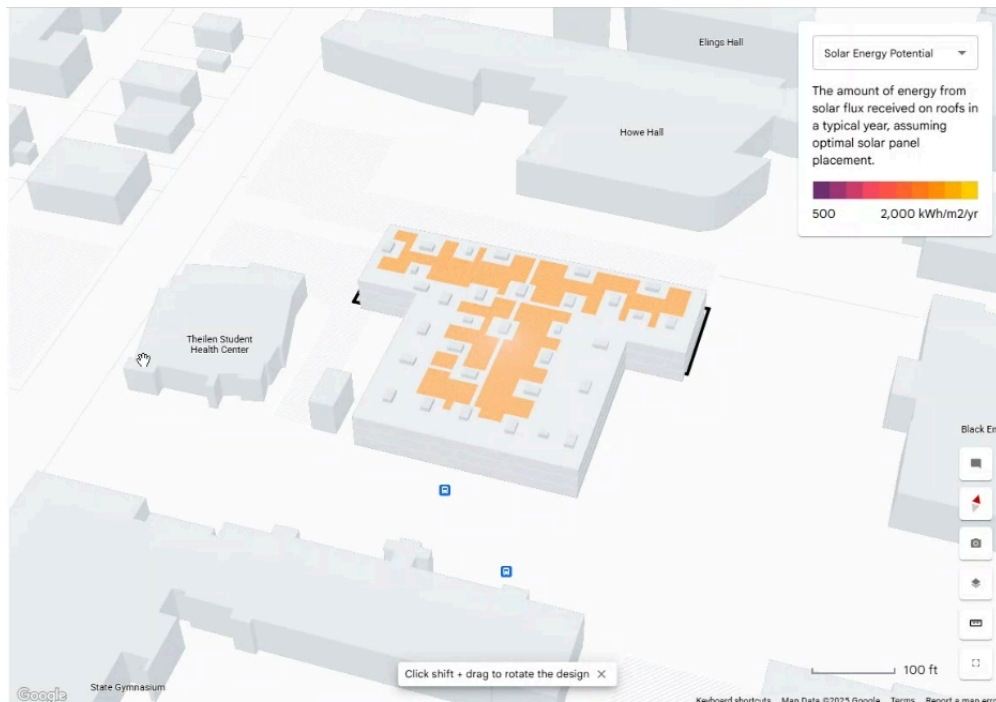
o **Summary of weekly advisor meeting**

3/3 Meeting With Adam Arnold (distribution):

In our weekly meeting with Adam, the distribution team clarified objectives and dove more into the model development timeline. The team discussed progress, with the completion of load coordinates from Thomas being laid out in an excel graph, shown below next to a map of campus (not all buildings included):



Adam suggested trying to overlay this with the campus map to demonstrate load position accuracy. The team had questions about power factor values (we were told from ISU FP&M that the values were all between 0.9 and 0.97, with an average of 0.95) and their variation among the systems. Adam told us to do research and vary these numbers, using IEEE articles and technical sources to justify any design decisions. Nathan introduced some new solar tools found in Google Earth, and demonstrated it on the Beyer gym building at Iowa State



The map shows where the panels could be placed, and also has a feature that can generate the cost feasibility of each building as well. This is a more accurate way to measure the solar panel space than the team had previously considered.

Moving forward, the distribution team and the client have set a goal of **Monday, March 24th** as a date where the model will be completed and ready for advancement. The client provided a paper of IEEE 123 Node testing that could be an alternative to the files Dr. Wang provided a network. After the base model is completed, the goal is to integrate the solar aspects that Nathan is working on (to also be completed by March 24th) so that the team can create a proposal for upgrades. This would occur in the month of April, and could potentially entail identifying times where there is an excess of solar and installing battery storage to maintain this value. There may also be cost/benefit analysis of each solar panel, as the levels of solar power produced may not justify the cost of installation on some buildings.

### 3/10 Transmission (Substation) Team Meeting with Client:

Here's a summary of our March 10th meeting and key action items moving forward:

#### **Safety Moment (Burns & McDonnell - Ergonomics)**

Be mindful of your workspace setup—ensure your back is supported, arms and legs are positioned comfortably, and your mouse and keyboard are on the same surface. Listen to your body and address any discomfort.

#### **Project Updates & Next Steps:**

- **Schedule:** Elevation & Conduit drawings are due **March 14th (Friday)**. Mina has already sent the Cable Conduit figures to be used.
- **GA Deliverables:**
  - Sean adjusted the viewport scaling, but the sizes still don't make sense in ACADE. He will switch to Bluebeam to continue work.
  - If Bluebeam doesn't function properly, he may need to scale manually using a known reference (e.g., a 10-foot dimension).
  - Mina may shift focus to the GA while Sean is in Italy, ensuring progress continues. Sean may take over cable/conduits upon his return.
- **Bluebeam Transition:**
  - Switching to **Bluebeam Studio Sessions** for collaboration on physical drawings (Elevations, GAs, etc.).
  - This will streamline Cable Conduit and Grounding work.
  - Sean will create a Bluebeam Studio session before leaving for Italy and share it with the group. If needed, we can designate one person to manage it if Studio is unavailable in the student version.
  - Studio allows real-time collaboration—comments made by other people can't be deleted, but files can be saved externally, updated, and then reuploaded.

#### **Action Items:**

- Emily will gather equipment dimensions.
- Sean will organize the GA cells for Mina, who will start addressing comments.
- Elevation updates: Pick up comments, add proper buses and labels, and incorporate additional views.
- GA updates: Add a control enclosure (placement is flexible), potentially with a surrounding fence to route cable and conduit.

#### 3/10 Meeting With Adam Arnold (distribution):

Adam had a site visit scheduled and was traveling, and was unable to meet at our scheduled time. The next meeting for the distribution team will be on Monday, March 24th.