

EE/CprE/SE 491 WEEKLY REPORT 3

Start Date - February 13, 2024

End Date - February 20, 2024

Group Number: 02

Project Title: Ames Substation

Client &/Advisor: Burns & McDonnell / Hugo Villegas

Team Members/Role:

Derek Elkins - Project Lead

Patrick Musoy - Pilot Scheme Researcher

Mackenzie Ray - Meeting Manager

Nathan Tegeler - Pilot Scheme Researcher

Matthew Wells - Pilot Scheme Researcher

Weekly Summary:

This week, we focused on finishing our initial research and finalizing our selection for both the station's bus configurations and the pilot schemes for each line. The three group members in charge of the pilot schemes met and discussed all of their findings and consolidated their research. Regarding the bus configuration, those two group members decided to use a breaker-and-a-half bus configuration at this station as they felt it was the best choice given the needs of this project. Derek and Matthew met with our advisor, discussed where each sub-team was in their research, and gave a general overview of what scheme/configuration we will be moving forward with.

Past Week Accomplishments:

Mackenzie Ray: Finally, chose a bus configuration (breaker and a half) to start designing and implementing into the site.

Patrick Musoy: Researching pilot schemes for different transmission line protection, power line current and permissive overreaching transfer trip (POTT), directional and phase comparison, and protective relays. Research on the difference between POTT, DCUB, and DUTT, and when to use them.

Derek Elkins: Chose a breaker and a half to be our bus configuration. I am starting to get everything ready for the CAD.

Nathan Tegeler: Finalized piloting scheme research and selected pilot schemes to use for each of the 4 transmission lines. Met as a group for the piloting schemes to go over findings and started piloting scheme report. Researched how protection schemes change for circuits with inverter-based generation compared to conventional synchronous generation. The main difference between these is that there is no overcurrent from inverters; this means that faults are harder to detect.

Matthew Wells: Finished researching relay types involved in pilot and non-pilot schemes. Compared the relevant pilot schemes based on their dependability, security, and speed. Met and discussed with the pilot scheme group about the potential primary and secondary schemes we would use for the different transmission lines. Started to finalize our findings in a more comprehensive report.

<u>Name</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>Cumulative Hours</u>
Derek Elkins	Finalized bus configuration type	0.5	4.5
Patrick Musoy	Researching pilot schemes for different transmission line protection, POTT, relays, and other protection system lines.	1.5	3.5
Mackenzie Ray	Chose a bus configuration	0.5	4.5
Nathan Tegeler	Piloting selection for transmission lines. Researched different relays and schemes that work for inverter based transmission.	4	10
Matthew Wells	Relay Types and Scheme research. Pilot and Non-Pilot Schemes	4	7

Action Item Table

Status	Action Item	Assigned to	Due Date	Priority	Notes
Complete	Piloting scheme research	Patrick Nathan Matt	2/18	high	Will now start a report to finalize our

					findings.
In progress	Bus configurations	Derek Kenzie	2/20	high	Chose a bus configuration, will start report and active design this coming week
Not started	Sight layout	Derek Kenzie	tentatively 3/1	Medium	
In Progress	Piloting scheme report	Patrick Nathan Matt	2/27	high	

Plans for Upcoming Week

Mackenzie Ray: I plan to meet with Derek and start the design for our breaker and a half bus configuration. I am also planning on setting up and possibly completing our report covering why we chose breaker and a half configuration.

Patrick Musoy: Finalizing the pilot scheme research report by deciding as a team which pilot scheme needs to be used for each line, and establishing the bus configuration with protection lines. Research more on the bus configuration and transmission line protection.

Derek Elkins: Kenzie and I are going to meet to start the design for our bus configurations. We are looking at designing the overview, one-line, and elevation.

Nathan Tegeler: Complete piloting scheme report. This will include describing the system and providing explanations for why we picked each pilot scheme for the respective line. We will also need to review the selected bus configuration to identify the protection for the bus.

Matthew Wells: I will work on the pilot scheme report so that at the start of next week, we can receive specific feedback from our client on our decisions. The report will involve identifying the specific type of scheme for each line, as well as a thoughtful justification for each scheme.

Summary of Weekly Advisor Meeting

We talked with our Advisor about the updates of where we are. The meeting was not long but Derek updated him on the current progress with bus configurations. Matthew updated him with the knowledge they had on pilot schemes. We told him our plans for how we are going to progress with the pilot schemes and the bus configurations. He made sure that we knew we could ask questions as we start getting into the design aspects.