

Contextualization /Design Check-In

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What is a substation?

A substation acts as a middleman in the electricity supply chain.

It takes voltage from one level to another.

- Step up - low to high
- Step down - high to low

A Bus is system of uninsulated conductors that carry electricity from one point to another



Project Overview-Ames Substation

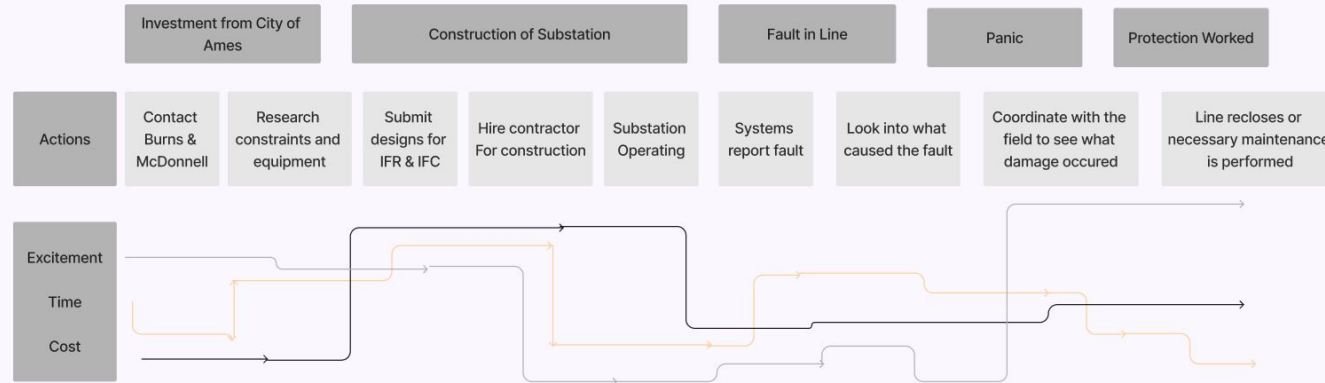
- Our main goal is to tap in a 69kV, 2 MW solar farm into an existing substation
- This station already has 3 input lines, the solar farm would make four
- Each lines requires a different pilot/relaying (communication of system) scheme based on its specific needs and standards
- Must design a bus configuration system that will implement the new line with a high level of reliability and a relatively low level of complexity to make both designing and maintenance easier
- End goal is to have a dynamic simulation with an event analysis report



Artifacts - Journey Map

Substation Owner

The owner of the substation has a major capital investment they want to be well protected in the event of a fault.





Artifacts - Pros and Cons Table

	SEL	General Electric	ABB
Pros	Reliable Great customer service	They provide a wide variety of equipment	Been around for a long time
Cons	Expensive	terrible customer service	Have subpar devices

Human

- Provides reliable power
 - Happy customer
- Thorough documentation
 - Design reports
- Spacing of lines for ease of maintenance
 - Account for maintenance vehicles/equipment
- Using SF6 Breakers
 - Reduce space





Economic

Economically friendly design choices:

- Using a lower cost autotransformer
- Using more dependable relays
 - Minimizes the need of replacement
- Advanced predictive maintenance





Technical

The internal complexity for our system comes from the interactions amongst relays, CT, CVTs, and other metering devices.

The external complexity of our design is maintained with the use of updated PSCAD software and industry standard electrical components.





Conclusion

- Challenges
 - Addressing the user needs and making the project economical as we don't have a budget.
 - Meeting required objectives for this cost user impacts.
- Not worried about cost
 - Focused on ensuring that equipment
- Meeting technical requirements has been re
 - Multiple reports completed
 - Some drawings started
 - I/O assignments

costs

