EE 492
Extra credit 1

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The goal of our project is to improve a part distribution system. As a utility company project, we trust the satisfaction of consumer and economic benefit of the sponsor are two biggest things for our project. That is why we decided to design our model based on reliability and economy.

We search some projects about the improvement of power distribution system on online. The project of Japan International Cooperation Agency lists similar objectives with us [1]. The first one is to provide reliable and stable electricity for people at cost-effective price. The system reliability and company economic benefit should be the most important things for all utilities. And another one is to reinforce and extend the existing power distribution systems. Actually, we knew our industrial customer has a future plan to extend the size of the plant in our last meeting. That is why we add the flexibility point as the based direction in our project. But it is still really hard to predict the load salutation in the future.

In our project, we intend to use the underground cable to instead of the overhead line. The underground cable has some specific advantages rather than overhead line. Based on current material and technology, the underground cable can decrease the damage percentage, better lifetime and less impact under several kinds of weathers. Though the visit some utility websites, we find a lot of utilities already plan to replace a part underground cable in their distribution systems. The NAVAJO TRIBAL UTILITY set up the completely underground electric construction standards to guide the design of power distribution system with underground cable [2]. In our design, we use the U.S Department of Agriculture Rural Utilities Service specification handbook as our construction standard. In the connection point, we plan to combine the overhead line and underground cable because of the high cost of underground cable. We plan to use underground risers to build the new underground circuit with the old overhead line. That will decrease a lot of costs. In NTUA construction standards, it also thought this combination of the system appears to provide for the most economical and efficient design [2]. And from NTUA standard, we find we miss some devices in the underground cable distribution system. Like, Switching cubicle and Pad-Mounted Voltage Regulators. That can help us to have different cost analysis plan. Such as we maybe use voltage regulators to support the stable voltage level. It can replace the high-cost type underground cable and capacitor bank.

On the same time, we visit some engineering company website, like DGR engineering, a foundation build company in Midwest. Actually, our project is really similar with DGR engineering project[3]. For example, the project of the city of Saint Peter, Minnesota converts City's electric distribution system to underground construction [4]. Our sponsor has the similar final goal about distribution system – to bury all overhead line to the underground cable. From the city of Saint Peter project, the multi-year plan should be considered. Because we maybe cannot build the whole new routine at one time, that will influence a lot of customer's life. A detail multi-year plan is important for our sponsor. Another interesting project is the project of City of Sioux Falls, South Dakota [5]. This topic of the project is to add three more mainline distribution circuits to increase reliability and improve aesthetics. Even though we

cannot design more mainline in our project. But that will be a good suggestion for our sponsor in the future upgrade.

In our report, we plan to list some suggestions that we find in the design process for the whole system, such as using the solar panel to solve the uncertainty future load problem. Though the similar project's information, we check our project main direction and get some ideas to improve the detail. That will be helpful in the final report.

Reference:

1 ."Activities in Ghana." Project for Improvement of Power Distribution System | Countries & Regions | JICA, www.jica.go.jp/ghana/english/activities/activity07.html.

2. "2014 Underground Electric Construction Standards." 2014 Underground Electric Construction Standards, NAVAJO TRIBAL UTILITY, 2014, www.ntua.com/comstan/2014%20Underground%20Electric%20Construction%20Standards.pdf.

3. DGR Engineering: DGR Engineering, www.dgr.com/featured-projects/Electrical-Power.

4. "Electric Distribution Conversion." Electric Distribution Conversion, DGR Engineering, www.dgr.com/uploads/content/SaintPeterElectricDistributionConversion.pdf.

5. "Mainline Distribution Circuit Additions." Mainline Distribution Circuit Additions, DGR Engineering, www.dgr.com/uploads/content/SiouxFallsMainlineDistribution.pdf.