

The analyses performed in this report are a result of information collected over the past two semesters. Gathering background information about the Water Bottling Facility gave way to the potential for modifications of the mechanical, acoustical, and electrical systems of the building. These analyses were run to give the author of this report a greater understanding of building systems in an environment that adapted to the student's interests.

The mechanical depth portion of the report focuses on the main subject of incorporating a ground-coupled heat pump into the HVAC system with smaller analyses of duct changes and exhaust additions.

The GCHP analysis found that the Water Bottling Facility could save over half of a million dollars annually if they were to replace the current HVAC system in the building with the researched system. The incorporation of the GCHP would use the buildings existing duct layout and internal controls while replacing the air-handling units with rooftop heat pumps. In order to implement this system the south parking lot would have to be decommissioned for the duration of construction because it is the location of the well field. After adding the system to the building, the Water Bottling Facility will see a reduction in energy costs as well as know that they are reducing their emissions by over 25% on the mechanical side.

After examining the fabric duct issues in the Water Bottling Facility it became evident that the design was not the problem, but the material used in the design. After research into different duct options, the conclusion was drawn that the best option was to keep the original duct layout and update the duct to a more durable solution that meets USDA standards.

Looking at different exhaust options gave way to the idea of controlled louvers with a hood to block weather. These vents will provide a means for heat to escape from the building without using much more electricity than is already used with the potential to offset the amount of time that the HVAC system is required to run by reducing the buildings load.

The acoustical evaluation found that the sound levels in the production area were higher than recommended by OSHA. To correct this it was suggested that, FDA and USDA approved acoustical baffles should be hung from the ceiling. The addition of 6,000 baffles will reduce the sound level of the space by 10 dBA, which will make the space fall below OSHA's recommendation.

The Electrical Analysis focused on the use of photovoltaics to contribute to the energy supplied to the Water Bottling Facility. In this analysis, it was found that due to the enormous electrical demand of the building, a photovoltaic array would not contribute much to the electrical supply. It was also found that the payback period for the array would be infinite and therefore not a feasible option for the Water Bottling Facility currently.