

1.0 Executive Summary

The M Resort is a multi-use casino, spa, and luxury suite space located in Henderson, Nevada just south of the Las Vegas strip. Through the analyses done in the previous technical reports, it was discovered that the building's mechanical system could be improved. The building utilizes a large amount of energy to maintain all the services offered throughout the year.

The Purpose of this mechanical redesign is to further analyze the central utility plant and the energy it consumes. The Las Vegas area attains a large amount of its power from the Hoover Dam, and with such a large demand for this power, the consumption and demand charges are some of the highest in the nation. Through an examination of all general utilities, it was discovered that the natural gas is at a marginally lower price than electricity.

Due to the difference in natural gas and electricity prices, a system of cogeneration was selected for the redesign. This system uses natural gas to generate electricity and the waste heat from this process can then be employed for building uses. This will create a large amount of waste heat and absorption chilling would be a great alternative to use this heat and replace the centrifugal chillers.

Though this report it was discovered that generating the full electricity usage of the building generates more heat than can be efficiently used by the building. Therefore another option of generating to meet heating demands was simulated as well. These options were evaluated based on first cost and annual utility costs. The result was that generating to electrical consumption created very high gas costs, and generating to heating demand produced larger costs than the existing system. Both systems had larger first costs as well. The emissions of the both redesigns were less than the existing system which could mean a cost effective system if carbon taxes and credits were significant in the future.

This redesign affects other systems in the central plant as well. The electrical system is most directly affected. With the differing chillers the electrical loads on the system change and thus the panel boards and wire sized needed to be augmented. Also the generating equipment creates additional acoustical loads on the central plant. Hence the walls and surrounding spaces were analyzed to verify the sounds emanating from the equipment would not affect guest areas.