

Executive Summary

This report is an evaluation of the existing mechanical system for Terminal 3 at McCarran International Airport in Las Vegas, NV. It includes design conditions, ventilation requirements, design loads and energy analysis as included in previous technical assignments. In addition, this report also includes a summary of design considerations, a summary of equipment, a description of how the system operates, and a critique of the system.

As demonstrated in Technical Assignment 1, Terminal 3 is mostly compliant with ASHRAE Standard 62.1-2007. A breakdown of the design outdoor airflows for each air handling unit is included in the body of this report. Design loads and energy analysis were discussed in Technical Assignment 2, and are included here for reference. Trane TRACE was used to perform the load estimations as well as the energy analysis. The data included in this report was provided by the mechanical design engineer, and represents the estimates used to design Terminal 3. A new analysis could not be performed due to various limitations. The calculated total block cooling load for Terminal 3 is 9,600 tons; and the total block heating load is 76,166,959 Btu/h. An annual cost analysis is included in the body of this report, but should be considered inconclusive as the model was intended only for system sizing and was never intended for energy analysis.

The Department of Aviation had several requests related to the design of Terminal 3. In general, it was requested that the design of the new central plant be as similar as possible to the existing central to simplify maintenance and operation. The most basic request of the owner was to ensure an efficient system capable of meeting peak demand loads. The comfort and satisfaction of passengers within Terminal 3 is considered the primary goal related to the design of the mechanical systems.

The chilled water system is a variable primary flow configuration with a peak cooling capacity of 11,000 tons being provided by five 2,200 ton centrifugal chillers. The condensing water system demand is met by five field erected concrete cooling towers. Two plate and frame heat exchangers are also provided for chilled water return pre-cooling and waterside free cooling. The heating hot water system is a primary / secondary system with a peak output capacity of 105,840,000 Btu/h being provided by six 21,000 MBH boilers. A total of 88 air handling units are included at Terminal 3, with an additional three units serving the central plant. These units are either Variable Air Volume (VAV), Single Zone Variable Air Volume (SZ VAV), or Constant Volume (CV). Many of the air handling units are equipped with variable frequency drives.

The existing mechanical system design of Terminal 3 seems to be appropriate for such a facility, with a high amount of consideration given to thermal comfort and indoor air quality. While the system appears to be adequately sized to meet the expected swings in occupant density, one must consider if the issues of energy consumption have been fully analyzed. The use of alternative technologies may help to reduce annual energy costs, and should be given further consideration.