

## Executive Summary

This proposal is for an alternative design to a portion of the mechanical system of Terminal 3 at McCarran International Airport located in Las Vegas, Nevada. The proposal outlines other alternative designs that were considered, as well as reasons why they were disregarded. In many cases, it was felt that these other alternative designs would not have a significant enough impact on the overall system to warrant further investigation. Many alternatives were also eliminated due to a lack of educational benefit.

The proposed thesis is a displacement ventilation strategy through the use of an underfloor air distribution (UFAD) system. It is proposed to utilize this design strategy in the airline gate hold rooms, as well as on the airside concourse of the terminal. Both of these areas are located on the southern portion of level 2. The existing system for the hold room areas is an overhead mixing system, which uses linear diffusers in the ceiling to achieve air distribution. The existing system for the airside concourse also uses a mixing system, but the air distribution comes from sidewall diffusers located high on the northern side of the concourse.

Preliminary research has indicated that the proposed thesis will likely achieve better indoor air quality and thermal comfort. Since these are two major concerns for these spaces, it is reasonable to believe that displacement ventilation is justified for these areas. Furthermore, the proposed thesis will also create the chance to learn about an emerging technology with many other potential applications.

The proposed thesis also covers two breadth topics in other engineering disciplines. The first of these breadth topics is an evaluation of the acoustical characteristics of the space. The existing design employs both sound attenuators and duct lining to reduce the acoustical impact of HVAC noise. Since the alternative mechanical design will result in lower air velocities, the possibility exists that these acoustical treatments will no longer be required in these spaces. The proposed acoustical analysis will also look at other noise factors within the space; including the operation of jet engines outside, as well as the noise from general activity inside the terminal.

The second proposed breadth topic will evaluate either construction management or architectural aspects of the same spaces. The addition of a raised floor will be required to accommodate the UFAD system. This has obvious cost and scheduling impacts that will have to be considered in the analysis. At the same time, this new floor system will also have architectural impacts on the space. Consideration will have to be given to accommodating this new floor system without significantly affecting ceiling heights in the spaces. Furthermore, the raised floor will have to make a smooth and level transition to areas that will not include a raised floor. This will likely require altering some floor elevations in other areas.

Most of the proposed work will be performed in accordance with various design guides that have been obtained on displacement ventilation and UFAD systems. These guidelines will serve as the major tool for completing the design process. Additionally, load simulations will be performed with Trane TRACE or similar software. The possibility also exists for some CFD modeling on airflows within the areas of proposed modification.