

Conclusion

The underfloor air distribution system is a viable option for the Proscenium Theater. Underfloor air distribution eliminates supply overhead ductwork in the theater, decreases the required outdoor air, and remains within the acceptable acoustical levels. The biggest feasibility issue with the underfloor system is the structural aspect of the plenum on the balcony. In order to affect the rest of the Center for the Arts building as little as possible the floor-to-floor height from the first to second level was not changed with the addition of the four-foot plenum on the balcony. The entrances to the balcony are all at the level of the middle row of seating and therefore occupants must walk up steps when entering from the back of the balcony and down steps when entering from the front side of the balcony. The structural steel supporting the balcony will need to increase in size in order to carry the additional load of the elevated slab.

There will be a large coordination issue with the placement of the diffusers in the elevated slab. In order to maintain the structural integrity of the elevated slab the holes cored into the slab for the floor diffusers should avoid the rebar as much as possible. Coring the holes after the curing of the concrete will increase cost and labor over leaving holes for the diffusers when pouring the concrete but the placement of the seats could be adversely affected if the holes are placed before the seats.

The underfloor air distribution system decreases the required supply fan horsepower due to a decrease in static pressure and decreases the cooling coil size due to a decrease in the required outdoor air because the air is delivered directly to the occupied breathing zone both of which ultimately result in a decrease of energy consumption.

The supply ductwork in the ceiling catwalk area of the Proscenium Theater is eliminated in the underfloor air distribution system thus leaving ample room for lighting fixtures for the theater performances. The only ductwork that remains in the ceiling catwalk area is the return ducts that collect the return air from the return air shafts in each of the corners of the theater.