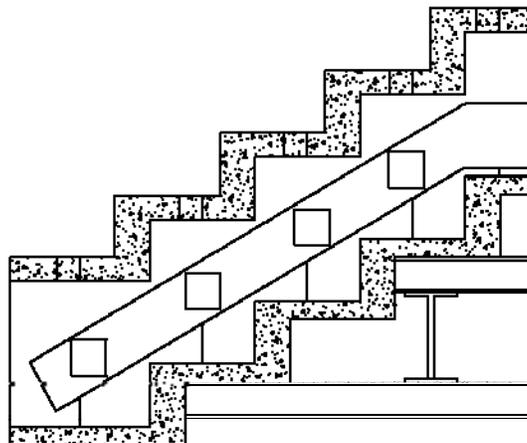


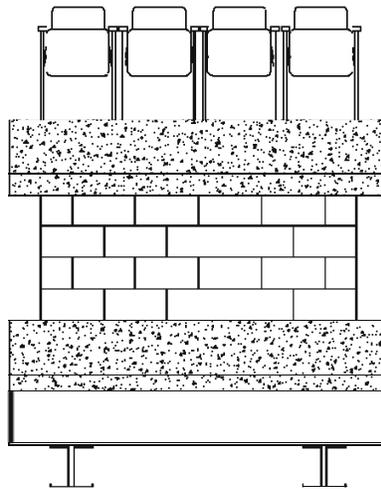
## Structural Design

### Underfloor Plenum Design:

The implementation of the underfloor air distribution is dependent on there being a plenum under the floor for the area where air needs to be supplied. In order to provide a four foot plenum below the seating area on the first level, the entire foundation for the Proscenium Theater needs to be four feet deeper. Once the present floor plan is depressed four feet, an elevated slab is built. The elevated slab is supported by 10' long rows of grout filled CMU blocks placed approximately 8' apart. The elevated slab will be 12" thick and therefore need a reinforcing in both the top and bottom of the slab. The reinforcing will be #4 bars in each face of the concrete each way.



The balcony will also utilize a four foot plenum for the supply air. The balcony will be raised up four feet in a similar fashion to that of the first level with an elevated slab. The balcony elevated slab will be supported by grout filled CMU blocks. The grout filled CMU blocks will be positioned above lateral supporting I-beams in the balcony. The I-beams that are perpendicular to the seating (main support for the cantilever of the balcony) will increase in size from W12x50 to W16x31. As a result adding the elevated slab to create the plenum the columns that the beams supporting the cantilever connect into will need to be designed to carry a larger load. The elevated slab in the balcony essentially doubles the amount of concrete that the column needs to support. The column will need to be increased from a W10x45 to a W10x60. (Calculations in Appendix F)



The structural support for the balcony is cantilevered steel I-beams connected to columns in the Orchard Street Lobby adjacent to the back of the auditorium. There are also four circular columns supporting the front of the balcony in the Proscenium Theater.

Since the balcony is raised up four feet, the third level of the Proscenium Theater, which contains the Spot Booth, must also be raised up four feet. The third level is only accessible from within the theater so raising the top level of the theater will not affect adjoining the theater to the rest of the building.

Where the theater has access to the rest of the building on the second level the height discrepancy from raising the balcony must be accounted for. There are four entrances to the balcony two are located at the rear of the balcony and then there is one on either side of the stage. The rear entrances will enter the balcony at the middle row level then have the occupants climb several steps to get to their seats on the back two rows. From the side entrances, the occupants will go down a set of steps to get to the first and second rows of seating.