

ERIC MUELLER

STRUCTURAL OPTION  
ADVISOR – DR. LEPAGE  
AE 481W  
OCTOBER 27, 2006

555 12<sup>TH</sup> STREET  
OAKLAND, CALIFORNIA



---

Technical Report #2:  
Pro-Con Structural Study of Alternate Floor Systems

Executive Summary

The purpose of this report is to analyze alternate floor framing systems and determine if they are a viable alternative to the existing system. The existing floor system consists of 2 ½" concrete slab over 3" deck that act compositely with the steel frame. Beams sized as W18's, span 43.5' in the critical bay and are supported by W24-W27 girders. Alternative floor systems were compared to one another based on several criteria, and are listed below. Most important were weight of the system, ability to span long distances, ease of construction, and cost. Secondary were floor system depth, fireproofing, and vibration control.

- Concrete Pan Joist
- Precast Hollowcore
- Non-Composite Slab/Steel
- Composite Joists

After analysis, concrete and precast systems were determined to be the least efficient. While they are inherently fire resistant, and do not require fireproofing, they are inefficient in spanning long distances. This long span is needed for the column free floor plan. Also, the weight of the system is unfavorable in the high seismic region. Foundation and lateral system redesign would be required, which can be very costly. Their benefits were in vibration control and relative cost. Non-composite steel joists offer long spans, lighter weight than concrete, and ease of construction. No shear studs are required in this system which saves cost and time over the existing. The members are larger which increases foundation loads, and costs, but is worth further investigation. Lastly, were the composite joists systems which offer a light weight and efficient system, and is worth further investigation. Joists are able to span long distances and carry the floor load. These are relatively expensive compared to the other systems, because of the need for shear studs. However, reduction in overall weight of the building will reduce foundation and lateral system costs.