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10/31/05
AE 481W

Structural Technical Report 2

Pro-Con Structural Study of Alternate Floor Systems

Executive Summary

The purpose of this report is to provide a descriptive analysis of, as well as a comparison between, the existing floor system of the Koshland Integrated Natural Science Center and the design of four alternate typical floor systems. The report provides detailed information on the current floor system and also the factored loads that were used to design the existing system. The design loads were taken from the drawings and confirmed with the BOCA 1993 code. The analysis focused on a typical bay of the current floor system which was calculated by hand and was also verified with the PCI Manual for the Design of Hollow Core Slabs (2nd Edition) and the CRSI Handbook (2002). The alternative floor designs were also analyzed by hand calculations which can be reviewed in the Appendices following this report.

The following portion of this report consists of the designing of four floor systems as alternatives to the existing system. All four systems are significantly different from one another. The floor systems that were selected for design include a one-way pan joist system, an open-web steel joist system, a composite beam/composite slab system, and a precast double tee beam system. In this section of the report, each alternative floor system is described, followed by a sketch of the typical bay incorporating the system described. In addition, several advantages and disadvantages of each of the alternative systems are discussed and compared briefly. Also, as referenced in the body of the report, calculations, design tables, and complete design details are included in the report as Appendices.

Finally, the last section of the report compares the advantages and disadvantages of each system in table format. The categories that are compared as the advantages and disadvantages are floor depth, self weight of the system, impact of construction schedule, and cost. With the information from the comparison table, the conclusion of the report emphasizes that the existing system proved to be the most efficient for this building. However there are other systems that could be considered as realistic possible alternatives such as the open web steel joist system or the double tee beam system.