Executive Summary:

Pro-Con Structural Study of Alternate Floor Systems is an investigation into possible alternative structural systems for Lexington II in Washington DC. For this report, several structural systems were designed and analyzed for the existing conditions in Lexington II. The results of the system designs were then compared with various criteria to determine which system is the more feasible redesign for Lexington II.

The existing system for Lexington II is a two-way flat plate slab system. This system is structural the thinnest possible floor slab, an important consideration in Washington DC where zoning requirements restrict height.

Other systems evaluated and designed as alternatives for Lexington II include;

- One-Way Flat Slab
- One-Way Joist System
- Concrete Slab on Steel Deck and Steel Framing
- Composite Slab
- Pre-cast Floor Slab

The first issue to arise was the need to regulate the existing column grid. To design the alternative systems, a new column grid was assumed with larger spans. Other issues looked at were effects of each system on foundation, lateral design, vibrations, and fireproofing. All designs proved to be either lighter or similar to the existing two-way slab in weight, creating no dramatic change in foundation. Also, all of the alternative designs can work well with the existing shear walls as lateral support. Some systems may be able economize the lateral system by redesigning the framing system as either moment or braced frames. Fireproofing and vibrations caused no major issues among any of the floor system analyzed.

The controlling factor in determining feasibility of a new structural system was floor sandwich depth. This found that either a one-way joist system or a composite system were the best choices for a building redesign.