Conclusion

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The objective of this study was to evaluate the design implications of incorporating an alternative system into the design scheme of a two-way post-tensioned flat plate. The proposed criteria of the redesign included maintaining the architectural integrity of the residential spaces without exceeding the overall building height limitation. The reinforced flat plate redesign met these criteria providing a flat ceiling surface without obstructions to mechanical soffits. Ceiling heights within residential units were also maintained without exceeding the building height limit.

Design implications of the reinforced flat plate included the increased structural depth to accommodate for the large span to depth ratios achieved in the post-tensioned design. Structural costs were higher with a majority of the cost difference from additional reinforcement required in the redesign of the flat plate. The flat plate thickness also impacted the gravity and lateral system designs of the building. Column dimensions increased as well as the required specified concrete strength to maintain a uniform column size throughout the building. The proposed system also increased building weight resulting in a design adjustment to the proposed shear wall system. The flat plate was incorporated into the lateral design with required additions to the central shear walls to meet displacement and story drift limits. The average duration for the completion of a typical level was shortened without the added construction time of placing and jacking the post-tensioning. Although the proposed system met the design criteria, the overall structural design of the building and associated costs are more feasible with a two-way post-tensioned flat plate design.

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