CHAPTER 5. CONCLUSION

5.1. CONCLUSION

Conclusion Based on the results of the pushover analysis and the performance evaluation conducted according to ASCE 41-23, the following conclusions are drawn:

1. Effect of Shear Wall Addition on Global Stiffness: The addition of concrete shear walls significantly improved the lateral stiffness and strength of the existing structure. All strengthened models (Model 2, 3, and 4) exhibited a substantial reduction in target displacement and an increase in base shear capacity compared to the Base Model (Model 1).
2. Effect of Configuration on Performance Ranking: The placement of shear walls plays a critical role in determining the structural performance and failure mechanism. Based on the evaluation of Life Safety (LS) criteria and the sequence of damage, the models are ranked from most effective to least effective as follows:
    a. Rank 1: Model 2. This configuration proved to be the most effective. It provided a balanced stiffness distribution, successfully delaying the formation of brittle failure mechanisms. Model 2 is the only configuration that fully satisfied the Life Safety (LS) performance objective in both X and Y directions.
    b. Rank 2 & 3: Model [X] and Model [Y]. Although these models offered higher initial stiffness than the base model, they failed to meet the LS criteria due to premature [mention failure type, e.g., shear failure in walls/beams] in the Y-direction.
    c. Rank 4: Model 1 (Existing Building). The original structure showed the poorest performance, governed by early brittle shear failure in beams and failing to meet both IO and LS criteria.
3. Compliance with ASCE 41-23 Objectives: While all retrofit schemes improved the structural behavior, simply increasing stiffness does not guarantee compliance. The analysis confirms that Model 2 is the recommended retrofit strategy as it successfully mitigated the risk of collapse (LS Satisfied) without inducing premature brittle failure in the supporting elements.

5.2. RECOMMENDATION

For future research and further development of this study, the following recommendations are proposed:

1. Advanced Analysis Methods: This study utilized Non-Linear Static (Pushover) Analysis. It is recommended to validate the results using Non-Linear Time History Analysis (NLTHA) to capture the dynamic behavior and energy dissipation of the structure under real ground motion records.
2. Foundation Evaluation: The current study assumed a fixed-base condition. Future studies should consider Soil-Structure Interaction (SSI) to evaluate the impact of the added shear wall weight and stiffness on the existing foundation system.
3. Economic Feasibility: While Model 2 is technically superior, an economic analysis (cost-benefit analysis) should be conducted to compare the construction costs of each configuration against the level of safety provided.