Architectural Engineering 2013 Senior Thesis

Senior Thesis Final Report

Reston Station Phase 1 Garage | Reston, VA

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Executive Summary

The purpose of this report is to present the findings of four construction analysis topics pertaining to the Reston Station Phase 1 Parking Garage. The garage consists of 1.3 million square feet of parking space making it the largest parking structure east of the Mississippi River. Planned future developments include 3 office buildings, a hotel, and a large apartment building on the above ground levels of the structure. The construction schedule duration was 28 months and the project budget was $93 million.

The first analysis presents the findings of research regarding the use of public-private partnerships in the construction industry. The members of the partnership at Reston Station are Comstock Partners (private owner) and Fairfax County (public owner). Public private partnerships are relatively common in infrastructure construction related to transit and utility needs but are rare in commercial construction settings. The investigation into the partnership at Reston Station and other public private partnerships revealed a weak point when it comes to decision making but also found that the best solution is early determination of a decision making model for the project.

The second analysis investigates the use of bonded warehouses to mitigate risks encountered with onsite storage of equipment. It was found that a short term month-to-month logistics service would be far more cost effective that leasing an entire ware house over an extended period of time. In the case of Reston Station, it would have cost $6,000 per month to store equipment in a third part facility and $48,000 per month to rent an entire warehouse facility under their operation.

The third analysis sought to determine the benefits and costs associated with the use of short interval production scheduling (SIPS). From this, a structural engineering analysis was also done to evaluate the reshoring requirements for the garage slabs. Results were analyzed by incorporating SIPS sequencing and redesigning the slab so that reshore requirements allowed for 2 framed slabs with 2 reshored slabs. This resulted in finish sequence completion date 85 days earlier than the baseline schedule at a structural redesign cost of $200,000

The fourth and final analysis concentrated on one of the design coordination issues faced on the project due to the participation of 3 separate design teams on various projects on site. Specifically, the addition of mechanical chases was evaluated to ease the tight coordination requirements with slab penetrations between current construction and future buildings still being designed. The size of the main building drains for both storm and sanitary waste for each of the future buildings was found in a mechanical engineering analysis and the chases were sized accordingly. It was found that the addition of chases would increase the project budget by $99,000 while core drilling when necessary would only cost $11,000.