Structural Study Results

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1200 Architectural Engineers, PLLC (1200AE) has been retained by St. John’s Church Foundation to perform a structural investigation and analysis of the existing roof structure as well as an assessment of conditions at the north end foundation wall. The structural investigation looked at the north addition truss system, both in its existing configuration as well as considering the possible removal of the tie rods. The roof structure analysis aimed to resolve the question of whether the tie rods could be removed following upon the reduction in roofing weight with the replacement of the Hendricks tile with metal. The existing configuration, a combination of historic timber framing with substantial reinforcement with structural steel from a 1963 renovation, was found to be robust structurally, having ample strength for the current and future loads. With the proposed removal of the tie rods, the structural analysis found the members of the structural system to still have sufficient strength to carry the required loads without failure, however the modification was found to result in excessive deflections of both the roof ridge and the tops of the supporting walls; in effect, with the removal of the tie rods, the truss bases would spread outward and the ridge would sag. In addition to being visually apparent, the predicted movement would also likely result in cracking in finishes and possible damage to the supporting wall construction and stained glass windows. As such, 1200AE concluded that the tie rod removal should not be implemented without also structurally strengthening the roof truss system.

Moving from the highest reaches to the lowest, 1200AE also explored the north end foundations and surrounding sanctuary floor framing. Although the majority of framing and foundation conditions were found to be in satisfactory condition, the northeast corner presented some troubling conditions where the foundations were locally undermined due to some earlier soil removals within the crawl space. Also in this same area, problems of framing deterioration due to past termite infestation were uncovered. Designs for repairs have been developed, which include locally underpinning the undermined foundations while also reinforcing the floor framing with new wood members from within the crawl space. Although the work is fairly limited in scope, the implementation of the repairs will require careful coordination and challenging access limitations.