AESTIMO, INC.
Facilities Engineering Consultants

August 13, 2024

St. Andrew Catholic Church
827 Sheldon Road
Channelview, TX 77530-3511

Attention: Ms. Lindsay Schlegal
acc7067@standrewchurch.net

Subject: **Review of Steeple Distress and Water Infiltration**
St. Andrew Catholic Church
827 Sheldon Road
Channelview, TX 77530-3511
Aestimo Project No. 245286-01

Dear Ms. Schlegal:

Aestimo, Inc. (AESTIMO) is pleased to provide this letter regarding a review of reported deterioration in the glue-laminated wood steeple mounted to the roof as well as water infiltration within the sanctuary of St. Andrews Catholic Church, in Channelview, Texas. This work was completed at the request and authorization of Ms. Lindsay Schlegal, of St. Andrew Catholic Church, in accordance with the provisions of AESTIMO's Work Authorization Sheet dated July 24, 2024 and subcontract agreement with the Archdiocese. The purpose of our services was to review and evaluate reported deterioration and water infiltration and to provide recommendations for corrective action.

Background Information

The sanctuary of St. Andrew Catholic Church was reportedly constructed circa 1983. Construction of the sanctuary includes conventional wood framing, glue-laminated wood framing with wood deck and a glue-laminated wood steeple. According to project records, the glue-laminated framing was provided by R.M. Rogers, who is still in business. Unfortunately, no shop drawings for the project have been found by the church or R.M. Rogers as of the date of this report.

Peeling paint and wood decay as a result of long-term exposure to moisture is apparent on the exterior of the glue-laminated wood, particularly near the bases of the four legs of the steeple. In addition, water infiltration has been reported below the clerestory windows within the sanctuary.

Findings and Observations

Mr. John Fairchild and Mr. Aaron Fairchild, of AESTIMO, performed a site visit on August 6, 2024, to review and document existing conditions.

The following summarizes typical conditions and deficiencies documented by AESTIMO:

1. Overview of the east elevation of St. Andrew's sanctuary. Note that delaminated paint is apparent on the vertical column members of the steeple. In addition, reported water infiltration within the sanctuary appears to be limited to areas directly below the clerestory windows along the stepped roof line.

2. Photograph of the east side of the sanctuary steeple. The attachment of the four arched columns of the steeple assembly to the roof structure could not be determined. Note areas with delaminated/missing paint. Also note that wood decay is apparent within localized areas of the arched column members.

3. Close-up view of the arched steeple columns. Note the missing paint and apparent minor decay of the underlying glue-laminated member.

4. Close-up view of water-related deterioration at the base of the north arched steeple column. Similar distress is also apparent on the other three other columns, particularly the one on the west side.

5. View of the base of the south arched column member of the steeple. Rotten wood is apparent at the corners of the member; however, the interior wood generally appears to be in acceptable condition.

6. In general, the arched steeple columns exhibit uneven surfaces, which have been coated with paint. Most of the more significant deterioration is evident at the corners of the members.

7. Delaminated paint and localized wood decay is apparent on the top of the cross member as well as immediately below the cross at the top of the steeple. Note that sheet metal caps have been installed at the tops of vertical glue-laminated members. This flashing appears to have minimized deterioration of the protected members.

8. Steel framing members tie vertical members of the steeple together (photograph provided by St. Andrews). The steel members and bolted connections appear to be in good condition. It should be noted; however, that the base of the center vertical member of the cross exhibits deterioration. The extent and severity of the deterioration was not apparent from the vantage point of the photographer. Close-up inspection will be required to determine appropriate corrective action.

9. The ridge beam extending out from the southeast corner of the upper roof and the rake/fascia that frames into the ridge beam exhibit severe deterioration. The photograph below on the left was documented from the southwest and the one on the right was documented from the east, looking upward.

10. Clerestory windows are provided within the roof structure of the sanctuary. The lower clerestory windows are located at the step between the low-slope and mid-slope roof area within the southeast corner of the sanctuary. The upper clerestory windows are located at the step between the mid-slope and high-slope roof areas within the northwest corner of the sanctuary. The windows are constructed with Dalle de verre-type stained glass set in wood or aluminum frames with perimeter sealant. Protective glass is provided on the outside of the original window frames using aluminum frames and perimeter gaskets.

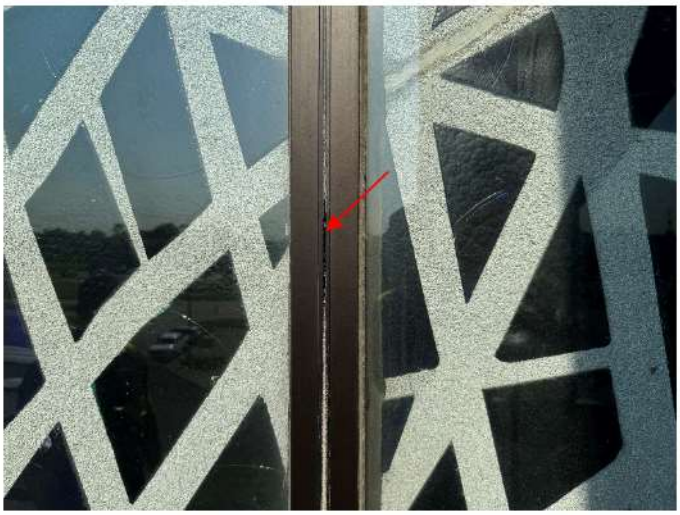
11. View of the stained glass clerestory windows from the interior of the sanctuary, looking toward the southeast. Note that water infiltration was reported to occur directly below the glue-laminated beams that extend below both the lower and upper clerestory windows.

12. The sealants for the stained glass appeared to be in fair condition with normal crazing of the surface as a result of aging (red arrow). Localized adhesive failures were observed at isolated locations. A second sealant joint is apparent between the aluminum frame for the protective glass and the original window frame (blue arrow). This sealant also exhibits crazing. The purpose of the sealant appears to be to seal the back side of the protective glass frame.

13. Gaskets for the protective glass were observed to be in fair condition; however, shrinkage has resulted in gaps forming at the window corners.

14. The protective glass was observed to have shifted at two locations, providing gaps through which storm water, as well as leaves and other debris can enter the window system (red arrows). Also note that protective glass window sealant around the perimeter of the windows is generally in a deteriorated condition and is missing at isolated locations (blue arrow).

15. Sealant was applied to the joints of some lower clerestory windows; however, the sealant is exhibiting deterioration due to normal aging and is missing at isolated areas. Typically, no sealant is provided in these joints on the upper clerestory windows.



16. Sealant has been remedially applied over some, but not all joints in the protective glass aluminum frames.

17. Sheetmetal rise-wall flashings are installed below the protective glass frame. It could not be determined whether any leaks could be related to deficiencies in the flashing without excavations; therefore, this remains a possible contributing source of water infiltration to the building interior.

18. Flashing is provided at the transitions between the various roof levels and sealant is utilized to seal the flashing to the substrate. The sealants are typically in a deteriorated condition due to normal aging. In addition, deterioration of the wood rakes is apparent at the flashing locations.

Conclusions and Recommendations

On the basis of AESTIMO's observations, the distress reviewed at St. Andrew Catholic Church appears to be generally related to normal deterioration and aging of waterproofing systems. Corrective action will be required to return the building to a fully serviceable condition.

The glue-laminated wood steeple is exhibiting a significant amount of wood decay; however, based on on-site observations, it does not appear to be in immediate danger of collapse. Repairs should be possible to return it to a good condition. Unfortunately, neither the original project drawings nor R.M. Rodgers have been able to provide information regarding the anchorage of the steeple to the roof structure; therefore, its adequacy is unknown.

To address the steeple deterioration, it is recommended that AESTIMO, or another qualified engineer, be retained to develop bidding documents that will include a scope of work and guide drawings and specifications for repairs to be completed. AESTIMO can establish an allowance for any repairs with unknown quantities for the base bid and establish unit rates for additional repairs that may be required during the project. For this reason, it is important to select a reputable contractor for the work. During the repair process, AESTIMO can ensure that any repairs in addition to the amounts indicated in the allowances are necessary.

Specifically, the following repairs are anticipated:

1. Install scaffolding for access to the steeple. Remove upon completion of the repairs.
2. Remove existing sheet metal flashings at the bases of the steeple as well as at the tops of the exposed wood surfaces. Replace sheet metal flashings when repairs are complete.
3. Remove all paint from the glue-laminated wood, exposing the surface of the wood.
4. Using mechanical or other means, remove all deteriorated/rotten wood and replace it with an epoxy-based wood filler. If necessary, splice in new wood sections on an "as-needed" basis.

5. Spread epoxy-based wood filler over the surface of grooved or uneven wood surfaces and sand to a smooth finish.
6. Evaluate the condition of the anchorage of the arched columns to the roof structure. If necessary, install steel reinforcement plates to properly anchor the steeple assembly.
7. Replace deteriorated wood rakes/fascias or remove and replace deteriorated wood sections with epoxy wood filler.
8. Replace deteriorated sections of the wood ridge beam at the peak of the high-slope roof as well as the rakes/fascias or remove and replace deteriorated areas with an epoxy wood filler.
9. Apply new paint/coating on the wood and steel components to provide long-term protection against weathering.

To address water infiltration within the sanctuary, AESTIMO recommends replacing the deteriorated sealants on the clerestory windows and rise walls of the sanctuary. It is likely that the existing water infiltration is limited to the existing defects in these systems; however, it is also possible that infiltration is occurring at the transition between the shingle roof and the base flashing below the clerestory windows. If addressing the window and rise-wall sealants is not entirely successful in eliminating the current leaks, replacement of the base flashing may be necessary; however, replacement is not recommended at this time.

Recommended specific repairs include the following:

1. Remove existing protective glass from window frames and temporarily store them on site.
2. Remove existing sealant from underlying stained-glass perimeters as well as the sealant between the stained-glass frame and protective glass frame. Ensure that original sealant is completely removed and replace sealant in both locations with new silicone-based sealant.
3. Clean the inside and outside faces of the stained glass.
4. Clean the inside and outside faces of protective glass and reinstall in existing aluminum frames using new gaskets or silicone “wet sealant” (cove bead of sealant between glass and frame).
5. Remove and replace window frame perimeter sealants with silicone sealant.
6. Remove and replace or install new “band-aid” type silicone sealant over existing joints in the aluminum window frame.
7. Replace deteriorated wood rakes/fascias or remove and replace deteriorated wood sections with epoxy wood filler.
8. Remove and replace or install new silicone sealant at all joints in clerestory rise walls.
9. Paint affected wood members to match existing.

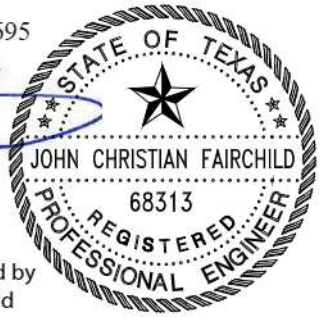
Qualifications

AESTIMO was retained to perform a review of reported distress in the steeple as well as water infiltration within the sanctuary of St. Andrew Catholic Church, in Channelview, Texas. The opinions presented in this report are based on observations at the site, conversations personnel familiar with the distress, and professional judgement. It is possible that defects and/or deficiencies exist that were not readily accessible, visible or that were inadvertently overlooked. In addition, over time, other problems may develop that were not evident at the time of the review. The opinions and recommendations in this report should not be construed in any way to constitute a warranty or guarantee regarding the current or future performance of any system identified.

We appreciate the opportunity to work with you on this project. If you have any questions or comments, please do not hesitate to call.

Sincerely,

AESTIMO, INC.
TBPE Firm Registration No. F-1695



John C. Fairchild, P.E.
Principal Engineer

John C. Fairchild
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David Swords, R.R.O.
Project Manager