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Certificate of Authorization #32371

Inspection Report – Structural & Electrical May 13, 2025

Regarding: Historical Renovation of 1895 Church
311 SW 3rd St.
Stuart, FL 34994

To: City of Stuart
121 SW Flagler Ave.
Stuart Fl. 34994

Permit #:
Date of Inspection: 04/04/25

This inspection report was requested and commissioned by the city of Stuart to assess the structural condition of the structure located at the address listed above. The inspection is primarily focused on the installation of replacement windows and includes an overall structural and general electrical system evaluation. Being listed as a historical building, additional attention is given to how the building is constructed and its structural integrity and overall safety. Many pictures and videos were taken during the inspection; several are included in this report. Not everything described in this report is shown in a picture.

NOTE: The referenced pictures and diagrams are located in files named: “Picture File – Fig 1-37” & “Picture File 38-73”, these files are intended to be included with this report. All three (3) files, this Report along with the two (2) accompanying files constitute the entirety of the report. The size of the files necessitated breaking the report into sections.

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This report is organized into sections. The first section solely provides a description of the conditions found. The Comment section discusses whether these findings have any impact on the structural integrity of the building and if any remediation work is required. This is followed by a section of Recommendations for the remediation suggested or required and concludes with a summary statement.

Throughout the report specific opening numbers with specific issues/deficiencies are referenced. Please refer to Figure 1, "Plan View" for specific window locations. See Figure 2, "Typical Wood Framed Wall Section Detail" for how a typical wood framed wall is constructed. Note that there is typically additional bucking, a maximum ¼" shim space allowed and waterproofing requirements by current codes that are not shown in the diagram.

Note that historical buildings were not always built to a specific code and that construction methods varied in the past. Not only the techniques varied, the builders also used the old growth materials available at the time. Given those circumstances, there are inherent structural principles that are always present in one form or another. In those cases, structural integrity is determined by evaluating the load path though the given structural members. Each member is evaluated based on the loading it receives which is dictated by its position and connections to other load bearing members. All of this will be discussed in detail in the following sections.

Conditions Found

The initial impression of the building is that it is freshly painted, well maintained and seems to be in generally good condition. A few cosmetic issues are noticeable, but nothing that looks structurally related at first glance.

This section of the report includes detailed descriptions of the floors, walls, ceilings and roof areas with a brief description of the overall condition of the building's electrical system. A general comment that applies to all the replacement windows when looking at them from the outside: The trim and the sill are 1x3 lumber that are not typical for a building with a historic designation. More about this statement in the comment section below.

For each of the windows there are issues listed that apply specifically to that window. In some cases, a brief comment or descriptive term helps to elaborate on the issue. This was done to save time and reduce the amount of verbiage. To save formatting, there is a corresponding picture when a figure number is provided, see the picture sections which are separate files; Picture File 1-37.pdf and Picture File 38-73.pdf

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Looking at Window 1 from the interior side, the construction is not typical.

Header not proper – This is typical throughout the house. – See Figure 3
Trimmer missing on right and left – See Figure 4
Rot at bottom (Area = 2"x ~10") – See Figures 5 & 6
Rot at Top (3"x ~4") – See Figure 7
Shim Gap and missing shims – See Figure 8
Sill is not installed, shimmed or sealed properly.

Window #2

Sill is not installed/shimmed properly and not sealed. – See Figures 9 & 10
Header not proper – See Figures 11 & 12
Trimmer missing on Left and right – See Figure 11
Sill is not sealed, light shines through – See Figures 13 & 14
Shim Gap at top and bottom - missing shims

Window #3 - structural is obstructed

Shim Gap at top, bottom and left side - missing shims – See Figures 15 & 18
Suspect that the Header not – Figure 16
Sill is not installed/shimmed properly – See Figure 17
See light under Sill also see light at floor – See Figures 19 & 20

Window #4 - structural is obstructed

Double Buck plus oversized – See Figure 21
Excessive gaps, missing shims – See Figure 21
Shim Gap at sides and bottom - missing shims – See Figure 22
Sill is not installed/shimmed properly
The Opening is missing Jack Studs (34" span) – See Figure 23

Window #5 - structural is obstructed

Header and Trimmers are not visible.
Excessive gaps, Missing shims at sides and Sill – Figures 24 – 26
Custom Buck at Header – See Figure 27
Shim Gap at sides and bottom - missing shims – See Figures 27 & 28
Sill is not installed/shimmed properly can see through to outside – See Figures 26 & 29
There are missing Cripple Studs below the window (34" span) – See Figure 30
Also missing (2) horizontal members, they have been removed – See Figure 31

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Window #6 - structural is obstructed

Improper/Missing Header with Excessive gaps, Missing Shims – See Figure 32
Improper Buck and Shim Installation – See Figure 33
Left Trimmer Rot Buck or Sister? – See Figure 34
Right side improper buck installation – See Figure 35
Shim Gap, Improper buck Installation, missing shims – See Figure 36
Under the Sill there is a direct opening to the exterior – Sole Plate missing (video)

Window #7 - structural is obstructed

Right bottom corner Sill, Window carrying load, excessive shims, missing anchors – See Figure 37
Excessive gaps at sides, missing shims – See Figure 38
Sill is not installed/shimmed properly – See Figure 39
Shim Gap and bottom - missing shims – See Figure 39
Left Corner Trimmer & Header Rot – See Figure 40
Right Corner – Missing Shims

Window #8 - structural is obstructed

Excessive gaps at left & right, missing shims – See Figure 41
Right Buck is not continuous; screw have no engagement – See Figure 42
Sill is not installed/shimmed properly.

Window #9 – Not replaced – See Figure 43

Window #10 – structural is obstructed

Excessive gaps at left & right, missing shims – See Figure 44
Sill is not installed/shimmed properly.

Window #11 – structural is obstructed

Excessive gaps at right, missing shims – See Figure 45
Sill is not installed/shimmed properly – See Figure 46

Window #12 – Not replaced – Framing looked OK

Window #13 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.

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Window #14 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.

Window #15 – Not replaced

Window #16 – structural is obstructed

Excessive gaps at left & right, missing shims – See Figure 47
Sill is not installed/shimmed properly
Missing Jack Studs – See Figure 48

Window #17 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.
Missing Cripple Studs
Right top Corner – Improper header not supported window may be load bearing

Window #18 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.

Window #19 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.

Window #20 – structural is obstructed

Excessive gaps at left & right, missing shims
Sill is not installed/shimmed properly.

Attic / Roof / Ceiling

Each section of the building was constructed slightly differently, Figure 1 shows the three (3) sections of the building, the Original Section and the two (2) that were added later. The original section was built in 1895; the other sections were added in 19?? And 19?? To bring it to its current configuration. Construction methods varied in each section, commonly, all are hand framed timber/lumber.

Figure 49 shows the roof area wood framing of the front section. The image shows the original hand framed roof members as well as additional Gable Roof reinforcements. An additional image, Figure 50, shows the Rafter reinforcements using 2x4's oriented perpendicular to the existing Rafters and

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screwed into place. Figure 51 shows that hurricane clips were added to the ceiling joists installed over the interior plywood wall covering in the Front Section of the building. There are no collars in this section of the roof/ceiling.

The Original section is shown in Figure 52. This image shows the Ridge Board, the Rafters and the Ceiling Joists. There are no collars in this section of the roof/ceiling only vertical ties, and the ties are not on every Rafter. Figures 53 & 54 show the size and spacing of the Ceiling Joists in the original section of the building. This information will be used to evaluate the structural integrity of this section of the building.

Figures 55 and 56 show a few roof rafters, one measured, the other showing nails that missed their mark. Figure 57 shows a repaired rafter with Roof Sheathing nails that missed their mark. Figure 58 shows an attempt to repair a damaged rafter. Figure 59 shows another attempt to repair a damaged rafter. Figure 60 shows a broken rafter.

Looking at the 3rd, or the cross portion of the building there is a double 2x beam spanning the section. The original beam has been replaced with newer lumber. Figure 61 shows the beam spanning the connection with the newer section to the right side of the picture. Figure 62 shows the left side of the beam with a clip missing its screw. There are other clips that also have issues with missing or screws that are not penetrating the substrate that are not included in this report but are visible.

The foundation is also wood framed with concrete piers and pedestals. Figure 63 shows how the original framing has been reinforced. There were no noticeable soft spots or irregularities found in the floor while performing the interior inspection. There is the feeling of the wood framed floor that is typical. Figures 64-66 show measurements of the flooring structural elements and their spans.

Figures 67 & 68 show the front fascia that was previously mentioned as a cosmetic issue. Looking more closely, the fascia has been improperly installed. In fact, in pictures 69 & 70 an entire section of the fascia fell off the building during a relatively severe rainstorm. And in the Picture of the front of the building, on the left-hand side of the stairs, there is a piece of the cladding that fell off the front of the building laying on the ground.

Additionally in Figures 71 & 72, the new modern plywood roof sheathing is showing. The missing fascia and cladding are clearly shown. The fascia was installed using nails into the ends of the rafters. Using nails in this manner is not acceptable, screws are required.

Moving on to the Electrical System, we opened every panel that we found. There were three (3) panels inside and (3) outside. Figure 71 shows Panels A & B. We checked the connections with the breaker and measured the incoming Feeds. Not everything we looked at is shown in this report as we are trying to limit the number of pictures. Figures 73 & 74 show two (2) of the outdoor panels. There are no issues reported with the electrical system. There is a recommendation, but no life safety issues were discovered or reported.

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Comments

The initial observation concerning the trim and sill material has more than just an ornamental concern. Note that maintaining the aesthetics of a historical building is typically a high value concern, this report focuses more on the structural issues. The main concern is that generally historical lumber is harvested from old growth trees that have a tighter grain structure and more tightly spaced rings. Modern lumber is younger growth with more widely spaced rings. The spacing of the rings and the tightness of the grain structure affect the structural strength of the lumber. Thus, the historical lumber is much stronger than today's commonly used lumber, so a one to one replacement is not the same. See Figure 43 for an example of the sill that was not replaced at this time.

Understanding that aesthetics is a high value concern for historical buildings, the trim and sill would most likely have been a rough sawn lumber which has a more organic look. A look much more common on historical buildings. Note that some of the ornamental trim was added to the building after its original construction but it was also done in historical times.

Furthermore, in historical timber-framed buildings, the windowsill is often a substantial wooden beam or plank that ties into the frame. It may be mortised or pegged into the vertical posts, contributing to the overall rigidity of the frame. The sill helps transfer loads from the window to the foundation or lower framing members, ensuring the window opening doesn't weaken the structure. Further analysis would be needed to evaluate if this is the case or not.

As mentioned previously, wood framed construction was based on ensuring a continuous load path from the source of the load all the way to the foundation. Please see Figure 75 for a typical modern window opening load path diagram. The diagram illustrates how the load from above is transferred to other load bearing elements all the way from the top of the building to the ground. Keeping this principle in mind, when looking at a historical building and knowing that in the past the Sill was a load bearing member calls into play those 1x4 modern sills installed improperly.

When something interferes or breaks the specific original load path, the affected load will find a new path. This new path may not be one that is favorable to the longevity of the building. This is why what may be seen as a simple piece of wood is actually more important than it appears. Normally a Trimmer stud would perform this task. In this building some of those Trimmer studs have been removed or cut. In all cases where the windows were replaced, specifically the concerning the bucking and shim work, is considered poor workmanship bordering on amateurish installation. Harsh and true. This alone warrants complete replacement.

Moving on, the intent of a structural header is to bear the weight of the roof or load above it to protect the window from "seeing" or carrying any of that vertical load. In both modern and historical buildings, windows are not intended to carry vertical structural loads. They are designed to withstand only the lateral wind load. Referring to Figure 2, the Header is supported by a Trimmer stud on each side, this Trimmer is what carries the load past the window down to the Sole or Bottom Plate. Each Trimmer is

supported by a King Stud that spans the full distance from the Sole Plate to the Top Plate. Note the orientation of the Header element. The board stands vertically and is typically doubled up, as this is its strongest orientation.

Found during the inspection and documented in this report as “improper header” the headers above these windows lie horizontally. This does not mean that there is absolutely a structural issue. If there is sufficient framing to carry the load around the window in a continuous path such that the window will not carry any of the loading from above it, the structure is most likely safe and stable. Where the window is considered to be carrying load, that condition needs to be corrected to prevent the window from being damaged or failing to operate properly. Since these walls were not fully opened it is not possible to make the determination at this time.

Where a Header was installed, the openings are not wide enough to allow the Header to be resting on any sort of load bearing member or Trimmer. Since many of the walls were not open enough to see into their construction certain assumptions can be made, worst case scenarios must be considered if there are sufficient facts to support them. Later in this report we will discuss the roof rafter and joist spacing. Often, but not always the roof joists are spaced the same as the wall studs. In this case its 24”, these windows being wider than the originals , @ 34”, means the installers may have cut through the load bearing King and Trimmer studs.

Each structural element needs to be considered as load bearing if there is insufficient information to determine otherwise. That is why when there is a significant amount of visible light coming from where the Sole or Bottom Plate should, there is an element of concern. Being covered, it might be totally adequate, not knowing it must at least be noted in this report as something that needs to be looked at when these are replaced.

Clearly on Opening #4, the Double buck and excessive shim are not typical. Although somewhat common in modern buildings, they always require an engineer’s letter and local Bldg. Dept. approval. Even a simple single 2X Buck may require an engineer's letter. See Figure 76, the note that states “Wood Framing or 2X Buck by Others” is a nod to the engineer’s letter. The letter is required to determine the anchoring of the bucks for this specific location as required by the wind loads dictated by code under ASCE 7-22.

There are too many specific issues with each and every window that have been replaced. To reduce redundancy this report will not comment on each item listed. The pictures record the issues. Bottom line is, each new window needs to be removed and replaced. More on that later under the recommendation section.

As seen in some of the pictures, in the front and back or cross section of the building hurricane clips were installed. A few of these clips were not installed properly. Typically, hurricane clips are installed directly to the members being joined at the connection. In this case they are installed over the wall covering. This is not detrimental to the structural integrity of the reinforcement but if the screws are not long enough to penetrate the structural substrate the clips may not be as effective as intended.

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In a portion of the interior buildout there is a drop ceiling. Calculations based on the spacing and spans of the supporting structure show that this drop ceiling is placing an over burden on the ceiling joists and that the drop ceiling should be removed. This is not an immediate safety concern as there are only minimal signs of being over stressed, however this report must state that it should be removed for structural concerns.

In furtherance of this same issue, many of the Rafters are overstressed; new Collars should be added to increase the capacity of the hand framed rafter system. Additional ties may be required to further reinforce the roof structural members. The connections to the wall are also in need of reinforcement, specifically some form of hurricane clips or straps.

An overall assessment of the foundation is included in this inspection. However not all of the information to evaluate the entire design was gathered during this inspection since the foundation was not the primary concern. Evaluating the floor's 2x6 joists we find that they fail on bending and deflection. Additional evaluation may find that the Girders supporting may have a problem as well. It appears as if some flooring reinforcements were made, additional areas may need to be addressed as well.

Bottom line, there are no specific issues to show and there are no immediate concerns with the Foundation. This report just states that using today's load requirements, given the materials used, there are issues that may need to be further addressed. Similarly, this report did not look specifically at the foundation connections due to time and access issues. We did look for any indications of significant foundation issues and non were found.

Finally, we looked at the overall Electrical system. From an overview there are no life safety issues to report concerning the electrical system. We checked connections and the line feed size as well as the exterior panels and main feed lines. All look to be in good working order.

The only comment just for documentation purposes, there are a few cloth insulated wires found in the attic space and assumed to be within the walls. The Florida Building Code does not require that these be replaced so long as they are in good condition, are properly installed, and were compliant with the code effective at the time of installation. Again, these cloth insulated wires are mentioned in this report for documentation purposes. No visible issues with these wires were found during this inspection. Many of the connections are not readily accessible.

Recommendations

As mentioned above, all of the windows need to be removed and replaced with windows that are sized according to the original design. The framing at each window that requires it should be restored and / or reframed using specified and appropriate methods and materials for a building designated as historical.

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Where applicable the interior wall covering, plywood, should be removed around the affected windows to reveal the structural framing. Once revealed, each opening should be reevaluated for its structural integrity.

Where missing, the Sole or Bottom Plate should be restored to its original condition with connections to the adjacent structural members and wall framing above. Trimmers and properly oriented headers should be installed with Cripples and Jack studs used where appropriate.

Additional gable end bracing should be added to further storm readiness of the building. This report also mentions the need for additional collar bracing and collar ties added where missing or only sporadically used.

Remove the Drop-Down Ceiling where it exists as original the roof and ceiling structural members were not designed for the additional loading. Insulation should be added to help provide a more comfortable living environment.

To ensure compliance and safety, have a licensed electrician evaluate the wiring's condition and consult with your local building department for any specific regulations. If insurance is a concern, you may need to replace some of the wiring to meet insurer standards, even if the FBC allows it to remain.

NOTE: The referenced pictures and diagrams are located in files named: "Picture File – Fig 1-37" & "Picture File 38-73", these files are intended to be included with this report. All three (3) files, this Report along with the two (2) accompanying files constitute the entirety of the report. The size of the files necessitated breaking the report into sections.

Please feel free to reach out to this office to help satisfy any questions, comments, or concerns.

Respectfully,

Jeffrey Friant, P.E.
60974

Digitally signed by Jeffrey Friant, P.E. 60974
Date: 2025.05.13 14:43:05 -04'00'

Jeffrey C. Friant, P.E. FL60974
Senior Engineer

References:

The Journal of Light Construction – Load Path
Chicago Window Expert – Shim Diagram
Eastern Architectural Systems Product Approval FL164121 – Single Hung Window Detail