Date Submitted: 5-21-2025

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Juno Beach Gazebo

Limited Property Condition Assessment
Report Date: May 21, 2025

Archetype Engineering & Architecture, Inc.| 601 Heritage Drive, Suite 408, Jupiter, FL 33458

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Introduction

At the request the client, Donald J. Atkinson, P.E., Architect, CBC of Archetype Engineering & Architecture, Inc. conducted site observations of the Gazebo structure located adjacent to the Town Hall, Juno Beach, Florida. The structure is located at the lakefront immediately behind the administration building. Site observations took place on May 6th, 2025. Archetype Engineering & Architecture, Inc. is the author of this Limited Scope Condition Assessment Report which was based upon site observations of the structure and wood evaluation standards.

Scope & Purpose: This field report seeks to identify, to the extent reasonable, the general conditions of the wooden structure and components of the gazebo, with a focus on wood deterioration concerns or other defects, needed corrections, or issues for continued safe use of the amenity. Recommendations for repair actions are provided, as deemed appropriate by the engineer. This report is not an exhaustive forensic evaluation but rather an assessment of the structure to assist decision makers about the efficacy of repair vs. replacement of the asset. Structural calculations or laboratory testing of samples of existing materials were not performed.

Forensic investigation findings in this report represent the opinions of Donald Atkinson, PE, Arch., CBC, based on the site observations and investigations by the engineer. No quantities of repair areas, cost estimates or any repair protocols were designed or provided by the engineer.

Archetype Qualifications: Don Atkinson has been a Licensed Professional Engineer, Architect and Certified Building Contractor working in Florida for 22 years and has been a professional engineer for 40 years. Archetype and has been providing commercial, institutional and threshold building condition assessments, building structure evaluations, structural repair specifications, construction administration and serving as an expert witness services in Florida. Prior to moving to Florida, Don served as the Director of Construction and Facilities Maintenance for over four million square feet of educational facilities, including capital budgeting and building reserves planning, and worked as a structural engineer at Odell Associates in Charlotte NC.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Conclusions & Recommendations

1. The wood framing of the gazebo deck is constructed close to surface water, wet soil, water running down the sidewalk, groundwater from the higher ground to the northwest, and irrigation water from a sprinkler head adjacent to the sidewalk and entrance to the gazebo. The gazebo roof drops water onto the ***exterior deck*** and this water runs down to the support framing and steel connections that provide support. (The ***exterior deck*** refers to the wood framing outside the main gazebo structural columns.) **The deterioration of the exterior deck framing is much worse at places that are adjacent to the soil and sidewalk side, not over the water.**

2. At the exterior deck and supporting wood framing, the directions of the wood joists and deck planks constantly change direction, differently from the center deck that resides within the interior of the gazebo. There are many wood framing members, and they are all short in length. There are numerous steel connection components between these many short wood members. The junctures of wood members have many gaps and odd angles that have spaces for water to enter. The combination of many short wood members, many steel connections, many spaces in the angled wood junctures and lots of water resulted in many locations for the connections to corrode. **Most locations of the wood deterioration and the corrosion of steel connections are found in the portion of the deck outside the columns of the gazebo structure, (under the main gazebo roof and inside the roof support columns).**

3. Some Insect habitation is present. Tiny ants were found in the deck portion of the structure. The ants live in small spaces between wood joists, at laps or small spaces between wood members at connections. These locations are most commonly found in multidirectional framing junctures found in the exterior deck extending (out beyond the gazebo columns, under the main gazebo roof).

4. **Little or no damage of the upper gazebo structure including the roof planks, framing, cupula, columns and piers were found.** The central gazebo portion of the structure appears to be in generally good condition. The upper roof, standing seam metal roofing, cupula, columns and piers appear to be in generally good condition.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

5. **The sidewalk adjoining the gazebo is cracked and appears to be showing signs of anticipated settlement.** Minor soil loss is typical at seawalls and bulkhead walls at bodies of water. The soil under the sidewalk adjoining the rock seawall is anticipated to erode through piping loss and the sidewalk section at the gazebo should be replaced at the gazebo entrance.

6. **Deterioration in the exterior deck portion of the structure is primarily caused by *Galvanic corrosion* of connections.** The corrosion took place as a result of severe galvanic corrosion of the metal in the deck framing connections. Zinc coating on the lightly galvanized carbon steel connectors, in a moist environment, in contact with copper-infused preservative treated wood, resulted in severe damage at the metal connections. **Copper in the wood acts reacts chemically with the zinc and iron in the galvanized steel causing severe corrosion.**

7. **The stainless-steel bolts did not rust, but the adjoining carbon steel connectors corroded badly.** The corrosion was so severe that it appears the preserved wood was damaged in the connection areas. Some of the damaged wood may have degraded to the point that some termites started to infest the wood before the chemicals in the wood killed them.

Repair Recommendations

1. **Engage an engineer to provide signed and sealed engineering drawings of the repairs required and bid package of design documents. The designer is the Engineer of Record (EOR) and provides sealed design documents.**

2. **Demo the entire gazebo deck and railing system. First demo the exterior portion of the deck. (Exterior deck out beyond the gazebo columns, under the gazebo roof,**

3. **Once the badly deteriorated exterior area of deck has been removed, the EOR and the contractor shall survey the wood gazebo columns to see if the removal of the outside deck has exposed any unknown (and currently unanticipated) damage. Any minor damage detected exposed by the removal of the exterior deck such as fastener holes of shrinkage cracks or other issues can be repaired as directed by the EOR.**

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

4. **The central deck framing defined as the decking and supporting structure inside the main gazebo columns is recommended to be removed and the deck of the gazebo is recommended to be rebuilt. Preserve and Protect the original gazebo structure (cupula, Roof, upper framing columns and piers) during the rebuild.**

5. **Reconstruct a new extended deck on the water side, and a new gazebo railing. The majority of the heavy-duty octagonal railing posts in the original structure are in good condition and could be reused in the newly constructed railings. The composite plastic railing cap could also be likely retained. Replace any octagon rail posts if found to be badly damaged.**

6. **The engineer recommends providing a gutter to collect roof water and direct outflow to scuppers projecting rainwater out beyond the new lower deck. A downspout alternative could also be considered by the town. Replace the sidewalk and provide a concrete slab to the seawall to support the wood gazebo deck that rests on the soil area.**

7. **Provide a new perforated drain at the upper side of the new sidewalk and extend to the lake for discharge and divert groundwater away from the entrance and land supported side of the gazebo.**

8. **Apply driftwood grey similar to Cabot's Bleaching oil/wood stain to provide UV/ moisture protection to the wood, while also to limit shrinkage cracks in new wood and provide a weathered naturally weathered and consistent finish.**

9. **Repair landscape, signage and other appointments now present.**

ARCHETYPE COMPANIES

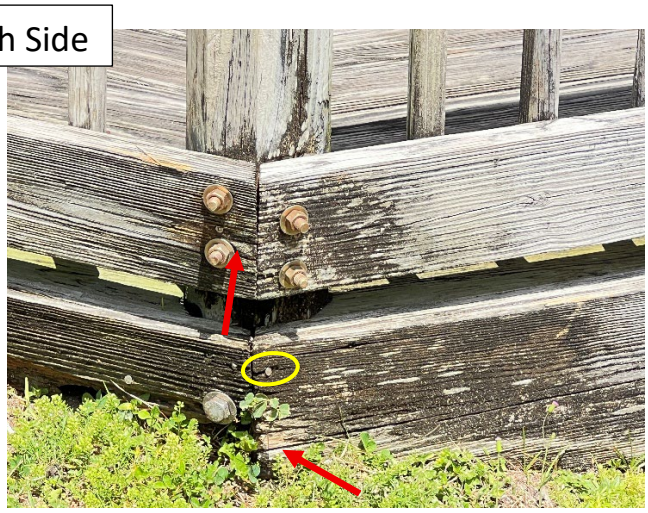
Juno Beach Gazebo Condition Assessment

The Gazebo is sited partially on soil, behind the lake-edge retaining wall, and half over water supported by piers. The column piers are composite with a cast concrete that was believed to have been installed in an earlier structure and the wood piers that were part of the main gazebo structure. These column piers are working together, bolted together for combined load carrying capacity, and to the extent observable appear to be in good condition. No sub soil or below water problems were noted. Investigations were not considered to be needed as chemically pressure treated wood below the oxygen rich atmosphere generally suffer little deterioration. The concrete appeared to have no cracks, spalls or evidence of corrosion of reinforing visible. The wood timber pier have normala shrinkage cracks in the wood grain which was cosidered typical for large timber members and were considered to be in good condition.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

South Side



The wooden base framing of the gazebo that was constructed in contact with the soil did show signs of deterioration. The bolted ends of the edge framing is seen with fractures that are anticipated with wood that is stressed by drying and shrinking stress. The large bolts so near the end of the framing members are particularly susceptible to cracking at theses ends. (see the red arrows)the yellow ellipse encloses one of several nails added extremely near the ends of the wood framing, which are also associated with end splitting of the wood. These cracks in the wood allow more moisture entry into the wood grain and cause greater cracking issues over time. The dark green surface material appears to be organic growth (moss and mildew) that is growing in the moist conditions similar to that which grows on rocks and trees in forests. Note the contrast in the wood framing over the water that is not embedded in the moist soil. Note the same moist condition is seen at the sidewalk juncture. This side of the perimeter deck framing is subject to surface water drainage from the sidewalk and has added irrigation I the worst possible location.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

North Side

At the north side of the gazebo, at the deck perimeter, near the soil, wood has been deteriorated by the moisture. This occurred where soil was in contact with the wood members ***and*** underslung metal hangers. (See damage of the underslung framing at the red arrows, and the underslung metal joist hangers inside the red boxes at this lower-level framing.) There is green organic growth on the surfaces of higher elevation wood framing, but the floor framing elevated a bit above the soil (as seen on slightly higher-level framing) has suffered far less the wood-rot deterioration.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Note that this wood above the water is in generally good condition.

Bolt at the edge of wood framing is an improperly placed fastener.

Note that this wood near the soil and sidewalk is more distressed than wood with air circulation. (South side of Gazebo, sidewalk at upper right corner of photo.)

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

The soil moisture is made worse by the drainage of water from the sidewalk surface. The location of the sprinkler irrigation added to the other groundwater is also problematic.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

This photo shows the main gazebo columns (yellow arrow at the right side of the photo) that extend down and connect with the concrete piers in the lakebed. The deck planks placed in different directions to the interior deck planks as well as the supporting framing must rely on irregular directions and odd joist configurations and connections. (This is seen within the red ellipse located left of the main column.)

One of these odd locations is seen in the next photo below.

This enlarged photo shows the angled floor joist at a connection located at the octagon-shaped railing post. The framing and steel connections are complex and unusual in their configuration. The stainless-steel bolts are in contact with dissimilar carbon steel connector plates which has succumbed to galvanic corrosion. Some of the odd sizes and shapes of wood appears to have been constructed with wood that was not preservative treated lumber.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

This photo shows the angled floor joist that runs around the interior octagon shaped columns and framing, to the outer perimeter railing posts. This exterior deck framing and steel connections rely on complex configurations. While the bolts are stainless steel, the connector plates are carbon steel. Physical contact of dissimilar carbon steel connector plates and stainless-steel causes galvanic corrosion of the connections and I the presence of water these steel connection components have corroded badly.

Many of the odd sizes and shapes of wood members in the extended deck exterior to the gazebo columns and interior octagon deck appear to have been constructed with wood that was not preservative treated lumber. The perimeter wood framing, decking and connections are generally in poor condition. (See left and below)

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Wet and deteriorating wood is an attractive habitat for termites. The only ***active*** type of insect infestation noted is seen above. These particular insects are seen on two lapped 2x joints. These were considered by the engineer to be very small ants, which were seen in various locations within wet wood. The wood itself in these locations did not have significant wood damage that would be anticipated with active termite habitation. These insect appear to be very tiny ants that constructed their colonies in the small gap spaces between the joists and wood blocking. The winged insects are leaving to start new colonies. These ants likely find abundant moisture and organic growth in the gaps.

Unknown insects (or arachnids had left fibrous or web material between the preservative treated planks of the roof. These were wiped away to reveal no damage to the wood had occurred. This could be a maintenance issue to address with cleaning. The upper gazebo wood construction appeared to be in generally good condition and would be considered to have a long remaining useful life.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

There are several locations that are noted where wood preservative treated wood has been damaged by deterioration. Most of these locations are found at wood connections where carbon steel components of those connections have suffered severe galvanic corrosion. Mixing of stainless steel, galvanized steel and copper chemical compounds in preservative treated wood cause accelerated corrosion. Apparent termite damage appears to have occurred at some of these areas of deterioration. The termite damage did not seem to be systemic, but at isolated locations. This is consistent with laboratory testing of termites and preservative treated wood which found that termites may attack treated wood but die in the process from the wood chemicals. A correlation between limited areas of termite damage and corrosion damaged wood and metal components was found. These damage areas were primarily all found in the deck framing and blocking at odd angle junctures.

Very little damage to the gazebo columns was found. Soil around one column in an area where deck framing was damaged was removed but not termite or rot damage was noted.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

The wood member buried in the soil and nailed to wind strapping to counter wind uplift forces.

Nails

Above are two examples of metal hurricane strapping that was extending downward, into the soil below the deck of the gazebo. The strapping had been attached to wood blocking that did not appear to have been preservative treated wood. The wood blocks would have been intended to have acted as “dead-men” anchors in the soil to resist uplift forces from wind-imposed loads. The wood was essentially decomposed due to organic digestion in the moist soil. The anchors have no functional value remaining.

The wood column of the gazebo appears to be good despite some deterioration of the adjacent wood framing.

This was considered generally representative of the condition of the observed wood columns. While the main gazebo columns may have some issues that would warrant repair if found, the general condition of these column appeared to be sound.

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Although not part of the original scope of this assessment, the engineer was asked to observe the second town gazebo at the south end of the lake. This south gazebo provided valuable design ideas that could be incorporated in the north gazebo repairs. This gazebo was accessed with a connector pier section that got the gazebo deck framing away from the soil and lake edge. This gazebo also had a alternative deck support design that provided Framing under the deck could be rectilinear while providing a large deck extension on the water side of the gazebo. **This framing approach limits the number of metal connections and simplifies framing and deck planks with rectilinear framing. Galvanic corrosion design detailing would prevent the corrosion problem.**

ARCHETYPE COMPANIES

Juno Beach Gazebo Condition Assessment

Conceptual Repair diagram