

MARtha'S VINEYARD
ENGINEERING & DESIGN

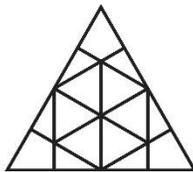
7 Arlington Ave Existing Conditions Letter For Partial Demolition Request

Prepared for the MV Commission



July 21, 2022

7 Arlington Ave, Oak Bluffs
Parcel ID: 3-15-0



MARtha'S VINEYARD
ENGINEERING & DESIGN



The purpose of this letter is to inform the MVC about the existing conditions of the single-family home located at 7 Arlington Ave, Oak Bluffs. On July 19, 2022, our office visited the site to inspect the condition of the foundation/support piers, exterior wall, 1st level floor, 2nd level floor, 3rd level floor, and roof framing (could only inspect what was readily visible) for the purposes to evaluate the current code-compliance and code-upgrades necessary during a substantial renovation to a building of this age.

Condition of Existing Building

At the time (assessors records show 1919 as date of construction but the MVC has stated from research that the actual date is 1875) of construction building standards and structural members were substantially undersized for their spans and were supported by inadequate footings/piers compared to today's required building methods / code compliancy.

Foundation/Support Piers

The foundation consists of multiple support conditions; a full height CMU (concrete masonry unit) foundation adjacent to a CMU crawl space under the newer addition off the rear of the building and dirt crawl space with sporadically placed timber/brick piers and brick/wood footings. Between the brick piers on the exterior of the building there are CMU blocks to keep air and rodents from gaining access to the crawl space.

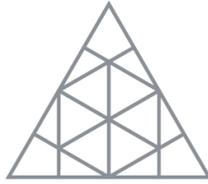
The CMU and brick piers do not show signs of substantial deterioration or imminent failure; although the bricks are of the age where beach sand mortar was used and those do deteriorate over time and need replacement. That being said, the brick/timber piers would not be capable of supporting a major renovation/addition or any additional weight/load applied to them. The timber piers do not show signs of rot or decay but are not adequately held down or fastened to the framing to prevent uplift as current code requires. All footings/piers are supported by inadequate (were visible) footings/bases and would need to be replaced to carry additional load. There are no "hurricane holdowns" or lateral support systems visible in the basement/crawl space or throughout the home, common for this era of construction.



Inadequately supported timber pier with brick footing/wooden shims



Inadequate connection between top of timber pier & girder



MARTHA'S VINEYARD
ENGINEERING & DESIGN

1st, 2nd, and 3rd Level Floor Framing

The existing building consists of under-framed floor joists on all 3 levels that far exceed their span ratings under current building codes and show significant deflection and over-stressing. The 1st level joists are true 2x6s @ 24" OC and are supported by 4x6 carrying sticks/girders located below bearing walls or equally spaced along the floor mass. In my professional opinion, the 1st level joists are not original to the 1875 construction due to their size and the fact the same joists/carrying sticks run throughout the entire 1st level, both under the "new" construction and original "Palmer Villa" building. The joist size in this building indicate they were installed sometime after 1900. Campground homes from the mid-late 1800s are usually framed with 2"+ wide x 4"+ deep joists/rafters or "half-cut" circular timbers. Also observed was the lack of foundation anchorage and a mud sill; this ensures the building is fastened to the foundation and will prevent the building from shearing (or sliding) off its foundation.

The 2nd level floor framing in the original Palmer Villa structure consists of 3x6s @ 24" OC and have a beveled edge detail along the base of the joist which was common for this era. These joists show a significant deflection and are spanning 14'-6" between supports. Using current code loading (15 lb/ft² dead load & 40 lb/ft² live load) the joists fail in bending stress and deflection by 157% & 396% respectively. This calculation only accounts for open bedroom/hallways; the additional 3rd level and interior bearing walls were not considered. Although no catastrophic event has occurred because of the inadequate floor joists, they are severely undersized and cannot support code loads and would need significant reinforcement during the renovation.

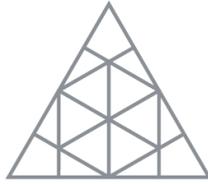
The 3rd level floor framing was not visible but is considered to be constructed in a similar fashion to the 2nd level. In both the 2nd and 3rd levels the floor pack is too shallow to allow for code plumbing and would require an 8" floor package to install "P" traps or other plumbing fixtures. If a secondary structural floor is not installed over the top of the existing floor, as what is proposed in this project, the plumbing will be visible below the framing as it is today in the living room in the photo above.



True 2x4 joists indicate construction of entire 1st level floor was after 1900



3x6 joists showing significant deflection and over stressing



MARTHA'S VINEYARD
ENGINEERING & DESIGN

Exterior Walls and Roof Framing

Like most campground style homes and those built around the late 1800s, the exterior walls are constructed with 4x4 posts spaced 4ft - 8ft or greater with vertical 1x boards acting as the shear diaphragm and load carrying support. This practice is far from code compliant and infilling between posts with new 2x studs @ 16" or 24" OC and re-sheathing the exterior of the building with structural grade plywood would be necessary to adequately resist the code-compliant wind shear. This building would be considered Exposure D (worst case scenario as per ASCE 7-16) with 140mph wind gusts @ 3-second intervals, this equates to a wind pressure of 27.79 lb/ft² and a load along the face of the exterior walls of 292 lb/ft. For reference, if you were holding a piece of plywood (4ft x 8ft sheet) the wind pressure felt would be nearly 900 lbs.



Load bearing wall showing 4x4 posts spaced far apart with minimum exterior shear capacity. Deflecting rim joist/header is also evident from this photo.

The roof framing consists of 2x4 rafters spaced at 24" OC and show very little space for installation in the rafter bays. The ridge condition was visible from the 2nd floor and consists of a single 1x ridge board with no hurricane holdowns or straps at the ridge board to prevent separation of rafters from top plate/ridge in a high wind event/positive interior pressure.

This home predates indoor plumbing, HVAC, and electricity (MEP). As homes were retrofitted with these new technologies joists and other structural members were cut or notched to accommodate the new conduit and/ or wires. In my experience, dealing with homes of this age, new MEP layouts were never installed with any real thought and the structural members were indiscriminately cut to provide chase areas. Without modern chases or thicker walls, new MEP lines would be exposed to either the interior or exterior of the building; greatly reducing the historic feel/nature of the building.

Conclusion

The existing building shows no signs of imminent collapse or is in disrepair. However, the structure will need significant repairs and improvements for any proposed renovation and/or addition to the existing home. All load bearing members and lateral support assemblies would require major retrofitting which would render some of the non-visible historic elements lost during construction. A new foundation and interior supports would be necessary to withstand code-compliant gravity and lateral loads. As well as new floor, roof and exterior wall framing to span across and over the existing historic floors to save them.

Sincerely,


Casey Decker, PE
MA Lic #54269