Peter NISSEN P.E.
CONSULTING ENGINEER

January 19, 2015

Studio Green
232 Sir Francis Drake Blvd.
San Anselmo CA 94960

Re: Lucas Valley HOA Community Center, Structural Assessment
Job Address: 1201 Idylberry Road, San Rafael CA

To whom it may concern:

As requested, I met with Jennifer Perarnaud and John Merten of Studio Green at the above-mentioned site on December 5, 2014. The primary purpose of the visit was to inspect, and form some opinion as to the material soundness and structural integrity of the buildings that make up the Community Center.

Existing Buildings Description

The HOA center is comprised of two structures, the "Gathering" and "Kitchen-Utility" buildings. Built in the 1960's, these buildings are constructed of timber framing and concrete masonry units (CMU). The timber framed roof connects the structures, and provides a covered awning around the rear. The site slopes gently towards Lucas Valley Creek, and the buildings are bordered by a parking lot on the eastside.

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Vertical Load Carrying System

The roof of the Gathering Building Great Room is composition shingle, 2x t&g decking over site-built trusses constructed of collar-tied 4x10 rafters at about 6'-6" o.c. Other roofs are flat, tar and gravel, 2x t&g decking over 4x10 beams at approximately 6'-6" o.c.

Foundation

The foundation is a concrete slab-on-grade, which was inspected in areas not obscured by flooring finishes. The foundation appears to be performing well, with no signs of cracking, and the buildings do not appear to be settling.

Lateral Load Resisting System

The Great Room, "Gathering Building":
Lateral loads are resisted by a shear wall or box system consisting of stud walls clad with T1-11 plywood, and a roof structure whose strength is derived from 2x t&g decking. Exterior walls consist mainly of 1/2" or 5/8" plywood siding, and interior walls consist of studs walls sheathed with sheetrock on both sides. Without a more invasive (destructive) investigation, we were unable to assess how the timber framed wall sills are anchored to the foundation. Typically, this type of structure would have 3/8" or 1/2" dia. anchor bolts spaced at four to six feet o.c.
Flat Roof Structures, "Kitchen-Utility" Building:
Lateral loads are resisted by a shear wall or box system consisting of the building's CMU walls, with roof structure strength derived from 2x t&g decking. We were unable to ascertain whether the CMU walls are reinforced and fully grouted but, if so, they should be more than capable of resisting the required lateral demands.

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Field Observations

During our walk-through, the following observations were made. Comments regarding component capacity are at a level of detail and demand consistent with current 2013 California Building Code requirements.

Gathering Building:

1. The Roof systems appeared to be in good serviceable condition, with no significant signs of distress. As expected, some weathering damage, including splitting at the end of wooden beams, has occurred (Figure 2). Rain water ponding was noted on the flat roofs, indicating some amount of framing member sag (Figure 1).

Fig. 1, Ponding Water

Fig. 2, Weather Damage

2. The pitched roof structure is constructed of site-built trusses, consisting of 4x10 beams collar-tied with (2) 2x8's. The 2x8's appear to be bolted to the 4x10 beam with (2) 5/8" diameter bolts (Figure 3). This connection is likely substandard, although it appears to be performing adequately.

Fig. 3, Trusses

3. The roof system diaphragm is constructed of 2x6 t&g. Considering the dimensions of the Great Room, this diaphragm is likely overstressed in shear (Figure 3).

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4. The exterior shear walls derive their strength from T1-11 siding, which is not considered a reliable shear wall sheathing. Therefore, the shear walls are likely overstressed.

Fig. 4, T1-11 Siding

5. The perimeter of the pitched roof sheds down to the T1-11 clad shear walls, but the roof shear transfer is compromised by the clear story glass windows. All roof shear demands are expected to transfer through the 4x10 rafter beam connection to wall top plates through cross grain bending "twisting" of the beam (Figure 5).

Fig. 5, Clear Story Windows

6. The lack of any hardware between the 4x10 rafters and top plates, with no blocking except the clearstory windows, is a substandard connection detail (Figure 2 & 5).

7. The perimeter wall mudsill anchor bolting to the concrete footing is likely inadequate.

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Kitchen and Utility Building (Flat Roof):

1. The perimeter walls are CMU block, assumed to be reinforced and fully grouted. These masonry walls provide tremendous strength, but the roof structure is not adequately connected to the CMU walls, and could separate in a significant seismic event. The "in-plane" strength is significantly reduced due to the clear-story openings, and the "out-of-plane" strap connection is not capable of resisting the required demand (Figure 6).

Fig. 6, Out of Plane and Clear Story Opening

2. The "out-of-plane" CMU wall transfers significant loads into the roof system diaphragm and, since the roof diaphragms are constructed of 2x6 t&g decking, and the transverse partition walls are not of adequate strength to reduce roof diaphragm loads, the roof diaphragm is likely overstressed (Figure 6).

Site Structures

1. The property extends to the Lucas Valley creek. An access path runs along the creek and is shored by a short wooden bulkhead wall near the bridge. This wooden wall appears to be performing well. Adjacent to this wall is an approximately two ft. tall raised planter bed retained by a concrete surround. This wall shows is also performing well though a couple of cracks were noted.

Earthquakes

Local Seismic History

The San Francisco Bay Area is located in an area of high seismic risk. The International Building Code / California Building Code specifies four seismic design categories, which are defined, by the structures occupancy category and the severity of the design earthquake ground motion of the site. Type A is the category for little or no seismic risk, and category D is for the highest level of risk. According to the code, the Bay Area, as well as most of the west coast of California, is assigned to category D. The area has had a history of seismic events, which have caused significant level of damage and loss of life. Some of the major events and geological faults on which they occurred are as follows:

Previous Earthquakes and Local Faults

The San Andreas Fault extends for a distance of more than 800 miles from the coast of the Gulf of California in the south, to an area north of San Francisco and has been the cause of several large earthquakes. The recorded history of earthquakes on this fault starts with the 1800 earthquake with the epicenter located near the San Juan Bautista. Other major seismic events in Northern California include the June 1838 earthquake, with an estimated magnitude of 7.0 and presumed epicenter south of San Francisco; the October 18, 1865 earthquake with an estimated magnitude of 7.0 and presumed epicenter near San Jose; the Great San Francisco earthquake of April 18, 1906, with an estimated magnitude of 8.3 and presumed epicenter north of San Francisco at Point Reyes Station; and the Loma Prieta earthquake of October 17, 1989, with a magnitude of 7.1, centered in the Santa Cruz Mountains. The latter is discussed in greater detail below.

The Hayward Fault is believed to extend from the southeastern part of San Jose to San Pablo in the northwestern portion of Contra Costa County. It passes through the district referred to as the Montclair District along Highway 13. It was the source of the June 1836 earthquake with an estimated magnitude of 7.0 and presumed epicenter located north of Hayward, and the October 1868 earthquake, with an estimated magnitude of 7.0 and presumed epicenter located in the Milpitas areas, as well as strong quakes in 1915, 1933 and 1937.

The San Andreas and Hayward Fault systems have the potential to trigger the strongest ground shaking for this building site, but the August 24 quake and resulting damage is believed to have occurred on the West Napa Fault. This earthquake is considered moderate measuring 6.0 on the Richter scale.

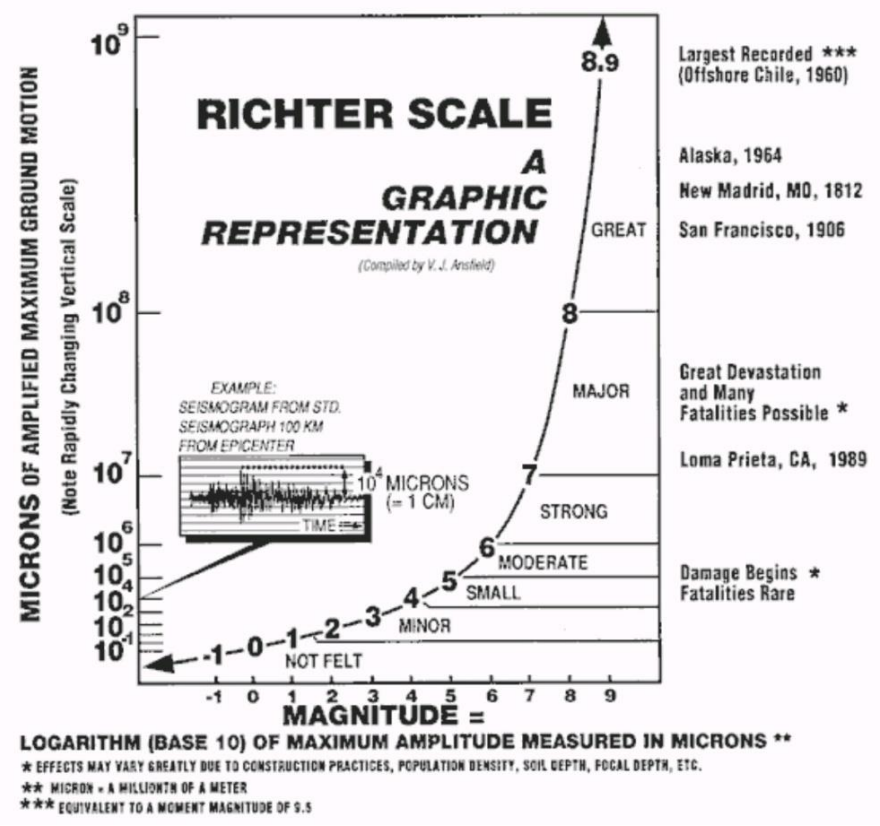
Another nearby known fault is the Concord Fault. Information on the seismic activity of this fault is currently incomplete, and is a matter of controversy.

Loma Prieta

The Loma Prieta earthquake measured 7.1 on the Richter scale, with an epicenter some 60 miles south of San Francisco, in the Santa Cruz Mountains, nine miles northeast of Santa Cruz. The focus, or point of actual rupture, was approximately 11.5 miles below the surface of the earth. The rupture between the Pacific and North American plates never reached the earth's surface but stopped short of it by approximately 3.7 miles. In Part, because the rupture apparently propagated in both the northerly and southerly directions, geologists believe that the recorded duration of strong ground shaking (+/- 15 seconds) may only have been half that expected for an earthquake of this Richter magnitude.

Peak ground accelerations experienced as a result of the earthquake varied considerably around the Bay, due the area's highly varied geology. Peak ground accelerations measured in this general area were on the magnitude of 0.08 G. Such measurements are relatively low when compared to other Bay Area sites where maximum measurements of approximately 0.27 G were recorded in areas founded in landfills or bay mud.

Loma Prieta, as experienced by the greater northern Bay Area, was not considered by geologists to be a major or "maximum probable" seismic event. Certainly an earthquake of similar magnitude with an epicenter closer to San Francisco, or an earthquake of greater magnitude, is still possible and could cause higher accelerations and greater damage.



Summary and Recommendations

The structure in general is performing well, maintenance repairs will help to delay dry root and weathering decay. Successive building code iterations have strived to improve building performance over the years. The structural shortcomings noted above are typical of this vintage of construction and especially Eichler homes/buildings. Since the structure has never been subjected to a significant seismic or wind event, it has performed admirably over the years.

Many of the items noted above could be rectified or improved upon substantially fairly simply. Of greatest concern is the connection of the CMU walls to the roof, the clearstory windows. Unfortunately, retrofitting these shortcomings could affect the Eichler character of the structure. The Gathering Building could be fairly easily strengthened during future remodeling and maintenance; shear walls, anchor bolting and reinforcement of the truss connections. The roof diaphragm could be sheathed with plywood while re-roofing, strengthening it.

Bringing the structure into conformance with current code requirements would be a costly endeavor. Minor improvements, as noted, will greatly improve the performance of the structures in a significant seismic or wind event.

Limitations and Limitation of Liability

The opinions contained in this report are based on limited walk-through visual inspections of the premises. No materials were removed or tested. This report shall not be misconstrued as a statement regarding structural integrity related to material quality standards or current design codes. Observations and structural engineering services have been performed in accordance with generally accepted structural engineering principles and practices. Statements and conclusions in this report are based upon exposed conditions and access available at the time of the site visit, which was severely limited. We do not imply that other hazards do not exist and do not assume responsibility for the capacity of the structure or foundation to resist vertical or lateral loads. This report has been prepared under a written contractual agreement with the addressee, (client) indicated above. The client has agreed to limit the liability of Peter Nissen Consulting Engineer to $750 or the amount of the fee whichever is greater for the services described above, for any and all matters arising from this visual examination and report. The information contained herein is for the exclusive use of the specific client. Any and all recommendations provided should be treated as preliminary only and are not intended as complete construction plans. Peter Nissen Consulting Engineer shall assume no liability for other parties who use this report without the written consent of the undersigned.

Please feel free to contact us if you have any questions regarding the above.

Sincerely,

Peter I. Nissen, P.E.

PeterNISSEN P.E.
250 Bel Marin Keys Blvd., Suite D-2
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