ATTACHMENT B

Harrison Tower

1621 Harrison Street
Oakland, CA

Initial Needs Assessment Report

August 20th, 2019

Prepared by

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1.0 <u>EXECUTIVE SUMMARY</u>

Property Name:	Harrison Tower
Property Address:	1621 Harrison Street, Oakland, CA 94612
Property Type:	Senior Affordable Apartments with Commercial Use
Date of Construction:	Completed in 1972 (per Oakland Building Department records)
Lot Size:	0.476 acres (per existing drawings provided by the Owner)
Building Area:	117,765 s.f. (gross area per existing drawings provided by the Owner)
Building Height:	13 stories + 1 basement, Approx. 130' above Harrison Street (per existing drawings provided by the Owner)
Number of Units:	100 studios + 1 Manager's unit (2 bedroom unit)
Amenities:	Community Room w/ Kitchen, Laundry Room
Other Uses:	Garage on the basement level, Commercial Use on 1st and 2nd floors.

Site Description: Harrison Tower is located at 1621 Harrison Street in Oakland. The east side of the lot is facing Harrison Street, and the street provides access for vehicles and pedestrians. The existing drawings show that the property is virtually flat along Harrison Street, and there is a slight slope up from the east side towards the west side. Entries to the residential apartments and the commercial uses are both located on the 1st floor. The 1st floor is elevated approximately 5 feet from the street level, and there are both a stair and a ramp to the sidewalk.

Overall Condition: Poor to fair condition.

Life Safety Issues and Code Compliance

There is no retroactive requirement for code compliance based building upgrades/ maintenance, therefore, the applicable building code for a particular structure is the one that was in force at the time of original construction (or subsequent remodel in the affected spaces only). The current building code for the State of California is the California Building Code 2016.

Accessibility: The original construction pre-dates the Fair Housing Act (June 1990) and does not comply with it. Americans with Disabilities Act, enacted in 1990 requires that any alteration to a public accommodation performed after January 26, 1992 shall be made to ensure to the "maximum extent feasible" that the altered portions of the facility are readily accessible and usable by individuals with disabilities. The team understands that future meetings with the Oakland Department of Building Department will be conducted to determine the degree of current building and accessibility code compliance required for the site and the unit interiors.

High-rise building requirement: The building is categorized as "high-rise building" per the Building Code. The current code requires additional life safety features for high-rise buildings, but the building is not equipped with such features. The California Existing Building Code Section 314 defines "Existing High-rise Building" and its life safety requirement. The Section defines the existing high-rise building as a "high-rise structure, the construction of which is commenced or completed prior to July 1, 1974". SSDP obtained the building inspection records from the Oakland building department, and the inspection records prove that the construction was completed in 1972. Therefore, the project will be required to comply with only the requirements for "existing high-rise building."

Flood Zone: According to FEMA Flood Map, the site is located in an area of minimal flood hazard.

Zoning: The Property is located in Zone CBC-C, Central Business District General Commercial Zone. The intent of the CBD-C Zone is to create, maintain, and enhance areas of the Central Business District appropriate for a wide range of ground-floor office and other commercial activities. Upper-story spaces are intended to be available for a wide range of residential and office or other commercial activities.

Conclusions
The overall condition of the Property appears to be poor to fair. The original construction appears to be of good quality. Assuming that the needs described in the report are remedied and maintenance is sustained, the Property should remain in adequate condition to support its present use and occupancy for at least 15 years, unless otherwise noted.

PML Tier-1 Investigation was conducted by Miyamoto International based on the available existing drawings and neighboring site's geotechnical report. It will require further investigation provided in a site specific geotechnical report and building material testing information in order to determine the scope of work for the structural upgrade. Both the Geotechnical Report and Materials Testing are being scheduled currently.

2.0 OBJECTIVES

The purpose of our observation and the resulting report is to assess the general interior and exterior condition of the building and site grounds. Separate consultants shall be hired by the Client to evaluate hazardous building materials (including asbestos, lead, and mold). The specific objectives of this architectural report are to:

- Identify and locate significant defects, deficiencies, and items of deferred maintenance of building elements and site elements and make recommendations for repair or replacement.
- Identify obvious and significant deficiencies concerning common building and safety code compliance.
- Identify obvious/ possible elements that will be required to upgrade due to a TCAC funding application.
- Provide a summary of the physical attributes of the Property and recommendations to create safe and sanitary housing for an additional 15 years of building life.

3.0 PROCEDURES AND LIMITATIONS

The Assessment Team consisting of: Saida + Sullivan Design Partners, EDesignC, Miyamoto International, and Steelhead Engineers conducted independent on-site evaluation of the Property to determine the condition of the various components for this report. During the site visits, the Assessment Team did not gain access to all areas, operate any specific equipment or perform any tests. The findings in the report are based only on visual observations as the Assessment Team did not remove any construction materials to inspect the underlying structure.

Significant damage may be present at hidden conditions that cannot be discovered without destructive testing which is beyond the scope of this evaluation. The observations and resulting report are, therefore, not intended to warrant or guarantee the performance of any building components or systems.
This report does not confirm the presence or absence of lead paint, asbestos, PCB'S, or toxic soils on this Property. Documents and data provided by the Client, designated representatives of the Client, or interested parties consulted in the preparation of this report have been reviewed with the understanding that consultant assumed no responsibility or liability for their accuracy. This evaluation is based on the Assessment Team's judgments of the physical condition of the existing building and site as well as the estimated remaining useful life of those elements and systems. The actual performance of individual components may vary from a reasonably expected standard and may be affected by circumstances, which occur after the date of evaluation. The evaluation is based solely on visual observations.

No representation is made as to the statue of title, legality of lots or zoning of the project, nor is any representation made as to the advisability or inadvisability of the purchase of, investment in, or financing of the subject property.

Although it is assumed that the development was constructed in compliance with contemporary building codes and standard building practices at the time of construction, and while the Property remains in poor to fair condition for present day use, the assessment does not include a detailed review to determine compliance with all local Building Department Codes, Fire Department requirements, or Planning Department ordinances. A future meeting with Oakland Building Department will be conducted to discuss the extent of compliance with current building codes that may be required depending on the finalized scope of work.

Due to the limitation of the assessment and investigation process, and the necessary use of unverified data furnished by others, the Assessment Team cannot assume liability if actual conditions vary from the information contained herein.

The conclusions represent professional judgments and are founded upon the findings of the investigations identified in the report and the interpretation of such data based on experience and expertise according to the existing standard of care.

4.0 PROPERTY DESCRIPTION

The following elements are included in the property observation review:

4.1. SITE

Social/Community Identity

The building faces Harrison Street with a setback area with landscaping, the stair, and the ramp. Currently, there is no indication or signage to help create a sense of place or residents' community identity.
Comments: When considering site amenities, including signage, site lighting, landscaping, and exterior building treatments, the team should consider treating the outdoor space with designs, materials, and colors to create community identity for the entire development.

Pedestrian Access

Pedestrian access is provided from the public sidewalk along Harrison Street. Entries to the residential apartments and the commercial uses are both located on the 1st floor. The 1st floor is elevated approximately 5 feet from the street level, and there are both a stair and a ramp to the sidewalk.
Comments: The existing ramp does not meet either ADA or the California Building Code accessibility requirements.

Security System

The building entry is controlled by an intercom system. A security camera system is installed throughout common areas.
Comments: Security system appears to be in working condition.

Topography

The property is virtually flat along Harrison Street, and there is a slight slope up from the east side towards the west side. Entries to the residential apartments and the commercial uses are both located on the 1st floor. The 1st floor is elevated approximately 5 feet from the street level, and there are a stair and ramps to the sidewalk.
Comments: The existing ramps does not meet either ADA or the California Building Code accessibility requirements.

Vehicular Parking	The garage is located at the basement level. The sloped driveway down from Harrison Street provides access to the garage. The existing drawings indicate that there are 39 parking spaces, but a large portion of the garage was being used for a staging area of the on-going construction for the commercial spaces during our site visit. The total number of parking spaces could not be verified. Accessible parking spaces were not observed. **Comments:** Providing accessible parking spaces and demarcating an accessible route to the elevators by re-striping is recommended.
Bicycle Parking	No bicycle parking, secured or unsecured was observed. **Comments:** Secured bicycle parking should be considered on site for residents, employees, and visitors.
Exterior Lighting	Exterior lighting along Harrison Street is provided via the flood light fixtures attached to the building and the downlight fixtures attached to the bottom of the cantilevered 2nd floor. It is not known if the exterior lighting provides adequate coverage for all the pathways, stairways, and entry areas at night. **Comments:** Further review for adequate lighting is recommended through interviews with the residents and the property manager as well as photometric studies by the electrical engineer.
Landscaping	Landscaping is limited to the planter areas along Harrison Street. There are existing shrubs and small trees. They appear to be in good condition. **Comments:** Review of the plants in the planters is recommended.
Site Drainage	Exterior areas on grade are limited to the following areas: 1. Planters along Harrison Street, 2. The driveway along Harrison Street, 3. The exterior patio at the north-west corner. The existing drawings indicate that the planters have no bottom and water drains through to the earth below. The driveway is downsloping from Harrison Street, and a trench drain is provided at the bottom of the slope. The patio area has a floor drain. **Comments:** All site drains appear to be in working condition.
Outdoor Gathering	The patio at the north-west corner on the ground floor, and the outdoor deck on the third floor provide opportunities for outdoor gathering. **Comments:** The patio on the ground floor is not included in the current scope of work. The third-floor deck is adjacent to the community room and it can be used by the residents. Consideration for new furniture to encourage residents to use the deck is recommended. The guardrail height is lower than the current code requirement. Adding a top rail to meet the current code height for a guardrail is recommended. The door threshold appears in compliance with accessibility requirements. Waterproofing appears to be in good condition.
Site Retaining Walls	Retaining walls only occur at the planters along Harrison Street. **Comments:** The retaining walls appear to be in good condition.
Site Stairs/ Ramps Handrails, Guardrails	The cast in place concrete stair and the ramp connect Harrison Street and the raised deck on the first-floor level. **Comments:** All elements appear to be in good condition. The existing ramp does not meet either ADA or the California Building Code accessibility requirements.

Exterior Signage

The signage displaying Oakland Housing Authority is above the commercial entry door and visible from the street. No signage is provided for the residential entrance.
Comments: A strong graphic and aesthetically designed site signage package is recommended to enhance the property identity.

Mailboxes

The residents' mailboxes are located at the residents' entry lobby on the 1st floor.
Comments: Mailboxes appear to be in working condition. Compliance with ADA/ accessibility requirement shall be reviewed.

Common Areas Amenities

Community Room (see also outdoor gathering), Shared Kitchen, Laundry Room, Restrooms are located on the third floor.
Comments: Further study is needed for accessibility and usability. Currently neither the kitchen or laundry space appears to meet applicable access requirements (reach ranges, maneuvering clearances, etc.)

Driveway, Building Sign, Stair, Planters

Ramp

Residential Entrance, Mailboxes

Garage

4.2. ARCHITECTURE

Foundation/ Basement Walls

The existing structural drawings indicate that there are grade beams under the tower portion of the building, and spread footings under two-story part of the building under the basement garage level.

Comments: The concrete floor and the walls are exposed in the garage level, and evidence of structural distress was not visible. The condition of the footing appears to be in good condition.

Basement Ventilation

The existing mechanical drawings and visual observation indicate that the exhaust fan is located near the northwest corner. A grilled garage roll-up door is installed at the garage entrance from the driveway.
Comments: The condition of the garage exhaust system was not evaluated in this report. A separate investigation is required if an evaluation is desired by the owner.

Building Frame

The existing structural drawings indicate that the building frame consists of reinforced cast in place concrete system.
Comments: The building frame/ structural system is being investigated by the structural engineer as part of the PML analysis.

Roofing

See attached report by Steelhead Engineers

Exterior Walls

Majority of the exterior walls consist of cast-in-place concrete walls and precast concrete panels with paint finish. Metal framed exterior wall assemblies with cement plaster or ceramic tile finishes are located at 1st and 2nd floor level along the courtyard. Parapets are either cast-in-place concrete walls or metal-framed sloped parapet with standing seam finish.
Comments: The concrete walls and the standing seam metal parapets appear to be in good condition. The metal-framed walls facing the courtyard were not observed.

Insulation

There is no insulation along the exterior walls. The existing drawings indicate that rigid insulation is installed on the roof but the actual condition is not verified.
Comments: Installation of interior furred wall with insulation along the exterior wall is recommended for better energy performance. Verifying and installing appropriate insulation on the roof is recommended if roofing is replaced.

Doors

The doors in storefront system are located at the residents' main entrance and the community room on the 3rd floor. Other service doors are hollow metal doors with hollow metal frame.
Comments: All doors appear to be in working condition while damage to the finishes were observed. Due to age, replacing all doors should be considered.

Windows

The windows in residential units are anodized aluminum framed single pane sliders with a sill approximately 10' above the finished floor (above the existing electric base board heaters).
Comments: Due to age, the sliding function may not be smooth. Single pane windows with thermally un-insulated frames are very ineffective for energy performance and conservation and replacing the windows with ones with better thermal performance is recommended.

Window Railings

At each residential window, a railing with vertical pickets exists. The railing is called out in the original drawings as measuring 3'-0" tall from the top of the concrete beam (effectively the window sill). Today's code would require this railing to be 3'-6" minimum height and that the space between the vertical pickets be less than 4" clear. The bottom of the railing should also have a gap less than 4" clear (original drawings show 4"). The railing as it exists could pose a danger to residents and in particular children who may be visiting if windows are open.
Comments: It is recommended to add a perforated metal or mesh material on the inside of the railings to be able to make them code compliant height, and eliminate the large space between pickets and at the bottom.

Satellite Dish Satelite dish does not exist.
Comments: Consideration for providing satellite dish is recommended as an option for residents.

Trash The main trash collection room is located in the garage level, and a trash compactor and two trash bins were observed. There is one trash chute connecting thru each floor and down to the main trash room. There is no means of ventilation in the trash rooms including the main trash collection room.
Comments: Review of the trash collection system and ventilation system with the property manager/ owner is recommended.


Roof


Typical Exterior wall, Windows


Trash collection room at garage level


Storefront/ doors at 3rd floor deck

4.3. COMMON SPACES

Accessibility The pedestrian access to the residential common spaces, management offices, and residential units are provided through the ramp along Harrison Street, the entry lobby, the elevator, then the corridor/ hallway to each space.
Comments: The ramp and the elevator do not meet either ADA or the California Building Code accessibility requirements. Accessibility compliance for each space shall be assessed in future site visits.

Elevators Two elevators are dedicated to the residential floors and the supporting functions. The elevator access is provided on the garage level, 1st floor lobby, 3rd floor, and all upper floor residential levels.
Comments: The existing elevator size does not meet either ADA or the California Building Code accessibility requirements.

Exit Stairs

There are two exit stairs, one at each end of the corridor on the north side and the south side. The stair on the north side provides access to the roof. The exit stairs appear to be maintained from the original construction.
Comments: The stairs appear to be in good condition. Compliance to the California Existing Building Code shall be reviewed.

3rd floor

The third floor consists of the community room, the outddor deck, the management offices, the community kitchen, the laundry room, the restrooms, and the manager's apartment.
Comments: The interior finishes appeared to be in fair to good condition. An interest for repurposing some office spaces was expressed by the Owner during the site visit. Further discussion and study are recommended. All door operating hardware should be lever style.

4th – 13th floors

These floors are dedicated to dwelling units with the elevator lobby, corridor, and the trash room.
Comments: The corridor finishes (carpet, wall finish) appear to be in poor to fair condition. Corridor flooring, base and either the wainscot or lean rail should be considered for replacement. Currently the lean rail and wainscot are the same color making the lean rail difficult to identify where it is. In general the corridors are dark (dark carpet, wainscot, front doors). Consideration for more contrast and lighter finishes in the corridors as a strong visual, as well as varying them per floor for way finding. The conduits for the fire alarm system and security system are exposed in the corridor, but concealing the conduits will require a dropped ceiling and it is not recommended. Painting of all exposed conduit is recommended. Unit ID numbers are on the entry door. It is recommended that new Unit ID signage be provided on the adjacent wall with code required braille. Additionally, from the elevator lobby unit directional signage is recommended.

All units were recently surveyed from August 13- 19th. The unit interiors range from very poor to good condition. Recommend the complete renovation of all units if budget allows, ee Section 4.4

Trash Room

The trash room for the residential use is located at south end of the building. The room does not meet either ADA or the California Building Code accessibility requirements (door hardware, maneuvering clearances, trash door operability, etc.)
Comments: It is recommended that the functionality of the trash collection is reviewed with the Owner and the property management team.

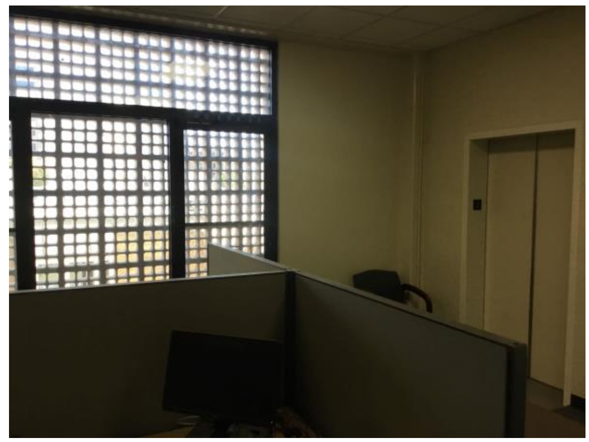

Community Room


Community Kitchen

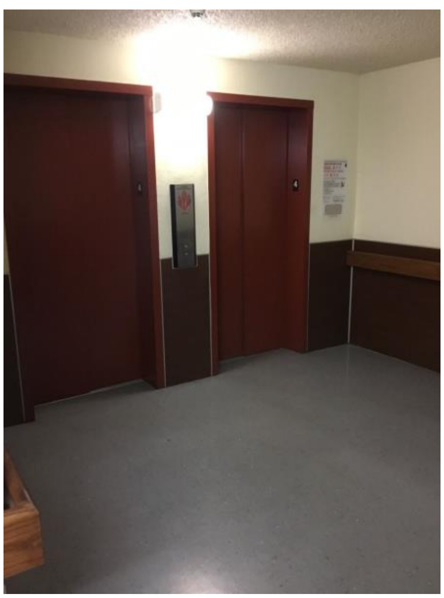
Laundry Room

Manager's Office

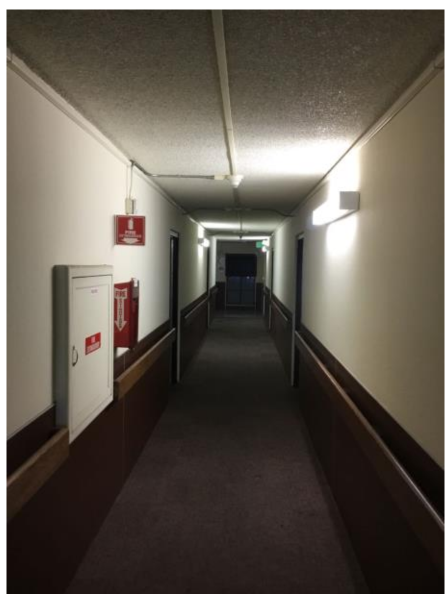
Assistant Manager's Office



Office at the elevators



Upper Floor Elevator Lobby



Upper Floor Corridor

Upper Floor Trash Room

4.4. DWELLING UNITS

General

Recently from August 13-19, all residential units were surveyed for the condition of the interior fixtures, finishes, appliances, cabinets, etc. The manager's apartment was not reviewed at this time. In general the residential aparmtents conditions range from very poor to good. It is recommended that all units be completely renovated as budget allows.

Accessibility

None of the units are designated as accessible units.
The first occupancy of the development pre-dates the Fair Housing Act and therefore is not subject to compliance with the act. If TCAC funding is used, it will require 10% mobility units and 4% Communication units.
Comments: There are a total of 101 residential units; (100) one-bedroom units (10 unit/ floor x 10 floors) and (1) two-bedroom unit on the third floor which is the manager's unit. Converting (1) one-bedroom unit/ floor at all levels (10 one-bedroom units), and the two-bedroom manager's unit to Mobility units will satisfy TCAC's 10% mobility units requirement. A minimum of 5 units are required to be Communication units to satisfy TCAC's 4% requirement. Locations of the units shall be scattered throughout the building. The communication unit requirement will be achieved by electrical equipment and devices. No reconfiguration of partition walls is expected. See attached SK-1 and SK-2 for possible mobility features upgrade.

Acoustics

Concrete walls and concrete slabs are located between units, and between units and corridor. The windows in residential units are anodized aluminum framed single pane sliders. In all units surveyed, there is a hard surface flooring in the kitchen. In the living rooms there is either hard surface flooring or carpet that appears to be glue down. Bathrooms all have hard surface flooring. Hallways and bedrooms are mixed with some having hard surface flooring and some having carpet.
Comments: While concrete wall/ floor provides good sound isolation, it has poor performance for impact noise. In particular, the floor assembly is weak in performance for impact noise, and therefore the installation of hard surface flooring with acoustic isolation mat (or integrated cushioned back) is recommended.

Flooring

Existing units floors vary by unit and consist of old and new short loop carpet (appears to be glue down), a newer vinyl sheet product, and an old composition vinyl sheet product. Transitions between different existing flooring types were either rubber or metal. Flooring base was either rubber or a cove of the older composition vinyl sheet.

Comments: Flooring is in poor to fair condition. Carpet is less preferred for the use of wheelchairs, walkers, and canes as well as durability (cleaning) and bed bugs. Sheet vinyl is more difficult to repair if damaged in one area. A vinyl plank or tile product with slip resistance, acoustic isolation mat (or integrated cushioned back) is recommended for comfort underfoot, firmness for wheelchairs and walkers, durability in wet and dry areas, and ease of replacement as needed. Elimination of flooring transitions due to differing floor materials (unless a flush transition is used) is also recommended for a senior housing development. Use of low or no-VOC adhesives is recommended for indoor air quality.

Doors

The unit entry doors are solid core, and the interior doors are hollow core. The wardrobe closet doors in the bedrooms are bi-pass door assemblies, some with opening hardware and some without.
Comments: Entry doors were observed to be in poor to fair condition. Many have knob hardware, damaged frames and the gasketing around the openings varies a lot (from new to non-existent). New entry doors with single motion lever / locking hardware, high and low peep holes and good air seal gasketing are recommended.
Interior doors were observed to be in poor to fair condition. It is recommended to replace interior bedroom and bathroom doors with new swing doors in kind with new lever hardware. Bi-pass doors with durable track hardware and wire pulls should be provided at bedroom wardrobe closets. At hallways, four doors open into this small area and door swings overlap. Many scrapes, dings and chips in doors were observed. Door bumpers or other means of protecting doors from adjacent door hardware is recommended. Consideration of not providing a door on the small linen closet in the hallway is recommended.

Walls / Ceilings

Walls and ceilings are lightly textured and painted on gypsum wallboard or on concrete.
Comments: It is recommended to repair (re-texture where needed) and repaint all walls and ceilings with low or no-VOC paint.

Window Coverings

Vertical louver blinds are installed at the majority of unit windows and most looked relatively new. Some units still had cloth draperies.
Comments: The cloth window coverings observed were in poor to fair condition. Vertical blinds are recommended to be provided at all windows in the units.
See 4.5 Other Considerations for heat gain at windows.

Cabinets

In general, two types of existing kitchen cabinets were observed. One type was clearly old flush faced doors and drawers and did not have hardware (knobs or pulls) and was clearly past its useful life. The second type was typically a Shaker style door with knob pulls.
Comments: With the exception of just a few units, the existing cabinets seem to be at the end of their useful life and are recommended to be replaced with new that have wire pulls for hardware.

Countertops & Sinks

The kitchen sinks are drop-in stainless steel, single-basin fixtures in plastic laminate or granite counters.
Comments: The laminate countertops are at the end of their useful life and are recommended to be replaced**.** The granite countertops in general were in good condition and possibly could be re-used. The wear on the sinks varied across units as well. It is recommended to replace them as budget allows.
Existing faucets are recommended to be replaced with new code compliant lever and low flow type.

Appliances

Each apartment includes an electric range and oven, re-circulating range hood and refrigerator. Approximately half of the units have garbage disposals.

Comments: Appliances observed were of various ages and conditions and it is recommended that all appliances be replaced. Also noted that original wall mounted exhaust fans at the sides of the range occurred in some units (not appearing to function) and were eliminated in other units. See mechanical recommendations from EDesignC's findings.

Kitchen Layout

The current kitchen layout does not meet the Mobility features requirement. **Comments:** As TCAC funding is expected, kitchen reconfiguration is expected for 10% of the units that are designated with Mobility features. See attached SK-1 and SK-2 for possible mobility features upgrade.

Kitchen Lighting

Current kitchen lighting consists of one light overhead (of varying brightness) and one wall mounted fluorescent tube light on the wall behind the sink. This light is extremely bright and it was noticed several residents who had covered this. **Comments:** A light mounted below the cabinet above to shine down on the sink is recommended.

Bathrooms

The bathroom layout consists of a tub/shower or shower with a curtain rod, sometimes a shower door, a wall hung sink or sink with vanity, a mirrored medicine cabinet, toilet, toilet paper holder, at least one towel bar and sometimes grab bars of different configurations.
Comments: The condition of the bathrooms vary widely. Some tub/shower installs are stained and moldy, while some are clean and are in good condition. A few showers were observed but have shower pans that are 2-3" above the floor and would not meet accessibility codes.
Condition of the flooring, sinks, vanities and toilets varied from unit to unit. It is recommended to replace all bathroom fixtures with low flow fixtures, and replace finishes since all units only have only one full bath, it should be in the best working order possible. Also recommended is consideration for grab bars in bathrooms given the aging population (and not above towel bars).
One other recommendation relates to the bathroom exhaust which in some units was very noisy/ loud or not seeming to work at all. See EDesignC's mechanical recommendations.

Mold

Mold was not observed in units (except some tub surrounds) visited during the site visits from August 13- 19th. However, it was reported in the PNA by the third party (report issue dated 3/13/2018).
Comments: A review of units once vacated and a protocol for mold abatement if found is recommended.


Unit 408 Kitchen


Unit 408 Bedroom with removed carpet

Unit 408 Bathroom


Unit 601 with shower pan

4.5. OTHER CONSIDERATIONS

TCAC Funding

TCAC funding will trigger upgrades for accessibility and energy efficiency. Those requirements shall be reviewed at the early stage of design.

Existing hi-rise building

Harrison Tower is considered as 'existing high-rise building' defined in the California Existing Building Code Section 314.
Comments: The requirements for existing high-rise building shall be reviewed at an early stage of design.

Heat Gain at Upper Floor Units

The unit surveys conducted on August 13-14 revealed that the upper floor units (Floors 9-12) experienced extreme heat gain, especially on the south side of the building.
Comments: Ceiling fan/ light kit combinations and window tinting should be studied if windows are not replaced as a priority. See EDesignC's findings for window replacement in general due to age and building comfort.

HARRISON TOWERS APARTMENTS

MEP PRELIMINARY CONDITIONS NEEDS ASSESSMENT

MECHANICAL, ELECTRICAL, PLUMBING

1621 HARRISON STREET, OAKLAND CA

Prepared For:
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San Francisco, CA

July 10, 2019
Revised July 25, 2019

CONTENTS

Executive Summary

The building utilities and systems are generally 50 years old and have reached the end of their useful life (EUL). A common goal for a major rehab is a 15 to 20-year life span following a renovation upgrade project. TCAC (California Tax Credit Allocation Committee) funding requires a minimum 15-year replacement capital reserve. The heating boilers and the domestic hot water boilers appear to have been replaced within the past 20 years. These devices have, as a rough estimate, 10 years of useful life remaining based on visual comparison to similar systems in other buildings.

This report covers only the residential floors of the building. The exterior lighting, offices, parking garage, and trash room are not in the scope of this project. For this report, we inspected a sample apartment and the roof-top equipment in detail. Our observations about conditions are based on limited observation. Maintenance records were not available to us for the preparation of this report and should be reviewed for systemic problems at the facility.

Mechanical Ventilation

We observed and were told that the ventilation system is not performing. Providing the best ventilation system possible will benefit resident health, lower maintenance costs, and reduce life-safety risks in the event of fire. Our inspection indicates that the existing ventilation system is similar to current Code-compliant systems of recent vintage and could be repaired. Currently, the system is very dirty, and there are broken fans and components. The City of Oakland plan checker has suggested that the existing system be left in place to avoid the need to bring the entire system in question up to current Code. The system could be replaced to bring it up to state-of-the-art.

Options for the ventilation system are:

> **Least:** Clean, repair, and replace with equal. Clean all fans, ducts, and grilles. Replace any non-operational fans. Replace all roof-top exhaust fans (range exhaust fans with direct-drive models). Clean and repair all range exhaust dampers and repair their control system.
>
> **Recommended:** The existing two-chase sub-duct system provides passable exhaust-only ventilation. The existing bathroom exhaust shafts do not include scavenger fans at the roof; only an atmospheric opening. Current emergency smoke removal requirements for multi-story buildings require roof-top fans on 90-minute emergency backup power (inverters). A proposal to add scavenger fans to the existing bathroom exhaust systems would need review by the City of Oakland plan checker to assure acceptance of this single modification to the exhaust system. The existing (to be replaced with equals) kitchen exhaust fans also should be powered by 90-minute emergency backup power.
>
> **Best practice:** State-of-the-art ventilation would be: “Whole house ventilation” (for each apartment) via an Energy Recovery Ventilator (ERV) unit located in each apartment, exhausting air (80 cfm) from the bathroom and supplying a balanced amount of filtered makeup air to the bedroom and living room.
>
> The kitchens would have new range hoods with in-apartment fan controls, a re-aligned replacement shaft with sub-ducts to the roof to accommodate the new hoods, and new scavenger fans on the roof.

Mechanical Heating

There is upwards of 20% utility bill savings potential from improving the heating system. Energy consumption of the building could be decreased by:

- Adding insulation to the roof and to the interior of the perimeter walls.
- Replacing the fenestration with current Code-compliant glazing.
- Upgrading and downsizing the heating system.

Options for the heating system are:

Least: Keep the system as it is. The convectors in the apartments need cosmetic repair. Functioning of the in-apartment controls needs to be checked and repaired. The Secondary Heating water pump appears to be old and worn; and likely to require replacement soon.

Recommended: Programmable thermostats could be added in each apartment to improve resident comfort and reduce heat operating time.

Best practice: Replace heating boilers with condensing boilers and downsize them. Also, replace the heating convectors in the apartments with panel radiators. The building upgrades will reduce the need for heat. The more efficient equipment will additionally save energy by meeting the reduced load.

Electrical

Main Power, Power within Dwelling Units, Lighting, Low Voltage Systems, Security, Fire Alarms, Elevators, Emergency Power, Fire Protection, and Utilities are covered in this report. Overall, while the system is functioning, it has deficiencies and obsolete equipment.

Least: Dwelling wiring devices should be replaced because they are worn and obsolete. Code-required outlet types and locations should be added to the kitchens and bathrooms. In mobility units, the outlet heights need a case-by-case review and relocation to comply with current Code.

Recommended: In conjunction with doing extensive plumbing repairs, as part of required upgrades to walls that are “opened up”, add new dedicated circuits to the bathrooms, kitchen counters, and garbage disposal (if included).

Best practice: Service and switchgear should be replaced because they are older pieces of equipment and the parts (like circuit breakers) are obsolete. Refurbished units are generally more expensive.

All lighting should be replaced. A complete change-out will be the most economical option from a maintenance and energy use perspective.

Plumbing

Leaks can be very costly failures and severely impact residents. Based on industry experience, we think that with the existing system, the number of plumbing failures will continue to increase because the systems are beyond their end of useful life projection. Water savings can be realized for low cost by replacing faucet aerators, shower heads, and toilets to the current CalGreen and WaterSense standards.

The utility cost for providing domestic hot water can be cut in half by adding a solar thermal water preheat system to the roof.

> **Least:** Keep the systems as they are. Carry reserve funds for covering repairs as they occur. Contract a detailed survey of the plumbing system, including camera inspections to provide a targeted priority repair list. Replace faucet aerators, and possibly entire faucets with current water-saving models. Repair, tune-up, and replace Acid Neutralization cartridges on the hot water heaters.
>
> **Recommended:** Conduct destructive testing of piping, prioritize repairs, and replace fixtures, shut-off valves, and connections to fixtures. Install current Code-compliant WaterSense fixtures. The domestic hot water plant on the roof has been replaced recently so replacing it could be a lower priority.
>
> **Best practice:** All building water piping should be replaced. All building Sanitary and Vent piping should be inspected and any weak areas replaced.

There is roof area available to add solar thermal domestic hot water preheat as a utility cost saving measure.

Building Data

Building Gross Area: 131,937 SF including parking and office spaces.

Residential: 101 units

Type	Size	Qty	Total SF
1BR/1BA	520	100	52,000
2BR/1BA	765	1	765

Year Built: 1970

Note: Asbestos is present in interior surface treatments.

Mechanical

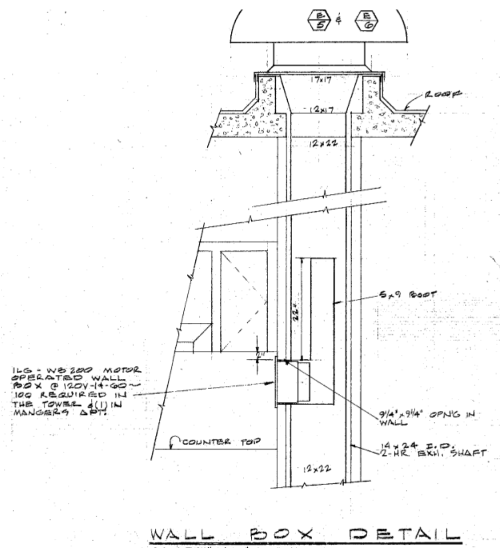
Mechanical Ventilation

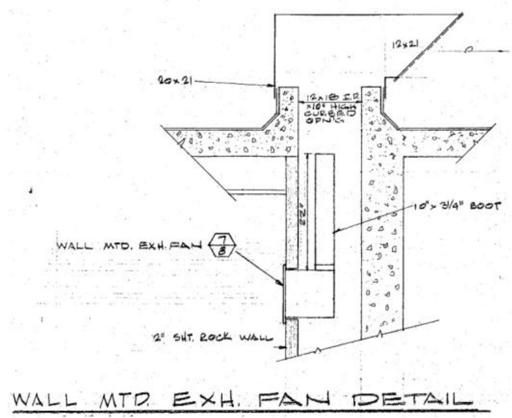
Although the building has a passable subducted exhaust system, it lacks any fresh air supply. Localities and certain zones are moving toward requiring MERV 13 air filtration to protect occupants against poor outdoor air quality. MERV 13 air filtration requires fan-forced supply air flow due to the resistance of the filter.

Title 24 standards for windows and construction have resulted in tighter building envelopes, and this building is Type1 concrete construction, an inherently airtight construction method. Retaining the existing exhaust ventilation system with no supply of outside air will result in unpredictable air flow and possible transmission of air contaminants from unit to unit within the building.

Typical Range with Recirculating Hood and Wall Exhaust

Damper at Range Wall Exhaust





Wall-mounted Bath Fan, showing Dirt

Typical Bath Fan Mounted in Plumbing Shaft Wall

Best Practice

The best applicable system to this building would be an individual Energy Recovery Ventilator (ERV) installed in each apartment to exhaust air (80 cfm) from the bathroom and to supply filtered makeup air to the bedroom and living room. This system would allow the introduction of MERV 13-filtered outside air, and balanced supply and exhaust air flows within each unit. It would also maximize air quality in each unit. With ERVs, the building's heating system can be downsized because there will be a 60% reduction in the heat lost to exhaust air. (See the Mechanical Heating section below.) Adding ERVs would require integration of inlet and exhaust openings with new fenestration in the existing wall openings of the building.

For kitchen range hoods, we recommend adding ducted hoods and replacing and relocating the subducts along with new riser ducts in the shafts up to new scavenger fans at the roof. Doing this will require replacement of the shaft walls. The roof-top fans need replacement because they are beyond end of life and extremely noisy; and they need to be on a 90-minute emergency power supply to comply with the subduct Code requirements.

Recommended Approach

If the City of Oakland Building Department stated that significant changes to the ventilation system would require bringing the ventilation system up to current Codes, the existing chases will need alteration or reconstruction. These changes could range from the 2018 estimate of $72,000 for 100 fire-stopped penetrations, to more for removing existing chase walls and ducting, and for replacing them using current Code-compliant methods.

The existing bathroom ventilation chase appears to be lined with galvanized sheet metal, but more recent repairs involving replacement of tubs have resulted in shaft-wall (dry wall) exposed to the air flow. Current Code requires all air flow to be contained in metal ducts. There are existing subducts for each bathroom fan, however, the air flow path also includes the plumbing pipes, two-hour access hatches, and shut-off valves for the shower fixtures; not isolated in a metal duct.

To follow best practices and to comply with current Codes, modifications are needed:

- The bath chases and range exhaust shafts should have scavenger fans added on the roof. The scavenger fans should be on emergency power for a 90-minute run time during emergency.
- The bath fans should be relocated to the ceiling, and should be two-speed, constant-on 50 cfm/80cfm-on-occupancy models to provide whole house ventilation. The sub-ducts should be relocated to join the fan exhaust above the bath's soffit ceiling.

These modifications would need to be vetted by the City of Oakland Building Department to determine the exact changes that they would require to the balance of the existing system to meet current Code.

If replacement of plumbing pipes is included in the project, then complete removal of the shaft wall at each bathroom will be required. The new installation will need to include the addition of a bathroom exhaust duct with subducts and roof-top scavenger fans. The duct should not be penetrated by plumbing pipes. Further destructive investigation would be required to determine how to install the new ducts and pipes in the existing shaft cut-out size through the slabs.

The existing kitchen exhaust shaft includes subducted inlets at about 40 inches high above the floor that are adjacent to the side of the ranges. Recirculating range hoods are located above the ranges. A change to the exhaust system to include ducted range hoods would kick off a reconstruction of the system. Relocated subducts entering into new riser ducts up to new scavenger fans at the roof would require replacement of the shaft walls and riser ducts. The roof -top fans are beyond end of life, very noisy, and need replacement. All shaft exhaust roof-top fans need to be on a 90-minute emergency power supply in order to eliminate the need for costly fire-smoke dampers at each apartment.

The current exhaust-only arrangement relies on building leakage to provide fresh air. Fresh air supply is not required in the current Code. A common solution is passive fresh air inlets through the building walls, however passive fresh air inlets are currently not favored by certain jurisdictions. Title 24 acceptance testing for the ventilation system must include measuring air flow at the fresh air inlets if they are installed. The required ventilation air flow rate is difficult to achieve at a fresh air inlet, due to competing other leaks into the apartment. Active fresh air intake (using a fan) is the preferred way to comply with the Title 24 acceptance testing standards.

The existing recirculating kitchen hoods would remain in place with a minimum intervention option.

Mechanical Heating

Start by improving the building's insulation:

The balance of the exterior wall area is uninsulated concrete, also a large energy loser. When refinishing the interior surface of the walls add interior insulation with one inch of rigid insulation (rock wool board is the best choice). This will reduce the heat loss through the walls by about five times. Together the window and wall improvement will greatly increase the occupants' comfort by evening out the interior surface temperatures; and not require heating convectors along entire perimeter of each apartment.

The roof insulation should be evaluated and improved if less than R-19. If the roof is being replaced as part of the base job, then the insulation should be brought to the current Code-required R-30. This will greatly improve the comfort of the upper floor units and is your most cost-effective energy-saving improvement to the building envelope.

Window replacement should remain a priority in the project scope of work. The architectural item that will improve the building comfort and energy performance is replacement of the single-pane aluminum frame windows. The current windows have no thermal break, poor seals, and no sun shading. The current Code-compliant window will keep heat in three times better in winter and will reduce summer heat gain from the sun by about a third also. The replacement is in scope.

The existing heating system is: gas-fired hydronic with two atmospheric draft conventional boilers and fin-tube; convectors along the perimeter walls of each apartment. Each apartment has a wall-mounted manual thermostat controlling a 2-way (on-off) valve that admits water to the convector.

Typical Convector Condition, Bent Fins

Typical 120v Motorized Valve

Boilers, Two that are ~20 Yearsoold

Heating Water Pump showing Corrosion

Best Practice Approach 1

Replace the entire heating system with a downsized lower-temperature hydronic system. New condensing boilers will save 15% of the gas usage to provide similar heat to the existing boilers. Couple this with replacement of the convectors in each apartment with panel radiators. The panel radiators, along with the improved windows and walls will require much less energy output to maintain comfort, so the entire system can be downsized from the current sizes. In addition, the installation of ERVs to capture heat lost to the exhaust air will allow a 30% reduction in the heating plant size.

Best Practice Approach 2

The Housing Authority has indicated the consideration of adding cooling to the building. We suggest converting the heating system to a Variable Refrigerant Volume (VRV) split-system heat pump system. A VRV system would give several advantages as follows.

<u>Energy Savings</u>. In addition to being very efficient, the VRV system allows sharing of heat or cooling between apartments. Because the building has two sides facing east and west, throughout the day half of the apartments may prefer cooling while the other half prefer heating. In traditional hydronic heating and cooling systems, this leads to high energy costs due to running heating and cooling equipment at the same time. The VRV system can send the waste heat from an air-conditioned apartment over to an apartment that needs heating. This exchange can happen automatically and at any time.

Maintenance Savings. The refrigerant-based VRV heat distribution system does not require regular maintenance the way that a hydronic system does. The VRV system also has factory-integrated controls for all the components, eliminating controls operation problems. The hydronic systems are built-up from different manufacturers' components with overlaid controls that are difficult to optimize.

Cost is similar to replacing the heating system, plus cooling is included. The cost and complexity of installing the VRV system is similar to replacing the entire heating system, including the piping. To add a hydronic cooling system to the hydronic heating system replacement would roughly double the cost because there are two parallel systems.

Adding any type of cooling system to the building will significantly increase the electrical system load, by approximately 50 to70 kW demand, probably triggering the need for a service upgrade.

Non-Residential Mechanical

The scope of work for the non-residential areas (offices, parking garage and trash room has not been included in this report.

ELECTRICAL

Main Power

Each residential floor of the building has two common panelboards located in the common hallway that feed the residential unit electrical loads. These corridor panelboards currently only feed residential loads and any work completed in the building will require these panels to continue to only feed residential loads. Typically, three floors of dwelling units are fed by one 400A electrical feeder. The existing panels are in fair condition. However, the equipment is approaching 50 years of service life and parts become difficult to find. Refurbished breakers are the only option; and these are usually at a premium price.

Recommended Approach

Replace the existing gear which is at the end of its useful equipment life. Maintain the existing approach of feeding unit dwelling loads from common corridor panels.

Electrical Power Within Dwelling Units

Residential units are fed with four (4) 20A branch circuits and one 50A/2P breaker for an electric range. The existing bathroom and kitchen receptacles were found to have GFCI protected devices. The existing breakers and branch circuits were found to not be AFCI protected. Many of the existing general-purpose receptacles throughout the units were found to be mounted below 15 inches.

Recommended Approach

Replace the existing devices at kitchens and baths with new combination GFCI/AFCI-type receptacles to meet current Code life safety improvements.

Replace breakers feeding the dwelling unit loads with AFCI-type to meet current Code and to improve safety from arc faults.

Provide a dedicated circuit for each dwelling unit bathroom to meet current Code and to minimize issues with hair dryers potentially blowing a circuit if shared.

Replace dwelling unit wiring devices (switches and receptacles) and install at new accessible heights.

Lighting

Existing lighting at the residential common area corridors consists of wall-mounted commercial surface 4-inch linear fluorescent fixtures.

Existing dwelling unit lights consist of surface-mounted permanent fixtures in the bathroom and kitchen. There are no fixed lights in the living room or bedroom. The existing fixtures within the dwelling units are fluorescent and compact fluorescent bulbs.

If the light switches in the restrooms are replaced, they will be replaced with vacancy sensors. We recommended that this control be kept separate from any exhaust fan control.

Recommended Approach

For energy reduction and uniform lighting throughout the spaces, we recommend replacing existing lighting fixtures throughout. New LED shielded fixtures should be installed within the common corridors. New LED, Title 24 JA8-compliant, fixtures should be installed within the dwelling units.

Low Voltage Systems

Existing phone service is provided by AT&T at the basement and then distributed from the third floor telecom room in the community space. Most of the phone outlets in the dwelling units have been damaged from years of use and are in fair to poor condition. The existing telephone lines are run within conduit within the dwelling units. There are existing Cable TV outlets located at the dwelling unit living rooms. The main incoming Cable TV feed was not verified during our site walk. However, it appears that the coaxial cable is also installed within conduit within wire chases.

Satellite dishes were not observed during the site walk.

Recommended Approach

Test existing phone lines and ensure that they are in proper working condition.

Confirm with building owner to ensure that television and data services for the tenants are acceptable.

Security

There is an existing entry system that is a ‘dial by directory’ type. It appears to be functioning. There is a brand-new AXIS Control CCTV system that was recently installed throughout common areas that shall remain.

Recommended Approach

Replace the existing entry system with a new ‘key-fob’ type entry system that is ADA-compliant.

Fire Alarm and Fire Fighter Communication Systems

The existing Kidde fire alarm system was installed within the last year and is currently up to Code although at the time of the site visit, the panel was in 'trouble' mode. A copy of the latest test report should be reviewed.

There is an existing hard-wired fire fighter telephone system within the exit stairwells of the building but it is unknown if it currently functions.

There are currently no two-way communication devices and/or an Emergency Radio Responder Coverage System (ERRCS) system provided at the facility for emergency responders.

Fire Alarm Control Panel (FACP)

There are existing hard-wired, and battery-powered smoke alarms located in the dwelling units.

Recommended Approach

Test building to see if the emergency radio system has complete coverage within the building. If not, provide an ERRCS (Emergency Responder Radio Communications System) within the building for emergency services.

Replace existing dwelling unit smoke alarms with new.

Verify FACP (Fire Alarm Control Panel) trouble items are cleared and that the devices installed meet the 75dB at the pillow requirement; and are low frequency.

Elevators

The elevators are all past EUL, so anticipate increasing maintenance costs.

A larger gurney-compatible elevator is required by current Code. Any changes to the elevators will require an elevator machine room update. We recommend that the Owner hire an elevator consultant to review the deficiencies and make recommended improvements.

Emergency Power System

There is currently no existing emergency power system on site. Emergency lighting is provided by battery pack light fixtures in the common hallways and stairwells. No other required emergency loads are currently in place.

Recommended Approach

If the building were constructed today, an emergency generator would be installed for the elevators to be used as an accessible means of egress. If a fire pump is added, it may require a diesel generator as well. Depending on the ventilation approach that is taken, at minimum, an inverter system will be required to provide the 90-minute back-up for the exhaust scavenger fans.

Fire Protection

The Existing Building Code indicates that because this building is Type 1 construction, a fire protection system is not required in the residential tower.

However, it is common for housing operators to install voluntary fire sprinkler coverage to reduce risk and possibly lower insurance costs. A voluntary addition would need to be full NFPA (National Fire Protections Association) 13 ordinary hazard coverage to the offices, corridors, dwelling units, and accessory spaces, including two combination standpipes to the roof, one at each stair.

An electric fire pump with an estimated 1,000 gpm capability would be required. Currently, some jurisdictions are moving to require that fire pumps have an emergency power source because PG&E power is no longer deemed reliable, due to the wildfire-related service cuts that PG&E makes. This would involve adding a diesel generator to the property.

Utilities

Water/Sewer are provided by EBMUD. No change in the water service or sewer service is anticipated as there will be no change in occupancy or plumbing. If a fire protection system is added to the tower, the existing fire water service will need to be upsized.

Gas from PG&E: No increase in the gas service capacity is expected as part of this job.

Electric from PG&E: The existing electrical room has two main services: one for the first and second floor housing authority office space, and one feeding the residential housing loads. The office service is a 1600A, 120/208V, 3PH/4-Wire service. The residential service is a 2000A, 120/208, 3PH/4-Wire service. The residential service is master-metered. This is a grandfathered-type electrical service and any upgrade to the unit electrical services will require major modifications for individual metering per current PG&E guidelines. The existing main gear is manufactured by Sierra Switchboard Company and is a fused switchboard type that is approaching 50 years of equipment life.

Recommended Approach

Replace the existing main distribution switchboard with a new electrical switchboard and circuit breakers to ensure another 20+ years of useful equipment life and to provide for safe and reliable electrical system distribution.

Plumbing

The building has two vertical chases in each apartment. One forms the wet wall of the bathroom, and the other is a corner chase in the kitchen behind the corner-mounted sink. The chases contain cast iron Drain Waste and Vent piping (DWV) and copper hot- and cold-water risers and laterals to the fixtures. All the piping is past its Expected Useful Life (EUL).

Rated Hatch into 2-hour Shaft, Shut-off Valves **View inside the Hatch**

Domestic hot water is produced in the roof penthouse by two condensing indirect hot water heaters (boilers) that recirculate water to two 119-gallon storage tanks.

Recommended Approach

Building domestic hot-water and cold-water piping should be thoroughly inspected, including destructive testing to view internal condition. Any evidence of leakage or improper installation/repairs should be replaced. Likewise, thoroughly inspect and camera the sanitary sewers and roof rainwater leaders; and replace any deficient components. The domestic hot water plant on the roof has been replaced recently, so replacing it could be a lower priority.

Repair the water with Type L copper tubing and fittings, and repair the DWV with cast iron.

The medium pressure gas riser supplies only the penthouse. It should be inspected for defects, and if in acceptable condition, can remain.

The project should include replacement of all plumbing fixtures with WaterSense (rated for conservation) ones:

Sink: 1.8 gpm Lav: 1.5 gpm Shower: 2 gpm

Best Practice

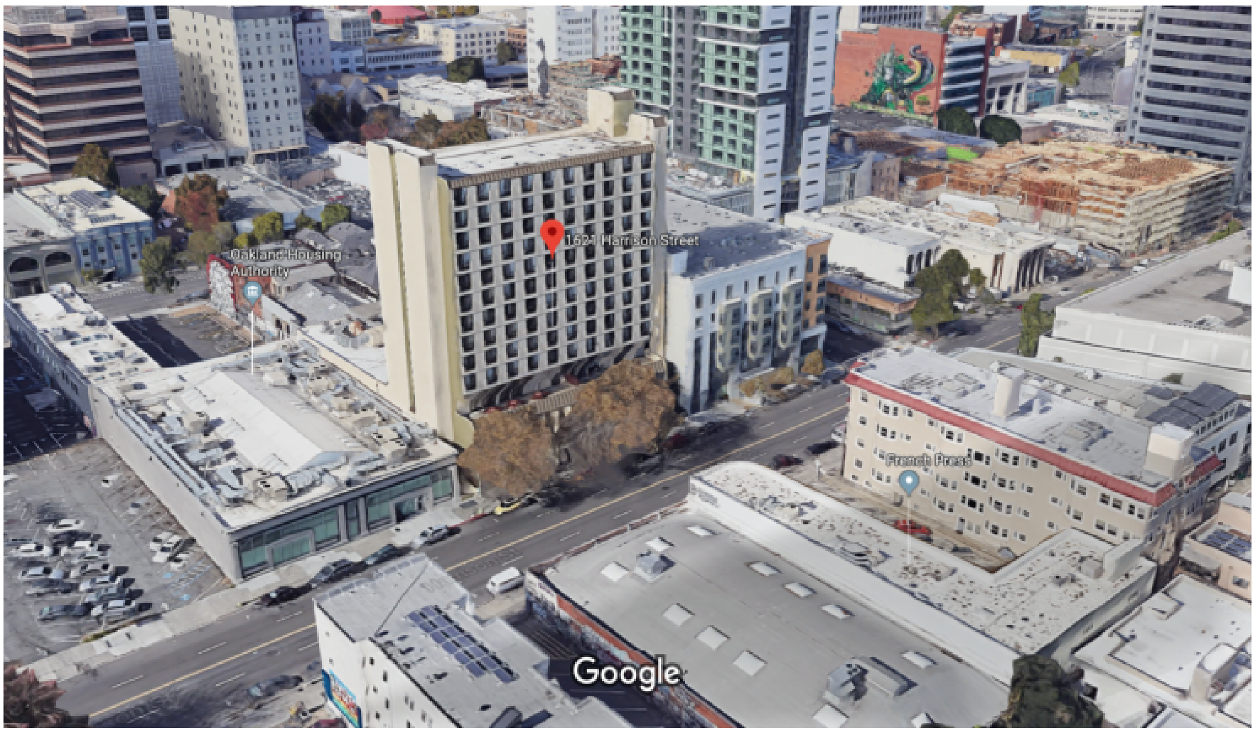
Consider using solar thermal through a 60% Solar Fraction system with 30 panels and a 2,000-gallon preheated water storage tank. This system would save 50% of the annual cost to produce domestic hot water. Because the gas supplies both heating boilers and domestic hot water boilers, it is not possible to break out the cost for domestic hot water from the total gas bill. According to California Commercial End Use Survey data, lodging buildings use four times as much gas for domestic hot water as for heating. This means Solar Thermal has a potential 40% savings on gas usage. ‘

This system’s panels would occupy most of the tower roof area. The storage tank footprint would be about six inches wide by 15 feet long and weigh about 20,000 pounds. There would be a 4’ x 4’ pump and heat exchanger rack, and the panels’ footprint would be about 1,000 SF. The storage tank and pumps could be located on the roof or alternately in the parking garage.

Seismic Risk Assessment of building at 1621 Harrison Street, Oakland, CA

PML REPORT

2019 July 1



Disclaimer

This report, and analyses, estimates and conclusions are based on scientific data, mathematical and empirical models. Due to the nature of this analysis methodology and input data, actual losses experienced during an earthquake may differ substantially from the estimates provided in this report

The professional structural engineering services summarized in this report have been performed using that degree of care and skill ordinarily exercised under similar circumstances, by reputable practicing structural engineers in this or similar localities at this time. No other warranty, express or implied, is made as to the professional content included in this report. This report has been prepared for the indicated client to be used solely for its evaluation of the above-mentioned building. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

Miyamoto International, Inc.

www.miyamotointernational.com

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1. Executive Summary

1.1 Findings

Miyamoto International has completed seismic risk assessment of the building, located at 1621 Harrison Street, Oakland, CA 94612. This assessment was performed at the request of Saida + Sullivan Design Partners.

The building under investigation consists of 13 stories and contains approximately 130,000 ft^2 of space. The lateral system consists of concrete shear walls while the gravity system is comprised of concrete columns, concrete beams and a mix of one-way and two-way slabs. The assessment was conducted utilizing methods and procedures consistent with good commercial or customary practices designed to conform to acceptable industry standards. The assessment relied on determining the Probable Maximum Loss (PML) for the building. PML is a tool used by structural engineers to calculate the anticipated 90-pecentile loss expected in the event of a design earthquake. The design earthquake has the level of shaking and intensity that is implied in the modern codes for the design of new buildings. For new buildings designed per provisions of modern seismic codes, PML value of less than 20% is expected and PML of greater than 20% is indicative of seismic deficiencies.

The seismic risk of the building is judged moderate with a PML of 30%. The higher PML for this building is not unexpected because:

- It was constructed in 1970 at a time when the knowledge of ground motion magnitude and the effects of ground motion on building/soil structures was less refined than current knowledge. Thus, it is not surprising that the design did not incorporate some of the lessons learned from earthquakes since.
- It is located in Oakland, which is a region of high seismicity with many active faults which could generate large magnitude ground accelerations.
- Deficiencies of the building are listed below:
    - Expansion joints in walls and slabs at podium levels
    - Discontinuous vertical concrete walls
    - Potential torsional behavior triggered by expansion joints

Many building constructed during this time period, with these types of structural systems, in regions of high seismicity have similar or higher PML. The site visit indicated that the visual observation of lateral and gravity systems were in general conformance with available existing drawings and no significant deterioration or seismic damage was observed and that is one of the factors enhancing the performance of the building.

To reduce the PML below 20%, there are robust and cost-efficient options available that have been used to seismically retrofit similar types of buildings in the past. The goal of a successful upgrade is to mitigate the key deficiencies in an efficient manner while staying cognizant of the need to minimize retrofit costs and maintain building occupancy. An initial step would consist of a more detailed structural assessment of the existing building condition through material testing and soils investigations at the site and preparation of a mathematical model to simulate the building performance, these are steps that could be taken with a Tier 2 analysis. The outcome of this first step would identify the key deficiencies that need to be addressed, more accurately predict material strengths, and verify as-built details not presented in the as-built structural drawings. After a more detailed analysis, material testing, and soil investigation, the PML could be reduced. In the case that a 20% PML is not met after additional testing and analysis, we believe strengthening of existing columns, walls, and floors would bring the PML down even lower. A last step would be replacing non-structural partitions with concrete or shotcrete walls where vertical discontinuities exist in the lateral system.

1.2 Limitations

The findings are based on engineering judgment and knowledge of how similar buildings have performed in past earthquakes. No detailed analyses or structural calculations were performed. The findings are general in nature and do not express or imply any warranty on the existing structure and its performance during a seismic event.

2. Introduction

2.1 Overview

The purpose of this project is to perform a seismic risk assessment of the building located at 1621 Harrison Street, Oakland, CA, hereafter referred to as the Building, and to develop an opinion on the likely performance of the building in an earthquake. The earthquake performance of the buildings was projected based on factors such as type and quality of construction, configuration, age, condition, design code used, seismic-resisting system, structural design and details, local geology and seismicity, distance to nearby faults, site earthquake history, and performance of similar buildings in past earthquakes.

2.2 Scope

The scope of work for this project consisted of the following tasks:

- Cursory review general geologic information, fault maps, and the earthquake history for the area to determine the seismic hazard.
- Briefly review available drawings to understand the primary lateral-load-carrying systems, and their strengths and weaknesses.
- Conduct walkthrough surveys of the Building to assess the general condition of the structure and general conformance of visible as-built structure to available existing structural drawings.
- Estimate a Probable Maximum Loss (PML) percentage for the Building based on the preliminary findings. The PML estimate is appropriate for a major earthquake affecting the region.
- Prepare a report summarizing our findings.

2.3 Procedure

A Level I Probable Maximum Loss (PML) study was conducted for the Property. A Level I PML study (ASTM 2016a and ASTM 2016b and ATC 2002) is the simplest level of analysis requiring the minimum amount of building data and site-specific geotechnical information to determine the economic loss associated with various levels of ground shaking. Probabilistic seismic hazard analysis software ST-RISK (2019) was utilized in this study. Probabilistic seismic hazard analysis is the process of determining the probability of ground shaking intensity for a given site. Four important contributors to this analysis are: the proximity of the site to earthquake faults, the size of the earthquakes that can be generated by these nearby faults, the resulting ground motion at the site, and the effects of local site conditions.

The hazard analysis only reflects the likelihood and intensity of ground shaking. To obtain risk measurements, the effects of the ground movement on the building must also be considered. A PML study is based on scientific data, mathematical and empirical models, past performance of similar buildings, the encoded experience of engineers, geologists and geotechnical specialists, professional opinions and user specified input information, using state-of-the art probabilistic seismic hazard analysis software.

3. Seismicity of the Building

3.1 Overview

The Building is located in downtown Oakland, California, as shown in Figure 1. The building coordinates are: latitude of 37.804998 and longitude of -122.266761.

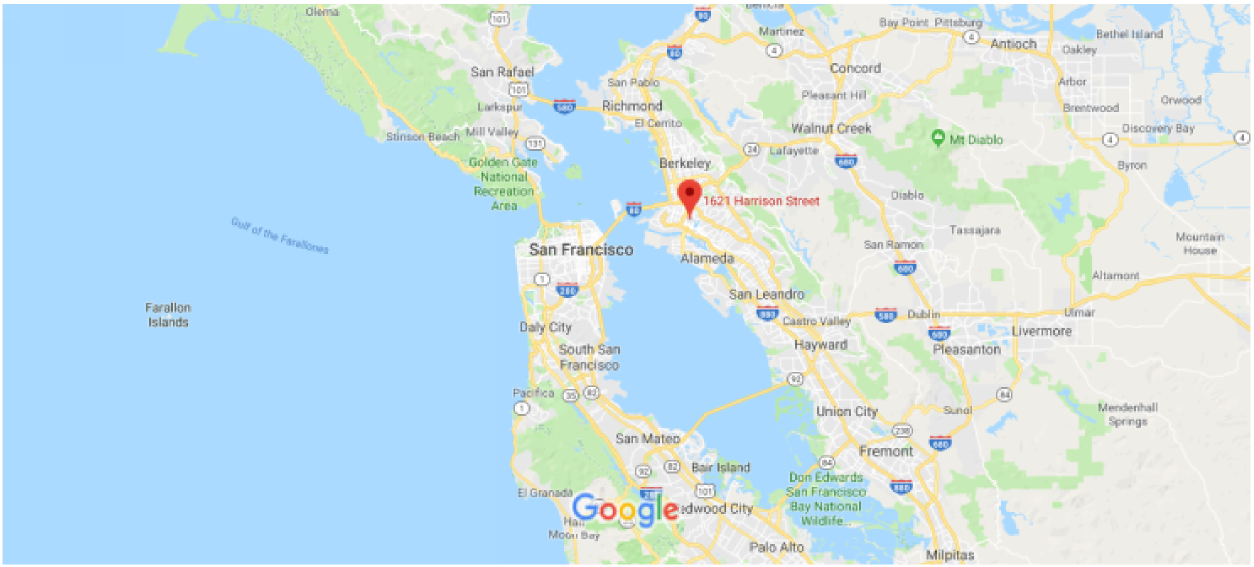

Figure 1. Location of the Building

3.2 Active faults

As shown in Figure 2, the Building is located in close proximity to a number of known faults including San Andreas (North Coast), San Andres (Peninsula) and Hayward (North). These faults can generate large earthquakes as has been witnessed in the previous Bay Area earthquakes.

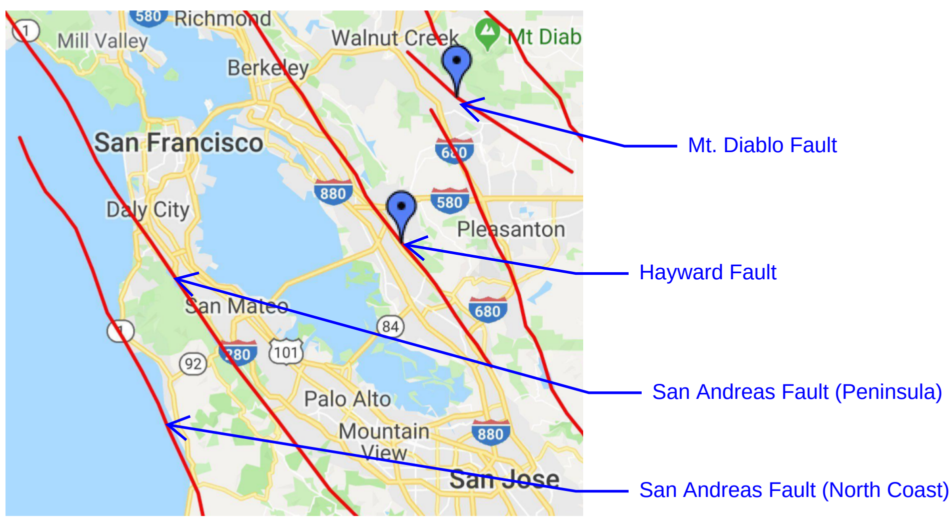

Figure 2. Known faults near the Building

3.3 Site class

In addition to the ground shaking, the underlying soil has significant effect on the intensity of shaking experienced by structures. Based on available USGS soil type maps and information from a previous soils report entitled *Geotechnical Investigation 1633 Harrison Street* prepared by Treadwell & Rollo dated 29, August 2008, including an addendum dated 15, June 2009 the soil profile was assumed to have a site classification of D.

3.4 Earthquake intensity

The PML values are usually expressed using the Modified Mercalli Intensity (MMI) scale, which is a commonly used measure of earthquake intensity. A description of the MMI scale is shown in. Section A.1.

3.5 Seismic hazard

The seismic hazard for the site was calculated from the platform developed by SEAOC & OSHPD (2019) based on the location and underlying soil. The seismic hazard is shown in Figure 3. The 2016 California building code, has assigned the subject site to Seismic Design Category D, which implies the area considered to be of high seismic risk.

OSHPD

1621 Harrison St, Oakland, CA 94612, USA

Latitude, Longitude: 37.805008, -122.26677000000001

USGS–Provided Output

$S_{XS,BSE-1N}$	1.000 g
$S_{X1,BSE-1N}$	0.603 g

Date	6/26/2019, 11:15:35 AM
Design Code Reference Document	ASCE41-17
Custom Probability	
Site Class	D - Stiff Soil

Type	Description	Value
Hazard Level		BSE-2E
S_S	spectral response (0.2 s)	1.716
S_1	spectral response (1.0 s)	0.639
S_{XS}	site-modified spectral response (0.2 s)	1.716
S_{X1}	site-modified spectral response (1.0 s)	1.086
f_a	site amplification factor (0.2 s)	1
f_v	site amplification factor (1.0 s)	1.7

Figure 3. Design earthquake seismic hazard

3.6 Site vulnerability potential

In addition to shaking damage, buildings and contents can be damaged from seismically induced soil failure, such as fault rupture, land sliding, liquefaction, and soil compaction. The potential susceptibility of the site to experience these failures has been estimated for the 475-year seismic hazard, as presented in Table 1.

- There are no known faults at the Building site and thus, fault rupture is not of a concern.
- The Building is located in downtown Oakland; which has not experienced landslides in past earthquakes.
- The Building has a basement and.as such; the risk from earthquake induced soil compaction is low.
- The Building has site class D or stiffer and was not constructed on fill near the bay and thus the potential for liquefaction is low.

Hazard	Fault rupture	Land sliding	Soil compaction	Liquefaction
Probability	Low	Low	Low	Low

Table 1. Site vulnerability potential

4. DESCRIPTION OF THE BUILDING

The Building; see Figure 4, was constructed in 1970. It has a group housing (R2) occupancy. The building footprint measures 127 x 150 ft, and comprises ten (10) stories on top of a 3 story podium, and one below-grade basement. The ground has a flat slope and the first level corresponds to the ground level. The building footprint steps back at the third level.

Figure 4. Photograph of the building

4.1 Building framing

The available structural plans; see Figure 5 show a system of reinforced concrete walls on the interior and perimeter. This framing was confirmed during the site visit (see Figure A.1). As such, using the FEMA 310 (1998) description, the building was classified as Type C2: Concrete Shear Walls with Stiff Diaphragms.

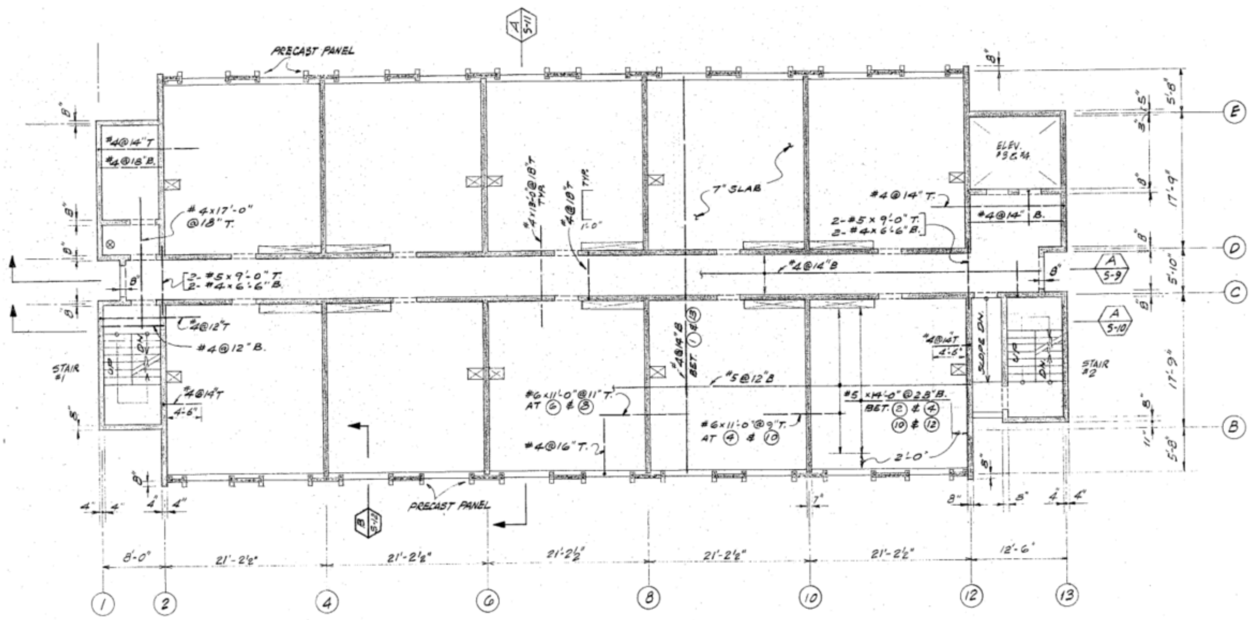

Figure 5. Typical floor layout

4.2 Site visit

A site visit of the building was conducted to assess its existing condition, verify the main building framing, and note any significant anomalies. Data from this visit is presented in Section A.2.

5. Findings

5.1 Overview

The seismic risk evaluation for the Building is presented as Probable Maximum Loss (PML). PML is a percentage of total building replacement value and does not take into consideration values of equipment or monetary loss from personal property. Section A.4 presents description on the anticipated level of damage associated with given PML percentages

The PML does take into account the intensity of shaking, soil conditions, and structural features. The PML is based on an event with a 475-year return period—commonly referred to as the design earthquake because it is the earthquake intensity implied in the building codes and which has a 10% probability of exceedance in 50 years—and is associated with a 90 percent confidence level on the structural response of the building. For this study, the PML is based on the review criteria discussed in Section 2.2 and Section 2.3

Given the building construction year of 1970, it was constructed based on the archaic building codes developed prior to the implementation of earthquake resistant design in the past thirty years. Accordingly, non-ductile concrete details and lateral system layout were assumed in the assessment.

5.2 Development of the checklist

As part of the assessment a checklist was developed to identify the key characteristics of the Building. This checklist (FEMA 1998) was initially developed during the site visit and further refined at the office (ASCE 2017) is replicated in Section A.3.

The key factors enhancing the seismic performance of the Building are its complete load path, consistent mass distribution, and redundant concrete wall layout. The main contributing factor to the Building's seismic vulnerability is the vertical irregularity in concrete walls, the expansions joints at the podium floors, and the potential torsional behavior at the podium floors.

5.3 Results

The seismic risk to the Building is summarized in Table 2. See Section A.4 for a correlation of this level of seismic risk to loss and damage.

Earthquake return period, year	MMI	Loss %*		
		PL	SUL	SEL
43	VI-VII	5	11	7
285	VIII	17	28	18
475	VIII	20	PML=30	20
2475	IX	31	38	25

Table 2. Seismic risk to the Building

5.4 PML

The PML (90% percentile for 475 year earthquake) for the Building was determined to be 30%; see Figure 6.

* PL=probable loss; SEL=scenario expected loss (50 percentile); SUL=scenario upper loss (90 percentile); PML=probable maximum loss (SUL for 475-year earthquake)

1621 HARRISO PML EVALUATION (TIER 1)

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

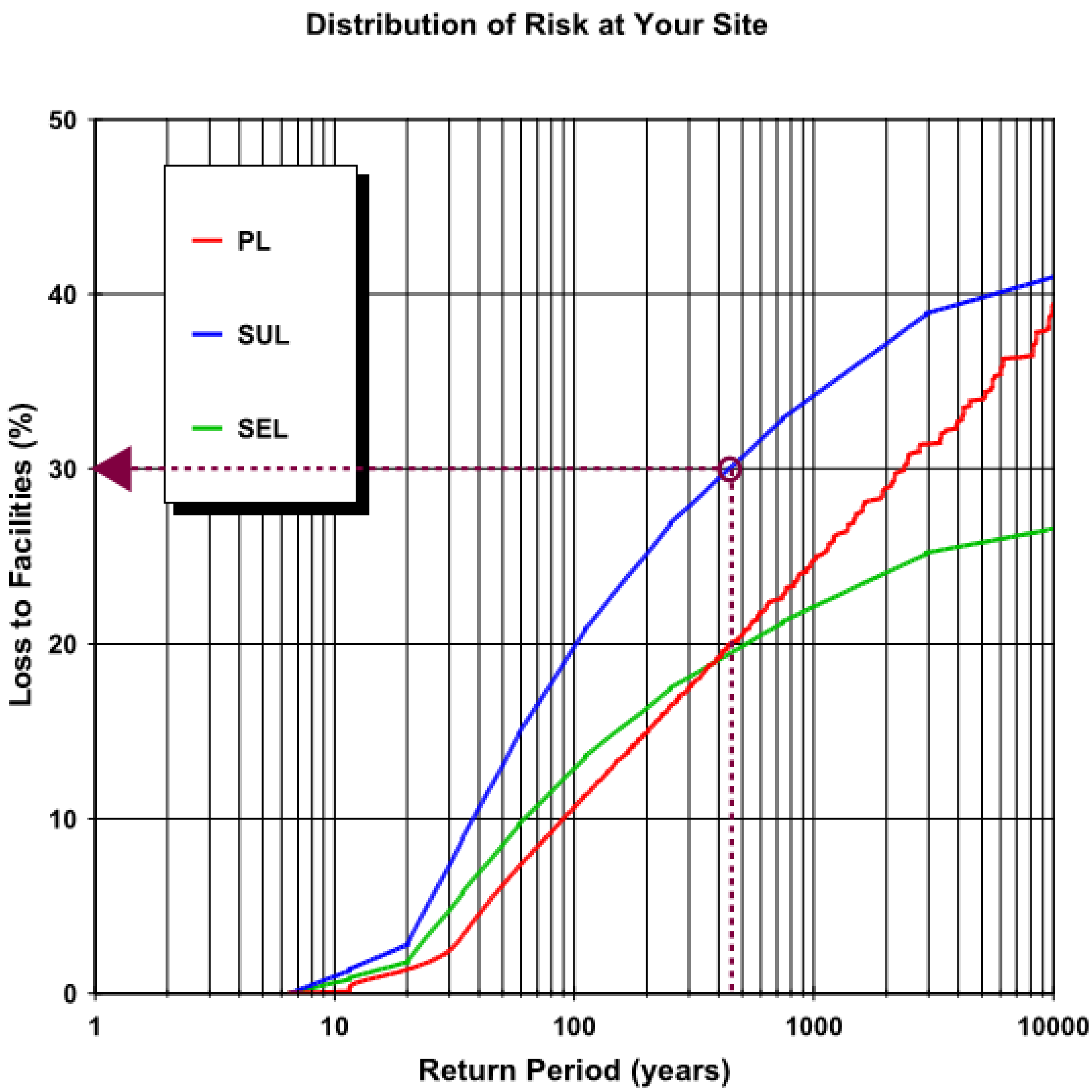

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Figure 6. Determination of PML for the Building

6. References

American Society of Testing and Material (ASTM) International (2016a), *ASTM E2026, Standard Guide for Seismic Risk Assessment of Buildings*, West Conshohocken, PA

American Society of Testing and Material (ASTM) International (2016b*), ASTME 2557, Standard Practice for Probable Maximum Loss (PML) Evaluations for Earthquake Due-Diligence Assessments1,2,* West Conshohocken, PA

American Society of Civil Engineers (ASCE) (2017) , *ASCE 41-17, Seismic Evaluation and Retrofit of Existing Buildings,* Reston, Virginia

Applied Technology Council (ATC) (2002) *ATC 13-1, Commentary on the Use of ATC-13 Earthquake Damage Evaluation Data for Probable Maximum Loss Studies of California Buildings*, Redwood City, CA.

California Builing Code (CBC) (2017) *2016 California Building Code: California Code of Regulations Title 24. Part 2, Volume 2*. Sacramento, CA.

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Appendix A Supplementary Material

Supplementary material pertinent to this report are presented in the following sections.

A.1 Modified Mercalli Intensity (MMI) Scale of 1931

The MMI scale is used to measure the intensity of an earthquake. It is based on the observed effects of earthquakes; see Table A.1.

Scale	Intensity	Description
I	Not felt	Not felt except by a very few under especially favorable circumstances.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings Delicately suspended objects may swing.
III	Weak	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize as an earthquake. Standing motorcars may rock slightly. Vibration is like passing of a truck. Duration estimated.
IV	Light	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; wall make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably.
V	Moderate	Felt by nearly everyone, many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII	Very strong	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; chimneys broken. Noticed by persons driving motor cars.
VIII	Severe	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed and slopped over banks.
XI	Extreme	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Extreme	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown in the air

Table A.1. MMI scale

A.2 Site visit

A site visit of the building was undertaken on 2019 May 20 to perform preliminary assessment. Sample photographs taken during the visit are presented in Figure A.1

Building Basement & MEP Bracing

Building Basement & MEP Bracing

Third Floor Suspended Ceilings with Wire Bracing

Third Floor Suspended Ceilings

Third Floor Roof mounted equipment

Third Floor Roof mounted equipment anchorage

Building Exterior

Roof MEP Equipment

Figure A.1. Photographs of the building taken during the site visit

A.3 FEMA 310/ASCE 41-13 CHECKLIST

Table 17-1. Very Low Seismicity Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Structural Components			
C NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
C NC N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Table 17-2. Collapse Prevention Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Low Seismicity			
Building System—General			
C NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
C NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.25% of the height of the shorter building in low seismicity, 0.5% in moderate seismicity, and 1.5% in high seismicity.	5.4.1.2	A.2.1.2
C NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
C NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
C NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
C NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
C NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
C NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6
C NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7

continues

Table 17-2 *(Continued)*. Collapse Prevention Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Moderate Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Geologic Site Hazards			
C NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
C NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
C NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
High Seismicity (Complete the Following Items in Addition to the Items for Moderate Seismicity)			
Foundation Configuration			
C NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
C NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Table 17-24. Collapse Prevention Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Low and Moderate Seismicity			
Seismic-Force-Resisting System			
C NC N/A U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
C NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
C NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
C NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction.	5.5.3.1.3	A.3.2.2.2
Connections			
C NC N/A U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
C NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls.	5.7.2	A.5.2.1
C NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation with vertical bars equal in size and spacing to the vertical wall reinforcing directly above the foundation.	5.7.3.4	A.5.3.5
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
C NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components.	5.5.2.5.2	A.3.1.6.2
C NC N/A U	FLAT SLABS: Flat slabs or plates not part of the seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC N/A U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning.	5.5.3.2.1	A.3.2.2.3
Diaphragms (Stiff or Flexible)			
C NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
C NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length.	5.6.1.3	A.4.1.4
Flexible Diaphragms			
C NC N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC N/A U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 2-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC N/A U	SPANS: All wood diaphragms with spans greater than 24 ft (7.3 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 40 ft (12.2 m) and aspect ratios less than or equal to 4-to-1.	5.6.2	A.4.2.3
C NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC N/A U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Figure A.2. FEMA 310 checklist for the Building

A.4 Description of expected damage for seismic losses

Table A.2 presents correlation of loss estimates, damage, and seismic risk.

Estimated Loss (% of Replacement Cost)[†]	**Expected Damage**	**Risk (Applicable to PML Only)**
0 - 10	Architectural damage, light and easily repairable; minimal disruption of use	Low
10 - 20	Limited damage, with some localized structural damage potentially leading to short-term business interruption	Moderately Low
20 - 30	Substantial structural damage, with potential for localized collapse; structure likely to be closed for inspection and until critical repairs are completed	Moderate
30 - 50	Severe structural damage, possibly including partial collapse and critical economic loss; structure likely to be closed for an extended period; repair may not be economically attractive	High
> 50	Severe structural damage leading to partial or total structural collapse and possibly complete economic loss	Very High

Table A.2. Description of damage associated with losses

[†] 20% or above could be potential life safety hazard

A.5 ST-RISK RESULTS AND GLOSSARY

1621 HARRISO PML EVALUATION (TIER 1) - Seismic Risk Analysis

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

INFORMATION SOURCES

SiteVisit: Sean Fraser
Interviewed:
Date: May 20, 2019
Docs Reviewed: ASCE 41 checklist and documents reviewed by JG

BUILDING DESCRIPTION

Building Classification: C2(4B) - Concrete Shear Walls w/ Stiff Diaphragms
Occupancy: Habitational
Latitude/Longitude: 37.8050 -122.2670
Region: USA: California
Region Version: 3.10
Evaluation Lifetime (yrs): 30
Uniform Building Code Design Edition: ? (pre-1973)
Year Constructed: 1970
Year Retrofitted:
Building Height (stories): 13
Fundamental Period (s): 0.786000
Area (sf): 130,000
Replacement Cost ($):
Plan Dimensions: 134ft X 127ft
Exterior North-South Walls:
Exterior East-West Walls:
Roof Deck/Framing: Concrete flat slab
Intermediate Floors/Framing: Concrete flat slabs ,beams
Ground Floors:
Columns: Concrete Columns
Foundation: Shallow spread foundations
Basement Levels: Slab on grade on shallow foundations
Parking Structure:

LATERAL FORCE RESISTING SYSTEM

Floors/Roof: Typical floors are constructed of Flat slabs. At the podium level, the slab is supported by concrete beams. There is also PT slab at levels 1, 2, and 33.
Walls/Braces: The lateral system consists of concrete shearwalls.

BUSINESS INTERRUPTION

Max. Loss With No BI:
Min. Loss At Abandonment:
BI Months At Abandonment:
BI Revenue Loss Rate($/Month):

1621 HARRISO PML EVALUATION (TIER 1) - Seismic Risk Analysis

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

GEOTECHNICAL DESCRIPTION

Provider:
Date:
UBC Soil Class: D
Liquefaction Resilience: High
Liquefaction Susceptibility: Low
Depth to Water Table (ft): 28
Landslide Susceptibility: Very Low

Topography:
Soil Conditions:

COMMENTS

Comments:

1621 HARRISO PML EVALUATION (TIER 1)

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St	**Engineer:**	Jacob Gruber
	Oakland, CA, United States 94612	**PE Number/State:**	85179, CA

MODIFIED FEMA-310 WORKSHEET

C2(4B)Concrete Shear Walls w/ Stiff Diaphragms

Category	Range	Typical	Modifier
GENERAL BUILDING FEATURES			
Complete load path	T, F	T	T
No strength irregularity	T, F	F	F
No soft story	T, F	T	F
No geometrical irregularities	T, F	T	F
No mass irregularity	T, F	T	T
No vertical discontinuities	T, F	F	F
Only minor torsion	T, F	T	F
No captive columns	T, F	T	T
Deflection compatibility	T, F	F	F
Interior mezzanines adequately braced	N/A, T, F	T	N/A
LATERAL FORCE RESISTING SYSTEM			
Redundancy	T, F, 0-10	5	T
Shear stress check of shear walls	T, F, 0-25	13	F
Complete frames	T, F, 0-5	2	T
Adequate wall thickness	T, F, 0-5	2	T
No flat slabs	T, F, 0-10	5	T
Reinforcing steel	T, F, 0-5	2	T
Adequate overturning strength	T, F, 0-10	5	2
Adequate confinement reinforcing	T, F, 0-5	5	F
Adequate reinforcing at openings	N/A, T, F, 0-5	2	F
Coupling beams properly reinforced	N/A, T, F, 0-5	5	N/A
CONNECTIONS			
Wall reinforcement doweled into footing	T, F, 0-5	0	T
Lateral load path at pile caps	N/A, T, F, 0-10	0	N/A
FLOOR DIAPHRAGMS			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	F
Diaphragm continuity	T, F, 0-10	5	F
Adequate reinforcing at openings	N/A, T, F, 0-5	0	T
Collectors	T, F, 0-5	2	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T

1621 HARRISO PML EVALUATION (TIER 1)

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
ROOF DIAPHRAGM (ONLY IF 5 STORIES OR LESS)			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	N/A
Diaphragm continuity	T, F, 0-10	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	N/A
Collectors	T, F, 0-5	2	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T
UNUSUAL CONDITIONS			
Insignificant concrete wall cracks	T, F, 0-5	2	T
Little deterioration of concrete	T, F, 0-5	2	T
Little post-tensioning anchor deterioration	N/A, T, F, 0-5	2	T
Little foundation damage	T, F, 0-5	2	T
Little foundation deterioration	T, F, 0-5	2	T
Adequate overturning resistance	T, F, 0-5	2	T
Ties between foundation elements	N/A, T, F, 0-5	2	T
Lateral force on deep foundations	N/A, T, F, 0-5	2	N/A
Pole buildings	N/A, T, F, 0-5	0	N/A
Insignificant sloping at site	N/A, T, F, 0-5	0	T
SITE DEPENDENT HAZARDS - ACTIVE FAULTS			
Surface fault rupture	N/A, 0-50	0	0
NONSTRUCTURAL EXTERIOR 'WALLS'			
Cladding, glazing, veneer	N/A, T, F, 0-10	5	5
Chimneys	N/A, T, F, 0-5	5	N/A
NONSTRUCTURAL INTERIOR 'WALLS'			
Partitions (HC tile)	N/A, T, F, 0-10	0	N/A
Partitions (pre-cast panels..)	N/A, T, F, 0-10	5	5
EXTERIOR ORNAMENTATION			
Parapets, cornices, and appendages	N/A, T, F, 0-10	0	T
INTERIOR ORNAMENTATION			
Building contents and furnishings	T, F, 0-10	5	T
Ceiling systems	T, F, 0-5	5	T
Light fixtures	T, F, 0-5	5	T

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
MECHANICAL AND ELECTRICAL SYSTEMS			
Mechanical and electrical equipment	T, F, 0-10	5	T
Piping and sprinklers	T, F, 0-5	2	T
Ducts	T, F, 0-5	2	T
Elevators	N/A, T, F, 0-5	2	F
HAZARDOUS EXPOSURES - POUNDING			
No adjacent buildings	N/A, T, F, 0-5	0	F
HAZARDOUS EXPOSURES - MATERIALS			
No hazardous materials	N/A, T, F, 0-10	0	T
OCCUPANCY (TYPE: HABITATIONAL)			
Interior Construction	-5-5	0	?
SITE DEPENDENT CHARACTERISTICS			
UBC Soil Class	A - E	D	D
Liquefaction Resilience	Low - High	Low	High
Liquefaction Susceptibility	V. Low-V. High	Moderate	Low
Depth to Water Table (ft)	0-1000+	30	28
Landslide Susceptibility	V. Low-V. High	Very Low	Very Low

1621 HARRISO PML EVALUATION (TIER 1)

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

VULNERABILITY SUMMARY

Component Modifier Summary

Base Class 90% Fractile Loss at MMI=IX (% of Value): 47

Modifiers to Base Class Loss

Item	Group Modifier (% of Loss)	Sigma (% of Loss)
1. Occupancy type:	0	1.7
2. Connections:	0	0.6
3. Walls:		
A. Exterior	0	3.4
B. Interior	0	2.6
4. Diaphragms:		
A. Floor(s)	2	2.5
B. Roof	-5	0.9
5. Ornamentation:		
A. Exterior	0	1.7
B. Interior	-5	1.0
6. Mechanical/electrical systems:	-5	2.6
7. Unusual conditions:	-9	1.6
8. Hazardous exposures:		
A. Tank and overhanging walls	0	1.7
B. Pounding and adjacent buildings	5	1.3
9. Site dependent hazards:		
A. Proximity of active fault	0	12.8
Total	-17	14.5

Modified Base Class 90% Fractile Loss at MMI=IX (% of Value): 39

Loss vs MMI

MMI	Loss to Facilities (% of Value) 90% Frac. Loss	Mean
V	0	0
VI	3	2
VII	15	10
VIII	27	18
IX	39	25
X	45	29
XI	51	33
XII	57	37

1621 HARRISO PML EVALUATION (TIER 1)

Company Name:	Miyamoto International	**Date:**	June 23, 2019
Building Name:	1621 Harrison	**Job Number:**	MI1917008.00
Street Address:	1621 Harrison St Oakland, CA, United States 94612	**Engineer:**	Jacob Gruber
		PE Number/State:	85179, CA

RISK SUMMARY

Expected Loss Table

Probability of Exceedence	MMI	Loss to Facilities (% of Value) PL	SUL	SEL	BI (months)
50.0% in 30 years 43 year return period	VI-VII	5	11	7	N/A
10.0% in 30 years 285 year return period	VIII	17	28	18	N/A
2.0% in 30 years 1485 year return period	IX	27	36	23	N/A
10.0% in 50 years 475 year return period	VIII-IX	20	PML 30	20	N/A
2.0% in 50 years 2475 year return period	IX	31	38	25	N/A

Event and Fault Table

Close and Significant Seismic Sources	Maximum Magnitude	Closest Distance (km)	Max. MMI	Max. SUL *	Max. SEL *	Maximum Business Interuption (months)	Percent Contribution **
California Gridded***	7.0	5.0	VIII-IX	32	21	N/A	3
Hayward-Rodgers Creek;RC+HN	7.2	5.4	VIII	28	18	N/A	5
Hayward-Rodgers Creek	7.3	5.5	VIII	29	19	N/A	8
Hayward-Rodgers Creek;RC+HN+HS	7.3	5.5	VIII	29	19	N/A	4
Hayward-Rodgers Creek;HN	6.6	5.9	VII-VIII	24	15	N/A	16
Hayward-Rodgers Creek;HN+HS	7.0	5.9	VIII	27	17	N/A	20
Hayward-Rodgers Creek;HS	6.8	5.9	VIII	25	16	N/A	21
Extensional Gridded	7.0	13.4	VII-VIII	18	12	N/A	<1
Calaveras;CN	6.9	22.7	VII	13	8	N/A	<1
Calaveras;CN+CC	7.0	22.8	VII	14	9	N/A	<1
Calaveras;CN+CC+CS	7.0	22.8	VII	14	9	N/A	<1
Calaveras	7.0	22.8	VII	14	9	N/A	<1
Mount Diablo Thrust	6.7	23.0	VII	14	9	N/A	<1
N. San Andreas;SAO+SAN+SAP+SAS	8.1	23.7	VII-VIII	23	15	N/A	7
N. San Andreas	8.0	23.7	VII-VIII	23	15	N/A	2
N. San Andreas;SAP+SAS	7.5	23.7	VII-VIII	18	12	N/A	3

* Losses to individual events are from shaking only.
** Percent contributions are for the probabilistic 475 year return period risk.
*** Event causing highest loss (from shaking only)

Average Annual Loss (% of Repl. Cost): 0.367786
Business Interruption Average Annual Loss ($): 0
Return Period of Major Liquefaction/Landslide: N/A

DISCLAIMERS and OTHER INFORMATION

RESULTS DISCLAIMER

This report, and the analyses, estimates and conclusions are based on scientific data, mathematical and empirical models, and experience of engineers, geologist and geotechnical specialist, using the input specified by the software licensee. Actual losses experienced during any earthquake may differ substantially from these estimates. Neither Risk Engineering, Inc., Degenkolb Engineers, nor any third party supplier of information to this software can be held liable for any inaccuracies in the results obtained by ST-RISK.

SPRINKLER DAMAGE

Substantial building facilities loss has occurred in recent large earthquakes due to fire sprinkler damage. The figures presented herein may not adequately account for these potential losses. If the modifier for sprinklers in the Mechanical and Electrical Systems section of the Modified FEMA-310 Worksheet was 3 or higher, or '?', a more detailed evaluation of potential sprinkler damage should be made and additional loss anticipated.

THIRD PARTY DATA

Much of the data in this report is derived from data provided by the California Geological Survey (CGS), the US Geological Survey (USGS), the Geological Survey of Canada (GSC), as well as other parties. Most of the original data received was modified to make compatible with ST-RISK. None of these parties can be held liable for any inaccuracies inherent in the data or inherent in the modifications.

GLOSSARY

MMI	Modified Mercalli Intensity - A measure of ground motion intensity based on human perception of motion and observed structural damage.
PML	Probable Maximum Loss - The percentage monetary loss (damage/replacement cost x 100) that has a 10 percent chance of being exceeded for a 475-year ground motion.
PL	Probable Loss - For a given time interval, or return period, this is the amount of loss that a property is expected to meet or exceed on an average basis. This combines the probability distribution of hazard with the full damage distribution, representing the best overall assessment of risk.
SUL	Scenario Upper Loss - The percentage monetary loss (damage/replacement cost x 100) that has a 10 percent chance of being exceeded given any defined ground shaking intensity. Equal to PML for 475-year ground shaking.
SEL	Scenario Expected Loss - The expected, or mean, percentage monetary loss (damage/replacement cost x 100) that is predicted given any defined ground shaking intensity.
Mean Loss	The expected, or average, percentage monetary loss (damage/replacement cost x 100) that is predicted for a given ground shaking level.
Sigma	The range of building assessment variation covered by one standard deviation. This represents the uncertainty of characterizing the building properly. This does not include uncertainty in the expected ground motion intensities nor range of expected damage. It is implied that the distribution of uncertainty is truncated at 100% and 0% of building value.
BI	Business Interruption / Loss-of-Use - The number of months that the facility is out of operation.
Base Class Loss	The percentage monetary loss for 90% fractile (damage/replacement cost x 100) assigned to a building class that accounts for type of construction and important construction deficiencies.
Modified Base Class Loss	The percentage monetary loss for 90% fractile assigned to a building class that accounts for the Base Class Loss and location and minor construction deficiencies.
Probability of Exceedence	The probability that the ground shaking level or damage level will be exceeded.
Event Causing Highest Loss	The highest level of intensity due only to shaking that is experienced when considering all earthquakes given a median predicted shaking level.
Maximum Considered Earthquake (MCE)	Loss associated with a 2% in 50 year probability of exceedence.
Uniform Building Code (UBC)	Loss associated with a 10% in 50 year probability of exceedence as defined by new building design provisions found in the Uniform Building Code.
% Contribribution	Percent contribution of fault or fault segment to the 475-year return period risk.

Steelhead Engineers, Inc.
2570 W. El Camino Real, Suite 650, Mountain View, CA 94040-1313
Tel 650.941.1112 Fax 650.396-4000
www.steelheadengineers.com

10 July 2019

Mr. Koji Saida, AIA
Saida+Sullivan Design Partners
44 Gough Street, Suite 202
San Francisco, California 94103

RE: Building Envelope Consultation
Harrison Towers, 1621 Harrison Street, Oakland, California
SEI JN: 19036

Dear Mr. Saida:

As requested, Steelhead Engineers, Inc. (SEI) visited the site and observed the roofs, Level 3 deck, garage, and interiors of three units. This letter summarizes our observations and recommended remediation.

BACKGROUND

Harrison Tower, a 13-story building containing 101 units of senior housing (Photo 1), is scheduled to be renovated in the near future. We reviewed the Physical Needs Assessment by Dominion Due Diligence Group (D3G). D3G made the following conclusions:

- *Façade/Exterior Walls:* The concrete panels are in fair condition and repair and repainting is recommended. The standing seam metal panels are in fair-to-poor condition and replacement is recommended. The brick is in poor-to-fair condition and needs repointing.
- *Windows:* The single-pane, aluminum-framed windows are in poor condition and need to be replaced.
- *Doors:* The hollow metal-framed doors are in poor condition and need to be replaced.
- *Roofs:* The TPO single-ply roofs, installed in 2016, are in fair condition; no remediation work is recommended.

SEI OBSERVATIONS

Alan Burnett of SEI visited the site on 20 May 2019 to observe the roofs, Level 3 deck, garage, and interiors of three units. Destructive, exploratory probing was not performed. Our observations are summarized below:

Garage

The garage is partially below grade. Construction work in the courtyard has resulted in leaks through garage ceiling slab cracks and drain pipe penetrations (Phots 2 to 4).

Level 3 Deck

- The Level 3 deck faces Harrison Street, is accessed from Level 3 doors, and has a topping slab (Photos 5, 6 and 8).
- Vegetation growth occurs in the topping slab construction joints (Photo 6).
- Scuppers provide drainage at the sides of the deck (Photo 7).

Level 3 Roof

- The roof is located at the rear of the building and has a U-shaped plan (Photos 9 to 11). It is a single-ply roof system bounded by low perimeter curbs and the building wall. There is mechanical equipment at one area of the roof. Roof drains and scuppers provide drainage.
- Ponded water occurs in front of one scupper (Photo 12) and blisters occur at the northwest corner of the roof (Photos 13 and 14); plant growth occurs at one roof drain (Photo 14).
- The roof is accessed from the laundry roof; the single-ply roof continues under the door sill (Photo 15)

Main Roof

- The roof has a single-ply roof system bounded by parapets and the penthouse building walls (Photos 16 and 17). Roof drains and scuppers provide drainage. Roof penetration include vents and vent pipes (Photo 18).
- The sealant is weathered at scupper/concrete wall junctions (Photo 19). Parapet coping joints has backer plates with sealant; the sealant is split at some coping joints (Photo 20).
- There is a ponding stain on the main roof (Photo 21).
- The longitudinal parapets have a standing seam mansard on the exterior wall side (Photo 22). There is a lower standing seam metal roof at a recess in the building wall (Photo 23).

Unit Interiors

- The aluminum-framed windows have single panes (Photo 24). We accessed the following three units: 408, 503, and 601 (Photos 25, 28 to 30) and observed the interior sides of the windows. We did not see waterstains.

- The corridors have steel-framed windows with wire glass (Photo 26). The sealant is deteriorated at the south-facing Level 4 corridor window (Photo 27).

SEI RECOMMENDATIONS

Based on our observations, we make the following comments:

Basement

The garage is partially below grade. We saw no evidence of leakage on the observed walls. The observed leakage in the garage ceiling are related the courtyard construction. We recommend no remedial work, assuming the completed courtyard construction resolves the observed leaks.

Level 3 Deck

We did not observe the waterproofing under the topping slab. Since we understand there are no leaks reported under the deck, we do not recommend waterproofing replacement. We do recommend some maintenance be performed (e.g., remove vegetation growth). If the door thresholds are redone, there may be some localized deck work needed (e.g., topping slab modification and/or waterproofing repairs).

Level 3 & Main Roofs

The Level 3 and main roofs are single-ply roofs that appear to have been recently installed; these roofs are probably under warranty. We understand that there are no reported roof leaks. We do not recommend roof remedial work, except maintenance work, such as the resealing the scupper/wall joints, the coping sealant joints, and removing vegetation growth. The observed blisters should be monitored for growth. Ponding, while not recommended, will not affect the single-ply roof warranty.

We understand that a portion of the Level 3 is being considered for an occupied roof area. From the waterproofing perspective, the existing roof could remain, with the roof deck installed over it. We recommend notifying the roof manufacturer to confirm the roof deck will not adversely affect the warranty. If pavers and pedestals are to be used, protection pads would be needed under each pedestal. Rails and access to the roof deck will need to be determined. Presently, the roof is accessed by the laundry room door.

Also, if new penetrations are installed due to the remediation work, we recommend the roof repair details be repaired by the roof manufacturer for warranty compliance, prior to starting construction.

Based on our observations, we do not recommend remedial work for the standing seam roofs and mansards.

Exterior Walls & Windows

We recommend the aluminum-framed, single-pane windows be replaced with more thermal efficient windows. We did not observe the masonry. Since D3G recommends repointing, we recommend including an allowance for repointing in the budget.

Sincerely,
STEELHEAD ENGINEERS, INC.

Alan E. Burnett, PE
Principal

enclosure: Photographs 1 to 24

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PHOTOS

Photo 1: General view of building.

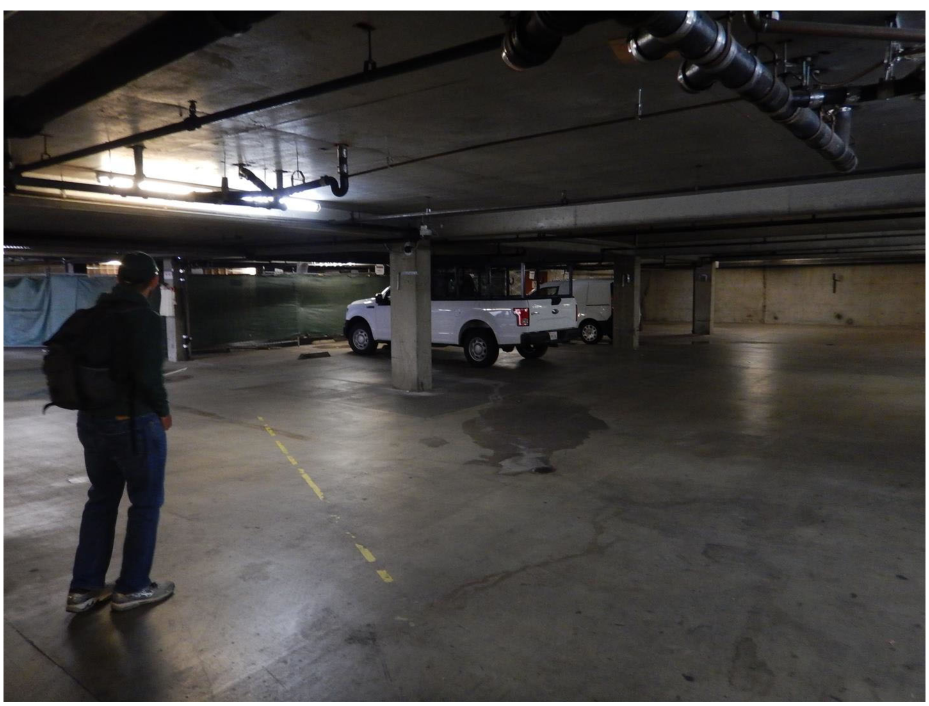


Photo 2: Leakage in garage.

Photo 3: Leakage in garage.

Photo 4: In-progress courtyard work above leaks.

Photo 5: Level 3 deck. Note vegetation grown.

Photo 6: Level 3 deck. Note vegetation growth.

Photo 7: Level 3 deck scupper.

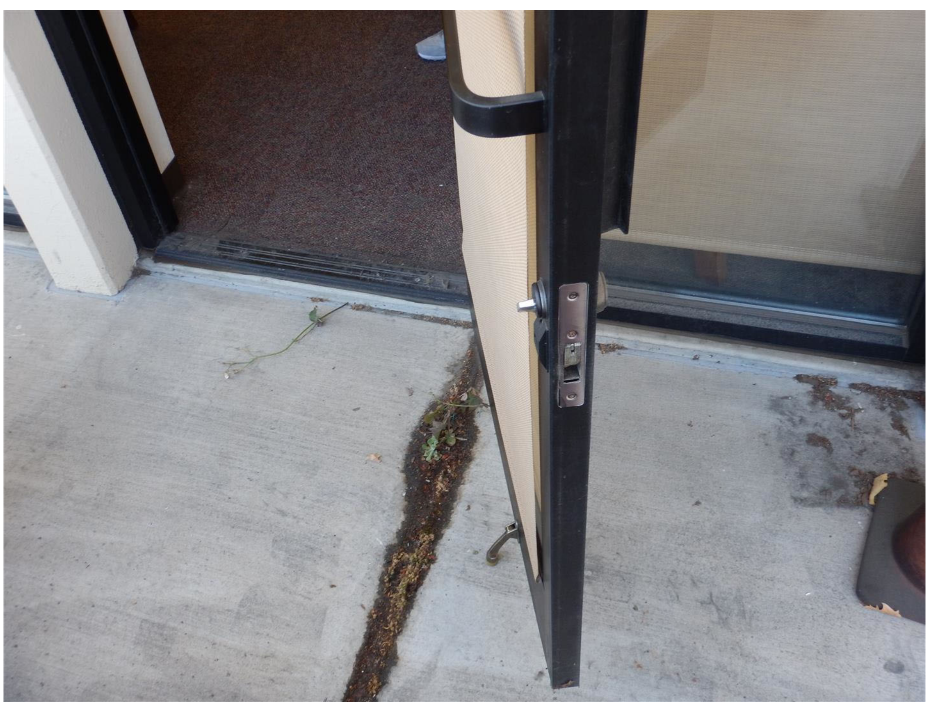


Photo 8: Typical door threshold.

Photo 9: Level 3 roof.

Photo 10: Level 3 roof.

Photo 11: Level 3 roof.

Photo 12: Ponded water at Level 3 roof.

Photo 13: Blisters in Level 3 single-ply roof membrane.

Photo 14: Plant growth at Level 3 roof.

Photo 15: Laundry room door sill at Level 3 roof.

Photo 16: General view of main roof.

Photo 17: General view of main roof.

Photo 18: Typical vent on main roof.

Photo 19: Typical scupper on main roof. Note weathered sealant.

Photo 20: Split sealant at parapet joint.

Photo 21: Ponding stain on main roof.

Photo 22: Standing seam metal mansard.

Photo 23: Small standing seam metal roof.

Photo 24: Typical windows.

Photo 25: Unit 408 window.

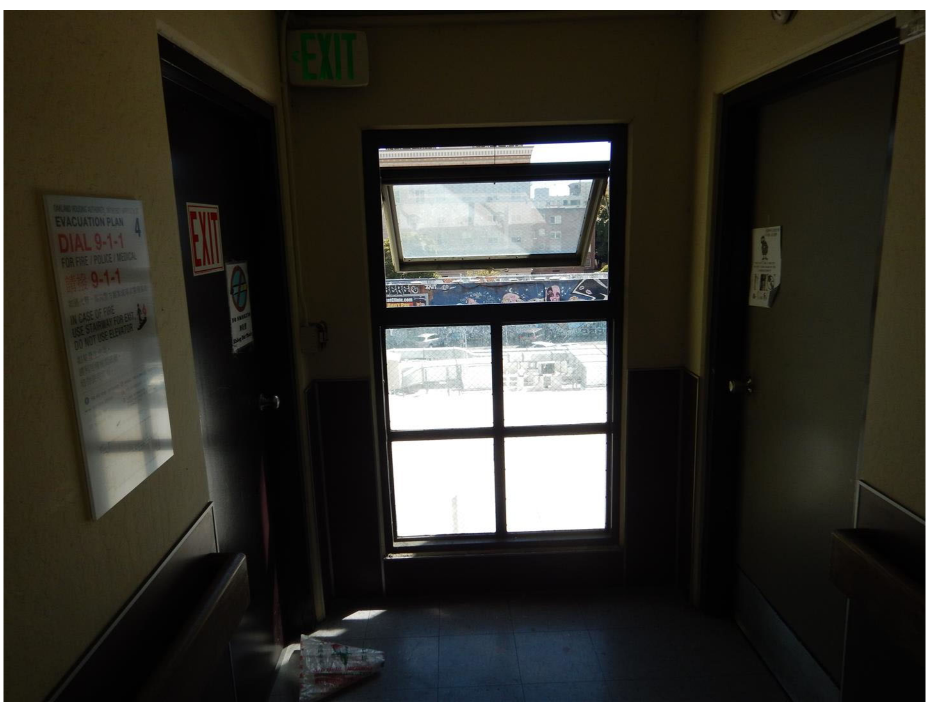


Photo 26: Level 4 corridor window. Note deteriorated sealant.

Photo 27: Level 4 corridor window. Note deteriorated sealant.

Photo 28: Unit 503 window.

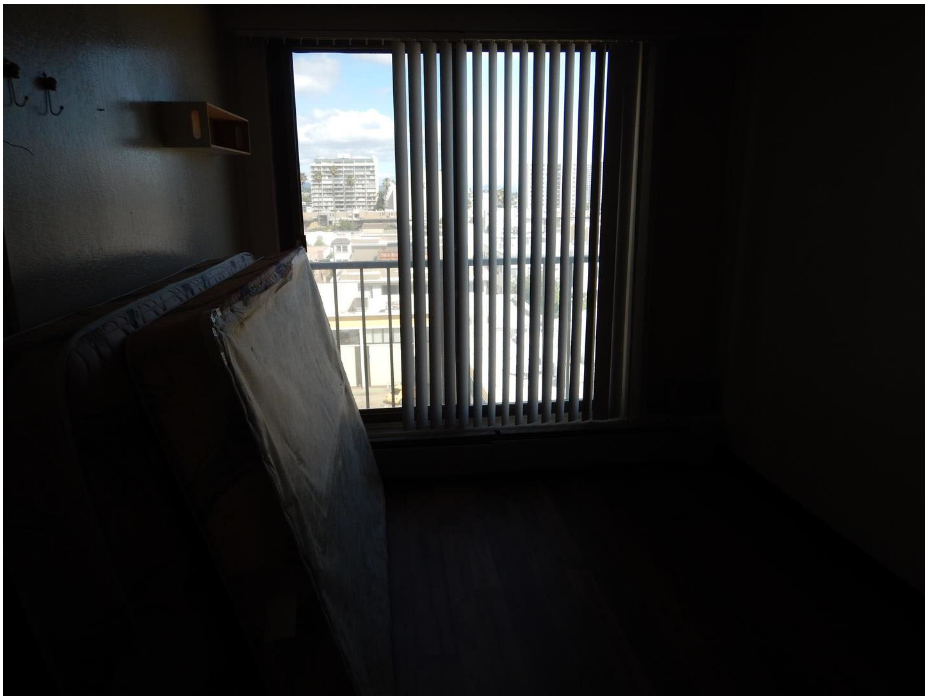
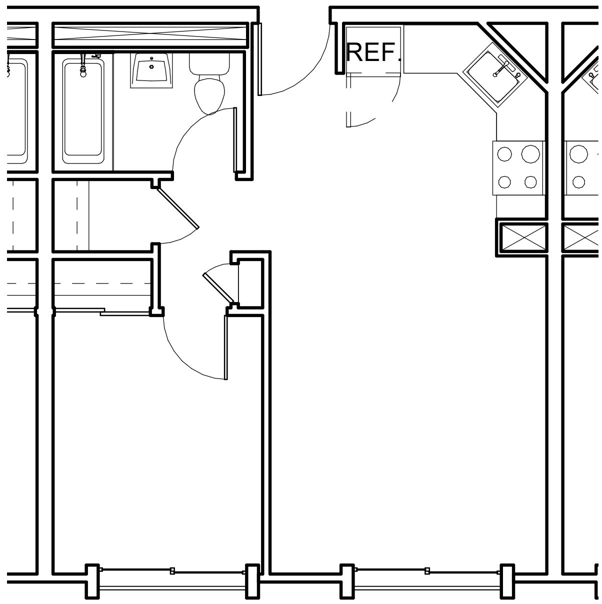
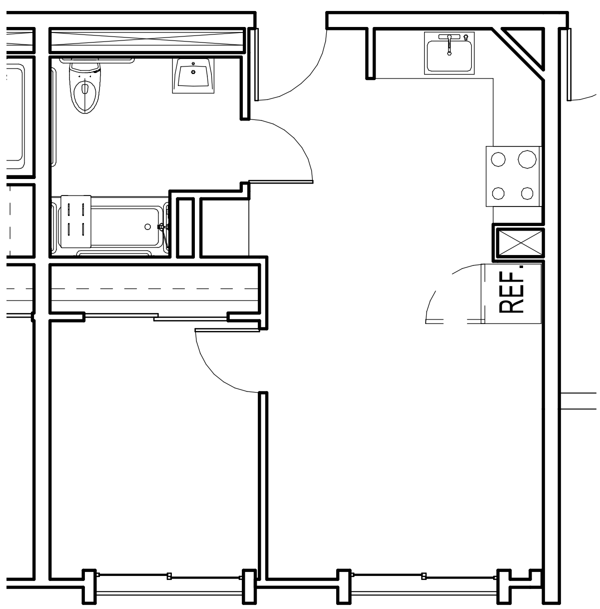


Photo 29: Unit 601 window.

Photo 30: Unit 601 sill/jamb corner.



1 SK-1 1 BR TYPICAL UNIT - EXISTING PLAN
SCALE: 1/8" = 1'-0"



2 SK-1 1 BR MOBILITY UNIT - PROPOSED PLAN
SCALE: 1/8" = 1'-0"

MOBILITY UNIT

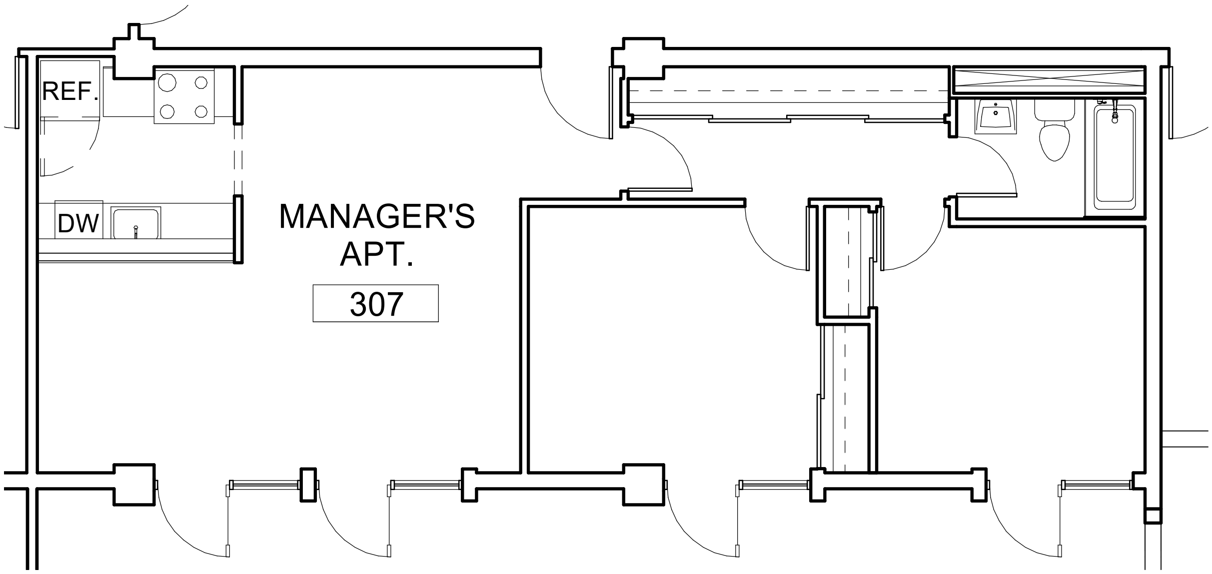
HARRISON TOWER
1621 HARRISON STREET, OAKLAND, CA

SSDP
Saida + Sullivan Design Partners

1BR UNIT

SK-1

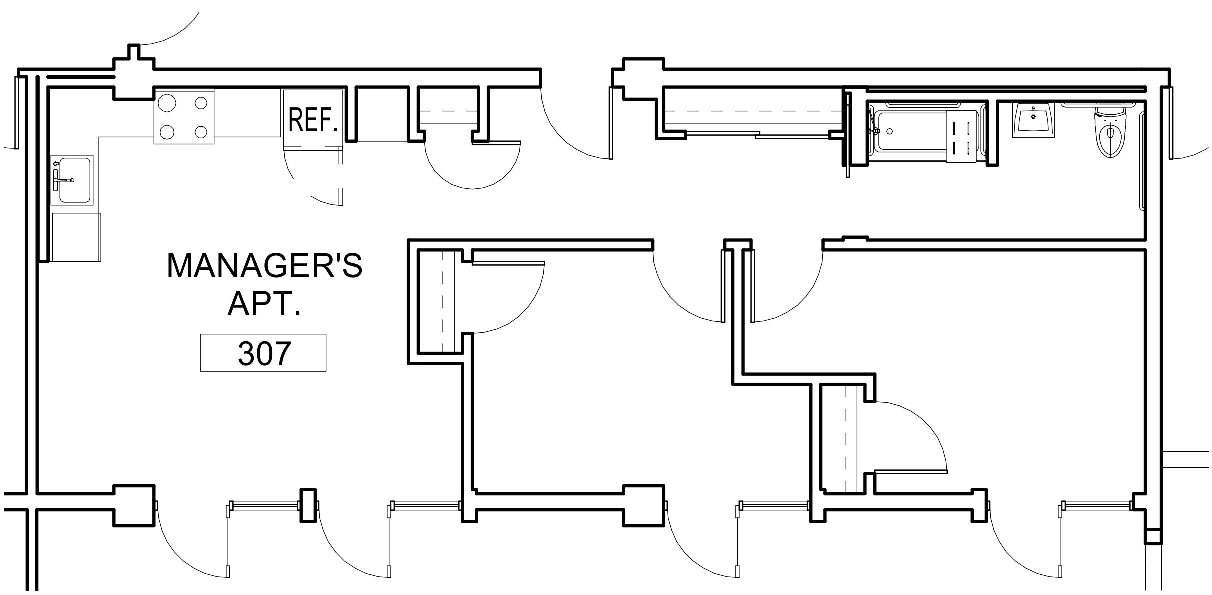
7/12/19



1 SK-2

2 BR MANAGER'S UNIT - EXISTING PLAN

SCALE: 1/8" = 1'-0"



2 SK-2

2 BR MANAGER'S UNIT - PROPOSED PLAN

SCALE: 1/8" = 1'-0"

MOBILITY UNIT

HARRISON TOWER

1621 HARRISON STREET, OAKLAND, CA

SSDP

Saida + Sullivan Design Partners

2BR MANAGER'S UNIT

SK-2

7/12/19