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Inspection Date: 11/17/2022

Report Date: 11/24/2022

Address: 555 Smith St.

Client: Mr. Smith

References: (1) Floor plans - 3rd Floor - Existing and Proposed

Attachments: (1) Glossary of Terms

Dear Mr. Smith,

Background

We assessed the above property from the interior living space at the 2nd and 3rd stories (note we could not access the first story interior), interior attic space, and crawlspace in order to observe the construction of the existing framing and determine if the existing interior walls between kitchen and dining room are load-bearing, and to discuss the feasibility of removing these walls. Our site observations and findings are included in this report regarding the removed interior wall assessment report.

Notes:

1. The words left, right, front, rear, and center are used throughout this report to describe locations within or around the structure/ property. These directions are all made relative to standing facing the structure/ from the front entry door.
2. The comments made herein are limited only to the exposed, visible & accessible portions of the structure. Comments cannot be made on structural elements that are hidden from view. The exact design of the building is generally not known if the drawings have not been made available.
3. No engineering/architectural drawings were available for the structure. Seismic analysis, code compliance, structural calculations or any other type of investigations are beyond the scope of this feasibility study.
4. This is not a comprehensive structural analysis of the home. The observations and findings noted in this report pertain specifically to the interior walls that our client is considering demolishing as part of modifications to the interior living space at the 3rd floor level.

Description

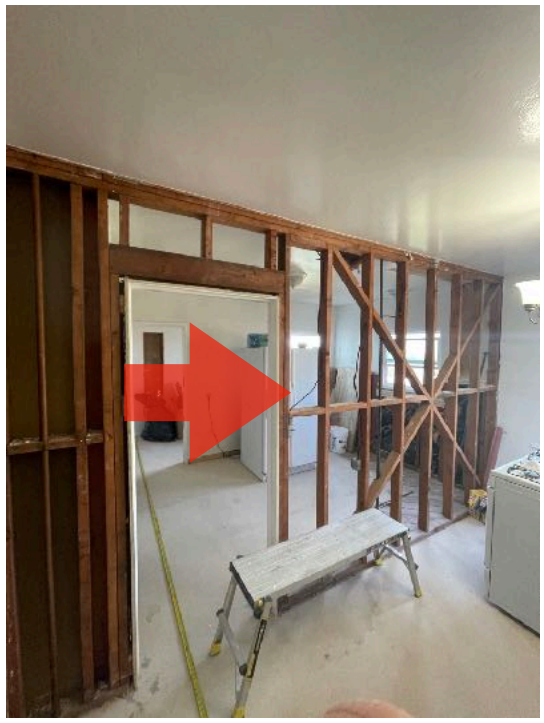
The structure was originally built in 1957 and and the structure appears to have been built using conventional building practices consistent with the age. The house is a one-story wood framed structure supported by raised foundation sections (crawlspace below).

Executive Summary

It is our conclusion that the interior wall that divides the kitchen from dining rom identified for removal in the proposed floor plan does provide some support for the roof framing structure at the home, and that engineering services would be needed to remove the wall in it’s in order to maintain the gravity force resisting load-path at the home. The scope of wall removal also includes the removal of the hallway closet wall that protrudes into the dining rom. This wall does not appear to provide vertical load support and can be removed without additional structural support provided. The scope of these alterations should be part of a set of construction documents submitted to the City of Oakland Building Department for permitting.

Area of proposed alterations

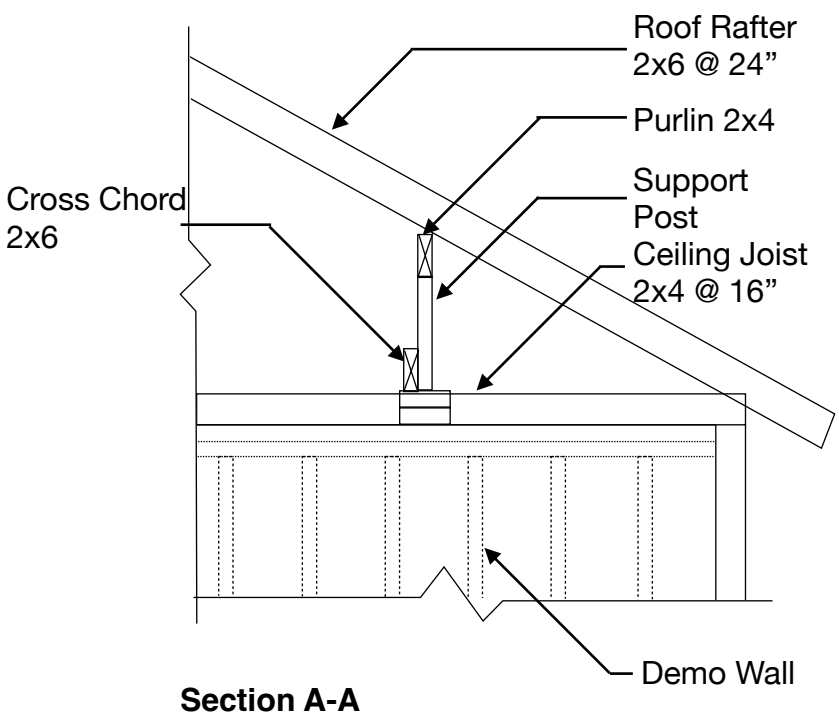
- **Proposed Alterations Details**:
  - Walls for removal are located at the back right of the 3rd story between the kitchen and dining rooms are roughly identified in the images and plan below.



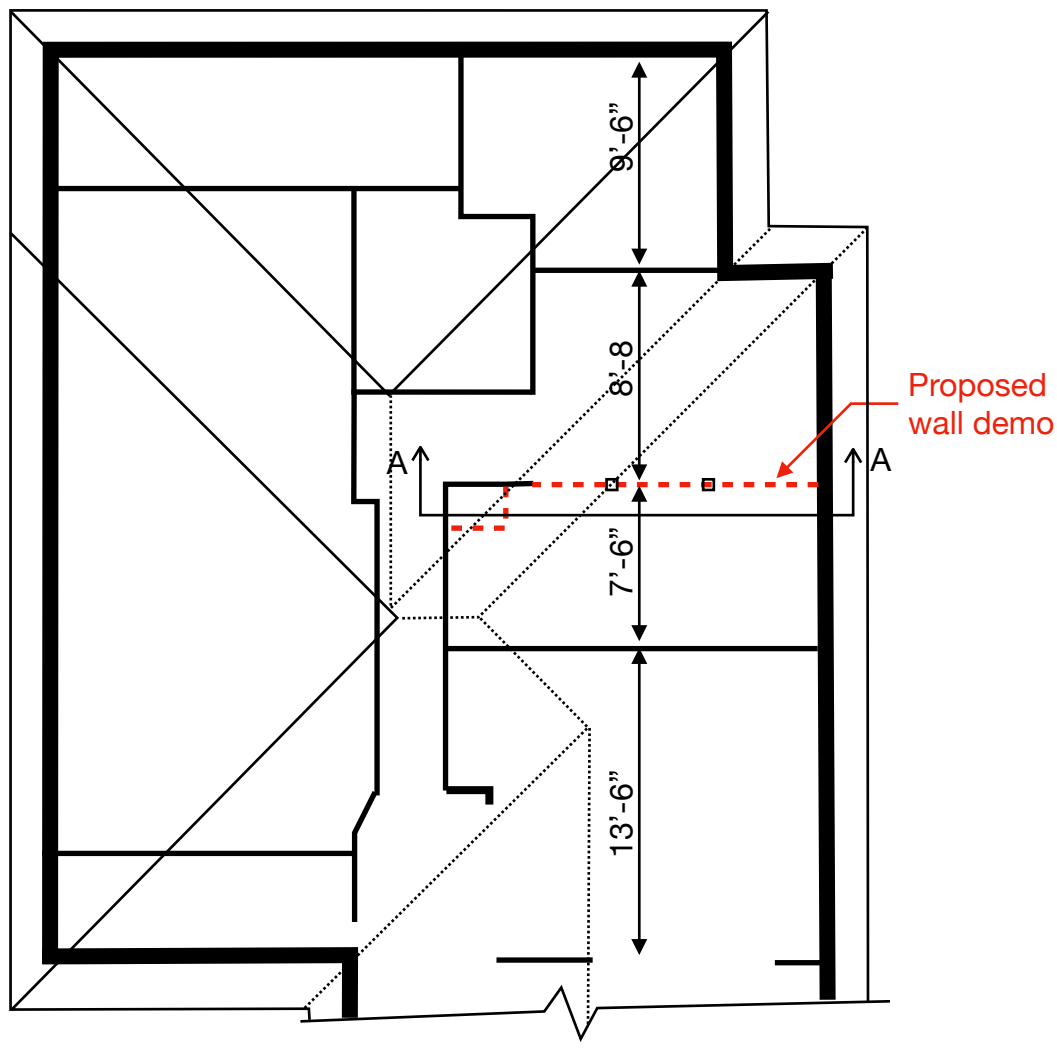
Item Image 1

Item Image 2

Overhead View (photo from Google Earth)



Section A-A

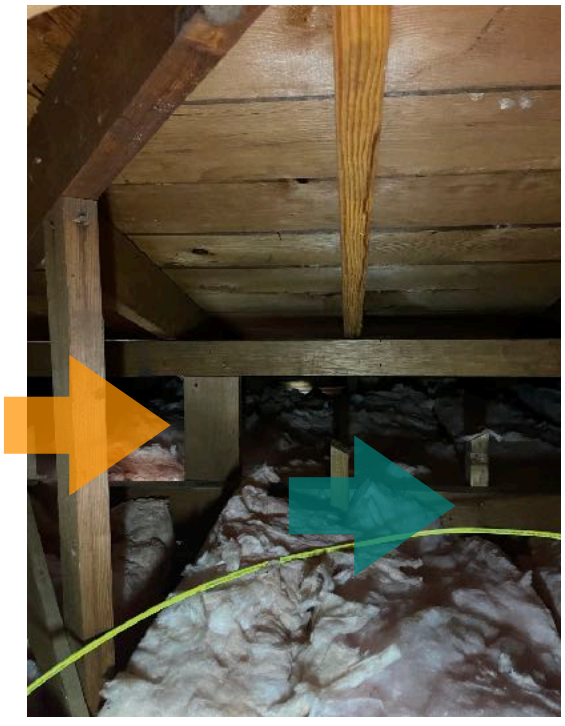


3rd Story Partial Plan

Images - Typical roof and ceiling framing

Item Image 1

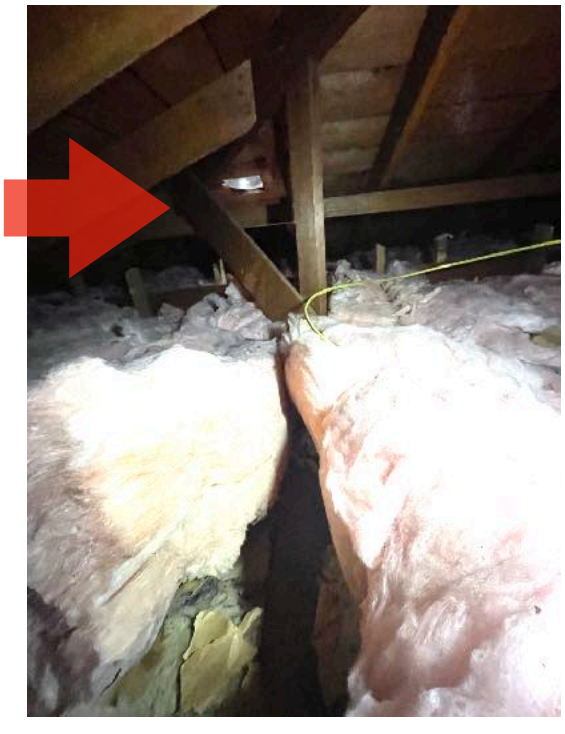
Item Image 2



Item Image 3

- **Observation Details**:
  - Hip and valley roof with complex geometry. Rafters span from perimeter wall plates to ridge board or hip and valley rafters (image 1). Typical framing consists of the following elements:
    - 2x6 hip and valley rafters (hip rafter shown with red arrow in image 1).
    - 2x6 roof rafters @24” on-center spacing (red arrow image 2).
    - 2x4 purlin to provide interior support point for rafters (blue arrow image 2).
      - Rafters and purlins provide the vertical support for the roof framing.
    - 2x post members to support the hip&valley rafters as well as purlins. These two posts are both bearing on the interior demo wall.
    - 2x4 ceiling joists @16” on-center spacing span left-to-right, and are lapped at interior wall supports. The joists run parallel to the demo wall (i.e. the demo wall does not support the ceiling joists). The ceiling joists support the ceiling and also resolve outward thrust on perimeter walls.
    - 2x6 cross chord elements that run longitudinally the length of the roof (green arrows in images 2 and 3). These members provide diaphragm continuity for seismic diaphragm loads.
  - Based off of the above observations, **the interior demo wall is a load bearing element for the roof framing.**

Images - Load bearing elements



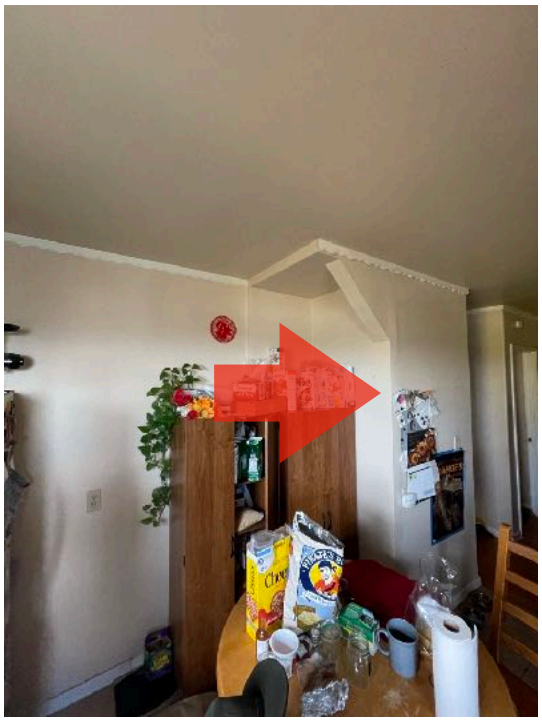
Item Image 1

Item Image 2

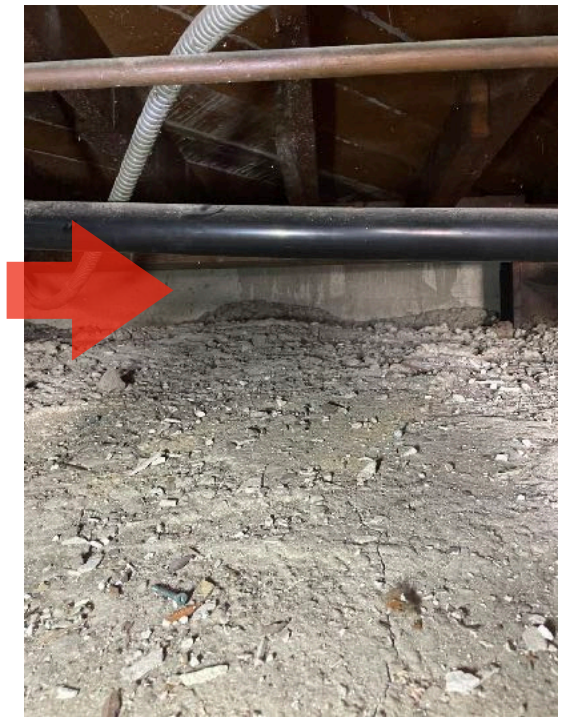
Item Image 3

- **Observation Details**:
  - Image 1: Post and kicker bearing on demo wall.
  - Images 2 and 3: Purlin support post bearing on demo wall.

Images - Vertical load path



Item Image 1 - 2nd Story

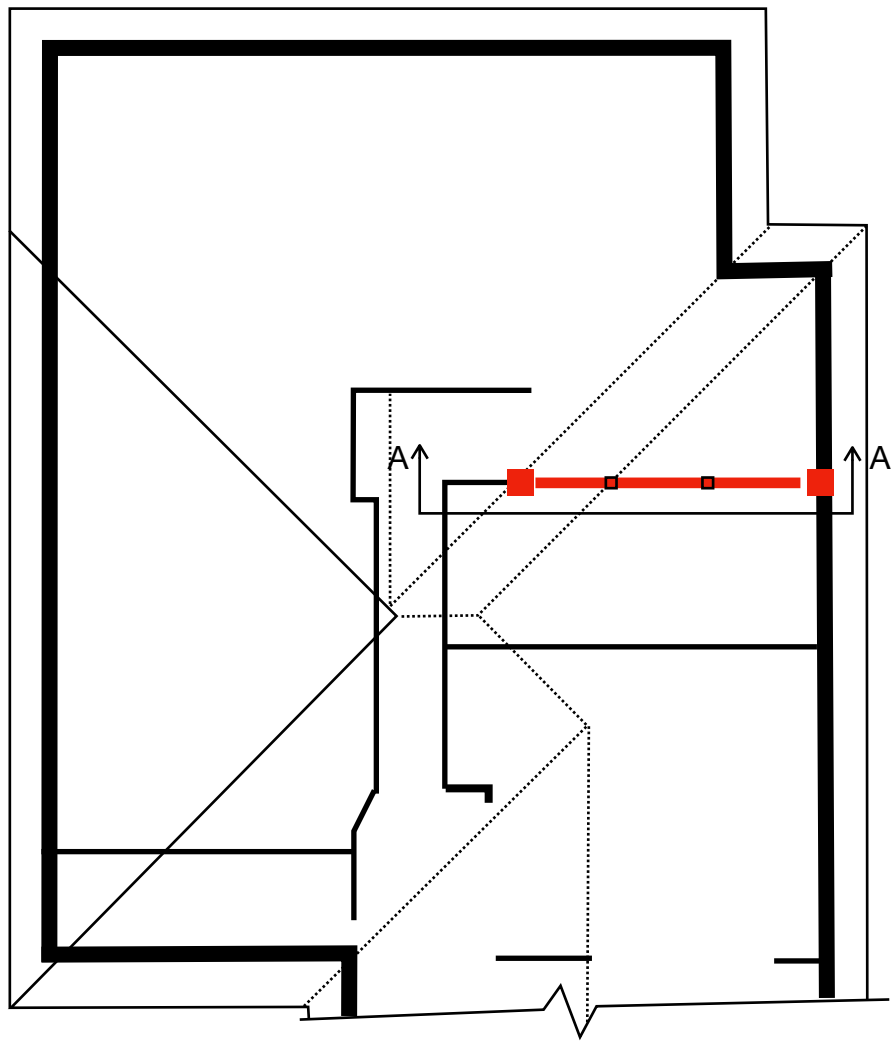


Item Image 2 - Crawlspace

- **Observation Details**:
  - The revised vertical load path for the roof will need to be traced all the way down to the foundation.
    - At the second story the kitchen to dining room wall appears to be offset from the wall above; however, the front wall shown with the red arrow in image 1 appears aligned.
    - In the crawlspace, the foundation wall shown in image 2 appears to be aligned with the demo wall from the 3rd story.

Discussion - Wall Removal

- Interior partition wall between the kitchen and dining room provides gravity support for roof framing elements. The support of these elements will need to be maintained in order to demolish this wall. and living room as identified in the report above provides gravity support for roof framing.
- Closet wall is does not appear to be load bearing, and can be removed without adding additional support.
- These partition walls do confer some additional lateral stiffness to the 3rd floor story; however, they do not appear to be primary elements of the lateral force resisting system. It will need to be fully demonstrated through structural analysis, but we think the removal of these walls can be justified through analysis and that additional strengthening of the lateral (seismic) force resisting systems is not necessary.
- Recommended approach will be to add new ceiling level beam and end posts to support the removed interior kitchen (see red elements on the 3rd story partial plan below)
- Options - There are two options for the new beam:
    - Option 1: Beam framed dropped below ceiling. This is likely an easier option for installation, but will have the disadvantage of reduced ceiling headspace from within the new kitchen.
    - Option 2: Beam framed flush with ceiling from ceiling space above. Likely a costlier installation and design, but has the advantage of an improved aesthetic.
- Considerations:
    - New beam will need to be sized to support post and kicker reactions.
    - Load path will need to be justified from roof level all the way down to foundations. We suspect the existing framing at the crawlspace, 1st, and 2nd stories will be sufficient without need for additional reinforcement, but this will need to be confirmed through analysis.
- Next steps:
    - Owner should decide on Option to take per the above.
    - Owner should hire a structural engineer to put together structural sketches for the proposed work and supporting calculations. At the description of the client BEAR can put together a proposal for these services.
    - Owner or contractor should use the drawings and calculations to obtain a permit through the City of Oakland Building Department.



3rd Story Partial Plan

It was a pleasure working with you. Please let us know if you have any other questions or concerns either now or in the future.

Performed by:

Matthew X. Namy, P.E.,S.E. (CA #C85086,#S6871)
Foundation Inspector

Reviewed & Approved by:

Nathan M. Toothman, P.E. (CA #C92336)
Owner & Principal Engineer

Attachment 1 - Glossary of Terms (Page 1 of 2)

ANCHOR BOLT: A steel bolt anchoring a wood frame structure to the foundation. Current UBC Code requires anchor bolts at 6" centers and within 4" to 12" of the end of each sill board.

BEARING PILE: A shaft or column drilled or driven into the ground to act as a foundation by transferring the load that it supports to the very firm soil or bedrock on which it rests.

BEDROCK: The solid crust of the earth, which may be exposed at the surface or located several hundred feet below the surface.

CAP: A concrete pad that ties the top end of a pile group together either in a cluster or row, which in turn supports a column or wall.

CATCH BASIN: Surface drain inlet with grate (also "drop inlet").

COSMETIC: Minor distress that does not impact structural integrity, i.e. drywall cracks, door offsets.

CREEP: The slow down slope movement of near surface soils usually related to annual wetting and drying cycles of expansive clay soils or poorly consolidated fill.

CRIPPLE WALL: The wall in the crawl space of a home between the foundation and home's first floor.

CUT: The ground surface remaining after the removal of soil by excavation.

EARTH TO WOOD SEPARATION: Current UBC Code and good construction practice requires a 6" separation between soil and the wood elements of a home to minimize pest infestation and rot problems.

EFFLORESCENCE: An indication of excessive moisture resulting in a white salt deposit remaining on a concrete surface after repeated drying cycles (also calcium deposit).

END BEARING PIER: A drilled or driven shaft, extended to bedrock, providing foundation support.

EXCAVATION: The digging out and removal of soil from a site.

EXPANSIVE SOIL: A type of clay soil which expands when moisture is added and shrinks during drying cycles.

FILL: The material used to fill & level, or adjust the grade of, a sloping site or to rebuild the base of an excavation to the required height (imported, not native soil).

FINGER DRAIN: A finger drain is constructed much like a sub-drain, but is typically positioned in the sub-area, just inside the perimeter foundation. A finger drain is typically 8" wide and varies in depth from 6" to 15" and often outlets to an 18" diameter, 30" deep, cased sump that is provided with a float-switch activated pump.

FLOATING FOUNDATION: A continuous spread footing foundation that extends under an entire building replacing many separate footings (also "mat").

FLOOR JOISTS: any of the small timbers or metal beams ranged parallel from wall to wall in a structure to support a floor or ceiling.

FOOTING: The portion of the foundation that bears on the supporting soil.

FORM WORK: The temporary mold into which liquid concrete is poured to create a specific shape and the associated structure.

FOUNDATIONS: The structural system constructed below a building that transfers the vertical weight and lateral loads of the building to the ground on which it stands.

FOUNDATION WALL: A wall (usually poured concrete or concrete block) built below ground level to transfer the weight of the exposed wall it supports to the footing on which it rests (also stem wall).

FRICTION PIER: A drilled or driven shaft extended into the ground normally filled with reinforced concrete which provide support through friction between the piers surface and the soil.

FRICTION PILE: A shaft or column that is drilled or hammered into the ground until the pressure or friction developed between the pile surface and the soil into which it is forced (driven) enables it to become a firm foundation support on which, when combined or grouped with other piles, to build heavy structures.

GRADE: Soil surface or the inclination of a pipe or the property (also site slope). Grade is often expressed as a ratio of the horizontal to the vertical components of slope i.e. 2:1.

GRADE BEAM: A reinforced concrete foundation element used to distribute building loads to foundations piers and to interconnect the piers.

HONEYCOMB: Voids in concrete typically resulting from inadequate vibration during placement (also "popcorn concrete").

INVERT: The lowest point on the inside surface of a pipe or channel.

Attachment 1 - Glossary of Terms (Page 2 of 2)

LANDSLIDE: A slope failure resulting in the downward movement of a section of a hillside.

LATERAL LOAD: A horizontally applied force typically resulting from seismic loads on foundations and wind loads on walls.

PIER: A column or shaft (also caisson) in the ground that serves as a foundation constructed by drilling a hole and filling it with concrete and reinforcing steel.

PIPE PILES: A type of underpinning in which steel pipes are driven into the ground below an existing foundation to provide stable support (also mini-pile).

PONY WALL: A less than standard height stud wall (also known as a cripple wall). It is usually employed to provide support between the foundation and the floor on a sloping site.

REINFORCING: The deformed steel rods or mesh embedded in concrete to strengthen it.

RETAINING WALL: A wall built to retain soil or support a foundation on sloping ground. The Uniform Building Code requires walls over 4 feet to be designed by a licensed Civil or Structural Engineer.

SEISMIC STRAP: A steel strap used to restrain the structure or an element of the structure from the lateral forces developed during earthquakes by connecting the frame to the foundation (also "tie-down). The term used to describe the exact location of a building.

SHEARPLY: Plywood reinforcement used to improve the strength of stud walls to resist lateral loads (earthquake forces).

SHEAR TRANSFER TIE: A metal brace nailed into both the shear wall and the floor joists that allows the shear wall to support the house during the shaking of an earthquake.

SHEAR WALL: Sheets of plywood nailed to the studs of an exterior wall, such as a cripple wall, to provide bracing against the shaking forces of an earthquake.

SILL: The first wood element above the foundation (also mudsill).

SIMPSON: A manufacturer of steel connectors for wood frame construction.

SLAB: A flat, thin, horizontal concrete element.

SLIPOUT: A small slope failure that moves (also "mud flow").

SLOPE: The degree to which a surface tends upward or downward – see definition for GRADE

SOFT STORY: An open area, commonly a garage, at ground level with a room directly above it. Because of the garage door, one wall of the house can’t be secured with shear wall.

SOIL PROFILE: A vertical cross-section drawing of the ground showing the type and depth of each layer of material between the surface and bedrock.

SPOT FOOTER: A spot or pad footing is used to support a single point of contact, such as under a pier or post.

SPREAD FOOTING FOUNDATION: A very common type of foundation that involves placing a wide flat concrete footing under the perimeter building walls distributing the weight over a greater area.

STANDING WATER: Water within the crawl space that has not evaporated or percolated away.

STEM WALL: The portion of the foundation above the footing that supports the wood frame by connection to the sill plate.

SUBDRAIN: A subsurface moisture collection system normally designed to cut off underground water flow (also "back drain", "curtain drain" or "french drain").

SWALE: Linear depression which forms a drainage channel.

UBC: Uniform Building Code; the code that each building permit authority uses as a basis for review and acceptance at residential design and construction (the code is updated periodically).

UNDERPINNING: Added foundation support placed under an existing building foundation.

WATERPROOF MEMBRANE: An impermeable barrier placed to prevent moisture intrusion.

WATER TABLE: The distance below the surface at which the soil is completely saturated with water. A perched water table can develop above the actual water table when a clay lens or other impermeable layer prevents or delays vertical percolation.