FOUNDATION & DRAINAGE INSPECTION REPORT

207 Avenue Ave., San Mateo

3/4/20

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Inspection Date: 3/4/20

Report Date: 3/5/20

Address: 207 Avenue Ave., San Mateo

Client: Client

References: (1) none

Attachments:
(1) Glossary of Terms
(2) Expansive Soil Illustrations
(3) Drainage Illustrations
(4) Seismic Retrofit Illustrations
(5) Foundation Underpinning Basics
(6) Terms & Conditions
(7) Typical repair/remediation cost ranges
(8) Foundation & Drainage Contractor Resources
(9) Possible causes of foundation movement

Dear Client,

Background

We inspected the interior and exterior of the property listed above to better understand overall condition of the foundation & related drainage conditions from the standpoint of a foundation specialist. The observations/findings are included in this report along with the corresponding pictures & recommendations for addressing the areas. **The observations/ findings are listed in order of relative importance.**

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/property from the front entry door and/or street.
2. The comments made herein are limited only to the exposed, visible & accessible portions of the foundations. Comments cannot be made on the foundation where the foundation is hidden from view. The exact design of the foundations is not known especially the portions of the foundation which are hidden from view such as below ground embedment depth and dimensions or existence and/or size, placement and amount of steel reinforcing bars within the foundation.
3. No engineering/architectural drawings were available for the structure. The inspection was performed without the benefit of formal soils investigation, slope stability analysis, drainage analysis or similar studies. Seismic analysis, code compliance, structural calculations or any other type of investigations are beyond the scope of this report. The amount and location of reinforcing steel (if present) can not be precisely determined without destructive testing

Description

The structure was originally built in 1955 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 perimeter (poured concrete) battered footer foundations that form 3 chambers. This type of foundation typically has a relatively shallow embedment depth into the ground and is consistent with the age of the structure. The front chamber of the crawlspace had 1-4 inches of standing water, the other two were mostly dry with some damp areas around the perimeter.

Observed Condition - Horizontal cracking

Item Image 1

Item Image 2

Item Image 3

Item Image 4

Item Image 5

Item Image 6

Observed Condition - Horizontal cracking (cont'd)

Item Image 7

Item Image 8

Item Image 9

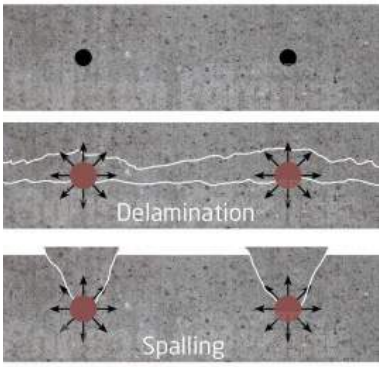
Item Image 10

Item Image 11

Item Image 12

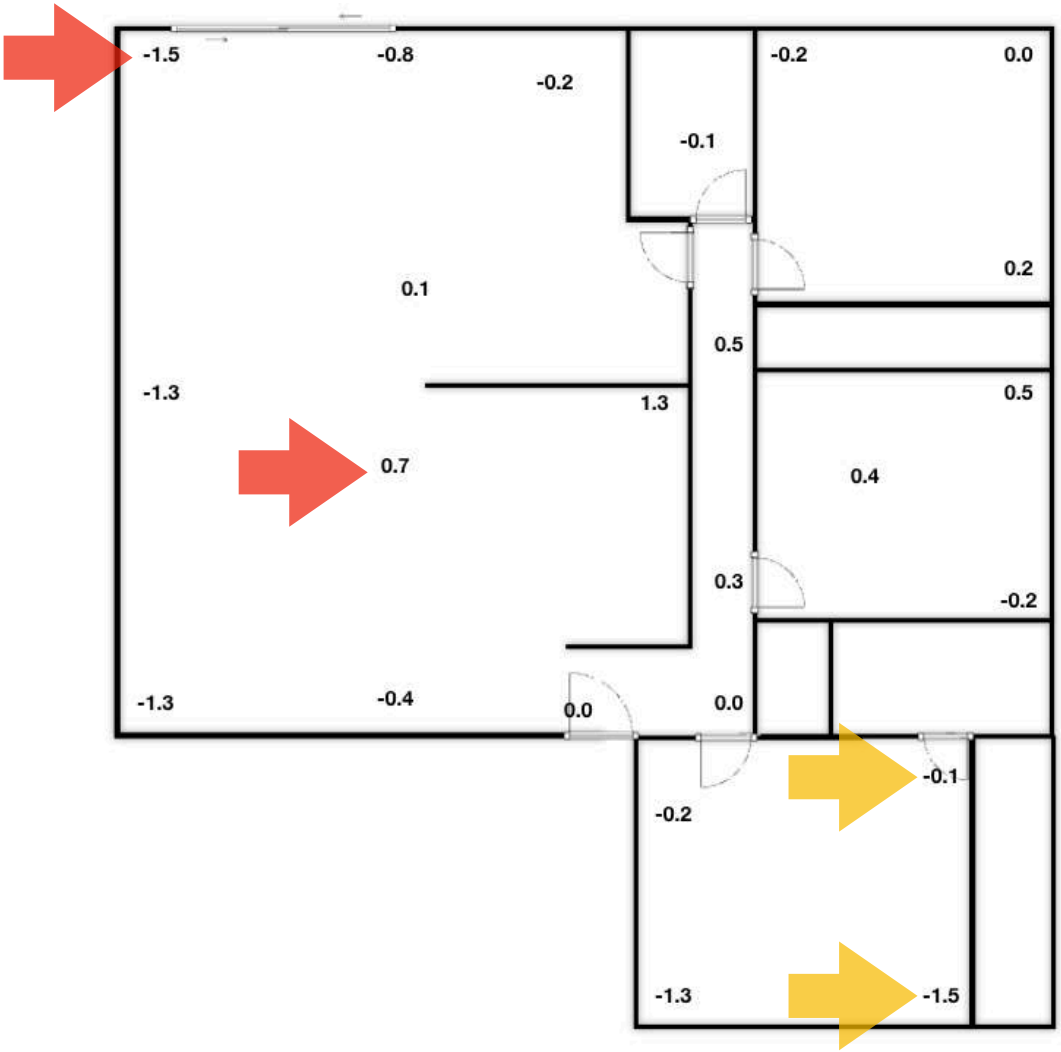
Observed Condition - Horizontal cracking (cont'd)

- The horizontal cracking is due to rusting of the rebar (reinforcing bar) within the foundation which is a form of 'spalling'. The rust causes the steel to expand and is a strong enough force to cause the concrete to crack (see image to the right). This is most noticeable where the rebar was placed closer to the forms but also the other source of the rusting is wicking of water up through the damp soils (common in this area near the Bay) so this is the most likely contributing factor.
- There are various spalling repair procedures that contractors can undertake, the least intrusive process is one that many contractors are familiar with ad the overview of the procedure is that the cracked areas are chipped away, the rebar then either cleaned or replaced and then special epoxies and mortar then used to seal and repatch the area (see image to the right). A budgetary price range for this repair process is typically in the $500/linear ft range (+/- 30%). The more extensive repair generally involves a partial removal and replacement of the foundation. Unless performed in sections, this requires the installation of temporary shoring to safely support the structure while the foundation is removed and replaced or for sections to be performed at a time with pro's and con's for each. Epoxy coated vertically installed steel reinforcing bar dowels are installed into the remaining bottom portion of the existing foundation, horizontally installed epoxy coated steel reinforcing bars are installed to the vertically installed steel dowels. Concrete forms are installed. The new upper portion of the foundation is poured with concrete treated with Xypex (an additive that helps the new concrete become more water resistant) which helps protect the new epoxy coated steel and helps to prevent spalling concrete. A budgetary price range for this repair process is typically in the $1,000/linear ft range (+/- 30%). In general, it is the second approach that is mentioned that is the preferred repair method in these areas where the source of the rusting is the wicking of the water up from below. The attempted epoxy repair was not effective as you can see it's cracked since, from my understanding this type of repair is no longer approved by the building department. The repairs that have been done may have held the areas together better for a while but eventually it will fully crack through.
- We measured up a total length of 60 ft (+/- 10%) with 20 ft of that matching up to cracking on the opposite side of the stem wall.
- From a budgetary cost standpoint I think that assuming the second approach mentioned above is the one that would be chosen by the contractor and associate engineer.
- Relative to the age, this degree of horizontal cracking is common and would advance slowly so it's not an immediate repair requirement but it's better to address as soon as practical.
- Compared to other homes I've seen in this area, I've seen some cases with less and some with more and would say this would be somewhere in the middle.
- **In conclusion, I would put the budgetary range a good range would be 40 x $1,000 per linear ft = $40K (+/- 30%).**



Spalling process

Observed Condition - Floor elevation results & signs of foundation movement



- The interior floors were spot checked for levelness using a Ziplevel manometer. The maximum elevation change was observed to be 2.2" between the red arrows shown and then for the added lower slab, a total of 1.4 inches as shown between the yellow arrows (note: the slab may have been poured with an intentional slope if it were once used as an outdoor patio.
- There were no interior indications of movement.
- There are two tolerance levels for single family homes of which we are aware.
    - The most stringent standard permits a total maximum differential of 1.5 inches over the length of the house, before the house is considered out of level.
    - The second standard originates from the Uniform Building Code suggesting a maximum deflection of 1/240. This calculates to a maximum of 1 inch in 20 ft.
- The structure is outside of the first of these tolerances but within the second, this is not uncommon for this age and in this area and overall, is less movement than I typically see for houses in this area.
- The last tolerance is a more subjective one in that people will not notice the overall degree of movement overall as much as the movement in any one particular room. Generally, for rooms that have less than a 1.5 inch amount of difference it's not to the point of detectability and/or not affecting the livability of the room. In this case I did not get the sense that the movement affected the livability of the house since its spread out evenly over multiple rooms/spaces.
- In the Bayside locations of San Mateo, Foster City and Redwood Shores, there has been differential settlement of the underlying soils over the extended time since original development. This commonly will cause deformation and sloping of foundations. The precise cause of the differential movement is beyond the scope of this report but would generally be the result of a shallow foundation in conjunction with the underlying soft Bay Mud (see Attachment 9 for further possible contributing factors and explanations). A licensed Geotechnical Engineer would be better able to address this issue based on subsurface analysis (soils report). It is impossible to predict the future performance, or ongoing rate of movement without the benefit of subsurface information and past history of the property (past floor elevations survey's to compare to and time between interior painting and the formation of cracks as a few examples). In general though, for movement related to consolidation, the movement is early in the life and then settles out. Based on this I don't this is a case where stabilization would generally be undertaken.
- This survey can be used as a baseline for future monitoring.

Observed Condition - Standing water in the crawlspace

Item Image 1 **Item Image 2**

- The front crawlspace chamber had approximately 1-4” of standing water at the entrance. A sump pump should be installed, depending on the slope of the crawlspace slab it may require 2 in this area. The other chambers were just damp but there is the potential that under some conditions that they have standing water so these should be monitored.
- **The cost range per installed pump may be in the $2K range (+/-30%), assuming it would just be 2 needed then it would be a total of $4K (+/- 30%) minimum (the back chambers still need to be monitored).**

Observed Condition - Signs of chimney movement

Item Image 1

- There is a small separation crack between the chimney and the wall. This is fairly minor and likely from past seismic activity or very slight settlement but nothing of concern. Recommendation would be to patch the area with an exterior caulking and monitor.

Observed Condition - Drainage improvements - exterior grade/slope

Item Image 1

Item Image 2

Item Image 3

- It is recommended to ensure adequate slope away from the house in all areas & recommend hardscape as the best option (see attachment 3 for illustrations relative to the grade depending on whether or not it's hardscape or porous (i.e. dirt or grass). On the right side (Image 1), the hardscape slopes away from about half of the length and then towards the front of the house it slopes back towards the house.
- For a house of this age with the horizontal cracking and water in the crawlspace, it would also be recommend to look into having subsurface drainage (french drains) installed in the future to help minimize the water near the foundation. However, there would likely still be water coming up from the center given the high water table in these areas so the french drain may still not fully address the water issue.

Observed Condition - Drainage improvements - downspouts

Item Image 1

- It is recommended to ensure all downspouts have extenders added to discharge water at least 5' from the house or discharge onto hardscape that then flows away from the foundation at least 5'

Observed Condition - Drainage improvements - planters near foundation

Item Image 1

- It is best to avoid planters near the structure as they tend to trap water next to the foundation and it is recommended that there be positive sloping of the grade away from the foundation.

Observed Condition - Drainage improvements - possible lack of positive drainage under deck

Item Image 1

- We can not see below the decking but it's possible there isn't adequate drainage away from the foundation in this area but should be added when the opportunity presents itself - alternatively, adding a roof over this area would help with this if the roof water is then directed away from the foundation. Since the crawlspace was dry (in the winter) and the foundation performance has been satisfactory over the life of the structure, these would not be improvements that require immediate attention.

Observed Condition - Foundation crack

Item Image 1

- There was 1 small vertical crack 1/8 in or less. These generally occur from past either seismic activity or a combination of shallow foundation embedment depth and expansive soils which will swell when wet and contract when dry (see attachment 2).
- For cracks this small, they are generally marked and monitored.

Observed Condition - Seismic risk mitigation notes

Item Image 1

- Please refer to Attachment 4 for additional information and illustrations related to the comments below.
- As desired, more comprehensive seismic upgrades could easily be installed to the sub-structure area. Additional foundation anchors could be installed between the mudsill and foundation. Metal framing connectors could be installed between the rim joist of the sub-floor and the anchored mudsill. These recommendations are detailed in the pre-engineered plan set for single family homes prepared and provided by the Association of Bay Area Governments (ABAG).
- These recommendations are also detailed in the Applied Technology Council (ATC) report “Seismic Rehabilitation Guidelines for Detached, Single-Family, Wood–Framed Dwellings” (document ATC-50-1) and have been recommended by the Federal Emergency Management Agency (FEMA) a division of the U.S Department of Homeland Security. Additional information can be found at the following: Earthquake Brace & Bolt (California Residential Mitigation Program) www.earthquakebracebolt.com, California Earthquake Authority www.earthquakeauthority.com & Quake Prepare www.quakeprepare.com.
- **Cost wise, considered an ‘upgrade’ relative to a real estate transaction - currently consistent with age**

Observed Condition - Concrete slab cracks

Item Image 1

- Typical minor concrete slab cracking, not of a structural concern relative to the house/foundation. It is possible that rebar was not used in the slabs and/or the subsurface prep wasn't adequate. The areas could be patched to extend the life or replaced as desired

Conclusion

In our opinion the visible portions of the foundation appear to be in serviceable condition.

It was a pleasure working with you, please let me know if you have any other questions or concerns either now or over time.

Sincerely,

Nathan M. Toothman
Owner

Disclaimer

This inspection report should not be considered a warranty or guarantee, implied or expressed, of the structure in general, including but not limited to the building superstructure, slabs, foundations, repairs recommended or repairs performed. Structures including but not limited to their foundations and slabs may be affected severely by changes in climate, land use, drainage, soil moisture conditions, soil characteristics, and other factors too numerous to list. The conclusions presented in this letter are based on the conditions visually observed during our visit. It is performed without the benefit of formal soils investigation, slope stability analysis, drainage analysis or similar studies. This letter is for use by the above named individual and is not to be used by any other individuals and is not transferable. Our opinions and recommendations are subject to change based on new information as it becomes available to this office.

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.

Attachment 2 - Properties of Expansive Soils

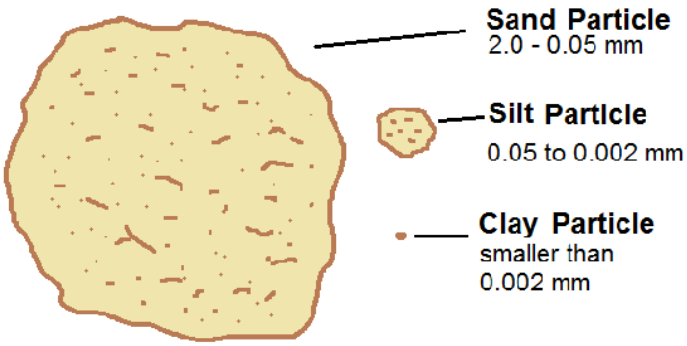


Fig 1 - Relative Particle Sizes

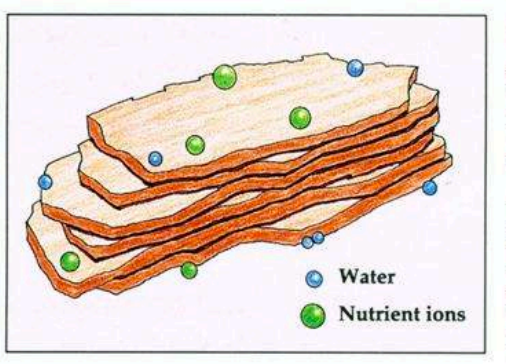


Fig 2 - Clay Shape

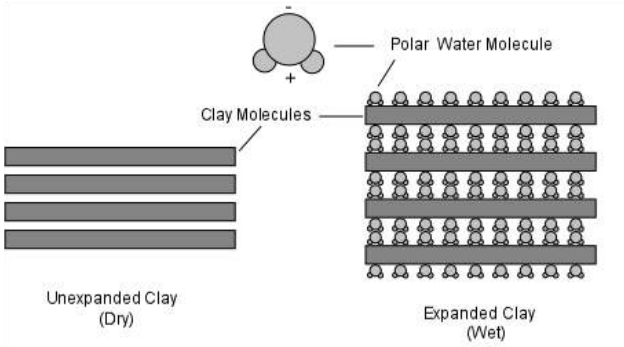


Fig 3 - Expansive Mechanism

Fig 4 - Visual Appearance of Expansive Soils When Dry

Attachment 3 - Drainage Illustrations

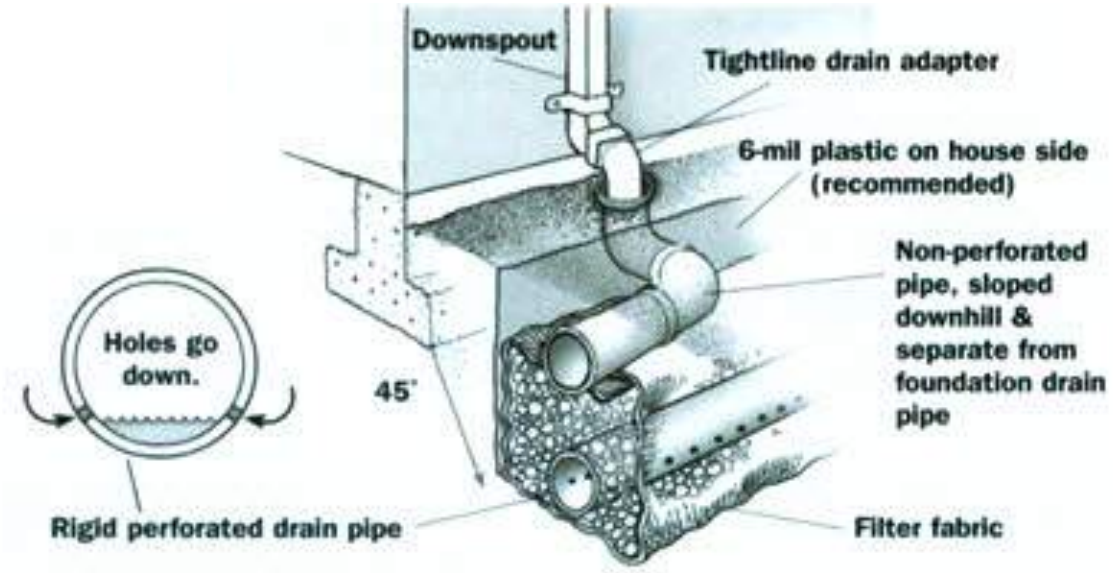


Fig 1 - Subsurface & Surface Drain Overview

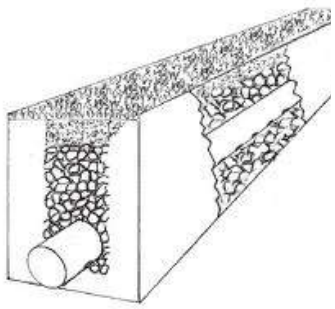


Fig 2 - French Drain

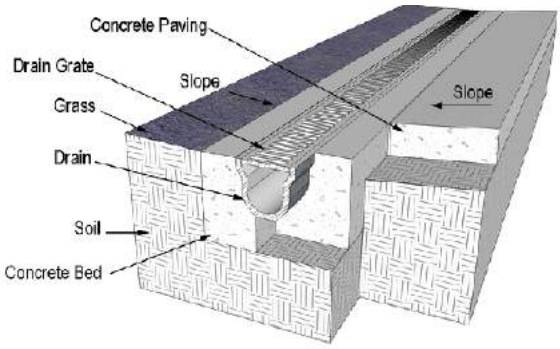


Fig 3 - Trench Drain

Fig 4 - Exterior Sump Pump

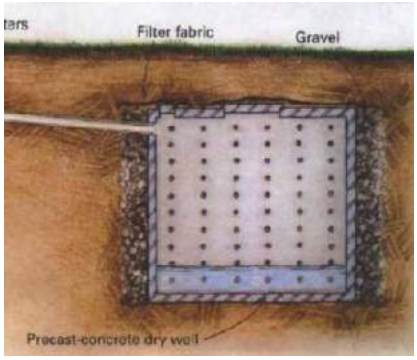


Fig 5 - Dry Well

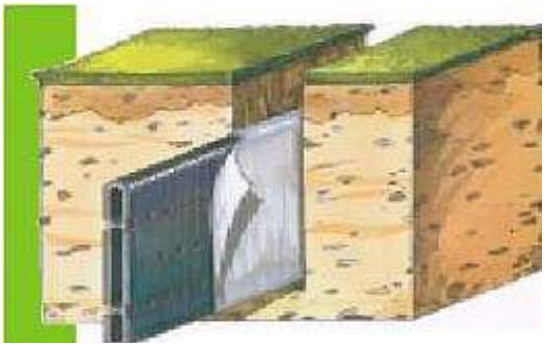
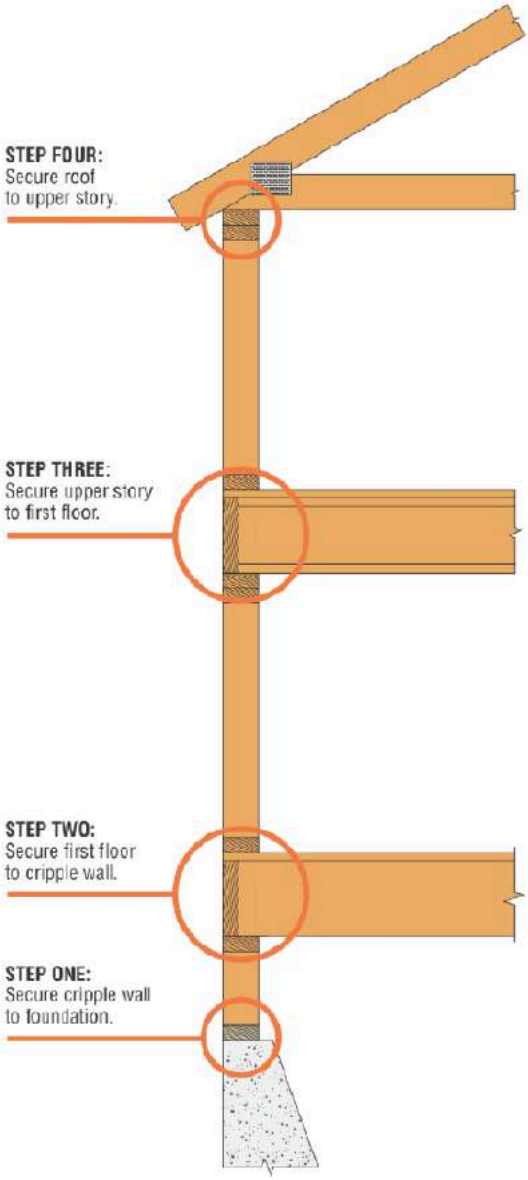


Fig 6 - Interceptor Curtain Drain

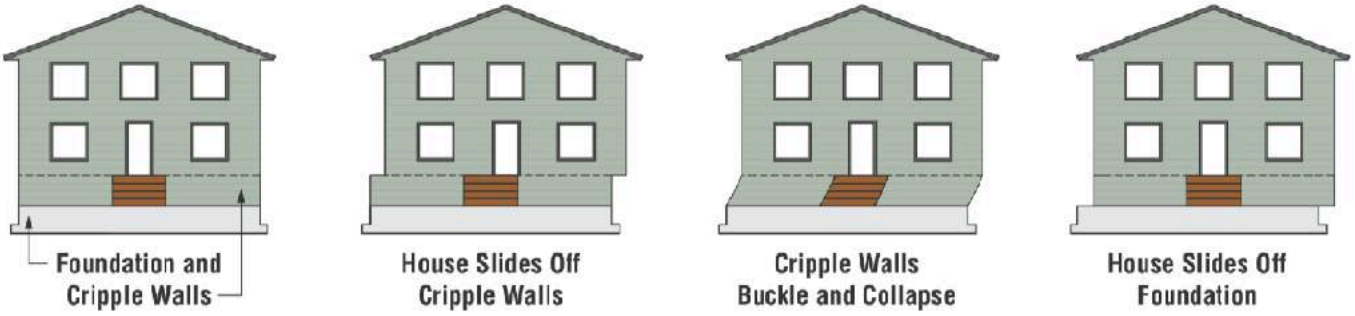
Fig 7 - Drainage Slope Relative To The Structure

Attachment 4 - Seismic/Earthquake Basics

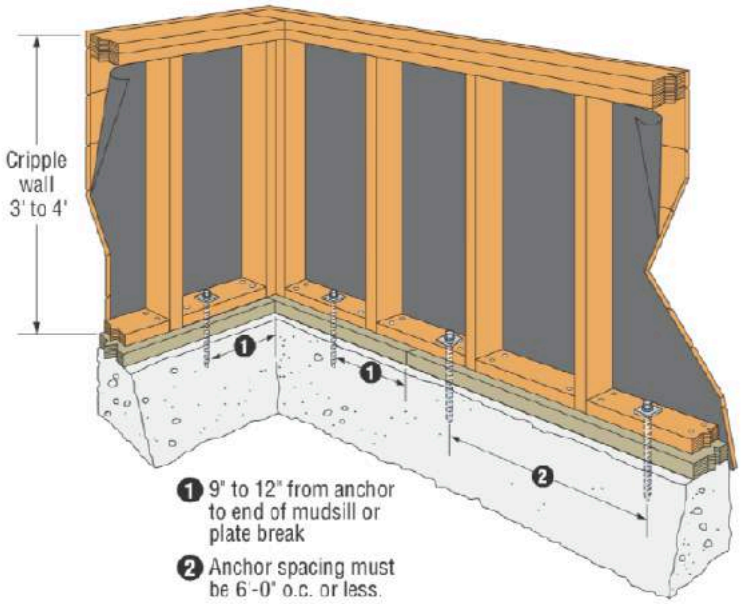
How Earthquake Forces Affect A Home

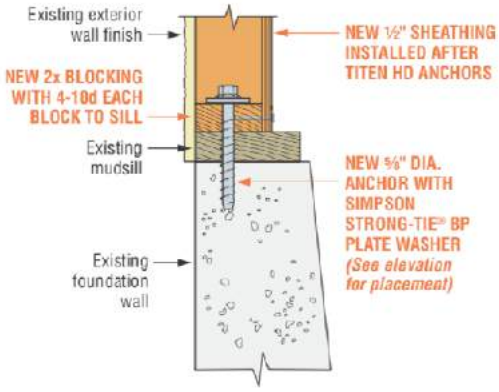


Continuous Load Path*

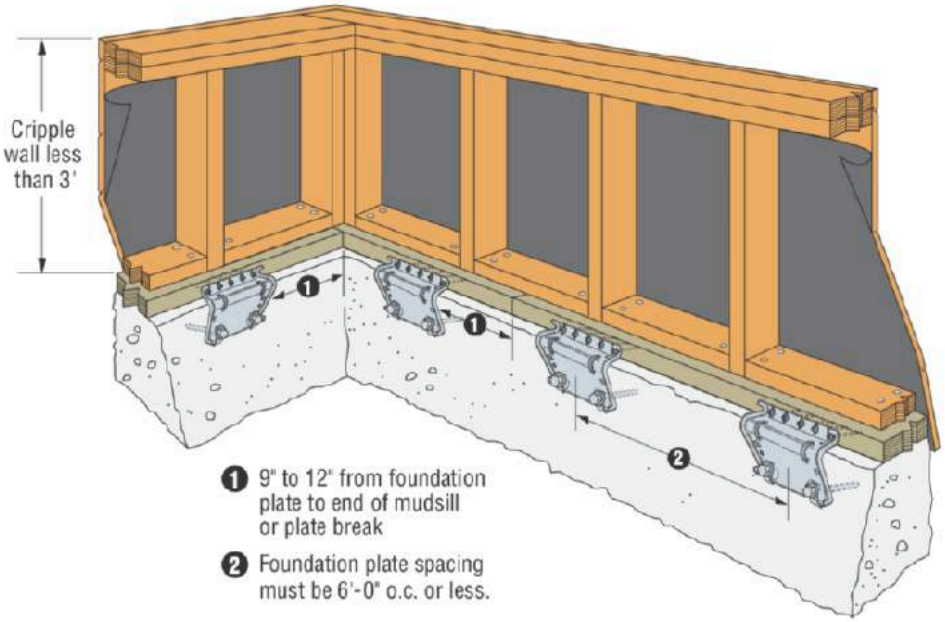


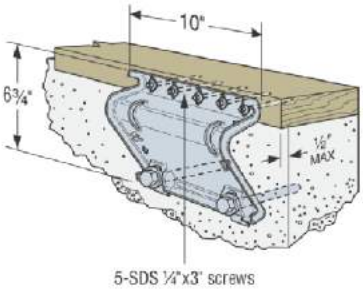
Attachment 4 - Seismic/Earthquake Basics



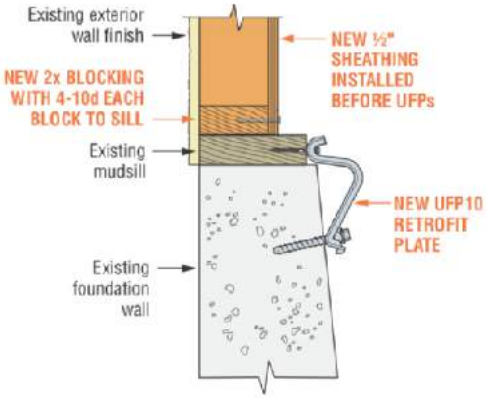


Anchoring Mudsill to Foundation with Titen HD Anchor



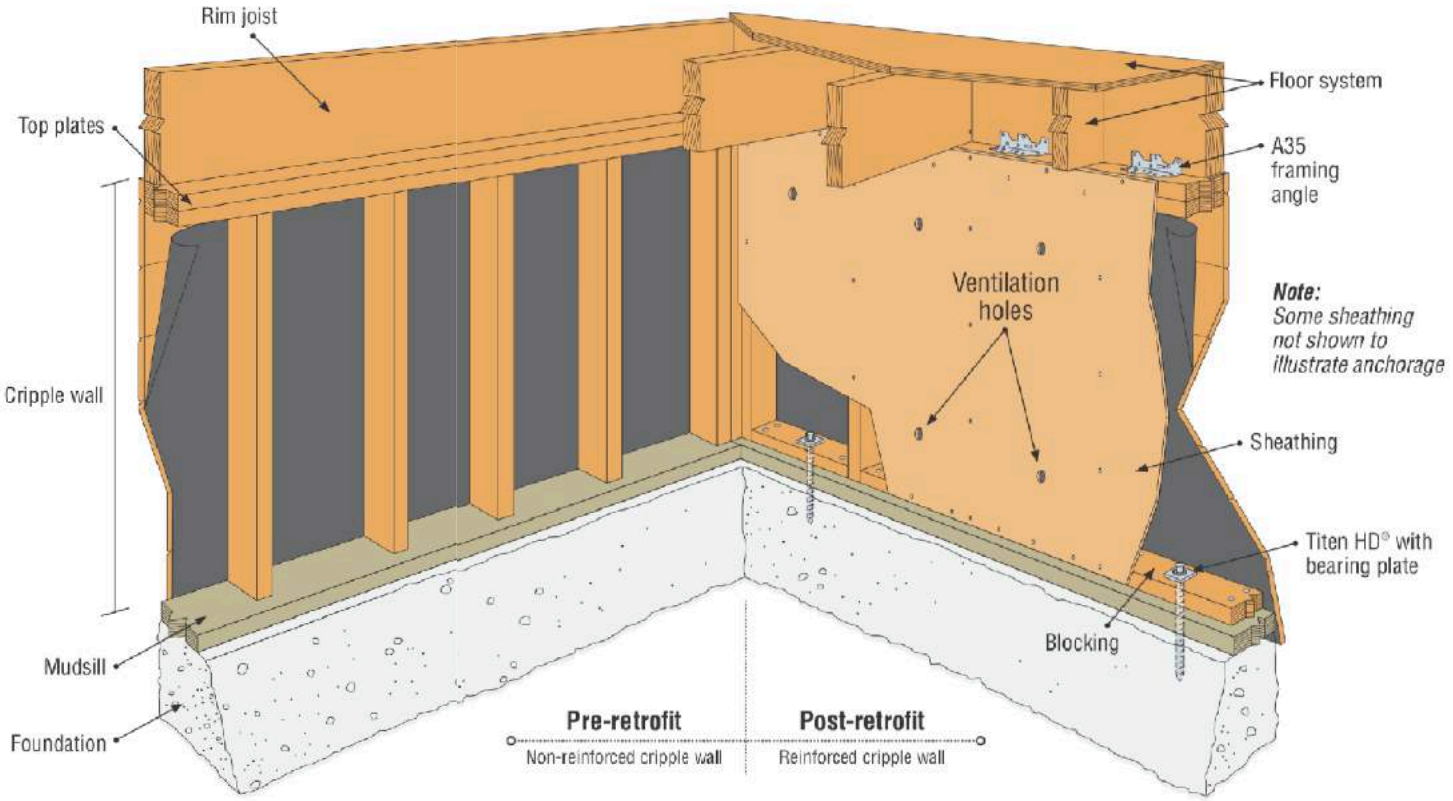


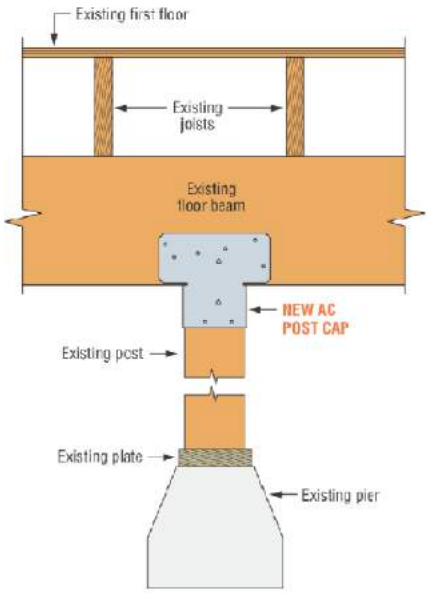
UFP



Anchoring Mudsill to Foundation with UFP

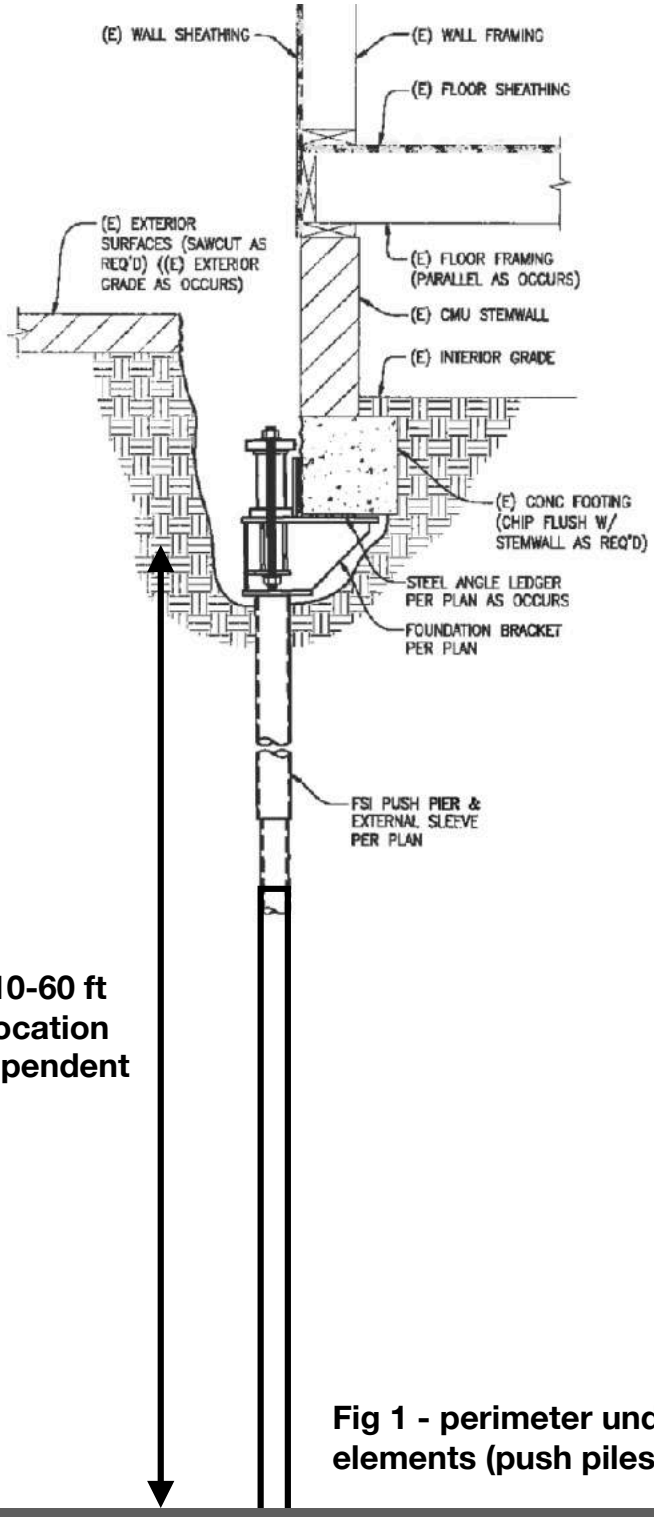
Attachment 4 - Seismic/Earthquake Basics





Typical Interior Post Detail*

Attachment 5 - Foundation Underpinning Basics



10-60 ft location dependent

Fig 1 - perimeter underpinning elements (push piles)

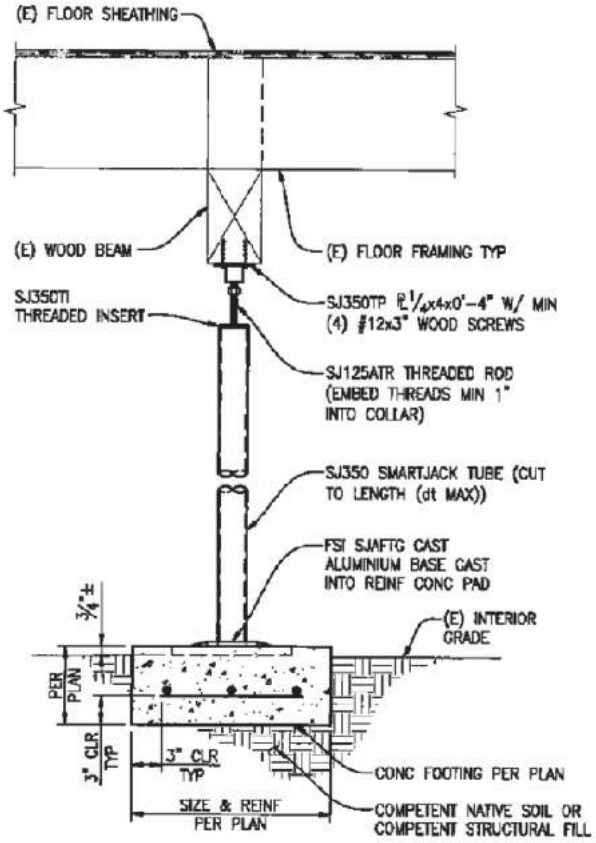


Fig 2 - interior new footers and adjustable posts

rock or suitable material

Attachment 6 - Inspection Terms & Conditions (Page 1 of 2)

Section 1 – General

1.1 The inspection of this property is subject to the Limitations and Conditions set out in this Agreement. Because evaluation of the existing structure requires certain assumptions be made regarding existing conditions, and because some of these assumptions cannot be verified without expending additional sums of money or destroying otherwise adequate or serviceable portions of the building, the Client agrees, to the fullest extent permitted by law, to indemnify and hold harmless the Inspector against all damages, liabilities or costs, including reasonable attorneys fees and defense costs, arising out of or in any way connected with this Project.

1.2 The inspection is based on a visual examination of the readily accessible features of the building. The inspection does not include identifying defects that are hidden behind walls, floors or ceilings. This includes wiring, heating, cooling, structure, plumbing and insulation that are hidden or inaccessible. Some intermittent problems may not be obvious on an inspection because they only happen under certain circumstances. As an example, we may not discover leaks that occur only during certain weather conditions or when a specific tap or appliance is being used in everyday life. We will not find conditions that may only be visible when storage or furniture is moved and they do not remove wall coverings (including wallpaper) or lift flooring (including carpet) or move storage to look underneath or behind.

1.3 We will have no liability for any claim or complaint if conditions have been disturbed, altered, repaired, replaced or otherwise changed before we have had a reasonable period of time to investigate.

1.4 The inspection report is for the exclusive use of the client named herein. No use of the information by any other party is intended.

1.5 This inspection should not be considered a warranty or guarantee, implied or expressed, of the structure in general, including but not limited to the building superstructure, slabs, foundations, repairs recommended or repairs performed. Structures including but not limited to their foundations and slabs may be affected severely by changes in climate, land use, drainage, soil moisture conditions, soil characteristics, and other factors too numerous to list. The conclusions presented in this report are based on the conditions observed during our visit. Our opinions and recommendations are subject to change based on new information as it becomes available to this office.

1.6 *Bear Engineering* shall perform those professional services as specified in the AGREEMENT and detailed herein. In rendering these services, *Bear Engineering* shall apply the skill and care ordinarily exercised by contemporaneous design professionals of the same discipline currently practicing under similar circumstances at the same time and in the same or similar locality. Upon notice to *Bear Engineering* and by mutual agreement between the parties, *Bear Engineering* will, without additional compensation, correct those services not meeting such a standard.

1.7 *Bear Engineering* shall put forth reasonable professional efforts to comply with the applicable laws, codes and regulations in effect as of the date of the execution of this AGREEMENT. Design changes made necessary by newly enacted laws, codes and regulations after this date shall entitle *Bear Engineering* to a reasonable adjustment in the schedule and additional compensation in accordance with the Additional Services provisions of this AGREEMENT.

Section 2 - Fees and Payments

2.1 Fees and Other Compensation

2.1.1 Fees for basic services, additional services, and compensation for reimbursable expenses are set forth in the AGREEMENT.

2.1.2 If *Bear Engineering*'s services covered by this Agreement have not been completed within 12 months of the date hereof, through no fault of *Bear Engineering*, the remaining fees shall be escalated at the rate of 5% per year.

2.1.3 Additional Services: Services beyond the scope of work indicated in the Agreement shall be on a cost-plus basis using billing rates in effect at the time these services are performed, However, before any additional services are provided, *Bear Engineering m*ust receive the CLIENT's consent to these services.

2.2 Payments on Account

2.2.1 Invoices for *Bear Engineering*'s services shall be submitted, at *Bear Engineering*'s option, either on a monthly basis or upon completion of any phase of service. Invoices shall be payable when rendered and shall be considered PAST DUE if not paid within 15 days after the invoice date. Any project with payment past due, *Bear Engineering* retains the right to suspend services until the past due payment is received and the Client's account is in good standing.

2.2.2 Retainers, if applicable to this PROJECT, shall be credited to the final invoice(s).

2.2.3 Any inquiry or questions concerning the substance or content of an invoice shall be made to *Bear Engineering* in writing within 30 days of receipt of the invoice. A failure to notify *Bear Engineering* within this period shall constitute an acknowledgement that the service has been provided.

2.3 Late Payments

2.3.1 A service fee of 1.5% (18% annual rate) per month or the maximum allowable by law will be charged on the outstanding balance of "past due" accounts.

2.3.2 In the event that any portion of an account remains unpaid 90 days after billing, *Bear Engineering* may, without waiving any claim or right against the CLIENT, and without liability whatsoever to the CLIENT, suspend the performance of the service.

Section 3 - Insurance, Indemnification and Limitation of Liability

3.1 Insurance

Bear Engineering shall secure and maintain professional liability insurance and automobile liability insurance to protect *Bear Engineering* from claims which may arise out of the performance of *Bear Engineering*'s services under this AGREEMENT, and from claims under the Workers' Compensation Acts. *Bear Engineering* shall, if requested in writing, issue certificates confirming such insurance to the CLIENT.

Attachment 6 - Inspection Terms & Conditions (Page 2 of 2)

3.2 Limitation of Liability

3.2.1 In recognition of the relative risks and benefits of the project to both the CLIENT and *Bear Engineering*, the risks have been allocated such that the CLIENT agrees, to the fullest extent permitted by law, to limit the liability of *Bear Engineering*, its officers, employees, and sub-consultants on this project for any and all negligent acts, injuries, claims, losses, expenses, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of *Bear Engineering* shall not exceed the amount of fees paid to *Bear Engineering* under this AGREEMENT. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

3.2.2 Time Bar to Legal Action: All legal actions by either party against the other arising out of or in any way connected with this AGREEMENT or the services to be performed hereunder shall be barred and under no circumstances shall any such legal action be initiated by either party after five (5) years from the date of Substantial Completion, unless this AGREEMENT shall be terminated earlier, in which case the date of termination of this AGREEMENT shall be the date on which such period shall commence.

3.3 Indemnification

Bear Engineering agrees, to the fullest extent permitted by law, to indemnify and hold harmless the CLIENT, its officers, directors and employees (collectively, CLIENT) against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, to the extent caused by *Bear Engineering's* negligent performance of professional services under this AGREEMENT and that of its sub-consultants or anyone for whom *Bear Engineering* is legally liable. The CLIENT agrees, to the fullest extent permitted by law, to indemnify and hold harmless *Bear Engineering*, its officers, directors, employees and sub-consultants (collectively, *Bear Engineering*) against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, to the extent caused by the CLIENT'S negligent acts in connection with the PROJECT and the acts of its contractors, subcontractors or consultants or anyone for whom the CLIENT is legally liable. The CLIENT agrees that any and all limitations of *Bear Engineering*'s liability, waivers of damages by the CLIENT to *Bear Engineering* and indemnifications by the CLIENT to *Bear Engineering* shall include and extend to those individuals and entities

Bear Engineering retains for performance of the services under this Agreement, including but not limited to *Bear Engineering*'s officers, partners and employees and their heirs and assigns, as well as *Bear Engineering*'s sub consultants and their officers, employees, heirs, and assigns. Neither the CLIENT nor *Bear Engineering* shall be obligated to indemnify the other party in any manner whatsoever for the other party's own negligence or for the negligence of others.

3.4 Third-Party Beneficiaries

Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against either the CLIENT or *Bear Engineering. Bear Engineering*'s services under this agreement are being performed solely for the CLIENT's benefit, and no other party or entity shall have any claim against *Bear Engineering* because of this Agreement or the performance or nonperformance of services hereunder. The CLIENT and *Bear Engineering* agree to require a similar provision in all contracts with contractors, subcontractors, sub consultants, vendors and other entities involved in this PROJECT to carry out the intent of this provision.

Section 4 - Miscellaneous Provisions

4.1 Opinions of Probable Construction Cost

In providing opinions of probable construction cost, the CLIENT understands that *Bear Engineering* has no control over costs or the price of labor, materials, or equipment, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of *Bear Engineering*'s qualifications and experience. *Bear Engineering* makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs. If the CLIENT wishes greater assurance as to Project or Construction Costs, he shall employ an independent cost estimator. Services to modify the Contract Documents to bring the Construction Cost within any limitation established by the CLIENT shall be considered Additional Services and paid for as such by the CLIENT.

4.2 Disputes Resolution

All claims, counterclaims, disputes and other matters in question between the parties hereto arising out of or relating to this Agreement or breach thereof will be presented to non-binding mediation, subject to the parties agreeing to a mediator(s).

4.3 Governing Laws

Unless otherwise specified, this contract shall be governed by the laws of the State of California

Attachment 7 - Typical repair/remediation cost ranges

Hardscape/Concrete Concrete slab approx 4in thick with reinforcing mesh (or rebar)	$20-40/sqft
Sump pump Pump, pit, piping & electrical connection to existing outlet	$1.5K-$3K/pump
French drains Subsurface drains	$200-$500/linear ft. (dep. on depth)
Foundation replacement	$750-$1,250/linear ft.
Foundation Underpinning	$3K - $4K/pile (all-in cost)
New Individual Footer	$1K - $3K/footer
Adjust post support to bear fully on concrete block	$100 - $200/footer

Note: these are budgetary numbers for what we have observed in the Bay Area, they are subject to change with market conditions, contractors should be consulted for their bids and recommend at least 3 bids for any expensive work. In providing opinions of probable construction cost, the client understands that Bear Engineering has no control over costs or the price of labor, materials, or equipment, or over the Contractor's method of pricing, and that the opinions of probable construction costs provided herein are to be made on the basis of Bear Engineering's qualifications and experience. Bear Engineering makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to bid or actual costs. If the client wishes greater assurance as to Project or Construction Costs, they shall employ an independent cost estimator.

Attachment 8 - Foundation & Drainage Contractor Resources

1. Peace of Mind Structural
Contact: Caroline Blasing, Office Manager
caroline@peaceofmindstructural.com
San Mateo, CA
(650) 343-3133
http://www.earthquakefoundation.com/

2. MG Constructors & Engineers, Inc.
Contact: Mark Garrison, Principal
markg@mgconstructors.net
Morgan Hill, CA 95037
(408)842-5599
http://www.mgconstructors.net/

3. FOUNDATION TECHNOLOGIES, INC.
Contact: Bruce Matheson, P.E.
bruce@fticonstruction.com
Woodside, CA
650.851.3697

4. Foundation Solutions & Ram Jack
Jordan Blasingame I Owner
jordan@foundationsolutions.com
Direct: 408.406.0128
http://wwww.foundationsolutions.com

5. Vini Joy
vinijoy@comcast.net
415-699-3100

6. SA FRESH ENVIRONMENT, INC
El Cerrito, CA 94530
(866) 689-4959

7. GIANCOLA CONSTRUCTION
Phone (408) 640-2577

8. Foundation Repair of CA
1-925-402-1692
https://www.foundationrepairofca.com/
Livermore, CA 94551

9. Clean CrawlSpace Inc.
https://www.cleancrawlspace.com/
1-866-379-2729
Santa Rosa, CA 95407

10. Larrabee & Associates, Inc.
San Jose, CA 95125
Phone 408 364 9000
Email: team@larrabeeandassociates.com

11. DoBel Construction Inc.
San Carlos, CA 94070
Phone: 650-593-4600
info@dobelconstruction.com

12. Soil Engineering Construction, Inc.
927 Arguello Street
Redwood City, CA 94063
650-367-9595 Office

13. Avalon Structural, Inc.
Aptos, CA 95003
(831) 479-4389 (office)
info@avalonstructural.com

Soils Engineer Referrals

1. Sigma Prime Geosciences Inc
332 Princeton Avenue
Half Moon Bay, CA
650 728-3590 telephone
info@sigmaprime.net

2. Michelucci & Associates
Phone: (650) 692-0163
Email: info@michelucci.com

3. Soil Engineering Construction, Inc.
927 Arguello Street
Redwood City, CA
650-367-9595 Office

Attachment 9 - Possible causes of foundation movement

Low Bearing Capacity Soils Some soils are not capable of supporting the weight or bearing pressure exerted by a building's foundation.	▬
Poor Fill Compaction In some cases lots are created by adding soils brought in from off-site locations or cutting one area of the hillside and filling another to create a more level lot and when fill soils are not adequately compacted, they can compress under a foundation load.	▬
Excessive Moisture Content Excess moisture can saturate foundation soils, which often leads to softening or weakening of clays and silts. The reduced ability of the soil to support the load results in foundation movement and/or cracking. The moisture is often a consequence of poor surface drainage around the structure, leaks in water lines or plumbing, or a raised groundwater table.	▬
Expansive Soils Expansive soils will swell when wet and contract when dry.	▬
Lateral Sliding/Soil Creep Soil creep is caused by slow downward movement of expansive soils under the influence of gravity and the effect of moisture changes. The depth to which this occurs varies depends on moisture amounts and soil types but can often times extend down below the depth of most shallow foundations.	✘
Insufficient Footers Sometimes footers are either nonexistent, designed too small for the current loads or not built to the design at the time and hence have inadequate bearing capacity.	✘
Soil Consolidation Consolidation occurs when the weight of a structure or newly-placed fill soils compress lower, weak clay based soils. Consolidation results in downward movement or settlement of overlying structures. Settlement caused by consolidation of foundation soils may take weeks, months, or years to be considered "complete."	✓
Soil Compaction Vibration from heavy equipment or vehicular traffic.	✘
Seismic Activity Vibration from seismic activity.	✘
Impact from Trees As trees mature, their demand for water also grows and the root systems continually expand and can draw moisture from the soil beneath the foundation. Clay-rich soils shrink as they lose moisture, resulting in settlement of overlying structures. Foundations closer to the surface are more often affected by soil dehydration due to tree roots than are deep, basement level foundations.	✘
Soil Erosion Most likely causes include poor surface drainage, faulty drains, leaking water mains or other underground water movements.	✘
Apparent Settlement Due to Construction This is where the area in question was built with a slope to it, greater than normal such that it looks as if it has settled when in fact it may not have moved.	✘

✘ Unlikely to be contributing based on data available at the time of the inspection

✓ Likely contributing based on data available at the time of the inspection

▬ Possibly contributing but further data, analysis (soils report) and/or history would be needed