COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT A

Tree Management Experts

Consulting Arborists
3109 Sacramento Street
San Francisco, CA 94115

Member, American Society of Consulting Arborists
Certified Arborists, Tree Risk Assessment Qualified

cell 415.606.3610 fax 415.921.7711 email Roy@treemanagementexperts.com

Leo Beigelman

via email: lbeigelman@aligos.com

RE: 222 Portola State Park Road
La Honda, CA 94020

Date: 7/26/19

ARBORIST REPORT
and
TREE PROTECTION REPORT

Arborist Report

- Provide on-site evaluation of certain trees on the 40-acre parcel.
- Trees to be evaluated include larger trees and trees subject to regulation that are within or adjacent to the home site, entry drive and other occupied areas (including neighbors or roads).
- Trees that are dead or hazardous will be identified throughout other parts of the property.
- Trees will be located using GPS and ArcGIS software. Data sets will be made available as a layer for use in design software such as used by Architects, Engineers and County staff.
- Tree inventory data can be used to overlay planned construction drawings and thereby identify tree impacts.
- Per County requirements, a tree protection plan can be developed based on the type and proximity of work to various species and sizes of trees.
- Provide a Report outlining Tree Protection Measures to be implemented during construction of the proposed improvements.

Background

The property at 222 Portola State Park Road currently has a gravel entry drive, a level building site and a single-family residence on the lot. There are also walking paths running through the property. The owner is planning to improve the driveway and parking area, and build a new single-family residence and a detached library tower in place of the current building.

As most of the property is heavily wooded, only trees regulated as significant and heritage trees by San Mateo County within the proposed work zone were inventoried. Significant trees are defined as those larger than 12” DBH (diameter at breast height), and heritage trees are further defined by species. Tree Management Experts has been designated as the Project Arborist for purposes of redevelopment of this site.

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The following documents were reviewed for this report:

- The proposed Landscape Site Plan dated March 26, 2019, prepared by ZAC Landscape Architects, Inc.

Observations

The property mostly consists of unmanaged or lightly managed woodland and forest with a large area of coastal chaparral. The land was logged at some point in the past, as there are extant large stumps and coppice sprout rings or stump regrowth. The current makeup of the wooded areas is mixed native coast live oak (*Quercus agrifolia*), California bay (*Umbellularia californica*), and Douglas-fir (*Pseudotsuga menziesii*) with scattered madrone (*Arbutus menziesii*).

There is abundant natural regeneration on the property, with oak, fir, and bay seedlings proliferating. The significant trees on site are generally in fair condition, with the expected proportion of declining trees on site. These were noted in our assessment and recommended for removal.

A total of 53 regulated trees were inventoried on this property. Tree numbers were assigned to each tree, and correspond to those used on the Landscape Site Plan and the tree tags affixed to the trees in the field. The data for tree identification, trunk diameter and recommendations are listed in the attached data table.

Discussion

Planned construction will affect trees along the current driveway, near the existing and proposed structures, and along the pathways. For this project, in accordance with San Mateo County regulations, the Tree Protection Zone (TPZ) will be the dripline of significant and heritage trees on the property. Three trees that were inventoried should be removed as they are either dying or are structurally compromised and threaten utility lines (Trees #793, 796, and 798). Tree #793 is threatening the utility lines running to the property. Trees #796 and 798 are dead and dying and threaten access along the driveway. These trees do not require replacement as there is sufficient natural regeneration on site to replace them.

Planned construction will necessitate pruning of some significant trees to allow for the building envelope of the new construction. In addition, the plans intend to have the library tower “nestled” in the edge of the woodland. For this building, the impacts to root systems can and should be minimized by building on piers rather than traditional foundation footings. This will result in a minimum amount of root impact from construction.

The owner hopes to preserve the health of the trees on site, especially the native oak trees, and the California bay should therefore be considered for removal. California bay are an alternate host for the plant pathogen that causes Sudden Oak Death (*Phytophthora ramorum*), also known as SOD. Since California bay is not killed by SOD, these trees can

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act as a source of inoculum as they continue to infect native oaks nearby without dying or showing significant signs of decline themselves.

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Tree Protection

Construction Procedures

DEMOLITION

All tree protective fencing, root buffers, and mulch must be in place prior to demolition. Refer to specific sections below for proper installation of each of these items.

At no time is any wheeled equipment or an excavator allowed to enter or cross over TPZ areas, except where a temporary root buffer has been installed. Use of a tracked Bobcat® or similar loader may be used within TPZ areas only on required root buffers, within the footprint of existing structures, or when the Project Arborist is on site to determine appropriate access points and to monitor soil and root conditions.

PATHWAY CONSTRUCTION

Because proposed pathways pass through wooded areas of the property, any clearing of organic material from the surface, placement of base rock and forming activities for pathways must be done by hand and under the direction of the Project Arborist. The subgrade should not be compacted in any way within the TPZ areas and grading should be limited to not more than 6 inches of either fill or cut.

The construction of the path leading around the western edge of the property will require the removal of a 9” douglas-fir, two 11” douglas-fir and a dead 11” coast live oak at the northwest corner of the new residence (top left corner of C2.1). As these trees are not regulated, they will not require removal permits, but are indicated on the Landscape and Civil plans. These trees do not require replacement as there is sufficient natural regeneration in the area. The trees should be removed before demolition and before tree protection is in place. These removals and the grading required for pathway construction will not prevent the future regeneration of native forest trees in the area.

FOUNDATION PERIMETER CONSTRUCTION

Foundation perimeter construction within TPZ areas must be done with tree protective fencing, root buffers, and mulch in place at all times. Equipment must remain within the new building footprints, on required root buffers or outside TPZ areas. The Project Arborist must be on site during any excavation activities within TPZ areas.

DRIVEWAY AND PARKING CONSTRUCTION

Because proposed driveways pass through wooded areas of the property, any clearing of organic material from the surface, placement of base rock and forming activities for driveway must be done under the direction of the Project Arborist. The subgrade should not be

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compacted beyond 85% within the TPZ areas and grading should be limited to not more than 6 inches of either fill or cut. Deviation from this shall be approved by and conducted under the supervision of the Project Arborist. The exception to this is for work within the existing width and depth of the existing roadbed.

For work within the dripline of the large douglas-fir Tree #951 and the coast live oak tree #950, airspade excavation must be used. In addition a geotextile shall be used as the base for road and parking construction. This will serve to spread the load and minimize root impacts. As above, this work must be done under the supervision of the project Arborist. There is still a risk of adverse root impacts and may predispose these trees to infection from pathogenic fungus. This may result in the trees declining or losing structural roots. Tree #951 is a large dominant tree that protrudes above the canopy of the surrounding trees and is sited on the ridgeline. The combination of these factors means that the tree may be at an increased risk of failure, and while the tree will not hit planned structures in case of failure, it could block road access. The tree should be carefully monitored following construction for signs of decline.

FOUNDATION PERIMETER CONSTRUCTION

Foundation perimeter construction within TPZ areas must be done with tree protective fencing, root buffers, and mulch in place at all times. Equipment must remain within the new building footprints, on required root buffers or outside TPZ areas.

STAGING AREAS

Staging areas are available outside of TPZ areas throughout the site. Storing and staging within TPZ areas can only be done on top of a required root buffer and with proper trunk protection, as specified in this report.

BACKFILL AND FILL SOIL

Within TPZ areas, all backfill and fill soil shall be comprised of clean native topsoil. Soil must be placed without tamping, vibration, rolling, saturating or otherwise causing compaction that exceeds 85 percent. No fill soil movement or placement may be done during wet soil conditions. Do not place, store or stage any fill soil within TPZ areas, except where backfilling against the construction perimeter.

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Tree Protection Measures

Tree Protection Implementation Methods

To implement tree protection measures effectively, fences shall align with tree canopies. It is recommended that fence posts be installed first, then place mulch and root buffers according to layout. Where tree canopies are contiguous, fencing may enclose multiple trees.

Surface installations such as root buffers and mulch must be installed in appropriate locations between areas identified by fence posts.

Following surface installations, chain link fencing must be strung tightly and closed off at all locations.

Tree Protection Measures for All Areas

TREE PROTECTIVE FENCING AND WARNING SIGNS

Placement: fence installation lines shall enclose the area defined by the driplines of significant and heritage trees to remain during construction.

Type and Size: 5 or 6-foot high chain link fencing shall be placed on 2 inch tubular galvanized iron posts driven a minimum of 2 feet into undisturbed soil and spaced not more than 10 feet on center.

Duration: Tree fencing shall be erected prior to any demolition activity, and shall remain in place for the duration of the project, except where a gap is needed for access to the detached garage.

'Warning' Signs: 'Warning' signs shall posted on Tree Protective Fencing not more than every 20 feet stating "WARNING – *Tree Protective Zone* – This fence shall not be removed"

TRUNK WRAP

Where root buffers are installed in lieu of Tree Protective Fencing, the trunks of significant and heritage trees shall be protected with one of the following methods:

Option 1: Planking: The trunk should be wrapped with a minimum of 4 layers of orange plastic snow fencing, then a layer of 2X4 planks set on end, edge-to-edge and wrapped with a minimum of 4 additional layers of orange plastic snow fencing. Do not nail the planks to the trunk.

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Option 2: Straw wattle wrap: This method may be easier to install on multi-trunk trees. Wrap the lower 6 feet of the trunk with straw wattles and secure with a layer of orange plastic snow fencing.

Option 3: Plywood box wrap: This method may be easier to install on multi-trunk trees. Build a box out of ½ inch plywood screwed together with 2 x 4 bracing. Place blocking between the plywood box and the trunk to prevent movement, cushioning the blocking with a strip of carpet or ½ inch thick cloth layer.

MULCH

Placement: All areas enclosed by Tree Protective Fencing shall have a 4 to 6-inch deep layer of mulch applied, leaving a 12-inch distance around each tree trunk free of mulch.

Type and Size: Mulch material shall be 2-inch unpainted, untreated wood chip mulch or an approved equal.

Duration: Mulch shall be placed in all designated areas prior to any demolition or construction activity.

ROOT BUFFER

Placement: A temporary protective Root Buffer must be installed before any driving, storing or staging takes place within any TPZ areas.

Type and Size: The Root Buffer shall consist of a base course of tree chips spread over each designated area to a minimum depth of 6 inches. In some cases it may further stabilize the tree chips to place a cap of a base course of 3/4-inch quarry gravel. The root buffer must be covered with a 3/4-inch or thicker layer of plywood. Additional wood chips may be added periodically upon the recommendation of the Project Arborist following monthly inspections.

Duration: All Root Buffers shall remain in place for the duration of the project.

Construction Impact Mitigation

GRADE CHANGES

Grading changes shall not exceed 6 inches of depth in cuts, or 6 inches of depth in fill where such grade changes are within Tree Protection Zones.

UTILITY TRENCHING

If any utility trenches must be excavated through any TPZ area, either directional boring or Air-spade® (or equivalent) excavation is required.

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FOUNDATION CONSTRUCTION

Foundation construction will cause root impacts from perimeter footing excavation along the perimeter of the new buildings. Root losses are anticipated for trees in these areas. The following mitigation is required:

Excavation

All roots encountered of any size whatsoever shall be cleanly cut with a sharp tool at the excavation perimeter. Excavation shall be performed under the direction of the Project Arborist.

Excavation Tailings

All tailings derived from excavation of the perimeter footings shall be immediately placed within the confines of the perimeter foundation, or outside all TPZ areas. No tailings shall be stockpiled, abandoned or allowed to remain overnight in any TPZ area.

Soil Fracturing

All inadvertent compaction of soil within any TPZ shall be loosened by soil fracturing with Air-spade® (or equivalent) excavation equipment subsequent to all equipment access needs.

TREE REPLACEMENT

Very few of the trees on site are planned for removal. Three (3) should be removed due to health and structural issues (p.2 and Data Table) and four (4) smaller trees conflict with planned construction (p. 3). The site has extensive tree cover and plentiful regeneration so direct replacement is unnecessary. If planting is desirable, a significant area to the north of the driveway, from the planned fire truck turnaround to the dogleg in the driveway could support additional trees. The owner was expressed interest in planting some riparian species and these could be planted along the drainage that intersects the driveway at the dogleg.

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Maintenance and Ongoing Care

Tree maintenance and ongoing care is necessary in preparation for construction, and throughout the entire timeline for construction. Anticipated needs include pruning and tree protection during landscape construction:

PRUNING

Pruning shall be done by a Certified Arborist in accordance with the current ANSI A300 Pruning Standards and International Society of Arboriculture (ISA) Best Management Practices.

Pruning shall be in accordance with that outlined in the data table.

IRRIGATION

Because of the nature of the semi-natural forest on the site, supplemental irrigation will only be recommended on an as needed basis for trees that show signs of construction related decline. In addition, summer irrigation of native oaks can predispose them to sudden oak death and fungal infections and should not occur under any circumstances.

In cases where irrigation is deemed necessary it shall consist of 1 time per month during the irrigation season (usually March through September, depending on precipitation) in the amount of 10 gallons per inch of trunk diameter to be evenly applied within the dripline.

LANDSCAPING

Care must be exercised during landscape construction to avoid any trenches across existing TPZ areas. If sub-surface trenches must be installed, common trenches should be used and they should stay as far away from the trees as possible. A trench running along a radius line directly toward a tree is preferable to a cross trench.

Landscape construction plans are subject to review and comment by the Project Arborist. If extensive trenching is required, Air-spade® excavation may be required.

Care must be taken to keep mulch away from the base of all trees and other woody plants. Similarly, soil grades must be carefully monitored to keep excess soil from accumulating around the base of trees and shrubs.

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Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Title and ownership of all property considered are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
2. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes or other governmental regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible. The consultant can neither guarantee nor be responsible for the accuracy of information provided by others.
4. Various diagrams, sketches and photographs in this report are intended as visual aids and are not to scale, unless specifically stated as such on the drawing. These communication tools in no way substitute for nor should be construed as surveys, architectural or engineering drawings.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior written or verbal consent of the consultant.
7. This report is confidential and to be distributed only to the individual or entity to whom it is addressed. Any or all of the contents of this report may be conveyed to another party only with the express prior written or verbal consent of the consultant. Such limitations apply to the original report, a copy, facsimile, scanned image or digital version thereof.
8. This report represents the opinion of the consultant. In no way is the consultant's fee contingent upon a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule, an agreement or a contract.
10. Information contained in this report reflects observations made only to those items described and only reflects the condition of those items at the time of the site visit. Furthermore, the inspection is limited to visual examination of items and elements at the site, unless expressly stated otherwise. There is no expressed or implied warranty or guarantee that problems or deficiencies of the plants or property inspected may not arise in the future.

Disclosure Statement

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

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Treatment, pruning, and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. An arborist cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate the trees.

Certification of Performance

I, Roy C. Leggitt, III, Certify:

- That we have inspected the trees and/or property evaluated in this report. We have stated findings accurately, insofar as the limitations of the Assignment and within the extent and context identified by this report;
- That we have no current or prospective interest in the vegetation or any real estate that is the subject of this report, and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions and conclusions stated herein are original and are based on current scientific procedures and facts and according to commonly accepted arboricultural practices;
- That no significant professional assistance was provided, except as indicated by the inclusion of another professional report within this report;
- That compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I am a member in good standing of the American Society of Consulting Arborists and a member and Certified Arborist with the International Society of Arboriculture.

I have attained professional training in all areas of knowledge asserted through this report by completion of a Bachelor of Science degree in Plant Science, by routinely attending pertinent professional conferences and by reading current research from professional journals, books and other media.

I have rendered professional services in a full-time capacity in the field of horticulture and arboriculture for more than 30 years.

Signed: Roy C. Leggitt, III

Date: *7/26/19*

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Certification of Performance

I, Aaron Wang, Certify:

- That we have inspected the trees and/or property evaluated in this report. We have stated findings accurately, insofar as the limitations of the Assignment and within the extent and context identified by this report;
- That we have no current or prospective interest in the vegetation or any real estate that is the subject of this report, and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions and conclusions stated herein are original and are based on current scientific procedures and facts and according to commonly accepted arboricultural practices;
- That no significant professional assistance was provided, except as indicated by the inclusion of another professional report within this report;
- That compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I am a member and Certified Arborist with the International Society of Arboriculture.

I have attained professional training in all areas of knowledge asserted through this report by completion of a Bachelor of Science degree in Forestry and Natural Resources, by routinely attending pertinent professional conferences and by reading current research from professional journals, books and other media.

I have rendered professional services in a full-time capacity in the field of horticulture and arboriculture for more than 5 years.

Signed: _____

Date: *7/26/2019*

222 Portola State Park Road
Regulated Trees

Tag #	Location	site id	Inspector	Common name	Botanic Name	diameter (in)	height (ft)	spread (ft)	trunks	Condition (%)	Task	Task Detail	priority	notes
931	driveway	1	awang	coast live oak	Quercus agrifolia	26	50	40	1	80	monitor		standard	
932	driveway	2	awang	coast live oak	Quercus agrifolia	29	50	60	1	70	prune	end weight reduction	standard	
933	driveway	3	awang	coast live oak	Quercus agrifolia	32	50	50	1	80	prune	end weight reduction	standard	
934	driveway	4	rleggitt	douglas fir	Pseudotsuga menziesii	17	60	30	1	80	monitor		standard	
935	driveway	5	rleggitt	coast live oak	Quercus agrifolia	30	70	70	1	80	prune	end weight reduction	standard	
											prune	crown clean	standard	
936	driveway	6	rleggitt	coast live oak	Quercus agrifolia	18	40	40	1	70	prune	end weight reduction	standard	
937	driveway	7	rleggitt	coast live oak	Quercus agrifolia	38	60	70	1	70	prune	crown clean	standard	
											prune	end weight reduction	standard	
939	driveway	9	rleggitt	coast live oak	Quercus agrifolia	22	60	60	1	80	prune	crown clean	standard	
940	driveway	10	rleggitt	coast live oak	Quercus agrifolia	22	40	35	2	70	prune	crown clean	standard	
942	driveway	12	rleggitt	coast live oak	Quercus agrifolia	28	50	40	2	80	prune	crown clean	standard	
											prune	end weight reduction	standard	
943	driveway	13	rleggitt	coast live oak	Quercus agrifolia	22	40	20	1	70	prune	crown clean	standard	
944	driveway	14	rleggitt	coast live oak	Quercus agrifolia	19	50	30	1	70	prune	crown clean	standard	
945	driveway	15	rleggitt	coast live oak	Quercus agrifolia	12	35	15	1	70	monitor		standard	
948	driveway	16	rleggitt	coast live oak	Quercus agrifolia	17	50	30	1	80	prune	crown clean	standard	
948	driveway	18	rleggitt	coast live oak	Quercus agrifolia	13	30	25	1	70	prune	crown clean	standard	
950	driveway	20	rleggitt	coast live oak	Quercus agrifolia	35	70	70	1	70	prune	crown clean	standard	
951	house	21	rleggitt	douglas fir	Pseudotsuga menziesii	53	120	100	1	70	prune	crown clean	standard	
											prune	end weight reduction	standard	remove north and south codominants
952	house	22	rleggitt	coast live oak	Quercus agrifolia	28	30	30	1	70	prune	crown clean	standard	
953	house	23	rleggitt	coast live oak	Quercus agrifolia	28	60	60	1	70	prune	crown clean	standard	
954	house	24	rleggitt	coast live oak	Quercus agrifolia	21	60	40	1	70	prune	crown clean	standard	
955	house	25	rleggitt	coast live oak	Quercus agrifolia	15	40	20	1	70	prune	crown clean	standard	
956	house	26	rleggitt	coast live oak	Quercus agrifolia	13	35	25	1	70	prune	crown clean	standard	
957	house	27	rleggitt	coast live oak	Quercus agrifolia	19	20	40	1	70	prune	crown clean	standard	
958	house	28	rleggitt	coast live oak	Quercus agrifolia	38	50	50	1	70	prune	crown clean	standard	
											prune	end weight reduction	standard	
959	house	29	rleggitt	coast live oak	Quercus agrifolia	17	30	30	1	70	prune	crown reduce	standard	
960	house	30	rleggitt	coast live oak	Quercus agrifolia	26	35	40	1	70	prune	crown clean	standard	
											prune	end weight reduction	standard	over house
961	house	31	rleggitt	coast live oak	Quercus agrifolia	17	35	30	1	70	prune	crown clean	standard	
962	house	32	rleggitt	douglas fir	Pseudotsuga menziesii	17	70	20	1	70	monitor		standard	overcrowded stand
783	house	33	awang	coast live oak	Quercus agrifolia	20	30	30	1	70	prune	crown clean	standard	
											prune	clearance	standard	
784	house	34	awang	coast live oak	Quercus agrifolia	13	35	20	1	70	prune	crown clean	standard	
785	house	35	awang	coast live oak	Quercus agrifolia	26	30	35	2	70	prune	clearance	standard	
											prune	crown clean	standard	

Tag #	Location	site id	Inspector	Common name	Botanic Name	diameter (in)	height (ft)	spread (ft)	trunks	Condition (%)	Task	Task Detail	priority	notes
786	house	36	awang	coast live oak	Quercus agrifolia	17	30	30	2	70	prune	crown clean	standard	
											prune	clearance	standard	
787	house	37	awang	coast live oak	Quercus agrifolia	17	30	20	1	70	prune	crown clean	standard	
788	house	38	awang	coast live oak	Quercus agrifolia	26	35	35	1	70	prune	crown clean	standard	
											prune	clearance	standard	
790	house	40	awang	coast live oak	Quercus agrifolia	30	40	40	2	70	prune	clearance	standard	
791	house	41	awang	coast live oak	Quercus agrifolia	27	40	40	1	70	prune	end weight reduction	standard	
											prune	crown clean	standard	
792	house	42	awang	coast live oak	Quercus agrifolia	27	50	30	1	70	prune	end weight reduction	standard	
											prune	crown clean	standard	
793	house	43	awang	cal bay laurel	Umbellularia californica	38	60	40	3	30	remove		hi priority	contact pge for line clearance
794	driveway	44	awang	coast live oak	Quercus agrifolia	19	40	40	1	70	prune	crown clean	standard	
795	driveway	45	awang	coast live oak	Quercus agrifolia	17	50	25	1	70	prune	crown clean	standard	
796	driveway	46	awang	coast live oak	Quercus agrifolia	16	45	30	1	0	remove		standard	dead
797	driveway	47	awang	douglas fir	Pseudotsuga menziesii	19	50	30	1	70	prune	crown clean	standard	
798	driveway	48	awang	coast live oak	Quercus agrifolia	17	40	30	1	30	remove		standard	hypoxylon cankers
799	driveway	49	awang	coast live oak	Quercus agrifolia	19	40	30	1	70	prune	crown clean	standard	
800	driveway	50	awang	coast live oak	Quercus agrifolia	11	40	30	1	70	prune	crown clean	standard	
685	driveway	51	awang	coast live oak	Quercus agrifolia	14	35	20	1	70				
686	driveway	52	awang	coast live oak	Quercus agrifolia	12	40	20	1	50	prune	crown clean	standard	
687	driveway	53	awang	coast live oak	Quercus agrifolia	18	40	40	1	70	prune	crown clean	standard	
688	driveway	54	awang	coast live oak	Quercus agrifolia	17	30	40	1	70	prune	crown clean	standard	
689	driveway	55	awang	coast live oak	Quercus agrifolia	32	40	40	2	70	prune	crown clean	standard	remove dead southern stem
690	driveway	56	awang	douglas fir	Pseudotsuga menziesii	15	50	25	1	70				
691	driveway	57	awang	coast live oak	Quercus agrifolia	30	50	50	1	70	prune	crown clean	standard	
692	driveway	58	awang	coast live oak	Quercus agrifolia	34	50	50	2	70	prune	crown clean	standard	
											prune	end weight reduction	standard	

COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT B

ROMIG ENGINEERS

GEOLOGIC AND GEOTECHNICAL INVESTIGATION

BEIGELMAN RESIDENCE

222 PORTOLA STATE PARK ROAD

LA HONDA, CALIFORNIA 94020

Prepared for

Mr. Leo Beigelman

222 Portola State Park Road

La Honda, California 94020

June 2019

Project No. 4779-1

ROMIG ENGINEERS

June 10, 2019
4779-1

Mr. Leo Beigelman
222 Portola State Park Road
La Honda, California 94020

RE: GEOLOGIC & GEOTECHNICAL INVESTIGATION
NEW RESIDENCE
222 PORTOLA STATE PARK ROAD
LA HONDA, CALIFORNIA

Dear Mr. Beigelman:

In accordance with your request, we have prepared a geologic and geotechnical investigation for your proposed residence to be constructed at 222 Portola State Park Road in an unincorporated area of San Mateo County near La Honda, California. The accompanying report summarizes the results of our field exploration, laboratory testing and engineering analysis, and presents geotechnical and geologic recommendations for the proposed residence.

We refer you to the text of our report for specific recommendations.

Thank you for the opportunity to work with you on this project. If you have any questions or comments concerning the findings or recommendations from our investigation, please call.

Very truly yours,

ROMIG ENGINEERS, INC.

Christina M. Tipp, P.G.

PROFESSIONAL GEOLOGIST
CHRISTINA M TIPP
No. 9283
STATE OF CALIFORNIA

David F. Hoexter, C.E.G.

REGISTERED GEOLOGIST
DAVID F. HOEXTER
No. 1158
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Tom W. Porter, P.E.

REGISTERED PROFESSIONAL ENGINEER
THOMAS W. PORTER
No. 77883
CIVIL
STATE OF CALIFORNIA

Copies: Addressee (1)
EID Architects (3)
Attn: Mr. Stuart Welte and Mr. Ray Parkinson
ZFA Structural Engineers (via email)
Attn: Mr. Joshua Raney
Lea & Braze Engineering, Inc. (via email)
Attn: Mr. Jim Toby and Mr. Christopher Phan
ZAC Landscape Architects. (via email)

GEOLOGIC AND GEOTECHNICAL INVESTIGATION
BEIGELMAN RESIDENCE
222 PORTOLA STATE PARK ROAD
LA HONDA, CALIFORNIA 94020

PREPARED FOR:

MR. LEO BEIGELMAN

222 PORTOLA STATE PARK ROAD

LA HONDA, CALIFORNIA 94020

PREPARED BY:

ROMIG ENGINEERS, INC.

1390 EL CAMINO REAL, SECOND FLOOR

SAN CARLOS, CALIFORNIA 94070

JUNE 2019

ROMIG ENGINEERS

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GEOLOGIC & GEOTECHNICAL INVESTIGATION
FOR
BEIGELMAN RESIDENCE
222 PORTOLA STATE PARK ROAD
LA HONDA, CALIFORNIA

INTRODUCTION

We are pleased to present the results of our geologic and geotechnical investigation for your proposed residence to be constructed at 222 Portola State Park Road in an unincorporated area of San Mateo County near La Honda, California. The location of the site is shown on the Vicinity Map, Figure 1. The purpose of this investigation was to evaluate subsurface conditions at the site and to provide geologic and geotechnical recommendations for the proposed residence.

Project Description

The project consists of constructing a new residence at your approximately 39-acre property located in an unincorporated area of San Mateo County near La Honda. The proposed single-story residence will be located in the general area of the existing residence. The proposed project does not include a basement. A combined greenhouse and library structure are planned to the southeast (downslope) of the residence which will cut into the slope on the upslope side and daylight along the downslope side with up to about 12 foot high basement walls. The existing driveway will be widened in locations and will include a hammer-head turnaround. Multiple site retaining walls are planned along the upslope and downslope sides of the residence and along the path to the accessory structures and may also be needed along portions of the driveway. We understand a new leach field is planned downslope of the residence, at the approximate location of the existing leach field. Structural loads are expected to be light as is typical for this type of construction.

Scope of Work

Our scope of work for this investigation was presented in detail in our agreement with you dated April 4, 2019. In order to complete our investigation, we performed the following work.

- Review of readily available geologic and geotechnical literature pertinent to the general area of the site.

- Subsurface exploration consisting of drilling, sampling, and logging of five exploratory borings in the area of the proposed residence and improvements.
- Geologic reconnaissance and field mapping by our certified engineering geologist and professional geologist.
- Review and interpretation of stereo-pair aerial photographs and geologic maps.
- Laboratory testing of selected samples to aid in soil classification and to help evaluate the engineering properties of the soil encountered at the site.
- Engineering analysis and evaluation of the exploration and laboratory data to develop geotechnical design criteria for the project.
- Preparation of this report presenting our findings and geotechnical and geologic recommendations for the proposed residence.

Limitations

This report has been prepared for the exclusive use of Mr. Leo Beigelman for specific application to developing geologic and geotechnical design criteria for the currently proposed residence to be constructed at 222 Portola State Park Road in an unincorporated area of San Mateo County near La Honda, California. We make no warranty, expressed or implied, for the services we performed for this project. Our services are performed in accordance with the geotechnical engineering principles generally accepted at this time and location. This report was prepared to provide engineering opinions and recommendations only. In the event there are any changes in the nature, design, or location of the project, or if any future improvements are planned, the conclusions and recommendations presented in this report should not be considered valid unless: 1) the project changes are reviewed by us, and; 2) the conclusions and recommendations presented in this report are modified or verified in writing.

The analysis, conclusions, and recommendations presented in this report are based on site conditions as they existed at the time of our investigation; the currently planned improvements; review of readily available reports relevant to the site conditions; and laboratory test results. In addition, it should be recognized that certain limitations are inherent in the evaluation of subsurface conditions, and that certain conditions may not be detected during an investigation of this type. Changes in the information or data gained from any of these sources could result in changes in our conclusions or recommendations. If such changes occur, we should be advised so that we can review our report in light of those changes.

SITE EXPLORATION AND RECONNAISSANCE

Our subsurface exploration were performed on April 23, 2019. Subsurface exploration was performed using a Mobile B-53 truck-mounted drill equipped with 7.25-inch diameter hollow-stem augers. Five exploratory borings were advanced to depths ranging from approximately 8 to 39.9 feet. The approximate locations of the borings are shown on the Engineering Geologic Reconnaissance Map, Figure 2. The boring logs and the results of our laboratory tests are attached in Appendices A and B, respectively.

Surface Conditions

The 39-acre property is located in a rural area to the west of Skyline Boulevard and locally, west of Portola State Park Road. At the time of our investigation, the site was occupied by a two-story, wood-framed residence/stable which had a wood siding exterior. The lower level was a stable with the living area located on the second floor. A rough graded unpaved dirt road extended approximately 700 feet from the residence to Portola State Park Road. An aggregate concrete walkway was located at the northeast corner of the residence. A small detached accessory structure was located adjacent (west) of the residence. The site was vegetated with native grass, small to large shrubs, and small to large trees.

The residence was located on a relatively gently sloping building pad with undeveloped area to the north and south. Some minor grading likely occurred along the building pad during the original construction of the residence. The ridge to the north (upslope) of the residence area generally sloped to the south and west at inclinations ranging between approximately 1.3:1 to 4:1 (horizontal:vertical). To the south of the residence, the hillside sloped to the south and southeast at inclinations ranging between approximately 2.2:1 to 7.5:1 (horizontal:vertical). The undeveloped area at the southern portion of the site generally sloped to the south and southeast at an inclination of approximately 2.5:1 (horizontal:vertical).

Based on their age, the existing residence and accessory structure are likely supported on a conventional shallow foundation system, although the depth and width of the foundations are unknown. The exterior stem wall was generally not visible. The roof downspouts appeared to discharge adjacent to perimeter foundations.

Subsurface Conditions

At the locations of our Borings EB-1 and EB-2, which were advanced immediately south and west of the proposed residence, we encountered approximately 4 feet of colluvium which consisted of firm to stiff clayey silt of low plasticity. The clay was underlain by very severely weathered and fractured siltstone of the Monterey Formation. The bedrock appeared locally sheared with brown clay seams and was brecciated in the majority of the rock samples collected from the two borings. At depth in Boring EB-2, small randomly oriented polished surfaces were observed with no apparent indication of movement at a depth of approximately 35 feet. The bedrock extended to maximum the depths explored of 30 and 39.9 feet.

In Boring EB-3 which was advanced at the location of the proposed library and greenhouse, we encountered very severely weathered siltstone bedrock of the Monterey Formation which extended from the surface to the maximum depth explored of 25 feet. The weathered siltstone bedrock also exhibited clay seams and appeared to be internally sheared and transitioned to silty sandstone at a depth of approximately 22 feet.

In Borings EB-4 (immediately east of the proposed residence) and EB-5 (along the driveway at the location of the fire truck turnaround), we encountered approximately 2 feet of colluvium which consisted of soft to stiff clayey silt of low plasticity. Below the colluvium, in Boring EB-4 we encountered approximately 2 feet of residual soil which consisted of stiff to hard sandy lean clay of low to moderate plasticity. The residual soil was underlain by very severely weathered, fractured, friable siltstone bedrock of the Monterey Formation. The bedrock appeared brecciated with brown clay seams and extended to the maximum depth explored of 25 feet. In Boring EB-5, the surficial clayey silt was underlain by siltstone bedrock of the Monterey Formation to the full depth explored of 8 feet.

The internal shearing and brecciation observed in the samples appeared to be related to internal deformation within the bedrock that likely occurred during tectonic uplift of the Santa Cruz Mountains (as discussed in the Regional Geology section, the Monterey Formation at this location is tightly folded). There were no indications of recent more localized movement or shearing related to landsliding within the observed samples and no indications of slickensides or wet zones. However, the shearing and brecciation may be related to much larger-scale inactive landsliding involving the site and surrounding vicinity. This is further discussed in subsequent sections of this report.

A Liquid Limit of 45 and a Plasticity Index of 12 were measured on a sample of near-surface soil obtained from Boring EB-5. These test results indicate that the near-surface soil at the site has low plasticity and a low potential for expansion.

Ground Water

Free ground water was not encountered in the borings during our investigation. The borings were backfilled soon after drilling and sampling were completed; therefore, a stabilized ground water level was not obtained. There were no indications of springs or seeps observed at the site. It is possible that seasonal or perched ground water conditions could develop in the surface soils and near the surface of the bedrock during and after significant rainfall or due to landscape watering on the property and at the upslope areas. Please be cautioned that fluctuations in the level of ground water can occur due to variations in rainfall, landscaping, and other factors.

GEOLOGIC SETTING

Regional Geology

The site is located within the central region of the Coast Ranges Geomorphic Province, which extends from the Oregon border south to the Transverse Ranges. The general topography is characterized by sub-parallel, northwest trending mountain ranges and intervening valleys. The region has undergone a complex geologic history of sedimentation, volcanic activity, folding, faulting, uplift and erosion. The relatively flat-lying, alluviated San Francisco Bay Plain is situated to the northeast of the site and the site lies within the Santa Cruz Mountains.

Based on Brabb et al. (2000), the site is underlain by bedrock of the Monterey Formation. The Monterey Formation is described as a porcelaneous shale with chert, mudstone, impure diatomite, calcareous claystone, and small amounts of siltstone and sandstone. The geologic map indicates bedding orientations of the Monterey Formation bedrock generally striking in the northwest direction and dipping toward both the northeast and southwest at inclinations ranging from 30° to 60°. Thus, a series of relatively tight folds within the Monterey Formation occurs in the immediate site vicinity. The subject site is in close proximity to a geologic contact, located southwest of the site, where the Monterey Formation is juxtaposed against the Mindego Basalt and related volcanic rocks (refer to the Vicinity Geologic Map, Figure 3).

A preliminary map of landslide deposits prepared by Brabb and Pampeyan (1972b) indicates the site is located within a large landslide that extends approximately 500 feet north, 1,200 feet east beyond Portola State Park Road, 6,000 feet south, and 1,700 feet west to Camp Pomponio Road from the location of the existing and proposed residence. The area of sliding is identified as "questionable". The residence and subject site are located in the upper portion of the mapped landslide. Portions of both Portola State Park Road and Camp Pomponio Road occur within the upper limits of the landslide, along the headscarp, and downslope of the headscarp. Evans Creek extends down the middle of the mapped landslide with the west and east hillsides sloping down to the creek (refer to the Brabb and Pampeyan (1972) map, Figure 4).

The landslide inventory beta (map) prepared by the California Geological Survey (CGS, 2019) shows dormant mature and old/relict landslides on the sloping terrain of adjacent knolls and hills. The location of the proposed residence and improvements appear to be located outside the limits of both the landslides and landslide source areas shown by CGS (Figure 5). In addition, there are no landslide or landslide sources mapped upslope of the proposed improvements.

The majority of the site and surrounding area are located within an "Earthquake Induced Landslide" zone on the Seismic Hazard Zones map of the Mindego Hill Quadrangle (CGS, 2005). The top of the knoll beneath the residence appeared to be located outside of the landslide hazard zone, while the surrounding slopes are within the hazard zone based on the Seismic Hazard Zone map. The Landslide Inventory Beta (CGS) shows multiple landslides in the immediate vicinity of the site, including along Portola State Park Road, Evans Creek, and potentially on the lower southwest portions of the site; however, no landslides are shown beneath or upslope of the location of the existing or proposed residence.

The site is not located within a fault hazard zone according to California Special Studies Zone map (1974). There are no faults underlying or projecting towards the site on published geologic maps.

Engineering Geologic Reconnaissance and Site Geology

Our engineering geologic reconnaissance was conducted on April 17 and May 9, 2019. Our reconnaissance consisted of traversing the site and proposed building areas, where accessible, and driving along Portola State Park Road, Alpine Road, and Camp Pomponio Road.

In general, the ground surface of the proposed building areas and the driveway was blanketed by colluvial soil consisting primarily of clayey silt of low plasticity underlain by siltstone and sandstone bedrock of the Monterey Formation. Siltstone and sandstone bedrock outcrops were observed immediately north of the existing residence, north/northwest of portions of the driveway, and along the west/northwest sides of existing paths (likely former logging or ranch roads, no longer in use) between the existing residence and Portola State Park Road. The bedrock outcrop north of the residence was oriented N45°W and dipping 85°S. There were no indications of mass grading (cuts and fills).

The residence was located atop a broad ridge, in which the apex of the ridge generally sloped moderately down toward the south at inclinations ranging from 3:1 to 8:1 (horizontal:vertical). The sides of the ridge sloped moderately to steeply toward drainages on the west and southeast at inclinations ranging from 2.2:1 to 4:1(horizontal:vertical). We observed over-steepened (approximately 1.5:1 to 2:1 (horizontal:vertical)) slopes due to cuts, up to 10 feet high, made along the north and northwest sides of the driveway. We also observed fill beneath the driveway at the bend over a drainage culvert. The existing residence and a portion of the driveway northeast of the residence were situated on a gently sloping pad (7:1 to 23:1(horizontal:vertical)). The hillside ground surface downslope, south of the existing residence appeared to have been disturbed or disced. The site generally appeared to exhibit limited grading and consist of native slopes, soil and rock. The approximate boundaries of the observed cuts and fills, rock exposures, and existing structures are shown on Figure 2.

A landslide was observed approximately 200 to 300 feet west on an adjacent property. The landslide had a headscarp about 10 to 15 feet high and was 40 to 50 feet wide and considerably greater in length. Vegetation and trees were present within the feature; however, no landslide mass (toe) was visible from the top of the landslide. This feature was located on the slope and directed away from the proposed development. Another landslide was observed on the subject site approximately 80 feet east and downslope of the proposed library/greenhouse. This landslide was approximately 120 feet wide, extended down to the creek, and had a highly subdued, shallow and hollow bowl-shape. The creek appeared to be deflected toward the opposite slope, suggesting the landslide mass (toe) was present at the base of the hillside and landslide. Neither of the landslides appeared active and no slide masses were evident on the slopes. The approximate locations of the landslides are shown on Figure 2. Two additional areas of landsliding were noted downslope of and not visible from the proposed development location, and are described in the Aerial Photographs section of this report.

We could not gain access to the existing residence interior. However, there were no exterior indications of distress, settlement or lateral movement. There were no indications of currently active landslides, debris flows, or larger/deeper slope failures within or adjacent to the proposed residence and planned improvements. We did not observe surface cracks or scarps on the site, which would indicate dismantling or settling of the hillside or ancient landslide deposits. There were no indications of springs, seeps or unusually shallow ground water.

Vicinity Reconnaissance

In addition to our site reconnaissance, we drove Portola State Park Road, Alpine Road, and Camp Pomponio Road from Portola Redwoods State Park to Pescadero Creek County Park to look for indications of distress or settlement to the road and/or reactivation of the large landslide mapped by Brabb and Pampeyan (1972) and the immediate area surrounding the landslide. Refer to Figures 4 and 5 for the roads (locations highlighted) observed during our reconnaissance.

Portola State Park Road was generally constructed by cutting into the hillside, which exposed fractured sandstone bedrock along the majority of the road from Alpine Road south to Portola Redwoods State Park. Very severely weathered, friable, clay seam-ridden, and fractured Monterey Formation bedrock near the driveway entrance to the site was observed and appeared similar to the bedrock encountered in our exploratory borings. Portola State Park Road was surfaced with asphalt and appeared to be in good condition with no settlement and few cracks or patches. Fractured bedrock was observed in the road cut of the intersection of Alpine and Portola State Park Road and along the upslope side of the road cut for Camp Pomponio Road.

Camp Pomponio Road, also surfaced with asphalt, was limited to one car width and the entire road was in poor condition with potholes, alligator cracking, extensive cracks up to 2 inches wide, and several patches. One localized span of the road, 4,000 feet south of the intersection of Alpine Road and approximately 30 to 40 feet wide, had cracks and appeared to be settling downslope towards Evans Creek (refer to Figure 4 for the specific location). Camp Pomponio Road was in poor condition as a whole, which may be due to poor construction and overall neglect of the road, and only one localized segment appeared to have experienced distress due to slope movements. This distress appeared to be localized fill settlement along the road edge and not related to larger-scaled movements.

Aerial Photographs

Three sets of stereo pair aerial photographs flown from 1958 to 2000 were interpreted, to supplement our on-site engineering geologic observations. Imagery scales ranged from 1:12,000 to 1:36,000. The photograph sets are referenced at the conclusion of this report.

The 1958 imagery predates development of the site (the existing residence was not present). The site was located along a broad lateral ridge on a relatively flat bench. The site was within a laterally extensive landslide complex, with individual smaller slides within a larger landslide. A broad headscarp pullaway zone approximately 500 feet in width slopes down from near the intersection of Alpine Road and Portola State Park Road, north of the subject site. The landslide appeared deeply dissected with drainages, and no indication of a discrete toe deposit, indicating that the landslide was not active. There are no indications of landsliding directly impacting the subject site.

The subsequent larger-scale imagery indicated the presence of the existing residence. The landslide west of the residence was apparent as a relatively long but narrow area lacking the relatively tall trees evident on the surrounding slope, approximately 250 to 300 feet distant and lower in elevation than the proposed development. The broad landslide east and downslope of the proposed library/greenhouse was not evident, as the slope was covered with a tree canopy. A landslide located off-site within the drainage southwest and downslope of the residence location was evident on the photos, but was more than 300 feet distant from and directed away from the development location. Finally, the heads of several shallow localized landslides or soil slumps were located approximately 500 feet laterally south and downslope of the proposed development.

There are no indications on the aerial imagery of landslides which would impact the proposed development, and there are no lineations or other indications of faulting.

Landslide Discussion

The subject site is situated on a ridge of bedrock below the headscarp of an ancient, relict landslide. There were no indications of recent movement or reactivation of the large landslide and no indications of distress, lateral cracks, or hummocky topography visible on the site or adjacent roads (Portola State Park Road, Alpine Road, and Camp Pomponio Road). The roads observed during our reconnaissance (Figures 4 and 5) did not exhibit distress or settling from landsliding or slumping, except for one localized area on Camp Pomponio Road. The features of the large landslide do not suggest recent or active movement, but rather an old, relict landslide that has been weathered in place and has been deeply dissected by surface runoff and incised by local drainage channels. The

degree of dissection of the landslide further suggests that movement of the landslide has not occurred in some time, likely thousands of years.

The two small landslides observed on or adjacent to the subject site were located a minimum of approximately 250 and 80 feet from the footprints of the proposed residence and the library/greenhouse, respectively. There were no indications of recent movement or reactivation of the two landslides or areas surrounding the landslides. Two additional areas of localized landslides (evident on the aerial imagery) are downslope of and distant from the proposed residence and impart no impact or risk to the project.

Finally, the proposed building area of the residence, library/greenhouse, leach field and driveway appeared to be stable with no underlying active landslides, shallow soil slumps, debris flow channels or source areas, surficial cracks, or water ponding. There was no indication of the larger-scale landslide mass underlying the broad site vicinity breaking up, settling, or reactivating at the immediate subject site.

In our opinion, based on our site and immediate vicinity reconnaissance, aerial photographic interpretations, and review of published maps, the proposed improvements are planned in areas that have not been affected by active landsliding, rockfalls, debris flows, slope failures, and settling or disruption or dismantling of the slide mass underlying the area. The proposed improvements are planned in areas with gentle to moderate slopes and will not extend into or onto steep slopes, cut slopes, or onto significant breaks in slope. Also, the site is not located near the margins of the large landslide or margins and headscarps of smaller landslides on the site. In our opinion, the expected grading is not expected to affect the stability of the site or the larger ancient, relict landslide.

Faulting and Seismicity

There are no mapped through-going faults within or adjacent to the site and the site is not located within a California Earthquake Fault Zone (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable. The closest active fault is the San Andreas Fault, located approximately 3.6 miles northeast of the property. Thus, the likelihood of surface rupture occurring from active faulting at the site is low.

The San Francisco Bay Area is an active seismic region. Earthquakes in the region result from strain energy constantly accumulating because of the northwestward movement of the Pacific Plate relative to the North American Plate. On average about 1.6-inches of movement occur per year. Historically, the Bay Area has experienced large, destructive earthquakes in 1838, 1868, 1906, and 1989. The faults considered most likely to produce

large earthquakes in the area include the San Andreas, San Gregorio, Hayward, and Calaveras faults. The San Gregorio fault is located approximately 8.8 miles southwest of the site, respectively. The Hayward and Calaveras faults are located approximately 22 miles northeast and 25 miles southeast of the site, respectively. These faults and significant earthquakes that have been documented in the Bay Area are listed in Table 1, and are shown on the Regional Fault and Seismicity Map, Figure 4.

Table 1. Earthquake Magnitudes and Historical Earthquakes
Beigelman Residence
La Honda, California

Fault	Maximum Magnitude (Mw)	Historical Earthquakes	Estimated Magnitude
San Andreas	7.9	1989 Loma Prieta	6.9
		1906 San Francisco	7.9
		1865 N. of 1989 Loma Prieta Earthquake	6.5
		1838 San Francisco-Peninsula Segment	6.8
		1836 East of Monterey	6.5
Hayward	7.1	1868 Hayward	6.8
		1858 Hayward	6.8
Calaveras	6.8	1984 Morgan Hill	6.2
		1911 Morgan Hill	6.2
		1897 Gilroy	6.3
San Gregorio	7.3	1926 Monterey Bay	6.1

In the future, the subject property will undoubtedly experience severe ground shaking during moderate and large magnitude earthquakes produced along the San Andreas fault or other active Bay Area fault zones. Using information from recent earthquakes, improved mapping of active faults, ground motion prediction modeling, and a new model for estimating earthquake probabilities, a panel of experts convened by the U.S.G.S. have concluded there is a 72 percent chance for at least one earthquake of Magnitude 6.7 or larger in the Bay Area before 2043. The Hayward fault has the highest likelihood of an earthquake greater than or equal to magnitude 6.7 in the Bay Area, estimated at 33 percent, while the likelihood on the San Andreas and Calaveras faults is estimated at approximately 22 and 26 percent, respectively (Aagaard et al, 2016).

Earthquake Design Parameters

The State of California currently requires that buildings and structures be designed in accordance with the seismic design provisions presented in the 2016 California Building Code and in ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures."

Based on site geologic conditions and on information from our subsurface exploration at the site, the site may be classified as Site Class C, dense soil and soft rock, in accordance with Chapter 20 of ASCE 7-10. Spectral Response Acceleration parameters and site coefficients may be taken directly from the U.S.G.S. website based on the longitude and latitude of the site. For site latitude (37.2841), longitude (-122.2146) and Site Class C, design parameters are presented on Table 2 on the following page.

Table 2. 2016 CBC Seismic Design Criteria
Beigelman Residence
La Honda, California

Spectral Response Acceleration Parameters		Design Value
Mapped Value for Short Period -	S_S	1.801
Mapped Value for 1-sec Period -	S_1	0.836
Site Coefficient -	F_a	1.0
Site Coefficient -	F_v	1.3
Adjusted for Site Class -	S_{MS}	1.801
Adjusted for Site Class -	S_{M1}	1.086
Value for Design Earthquake -	S_{DS}	1.201
Value for Design Earthquake -	S_{D1}	0.724

Geologic Hazards

As part of our investigation, we reviewed the potential for geologic hazards to impact the site and the proposed residence, considering the geologic setting and the soils encountered during our investigation. The results of our review are presented below.

- Fault Rupture - The site is not located in a California Earthquake Fault zone and based on our review of published fault maps and associated geologic literature, an active fault is not believed to exist beneath the site.

- Ground Shaking - The site is located in an active seismic area. Moderate to large earthquakes are probable along several active faults in the greater Bay Area over a 30 to 50 year design life. Strong ground shaking should therefore be expected several times during the design life of the proposed residence, as is typical for sites throughout the Bay Area. The residence and other improvements should be designed and constructed in accordance with current earthquake resistance standards.

- Liquefaction - Liquefaction occurs when saturated sandy soils lose strength during earthquake shaking. Ground settlement often accompanies liquefaction. Soils most susceptible to liquefaction are saturated, loose, sandy silts, silty sands, and uniformly graded sands. Since saturated, loose sands and other soils prone to

liquefaction were not encountered during our investigation, the likelihood of liquefaction occurring at the site is low. The site is also not located within a State liquefaction hazard zone.

- Differential Compaction - Differential compaction occurs during moderate and large earthquakes when soft or loose, natural or fill soils are densified and settle, often unevenly across a site. Since the soils encountered in our borings were generally firm to stiff clayey silt, stiff sandy lean clay, and weathered bedrock in our opinion, the likelihood of significant differential compaction of these materials at the site is low. Localized fill soil was present above the culvert in the driveway, and if left in place may result in differential compaction.

- Landsliding - As discussed previously, the site is located within the upper limits of a large ancient, relict landslide. Based on our review of published maps and photos, associated geologic literature, and our reconnaissance of the subject site and surrounding area, the ancient landslide appears to be stable. In addition, two small scale landslides were observed on and adjacent to the subject site, with two additional areas at a greater distance from and downslope of the site. The two nearest landslides appeared to be constrained within the near surface soil and appeared stable during our visits. As mentioned previously, the landslides are situated at least 80 and 250 feet from the nearest proposed improvements and are not expected to affect the project.

  Based on our investigation, the proposed construction will likely not affect the ancient large-scale landslide mapped beneath the surrounding neighborhood or the two much smaller landslides. In our opinion, the proposed residence and site improvements constructed as recommended in our report, are not likely to pose a risk to the stability of the immediate site or increase the potential for landslides to affect adjacent properties. In our opinion, the risk of reactivation of this deep-seated ancient landslide and smaller landslides is low.

CONCLUSIONS

From a geologic and geotechnical viewpoint, the site is suitable for the proposed residence, library/greenhouse, and associated improvements provided the recommendations presented in this report are followed during design and construction. Specific geotechnical recommendations for the project are presented in the following sections of this report.

The primary geotechnical concerns at the site are the presence of several feet of surface colluvium which is subject to downslope creep, localized areas of fill associated with previous grading work particularity along the driveway, the weak and variable nature of the bedrock underlying the site, the moderately to steeply sloping nature of the site, and

the potential for severe ground shaking at the site during a major earthquake. The bedrock encountered in our borings was variable in nature and portions of the bedrock were relatively weak and almost completely weathered in some locations.

In order to reduce the potential for differential movement across the residence and library/greenhouse and to provide sufficient lateral support, in our opinion, the proposed structures should be supported on a moderately deep drilled pier and grade beam foundation system bearing well into weathered bedrock below the colluvium, residual soil, and a majority of the weak bedrock stratum.

We recommend that any proposed retaining walls and other site improvements located along existing grades and/or retaining fill such as along sloping ground (which do not cut into bedrock), be supported on a drilled pier foundation extending into weathered bedrock. In our opinion, as an alternative to piers, retaining walls which will retain cuts into bedrock at least 4 feet below current site grades with relatively flat ground in front of the walls may supported on conventional continuous spread footing foundations bearing in undisturbed residual soil or weathered bedrock.

Since portions of the proposed driveway alignment, exterior flatwork, and other site improvements will overlap areas of existing fill, in our opinion, the existing fill should generally be excavated and compacted below exterior flatwork, new driveway pavements and any other site improvements during site preparation and prior to placing new fill. Our staff should observe the condition of the existing fill located below the proposed improvements. Removal and compaction of existing fill and subgrade preparation below the proposed improvements should be performed as recommended in the section of this report titled "Earthwork."

Because subsurface conditions may vary from those encountered at the locations of our borings, and to observe that our recommendations are properly implemented, we recommend that we be retained to 1) review the project plans for conformance with our recommendations; and 2) observe and test during earthwork and foundation construction.

FOUNDATIONS

Pier and Grade Beam Foundation

In our opinion, the proposed residence, library/greenhouse, site retaining walls, and other site improvements planned along sloping ground may be supported on a pier and grade beam foundation, bearing well into weathered bedrock below the colluvial and residual soils and any localized fill. The piers should be at least 16-inches in diameter. Piers

should extend at least 20 feet below the bottom of the grade beams and at least 16 feet into weathered bedrock, whichever is deeper. Piers constructed for site retaining walls may be reduced to a depth of 10 feet below the grade and at least 8 feet into weathered bedrock from a geotechnical viewpoint, whichever is deeper. The piers may be designed for an allowable skin friction in bedrock of 450 pounds per square foot for dead plus live loads, with a one-third increase allowed when considering additional short-term wind or seismic loading. The uplift capacity of the piers may be based on a skin friction value of 350 pounds per square foot.

We recommend that relatively rigid grade beams be provided between piers supporting the improvements as required by the structural engineer. The grade beams should extend at least 8-inches below the crawl space grade or slab subgrade elevation to help limit the infiltration of surface runoff under the structure.

Pier drilling should be observed by a member of our staff to confirm that the pier holes extend at least the required minimum depth into bedrock and are properly cleaned of all loose or soft soil and debris. The minimum pier depths recommended above may require adjustment if differing conditions are encountered during drilling. While we expect that moderate sized drilling equipment can achieve the required minimum pier embedment depth, a rock bit equipped with carbide teeth may be required due to the hardness of the bedrock present below at least portions of the site.

Concrete should be placed in the pier holes as soon as practical after drilling. Ground water may seep into the pier holes during pier drilling and it is possible that ground water seepage could cause some sloughing or caving of the pier holes. This can be further evaluated during drilling of the initial piers. If ground water cannot be effectively pumped from the pier holes, concrete will need to be placed in the pier holes by the tremie method. The contractor should plan on placing concrete the same day the piers are drilled.

Lateral Loads for Pier Foundations

Due to the potential for lateral creep of the native soil and colluvium, we recommend that piers be designed to resist an active soil pressure equal to an equivalent fluid pressure of 125 pounds per cubic foot, acting upon the portion of the piers within the upper 4 feet, in the downhill direction. The active pressure may be assumed to act against 2 pier diameters. The active load and other lateral loads may be resisted by passive earth pressure based upon an equivalent fluid pressure of 350 pounds per cubic foot, acting on 2 times the projected area of the pier in bedrock 4 feet or deeper below the original ground surface. The passive resistance of the upper 4 feet (taken from current grades) should be neglected.

In our opinion, the creep load provided above does need not to be considered for the residence piers located further than 20 feet from the sloping areas and for the library/greenhouse piers located in areas with at least 5 feet of cut. The passive earth pressure in these areas should be neglected to a depth of 2 feet.

Spread Footing Foundation

In our opinion, as an alternative to drilled piers, site retaining walls and other site improvements located in cut well into bedrock subgrade, as discussed previously, may be supported on conventional continuous spread footing foundations bearing in undisturbed residual soil or weathered bedrock. Footings should have a width of at least 15 inches and should extend at least 24 inches below exterior grade and at least 24 inches below the bottom of concrete slabs-on-grade, whichever is deeper. Footings should also extend at least 12-inches into competent weathered bedrock, even if it requires a deeper embedment than stated above. Footings with at least these minimum dimensions may be designed for an allowable bearing pressure of 2,500 pounds per square foot for dead plus live loads, with a one-third increase allowed when considering additional short-term wind or seismic loading. Exterior finished grade should be considered the lowest adjacent grade within 4 feet of downslope side of any footing excavations.

All footings located adjacent to utility lines should be embedded below a 1:1 plane extending up from the bottom edge of the utility trench. All continuous footings should be reinforced with top and bottom steel, to provide structural continuity and to permit spanning of local irregularities.

Our representative should observe all footing excavations prior to placement of reinforcing steel to confirm that they expose suitable bedrock material and have been properly cleaned. If native or fill soils or disturbed bedrock are encountered in the foundation excavations, our field representative may require overexcavation and/or compactive effort or a deeper footing depth before the reinforcing steel is placed.

Lateral Loads for Footing Foundations

Lateral loads may be resisted by friction between the bottom of the footings and the supporting subgrade. A coefficient of friction of 0.3 may be assumed. In addition to friction, lateral resistance may be provided by passive soil pressure acting against the sides of foundations cast neat in footing excavations within weathered bedrock. We recommend assuming an equivalent fluid pressure in bedrock of 400 pounds per cubic foot for passive soil resistance, where appropriate. The upper foot of passive soil

resistance should be neglected where soil adjacent to the footing will be landscaped or subject to softening from rainfall and/or surface water runoff.

Settlement

Thirty year post construction differential movement due to static loads is not expected to exceed 1-inch across the proposed residence and library/greenhouse structures supported on drilled pier foundations designed and constructed as recommended. Some additional differential settlement is possible across retaining walls and other improvements supported on continuous shallow footing foundations.

SLABS-ON-GRADE

General Slab Considerations

To reduce the potential for movement of the slab subgrade, at least the upper 6-inches of the subgrade soil should be scarified and compacted at a moisture content above the laboratory optimum. The soil subgrade should be kept moist up until the time the non-expansive fill, aggregate base, and/or vapor barrier is placed. Slab subgrades and non-expansive fill should be prepared and compacted as recommended in the section of this report titled "Earthwork." Soft, wet, or unstable soils should be removed from slab-on-grade areas. Exterior flatwork and interior slabs-on-grade should be underlain by a layer of non-expansive fill as recommended below. The non-expansive fill should consist of Class 2 aggregate base or clayey soil with a Plasticity Index of 15 or less.

If exterior flatwork is proposed along the downslope sides of the level pads where fills are likely present, the old fills should preferably be overexcavated and compacted to current day compaction standards for better performance. The likely presence of the fill will need to be established during grading. We can provide further guidance during the design and grading for the exterior flatwork improvements, as needed.

Considering the potential for some differential movement of the surface and near-surface soils, we expect that reinforced slabs will perform better than unreinforced slabs. Consideration should be given to using a control joint spacing on the order of 2 feet in each direction for each inch of slab thickness.

Exterior Flatwork

Concrete walkways and exterior flatwork should be at least 4 inches thick and should be constructed on at least 6 inches of Class 2 aggregate base. To improve performance, exterior slabs-on-grade, such as for patios, may be constructed with a thickened edge to improve edge stiffness and to reduce the potential for water seepage under the edge of the

slabs and into the underlying base and subgrade. In our opinion, the thickened edges should be at least 8 inches wide and ideally should extend at least 4 inches below the bottom of the underlying aggregate base layer.

Interior Slabs

At-grade interior slab-on-grade floors, should be constructed on a layer of non-expansive fill at least 8 inches thick. Since the garage floor will support vehicle loads, we recommend that the garage floor slab be at least 5 inches in thickness. Recycled aggregate base should not be used for non-expansive fill below interior slabs-on-grade, since adverse vapor could occur from crushed asphalt components.

Moisture Considerations

In areas where dampness of concrete floor slabs would be undesirable, such as within the garage and building interior, concrete slabs should be underlain by at least 4 inches of free-draining gravel, such as ½- to ¾-inch clean crushed rock with no more than 5 percent passing the ASTM No. 200 sieve. Pea gravel should not be used for this capillary break material. The crushed rock layer should be compacted and leveled with vibratory equipment. The crushed rock layer may be considered as the upper 4 inches of the non-expansive fill recommended above.

To reduce vapor transmission up through at-grade concrete floor slabs, the crushed rock section should be covered with a high quality vapor barrier conforming to the requirements of ASTM E 1745 Class A, with a water vapor transmission rate less than or equal to 0.01 perms (such as 15-mil thick "Stego Wrap Class A"). The vapor barrier should be placed directly below the concrete slab. Sand above the vapor barrier is not recommended. The vapor barrier should be installed in accordance with ASTM E 1643. All seams and penetrations of the vapor barrier should be sealed in accordance with manufacturer's recommendations.

The permeability of concrete is affected significantly by the water cement ratio of the mix, with lower ratios producing more damp-resistant slabs and being stronger structurally. Where moisture protection is important and/or where the concrete will be placed directly on the vapor barrier, the water-to-cement ratio should be 0.45 or less. To increase the workability of the concrete, mid-range plasticizers can be added to the mix. Water should not be added to the mix unless the slump is less than specified and the ratio will not exceed 0.45. Other steps that may be taken to reduce moisture transmission through the slab (or mat) include moist curing for 5 to 7 days and allowing the slab to dry for a period of two months or longer prior to placing floor coverings. Also, prior to installation of the floor covering, it may be appropriate to test the slab moisture content

for adherence to the manufacturer's requirements to determine whether a longer drying time is necessary.

Basement Water Proofing

We have not provided recommendations regarding the method or details for basement damp-proofing since design of damp-proofing systems is outside of our scope of services and expertise. Installing adequate damp-proofing below and behind the edges of the library/greenhouse lower level floor and behind the basement walls is essential for the success of the basement structure. Placing concrete with a low water cement ratio should be considered as one step of good damage proofing as discussed above. The damp-proofing system should be installed below the lower level of the library/greenhouse slab floor as determined by the water-proofing consultant.

Subsurface Drainage

Although it is unlikely that static ground water will rise to the lower level of the daylighting library/greenhouse, a subsurface drain system could be installed below the basement floor to reduce the possibility of water pressure developing below the slab and floor damp-proofing system. This slab underdrain is not considered mandatory.

If a slab underdrain is installed, perforated pipes for the underdrain should be installed at the bottom of the excavation. The floor drainage system should include a minimum 4- to 8-inch-thick blanket of free-draining gravel, such as 1/2- or 3/4-inch crushed rock with no more than 5 percent passing the ASTM No. 200 sieve, below the mat/slab. Prior to placing the gravel blanket, the subgrade below the gravel layer should be surface compacted and covered with filter fabric, such as TC Mirafi 140N. The gravel drain should extend up and around the sides of the foundation and basement walls. Drain pipes around the basement walls should consist of 4-inch diameter perforated PVC pipes with perforations placed down installed at bottom of the wall excavation. The perforated pipes should discharge to a suitable outfall location. To minimize vapor transmission through the floor slab, a high-quality water-proof membrane designed by the water proofing consultant should be placed over the crushed rock and around the edges of the mat foundation. A schematic sketch of the subslab drainage system is presented in Figure 7.

RETAINING WALLS

Basement and site retaining walls should be designed to resist lateral pressures from the adjacent native and fill soils and backfill. We recommend retaining walls with level backfill that are not free to deflect or rotate, such as residence retaining walls, be designed to resist an equivalent fluid pressure of 45 pounds per cubic foot, plus an additional

uniform lateral pressure of 8H pounds per square foot, where H is the height of the wall in feet. Retaining walls with level backfill that are free to rotate, such as site retaining walls, may be designed to resist an equivalent fluid pressure of 45 pounds per cubic foot. Retaining walls with backfill that slopes at about 2:1 (horizontal:vertical) should be designed to resist an equivalent fluid pressure of 65 pounds per cubic foot for walls free to rotate, with 8H added as recommended above for walls not free to rotate. Wherever walls will be subjected to surcharge loads, the walls should be designed for an additional uniform lateral pressure equal to one-half of the surcharge load for restrained walls and one-third of the surcharge load for unrestrained walls.

Based on the site peak ground acceleration (PGA), on Seed and Whitman (1970); Al Atik and Sitar (2010); and Lew et al. (2010); seismic loads on retaining walls that can yield may be simulated by a line load of $6H^2$ (in pounds per foot, where H is the wall height in feet). Seismic loads on walls that cannot yield may be subjected to a seismic load as high as about $11H^2$. This seismic surcharge line load should be assumed to act at 1/3H above the base of the wall (in addition to the active wall design pressure of 45 or 65 pounds per cubic foot).

To prevent buildup of water pressure from surface water infiltration, a subsurface drainage system should be installed behind the walls. The drainage system should consist of a 4-inch diameter perforated pipe (perforations placed down) embedded in a section of 1/2- to 3/4-inch, clean, crushed rock at least 12 inches wide. Backfill above the perforated drain line should also consist of 1/2- to 3/4-inch, clean, crushed rock to within about 1½ to 2 feet below exterior finished grade. A filter fabric should be wrapped around the crushed rock to protect it from infiltration of native soil. The upper 1½ to 2 feet of backfill should consist of compacted native soil. The perforated pipe should discharge into a free-draining outlet or sump that pumps to a suitable location. Damp-proofing of the walls should be included in areas where wall dampness and efflorescence would be undesirable. A diagrammatic section illustrating a typical drainage system for the basement is shown on Figure 7.

Miradrain, Enkadrain or other drainage fabrics approved by our office may be used for wall drainage as an alternative to the gravel drainage system described above. If used, the drainage fabric should extend from a depth of about 1 foot below the top of the wall backfill down to the drain pipe at the base of the wall. A minimum 12-inch wide section of ½-inch to ¾-inch clean crushed rock and filter fabric should be placed around the drainpipe, as recommended previously.

Backfill placed behind the walls should be compacted to at least 90 percent relative compaction using light compaction equipment. If heavy equipment is used for compaction of wall backfill, the walls should be temporarily braced. Preferably, the backfill behind the walls should be placed on level benches, rather than directly on the sloping grade.

Basement retaining walls for the library/greenhouse may be supported on a drilled pier foundation as presented previously. Site retaining walls may be supported on a continuous shallow footing or drilled pier foundation as presented previously.

DRIVEWAY PAVEMENT

We understand the driveway will likely be composed of Class 2 aggregate base surfaced with about a 2 to 4-inch layer of decomposed granite surface. Portions of the driveway will likely be driven on by moderate delivery vehicles or fire trucks. In our opinion, the decomposed granite driveway surface should be underlain by at least 10 inches of Class 2 aggregate base on a properly prepared and compacted soil subgrade. The owners should be aware that occasional maintenance of the gravel surface will be required to even out surface irregularities that commonly develop in weakly-bonded gravel surfaces due to vehicle turning, surface abrasion, and erosion from storm water.

Where paving stones will be used for portions of the driveway surface, the paving stones should be underlain by at least 8 inches of Class 2 aggregate base. Edge constraint, such as a concrete curb, should be installed around the perimeter of the paving stone area.

If portions of the driveway will be constructed with Portland cement concrete (PCC), we recommend the driveway pavement consist of at least 5 inches of PCC on at least 8 inches of Class 2 aggregate base. Un-reinforced concrete for the 5-inch-thick driveway pavement should have a 28-day compressive strength of at least 3,500 psi. PCC pavements should be laterally constrained with curbs or shoulders and sufficient control joints should be incorporated in the design and construction to limit and control cracking.

We recommend that measures be taken to limit the amount of surface water that seeps into the aggregate base and subgrade below vehicle pavements, particularly where the pavements are adjacent to landscape areas. Seepage of water into the pavement base tends to soften the subgrade, increasing the amount of pavement maintenance that is required, and shortening the pavement service life. Deepened curbs extending 4-inches below the bottom of the aggregate base layer are generally effective in limiting excessive water seepage. Other types of water cutoff devices or edge drains may also be considered to maintain pavement service life.

EARTHWORK

Clearing and Subgrade Preparation

All deleterious materials, such as existing foundations to be removed, slabs, soft surface soils, pavements, utility lines, vegetation, roots, topsoil, existing fill, etc., should be cleared from areas of the site to be built on or paved. The actual stripping depth should be determined by a member of our staff in the field at the time of construction. Excavations that extend below finished grade should be backfilled with structural fill that is water-conditioned, placed, and compacted as recommended in the section of this report titled "Compaction."

After the site has been properly cleared and stripped, and excavations to proposed grade have been made, exposed soil surfaces in areas to receive structural fill, foundations, slabs-on-grade, and pavements should be scarified to a depth of 6 inches, moisture conditioned, and compacted as recommended for structural fill in the section of this report titled "Compaction."

On-site soils, slab and pavement subgrades, and foundation, pier hole, and trench excavations should be kept in a moist condition throughout the construction period.

Existing Fill Recommendations

In our opinion, the existing fill should be excavated and compacted below the exterior flatwork, driveway, parking lots, new fill areas, and other site improvements. The fill should be excavated down to competent residual soil or bedrock and compacted under our direction. The resulting excavation bottom and sidewalls should be cut (benched) into as the structural backfill is being placed and compacted as discussed below. Imported backfill materials should be approved by a member of our staff prior to delivery to the site. The backfill should be moisture conditioned, and compacted as recommended in the section of the report titled "Compaction." A member of our staff should observe and test during re-working of the fill and placement of new fill, as required.

Slope Grading

Based on the current scope of the project, significant fills not supported by retaining walls are not planned as part of the proposed improvements. However if significant fill is planned on existing slopes having an inclination steeper than 6 horizontal to 1 vertical, any underlying fill should be removed, and the area should be benched, and a key excavated into the underlying competent weathered bedrock with subdrains installed, as needed. A generalized benching detail is shown in Figure 8. The key should extend a

minimum of 2 feet into weathered rock. The benches should be inclined into the back of the benches at an inclination of at least 1.5 percent. At a minimum, a subdrain should be installed at the base keyway. It may be beneficial to include subdrains at some of the benches higher up within the fill. The location and depth of the keyways and benches should be approved by our field representative. We should be retained to observe the earthwork operations, including excavation of the keyway and benches, subdrain installation, and placement and compaction of the fill.

Where installed, the subdrains should consist of a 12-inch width of free-draining crushed rock wrapped in an approved filter fabric or Caltrans Class 2 Permeable Material. Four-inch diameter rigid plastic pipe (Schedule 40 PVC, SDR 35 or equal) should be placed with perforations down on a 4-inch thick bed of crushed rock or Permeable Material. The Permeable Material or crushed rock should be continued up to at least 12-inches above the elevation of the next bench. A solid pipe should be used to direct the subdrain to a suitable discharge location. Cleanouts should be provided at appropriate locations.

Material for Fill

All on-site soil containing less than 3 percent organic material by weight (ASTM D2974) should be suitable for use as structural fill. Structural fill should not contain rocks or pieces larger than 6 inches in greatest dimension and no more than 15 percent larger than 2.5 inches. Imported non-expansive fill should have a Plasticity Index no greater than 15, should be predominately granular, and should have sufficient binder so as not to slough or cave into foundation excavations and utility trenches. Recycled aggregate base should not be used for non-expansive fill at building interior. A member of our staff should approve proposed import materials prior to their delivery to the site.

Temporary Slopes and Excavations

The contractor should be responsible for the design and construction of all temporary slopes and any required shoring. Shoring and bracing should be provided in accordance with all applicable local, state, and federal safety regulations, including current OSHA excavation and trench safety standards.

Temporary slopes less than 4 feet deep excavated in the native soils should be capable of standing near-vertical for short construction periods with minimal bracing. Field modification of temporary cut slopes may be required. Unstable materials encountered on slopes during excavation should be trimmed off even if this requires cutting the slopes back to a flatter inclination.

Protection of structures and improvements near cuts should also be the responsibility of the contractor.

Compaction

Scarified soil surfaces and all structural fill should be placed and compacted in uniform lifts no thicker than 8 inches in pre-compacted thickness, conditioned to the appropriate moisture content, and compacted as recommended for structural fill in Table 3. The relative compaction and moisture content recommended in Table 3 is relative to ASTM Test D1557, latest edition.

Table 3. Compaction Recommendations
Beigelman Residence
La Honda, California

	Relative Compaction*	Moisture Content*
General		
• Scarified subgrade in areas to receive structural fill.	90 percent	Above optimum
• Structural fill composed of native soil.	90 percent	Above optimum
• Structural fill composed of non-expansive fill.	90 percent	Above optimum
• Structural fill below a depth of 4 feet.	92 percent	Near optimum
Pavement Areas		
• Upper 6-inches of soil below baserock.	95 percent	Near optimum
• Aggregate baserock.	95 percent	Near optimum
Utility Trench Backfill		
• On-site soil.	90 percent	Near optimum
• Imported sand	95 percent	Near optimum

* Relative to ASTM Test D1557, latest edition.

Finished Slopes

We recommend that any new finished slopes be cut or filled to an inclination no steeper than 2:1 (horizontal:vertical). Exposed slopes may be subject to minor sloughing and erosion that would require periodic maintenance. We recommend that all slopes and soil surfaces disturbed during construction be planted to with erosion resistant vegetation.

Surface Drainage

Finished grades should be designed to prevent ponding of water and to direct surface water runoff away from foundations, and edges of slabs and pavements, and toward suitable collection and discharge facilities. Slopes of at least 2 percent are recommended for flatwork and pavement areas with 5 percent preferred in landscape areas within 8 feet of structures, where possible. At a minimum, splash blocks should be installed at the discharge ends of roof downspouts to carry roof water discharge away from perimeter foundations. Preferably, roof downspout water should be collected in a closed pipe system that is routed to a storm drain system or other suitable location.

Drainage facilities should be observed to verify that they are adequate and that no adjustments need to be made, especially during the first two years following construction. We recommend that an as-built plan be prepared to show the locations of surface and subsurface drain lines and clean-outs. Drainage facilities should be periodically checked to verify that they are continuing to function properly. It is likely the drainage facilities will need to be periodically cleaned of silt and debris that may build up in the lines.

FUTURE SERVICES

Plan Review

Romig Engineers should review the completed grading and foundation plans for conformance with the recommendations contained in this report. We should be provided with these plans as soon as possible upon completion in order to limit the potential for delays in the permitting process that might otherwise be attributed to our review process. In addition, it should be noted that many of the local building and planning departments now require "clean" geotechnical plan review letters prior to acceptance of plans for their final review. Since our plan reviews typically result in recommendations for modification of the plans, our generation of a "clean" review letter often requires two iterations.

At a minimum, we recommend that the following note be added to the plans:

"Earthwork, slab subgrade and non-expansive fill preparation, grading, pier drilling, foundation construction, retaining wall drainage and backfilling, pavement construction, utility trench backfilling, and site drainage should be performed in accordance with the geotechnical report prepared by Romig Engineers, Inc., dated June 10, 2019. Romig Engineers should be notified at least 48 hours in advance of earthwork and foundation construction and should observe and test during earthwork and foundation construction as recommended in the geotechnical report."

Construction Observation and Testing

All earthwork and foundation construction should be observed and tested by us to 1) establish that subsurface conditions are compatible with those used in the analysis and design; 2) observe compliance with the design concepts, specifications and recommendations; and 3) allow design changes in the event that subsurface conditions differ from those anticipated. The recommendations in this report are based on a limited number of borings. The nature and extent of variation across the site may not become evident until construction. If variations are exposed during construction, it will be necessary to reevaluate our recommendations.

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Aerial Photographs

United States Geologic Survey Library, Menlo Park, California (USGS), and Pacific Aerial Surveys, Oakland, California (PAS): black and white vertical stereo pairs; and WAC Corporation, Eugene, Oregon (WAC): color vertical stereo pairs.

Source	Imagery	Date	Scale
	PAS SF Area-2-93/94	3/2/58	1:36,000
PAS	SMT-AV-4515-16-27/28	9/1/93	1:12,000
PAS	SMT-AV-6600-16-27/28	6/26/00	1:12,000

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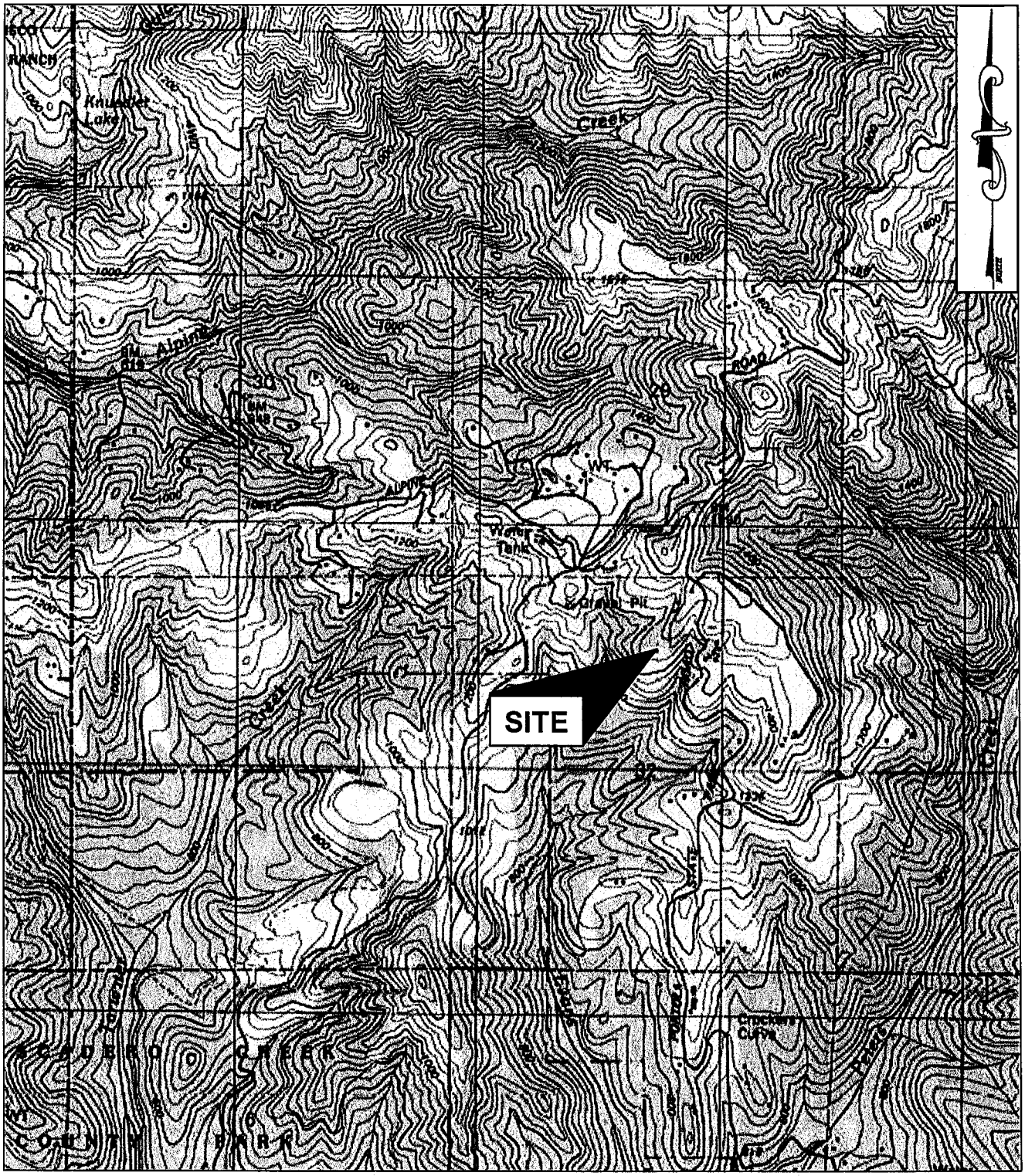
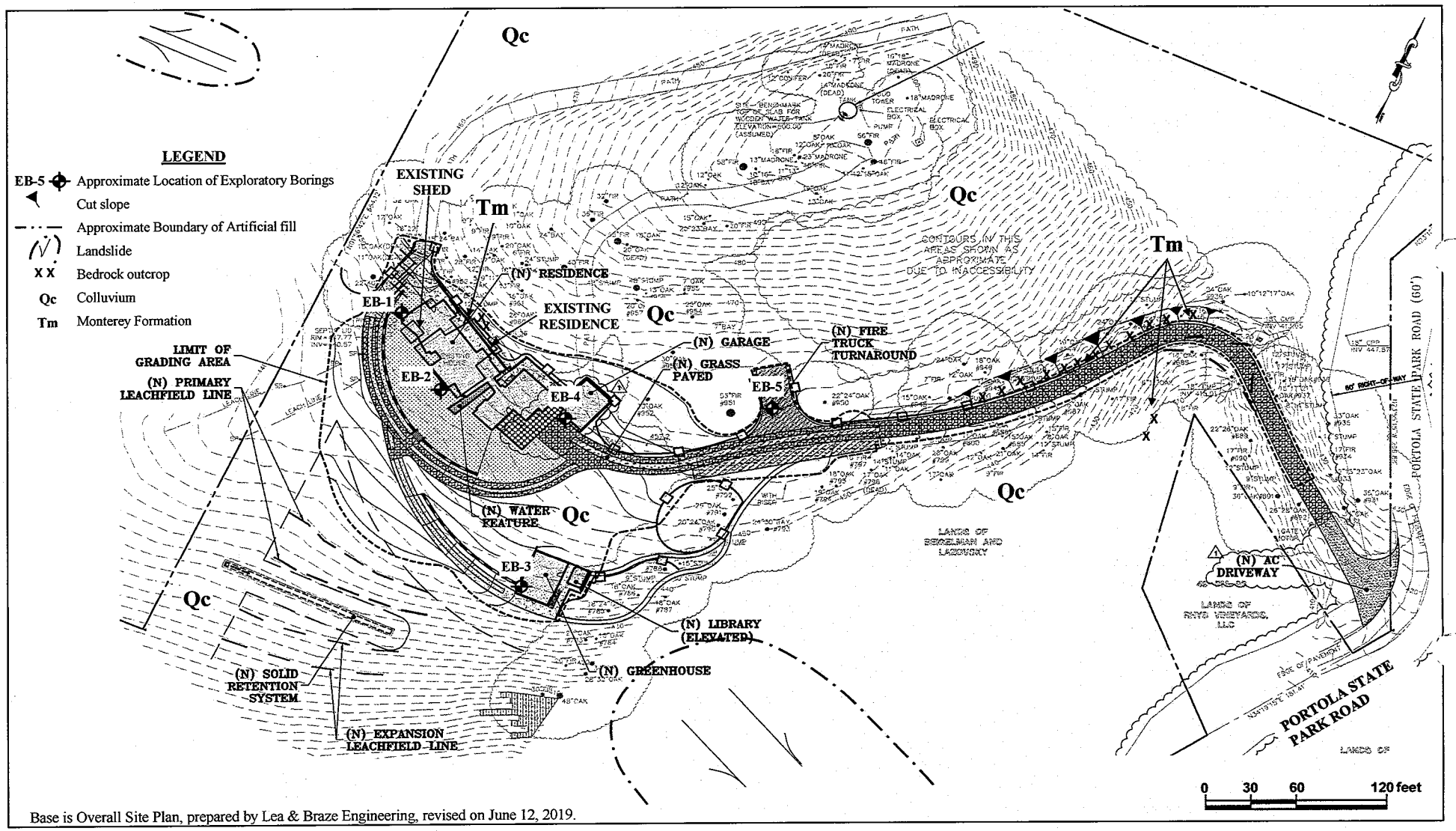


Scale: 1 inch = 2000 feet
Base is United States Geological Survey La Honda and Mindego Hill 7.5 Minute Quadrangle, dated 1997.

VICINITY MAP
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 1
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS



Base is Overall Site Plan, prepared by Lea & Braze Engineering, revised on June 12, 2019.

ENGINEERING GEOLOGIC RECONNAISSANCE MAP
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

ROMIG ENGINEERS

FIGURE 2
JUNE 2019
PROJECT NO. 4779-1

LEGEND

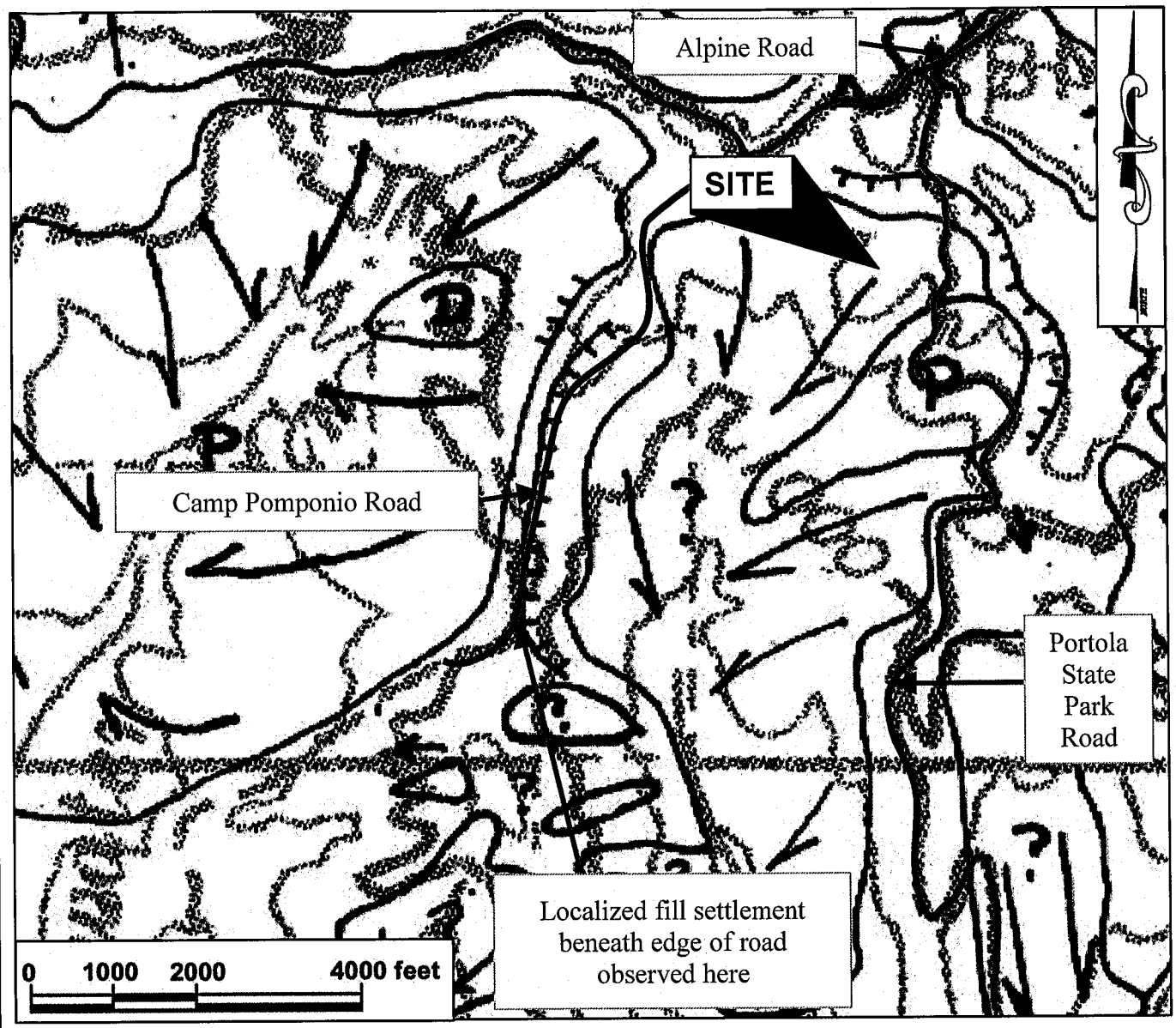
Tpt — Tahana Member (Miocene)	Geologic Contact - dashed where approximate, dotted where inferred.
Tlm — Monterey Formation (Miocene)	Fault - dashed where approximate, dotted where inferred.
Tla — Lambert Shale (Miocene)	5 — Strike and dip of bedding
Mindego Basalt and related volcanic rocks (Miocene)	0 1000 2000 4000 feet

Scale: 1 inch = 2000 feet
Base is USGS Geologic Map of San Mateo County (Brabb, Graymer, and Jones, dated 1998).

VICINITY GEOLOGIC MAP
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 3
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS



LEGEND

Roads observed during reconnaissance (highlighted in orange)

Large landslide deposit

Small landslide deposit

D Definite landslide deposit

P Probable landslide deposit

? Questionable landslide deposit

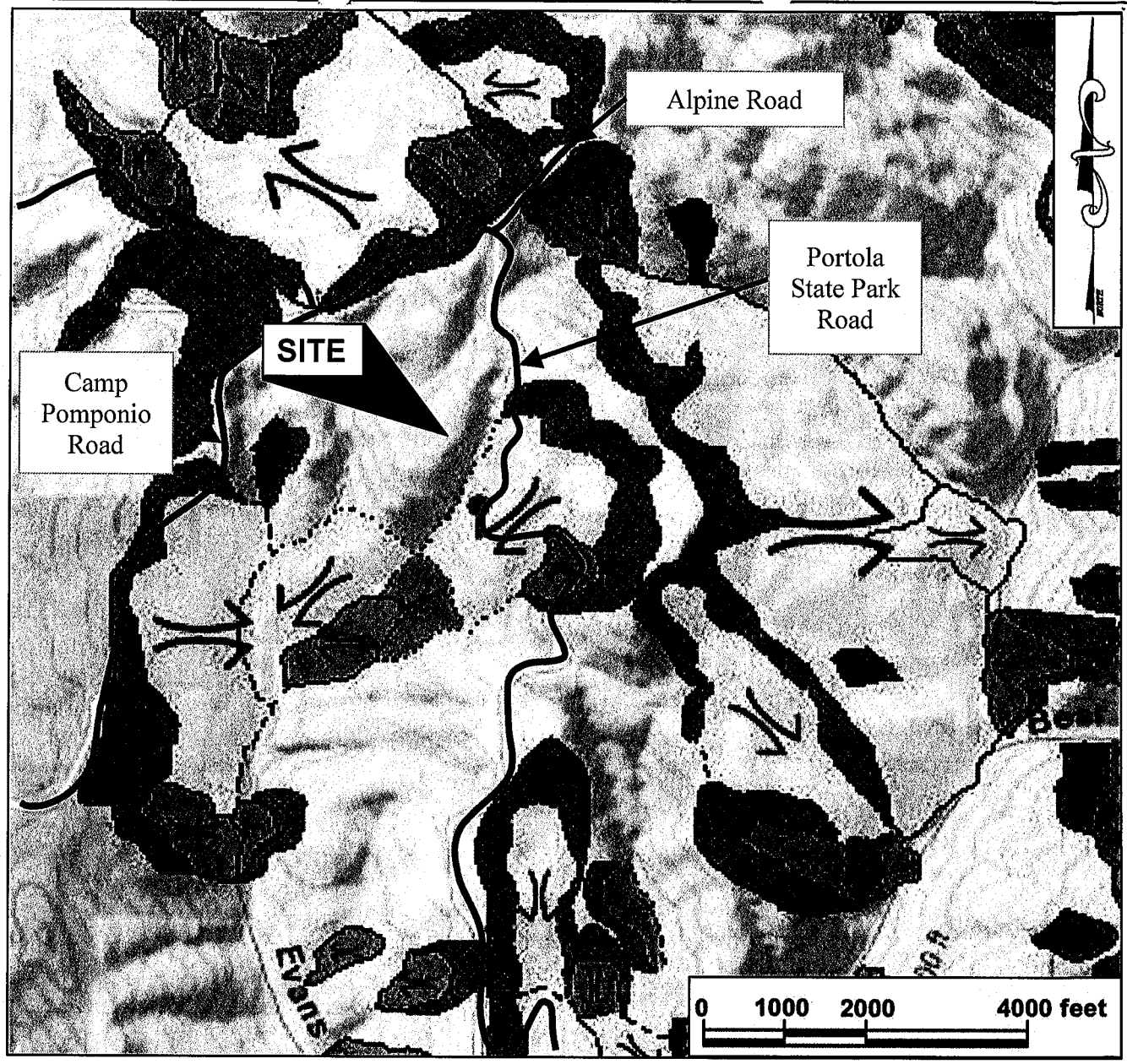
Note: No indications of possible active landslide movement along Camp Pomponio or Portola State Park Roads except as indicated (see discussion in text).

Base is Preliminary Map of Landslide Deposits in San Mateo County, California (Brabb and Pampeyan, 1972a) (annotated).

PRELIMINARY MAP OF LANDSLIDES (BRABB & PAMPEYAN, 1972)
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 4
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS



LEGEND

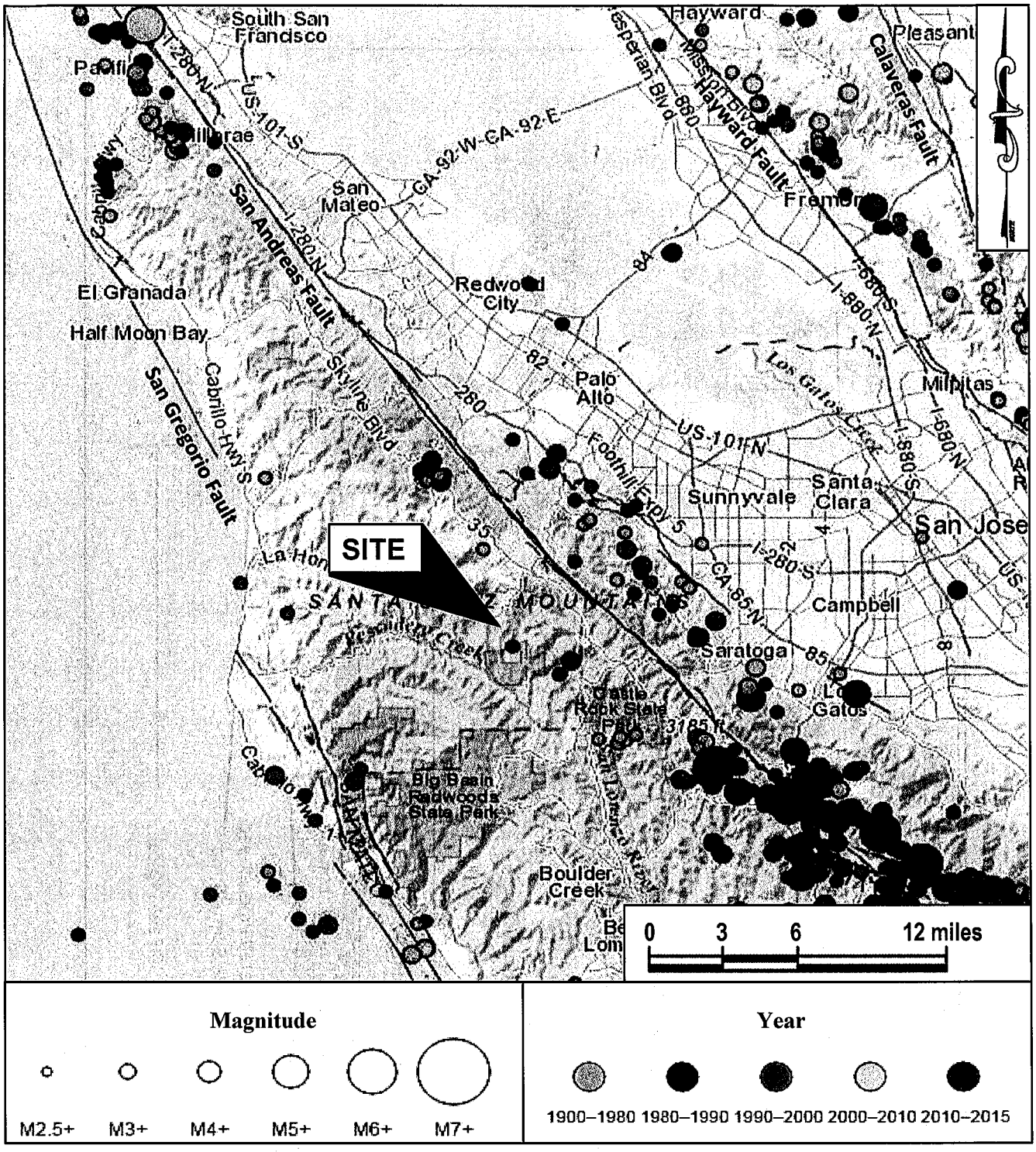
- Landslide source or scarp
- Active
- Dormant, young
- Dormant, mature
- Dormant, old/relict
- Rock slide
- Roads observed during reconnaissance (highlighted in orange)

Base is Landslide Inventory Beta Map, California Geological Survey (internet accessed 2019).

LANDSLIDE INVENTORY BETA MAP (CGS)
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 5
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

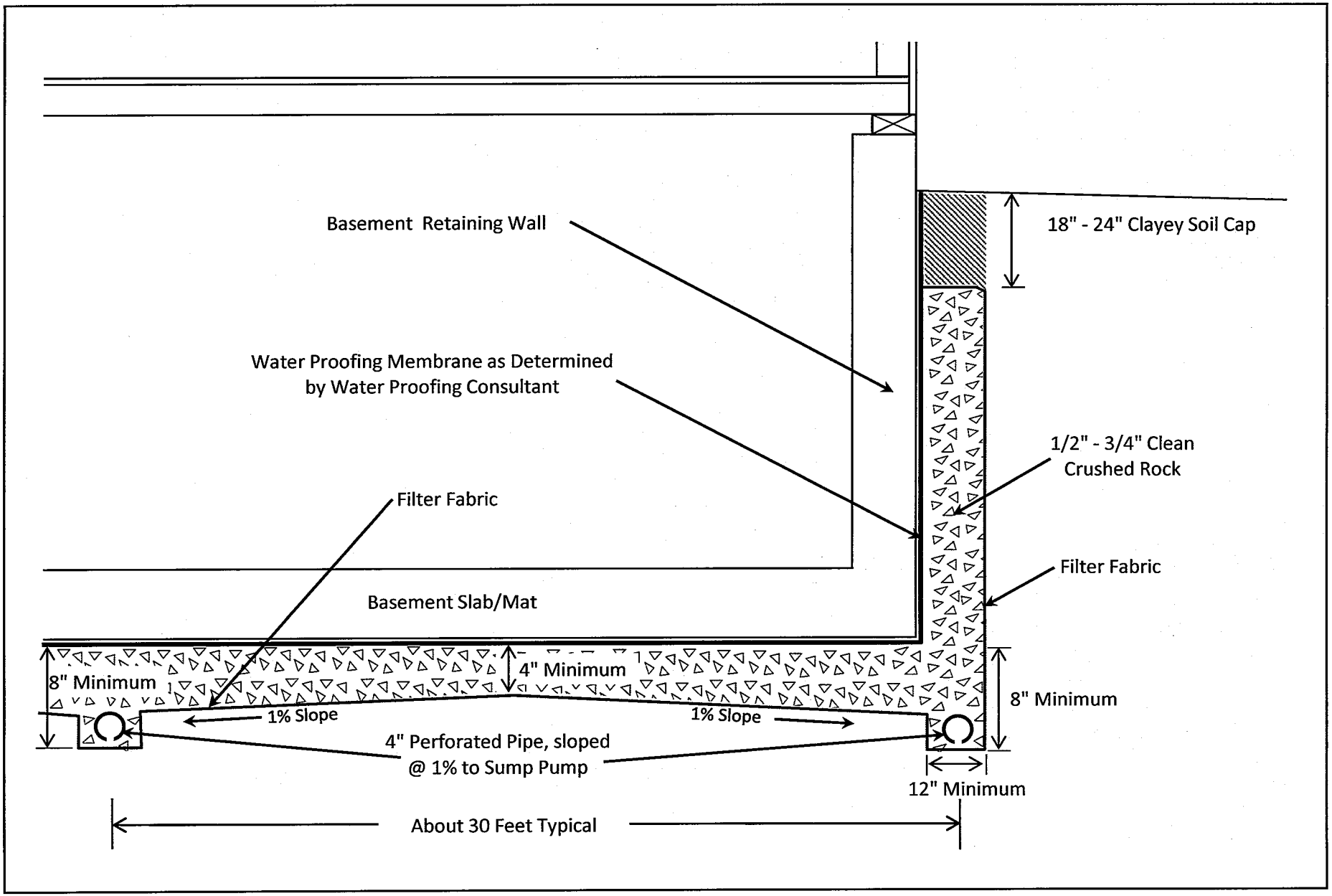


Earthquakes with M5+ from 1900 to 1980, M2.5+ from 1980 to January 2015. Faults with activity in last 15,000 years. Based on data sources from Northern California Earthquake Data Center and USGS Quaternary Fault and Fold Database, accessed May 2015.

REGIONAL FAULT AND SEISMICITY MAP
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 6
JUNE 2019
PROJECT NO. 4779-1

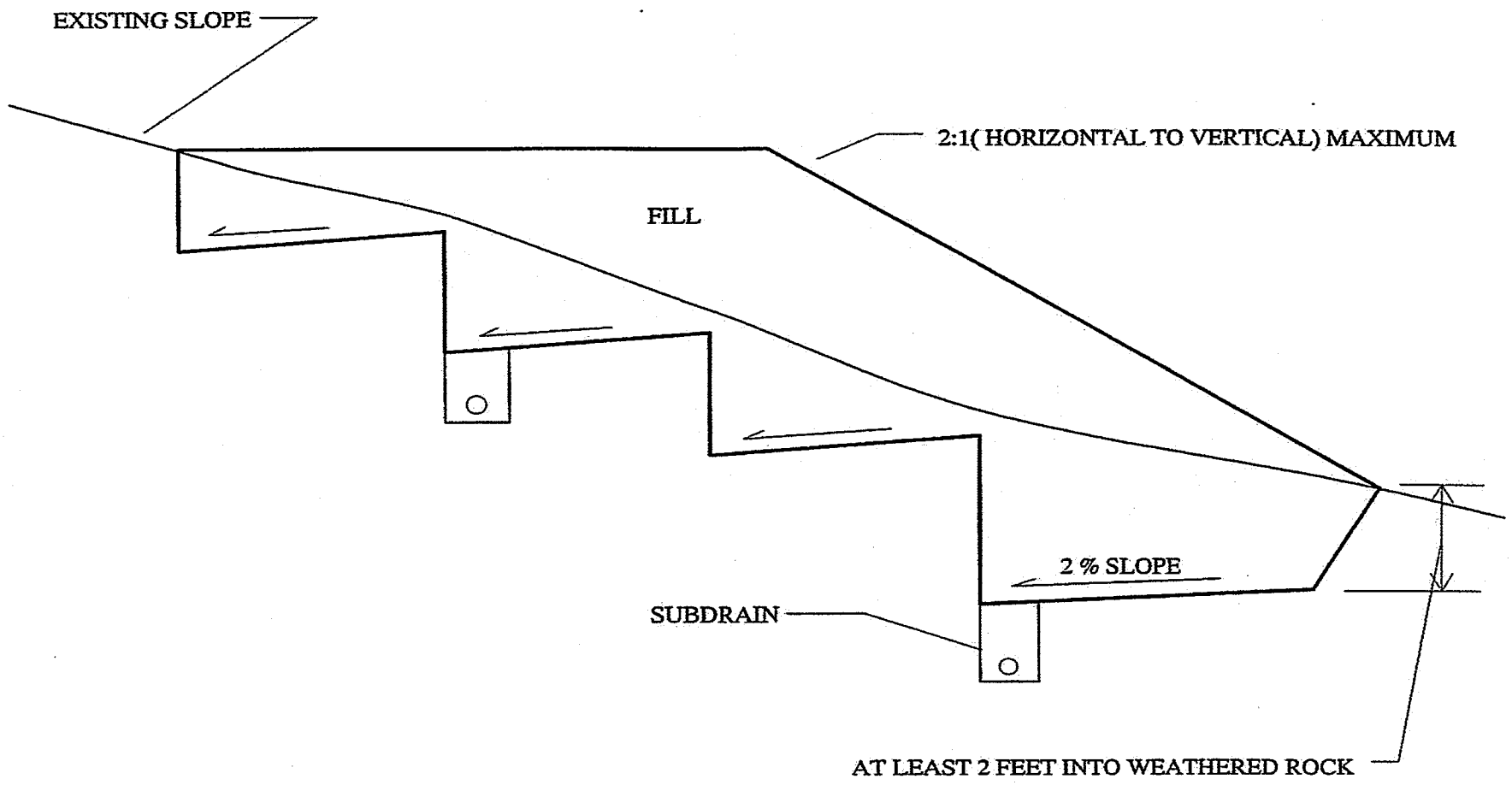
ROMIG ENGINEERS



SUBSLAB DRAINAGE DETAIL
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

ROMIG ENGINEERS

FIGURE 7
JUNE 2019
PROJECT NO. 4779-1



NOT-TO-SCALE

NOTE: LOCATION AND NUMBER OF SUBDRAINS, IF ANY, TO BE ESTABLISHED IN THE FIELD DURING GRADING

CONCEPTUAL SLOPE BENCHING DETAIL
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE 8
JUNE 2019
PROJECT NO. 4779-1

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APPENDIX A

FIELD INVESTIGATION

Our representative logged the soils encountered during drilling and samples were obtained at depths appropriate to the investigation. The samples were taken to our laboratory where they were examined and classified in accordance with the Unified Soil Classification System. The logs of our borings, as well as a summary of the soil classification system (Figure A-1), are attached.

Several tests were performed in the field during drilling. The standard penetration test resistance was determined by dropping a 140-pound hammer through a 30-inch free fall and recording the blows required to drive the 2-inch (outside diameter) sampler 18 inches. The standard penetration test (SPT) resistance is the number of blows required to drive the sampler the last 12 inches and is recorded on the boring logs at the appropriate depths. Soil samples were also collected using a 2.5-inch and a 3.0-inch O.D. drive sampler. The blow counts shown on the logs for these samplers do not represent SPT values and have not been corrected in any way.

The locations and relative elevations of the borings were established by pacing using the topographic survey provided to us by Lea and Braze Engineering, Inc., dated April 23, 2019 and should be considered accurate only to the degree implied by the method used.

The boring logs and related information depict our interpretation of subsurface conditions only at the specific location and time indicated. Subsurface conditions and ground water levels at other locations may differ from conditions at the location where sampling was conducted. The passage of time may also result in changes in the subsurface conditions.

USCS SOIL CLASSIFICATION

PRIMARY DIVISIONS			SOIL TYPE	SECONDARY DIVISIONS
COARSE GRAINED SOILS (< 50 % Fines)	GRAVEL	CLEAN GRAVEL (< 5% Fines)	GW	Well graded gravel, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVEL with FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SAND	CLEAN SAND (< 5% Fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (> 50 % Fines)	SILT AND CLAY Liquid limit < 50%		ML	Inorganic silts and very fine sands, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silts and organic clays of low plasticity.
	SILT AND CLAY Liquid limit > 50%		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soil.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.
BEDROCK			BR	Weathered bedrock.

RELATIVE DENSITY

SAND & GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	OVER 50

CONSISTENCY

SILT & CLAY	STRENGTH^	BLOWS/FOOT*
VERY SOFT	0 to 0.25	0 to 2
SOFT	0.25 to 0.5	2 to 4
FIRM	0.5 to 1	4 to 8
STIFF	1 to 2	8 to 16
VERY STIFF	2 to 4	16 to 32
HARD	OVER 4	OVER 32

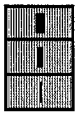
GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILT & CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	
12 "	3"	0.75"		4	10	40	200
SIEVE OPENINGS				U.S. STANDARD SERIES SIEVE			

Classification is based on the Unified Soil Classification System; fines refer to soil passing a No. 200 sieve.

* Standard Penetration Test (SPT) resistance, using a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler; blow counts not corrected for larger diameter samplers.

^ Unconfined Compressive strength in tons/sq. ft. as estimated by SPT resistance, field and laboratory tests, and/or visual observation.



KEY TO SAMPLERS

Modified California Sampler (3-inch O.D.)

Mid-size Sampler (2.5-inch O.D.)

Standard Penetration Test Sampler (2-inch O.D.)

KEY TO EXPLORATORY BORING LOGS
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE A-1
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

WEATHERING

Fresh
Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.

Very Slight
Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.

Slight
Rock generally fresh, joints stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.

Moderate
Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some are clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.

Moderately Severe
All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.

Severe
All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.

Very Severe
All rock except quartz discolored and stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.

Complete
Rock reduced to "soil". Rock fabric not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

HARDNESS

Very hard
Cannot be scratched with knife or sharp pick. Hand specimens requires several hard blows of geologist's.

Hard
Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.

Moderately Hard
Can be scratched with knife or pick. Gouges or grooves to 1/4 inch deep can be excavated by hard blow of point of a geologist's pick. Hard specimen can be detached by moderate blow.

Medium
Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1 inch maximum size by hard blows of the point of a geologist's pick.

Soft
Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be brocken by finger pressure.

Very Soft
Can be carved with knife. Can be excavated readily with point of pick. Pieces 1 inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

JOINT BEDDING AND FOLIATION SPACING

Spacing	Joints	Bedding and Foliation
Less than 2 in.	Very Close	Very Thin
2 in. to 1 ft.	Close	Thin
1 ft. to 3 ft.	Moderately Close	Medium
3 ft. to 10 ft.	Wide	Thick
More than 10 ft.	Very Wide	Very Thick

ROCK QUALITY DESIGNATOR (RQD)

RQD, as a percentage	Descriptor
Exceeding 90	Excellent
90 to 75	Good
75 to 50	Fair
50 to 25	Poor
Less than 25	Very Poor

KEY TO BEDROCK DESCRIPTIONS
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE A-2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 8-1/4" Hollow Stem Auger **LOGGED BY:** LF

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 450 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Colluvium: Dark brown, Clayey Silt, moist, fine to medium grained sand, low plasticity, roots.	Firm to Stiff	ML		0					
						7	47		
						12	53		
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, manganese oxide staining on fractures, orange mottling.	Soft	BR		5		24	49		
Dark brown clay seams, internally sheared.						33	62		
						33	57		
				10		30	57		
				15		54	55		
Increase in moisture, increase in clay content, internally sheared.				20		20	61		
Continued on Next Page									

EXPLORATORY BORING LOG EB-1
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-1
PAGE 1 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LE

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 450 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, manganese oxide staining on fractures, orange mottling.	Soft	BR		20					
				25		19	55		
Dark brown, clay seam, inclined at approximatley 45°.				30		43	54		
Bottom of Boring at 30 feet.				35					
				40					

Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.

*Measured using Torvane and Pocket Penetrometer devices.

EXPLORATORY BORING LOG EB-1
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-1
PAGE 2 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LF

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 447 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Colluvium: Dark brown, Clayey Silt, moist, fine to medium grained sand, low plasticity, sandstone fragments, roots.	Firm to Stiff	ML		0		7	43		
						11	50		
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, dark brown clay seams, fractured, brecciated.	Soft	BR		5		21	62		
						9	65		
						13			
				10		7	70		
				15		16	70		
				20		23	61		
Continued on Next Page									

EXPLORATORY BORING LOG EB-2
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-2

JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LR

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 447 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, dark brown clay seams, fractured, brecciated.	Soft	BR		20					
				25		28	62		
						13	47		
Orange mottling.				30					
						18	54		
Dark gray-brown, very moist, friable, some randomly oriented polished surfaces.				35					
						21	61		
Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.									
*Measured using Torvane and Pocket Penetrometer devices.	Medium Hard			40		50/5"	42		
Bottom of Boring at 39.9 feet.									

EXPLORATORY BORING LOG EB-2
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-2
PAGE 2 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 8-1/4" Hollow Stem Auger **LOGGED BY:** LF

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 436 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, friable, manganese oxide staining on fracture surfaces, orange mottling.	Soft	BR		**0**					
Dark brown clay seams.						26	13		
						15	52		
				5		26	59		
Brown clay seams, internally sheared.						31	61		
						43	50		
Brown clay seams, internally sheared.				**10**		31	56		
				15		18	61		
Very moist.				**20**		29	48		
Continued on Next Page									

EXPLORATORY BORING LOG EB-3
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-3
PAGE 1 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LR

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 436 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, friable, manganese oxide staining on fracture surfaces, orange mottling.	Soft	BR		20					
Dark brown, Silty Sandstone, moist, very fine grained, severely weathered, micaceous.				25		52	51		
Bottom of Boring at 25 feet.				30					
				35					
				40					

Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.

*Measured using Torvane and Pocket Penetrometer devices.

EXPLORATORY BORING LOG EB-3
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-3
PAGE 2 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 8-1/4" Hollow Stem Auger **LOGGED BY:** LF

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 452 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Colluvium: Dark brown, Clayey Silt, moist, fine to medium grained sand, low plasticity, roots.	Firm	ML		0					
						5	43		
Residual Soil: Brown, Sandy Lean Clay, moist, fine to coarse grained sand, low to moderate plasticity, bedrock fragments, few roots.	Stiff	CL				9	32		
				5					
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, friable, dark brown clay seams in fractures, brecciated.	Soft	BR				26	35		
						32	36		
						27	42		
				10		35	40		
				15		29	53		
				20		25	60		
Continued on Next Page									

EXPLORATORY BORING LOG EB-4
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-4

JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LE

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 452 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Monterey Formation: Light brown, Siltstone, moist, very severely weathered, fractured, friable, dark brown clay seams in fractures, brecciated.	Soft	BR		20					
				25		24	61		
Bottom of Boring at 25 feet.				30					
				35					
				40					

Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.

*Measured using Torvane and Pocket Penetrometer devices.

EXPLORATORY BORING LOG EB-4
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-4
PAGE 2 OF 2
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

DRILL TYPE: Mobile Drill B-53 with 7-1/4" Hollow Stem Auger **LOGGED BY:** LF

DEPTH TO GROUND WATER: Not Encountered **SURFACE ELEVATION:** 459 feet. **DATE DRILLED:** 04/23/19

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	PEN. RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Colluvium: Dark brown, Clayey Silt, moist, fine to medium grained sand, low plasticity, roots, bedrock fragments. ■ Liquid Limit = 45, Plasticity Index = 12.	Stiff	ML		0		12	39		
Monterey Formation: Light orange to brown, Siltstone, moist, very severely weathered, dark brown clay seams, brecciated.	Soft	BR		5		6 11 13 17	63 64 64 61		
Bottom of Boring at 8 feet.				10 15 20					

Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.

*Measured using Torvane and Pocket Penetrometer devices.

EXPLORATORY BORING LOG EB-5
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

BORING EB-5
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS

APPENDIX B

LABORATORY TESTS

Samples from subsurface exploration were selected for tests to help evaluate the physical and engineering properties of the soils encountered at the site. The tests that were performed are briefly described below.

The natural moisture content was determined in accordance with ASTM D2216 on nearly all of the soil samples recovered from the borings. This test determines the moisture content, representative of field conditions at the time the samples were collected. The results are presented on the boring logs at the appropriate sample depths.

The Atterberg Limits were determined on one sample of soil in accordance with ASTM D4318. The Atterberg Limits are the moisture content within which the soil is workable or plastic. The results of this test are presented in Figure B-1 and on the log of Boring EB-5 at the appropriate sample depth.

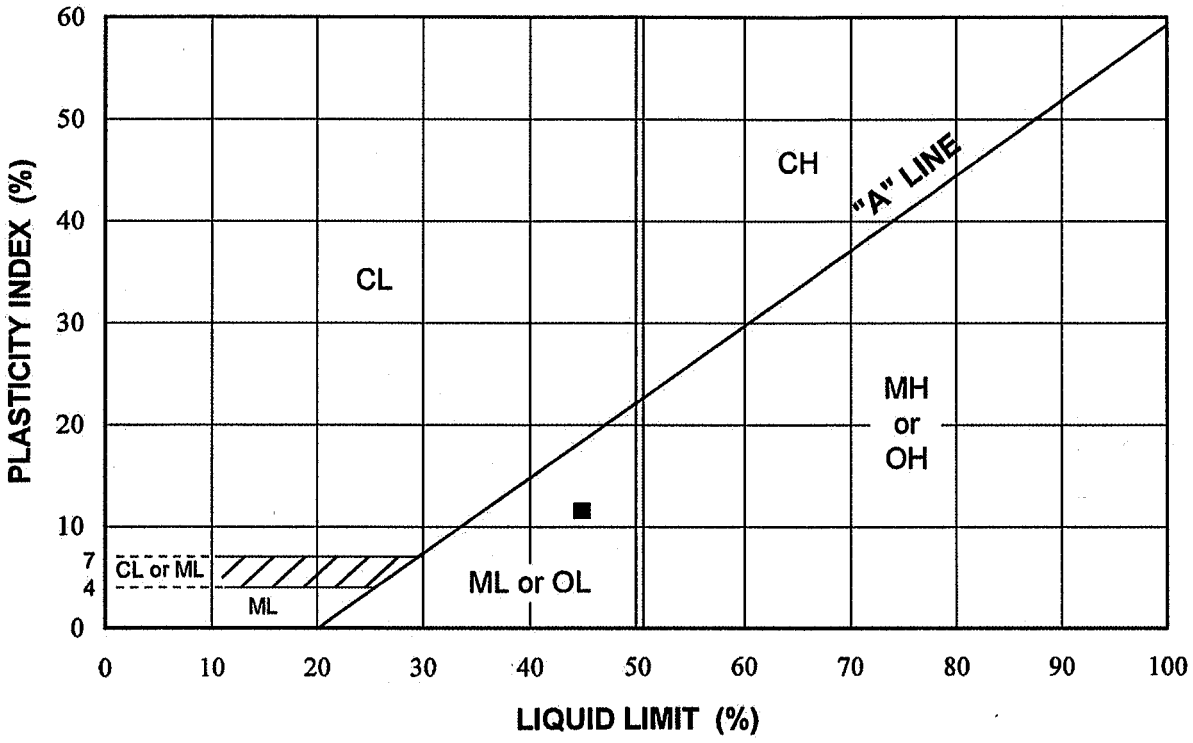
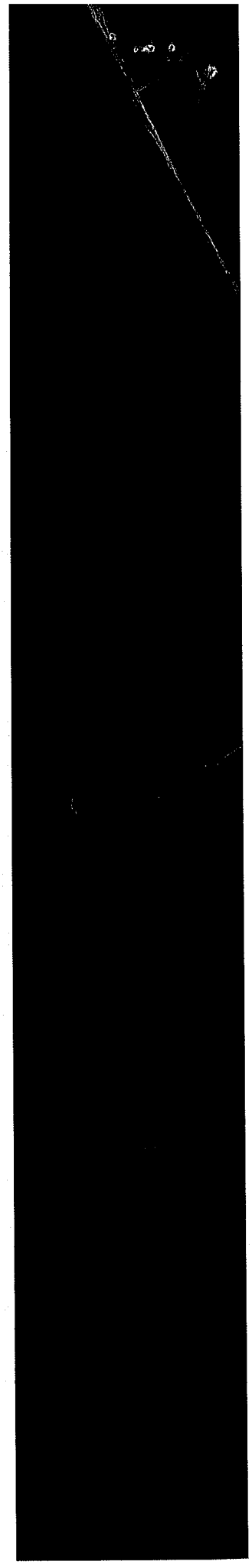


Chart Symbol	Boring Number	Sample Depth (feet)	Water Content (percent)	Liquid Limit (percent)	Plasticity Index (percent)	Liquidity Index (percent)	Passing No. 200 Sieve (percent)	USCS Soil Classification
■	EB-5	0.5-2	39	45	12			ML

PLASTICITY CHART
BEIGELMAN RESIDENCE
LA HONDA, CALIFORNIA

FIGURE B-1
JUNE 2019
PROJECT NO. 4779-1

ROMIG ENGINEERS



ROMIG ENGINEERS

ROMIG ENGINEERS, INC.

1390 El Camino Real, 2nd Floor

San Carlos, California 94070

Phone: (650) 591-5224

www.romigengineers.com

COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT C

LEA & BRAZE ENGINEERING, INC.
CIVIL ENGINEERS | LAND SURVEYORS

Main Office:
2495 Industrial Pkwy. West
Hayward, CA 94545
Ph: 510.887.4086
Fx: 510.887.3019

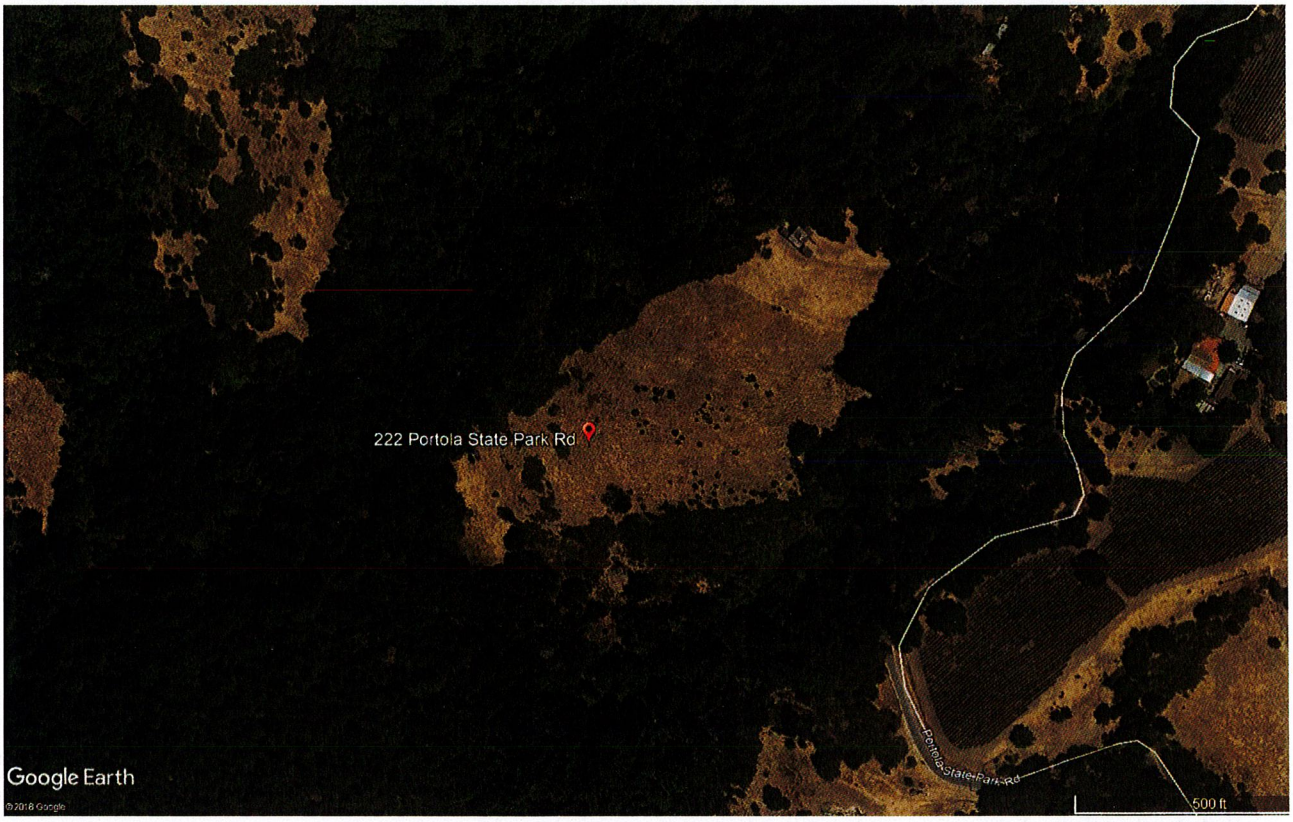
Sacramento Region:
3017 Douglas Blvd., Ste. 300
Roseville, CA 95661
Ph: 916.966.1338
Fx: 916.797.7363

Job: 2181412 CI
Dated: July 18, 2019

HYDROLOGY STUDY

222 Portola State Park Road
La Honda, California
(Unincorporated San Mateo County)

APN: 085-100-260



This package includes:

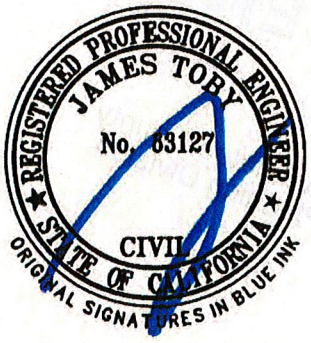
- Information Sheet
- Site Hydrology Calculations
- Site Hydrology Exhibits

References:

- Topographic Survey by Lea & Braze Engineering, Inc.
- Grading and Drainage Plan by Lea & Braze Engineering, Inc.
- NOAA Precipitation Intensity Map & Chart

Site Information:

Site Location: 222 Portola State Park Road
La Honda, California
APN: 085-100-260



Project Information:

Gross Lot Size: 1,706,663 sqft. (39.180 acre)

Existing Site Impervious Area:	2,098 sqft.	(0.048 acre)
Proposed Site Impervious Area:	10,050 sqft.	(0.231 acre)
Net Change of Impervious Area:	+7,952 sqft.	(+0.183 acre) Net Increase

(Pervious Paving = Pervious Pavers, Gravel & Turf Cell Driveway & Walkways)

Existing Site Pervious Paving:	8,843 sqft.	(0.203 acre)
Proposed Site Pervious Paving:	11,264 sqft.	(0.259 acre)
Net Change of Pervious paving:	+2,421 sqft.	(+0.056 acre) Net Increase

Existing Site Developed Area:	10,941 sqft.	(0.251 acre)
Proposed Site Developed Area:	21,314 sqft.	(0.490 acre)
Net Change of Developed Area:	+10,373 sqft.	(+0.239 acre) Net Increase

Hydrology Information: (Per NOAA Rainfall Intensity Map & Chart)

Storm Interval:	10 Year Return Storm
Initial Time of Concentration (Tc):	5 minutes
Rainfall Intensity (I):	10 year @ 5 minutes = 4.55 in/hr
Runoff Coefficient (C):	0.90 for Impervious areas, 0.60 for Semi-Pervious areas 0.30 for Pervious areas
Critical Duration for Retention:	12 minutes
Watershed:	Pilarcitos
FEMA Flood Zone Designation:	Zone X

Project Introduction:

The approximately 39.18 acre, irregularly-shaped, parcel is located on the west side of Portola State Park Road in a lightly developed, rural, hillside area in an un-incorporated area of the City of La Honda. The site is bounded by Portola State Park Road to the east and undeveloped, or very lightly developed, large parcels of land on the remaining sides.

Natural grades at the site slope moderately down in all directions from a hilltop located in the northern portion of the parcel. The proposed project is located south of the hill top with the topography in the vicinity of the proposed development sloping moderately to the south at a slope

of approximately 2:1 (horizontal to vertical) with a flatter area (4:1 to 10:1) in the area of the proposed development. Drainage across the property can be generally characterized as uncontrolled sheet flow to the south toward the un-developed neighboring property to the south.

The property is currently occupied by a small single-family residence, with an attached garage, located in the northwest corner of the property. The site is accessed by a gravel driveway extending west from Portola State Park Road to the attached garage. A small shed and concrete walkway are located at the residence. Two dirt paths lead from the residence to a wood water tank at the top of the hill. The remainder of the site is covered with native grasses and various young to mature trees.

Lea & Braze understands at this time the proposed project will demolish and remove the existing residence. We further understand that a new single-story residence will be constructed in approximately the same location as the existing residence. A new green house and library building will be constructed southeast of the residence. The existing gravel driveway will be paved with asphaltic concrete to access a gravel parking area at the garage. will be constructed in approximately the same location as the existing driveway. A new driveway will extend west, around a large lawn area south of the residence and will extend southeast to the green house and library.

The existing developed site area is approximately 10,941 square feet, with the total proposed developed area being 21,314 square feet, resulting in a net increase in developed area of approximately 10,373 square feet.

Hydrology Calculation Method:

The rational method was used for runoff calculations based on the San Mateo County Drainage Criteria for a 10 year storm event. The initial Time of Concentration was assumed to be 5 minutes. Intensity was taken from the site specific NOAA Rainfall Intensity Map & Chart to be 4.55 inches per hour. The C-value for impervious areas is taken as 0.90. The C-value for pervious paving area is taken to be 0.60. The C-value for pervious areas is taken as 0.30.

The project proposes to create and replace more than 50% of the existing impervious surface. Therefore, the County of San Mateo requires pre-construction runoff to be based on the undeveloped site condition for the purposes of stormwater retention and metering. The goal is to reduce the amount of storm water runoff through the use of an underground, retention and metering system to reduce post-construction runoff to below the undeveloped site runoff rate and provide a system capable of retaining the additional runoff.

Undeveloped Condition	Post-Construction (Without Metering)	Net Change	
Q = 53.481 cfs.	Q = 54.819 cfs.	Q = +0.654 cfs	(2.5% Increase)

Proposed Drainage Improvements: A series of vegetated swales, catch basins, area drains and trench drains are proposed to collect site storm water runoff from the area around the new construction. Collected runoff will be directed to a below grade stormwater retention and metering system and then to a rocked outfall energy dissipater located in the landscape area downhill of the retention system to be released overland as sheet flow in the historical direction.

Retention System Design Summary: To provide a dynamic analysis of the system performance, a HydroCAD model, using the rational method for calculations, using an IDF curve based on the intensities provided by the NOAA stormwater intensity chart for the site for a 10 year return storm

with a 5 minute initial time of concentration. (Refer to appendix A for the site map and hydrology information and hydrology exhibits)

To determine the overall post-construction runoff, drainage from the site was analyzed to determine which areas would be subject to capture by the new on-site retention system and which areas would bypass the system. The proposed site drainage exhibit indicates that runoff from the residence, lawn area, green house, driveways and walkways surrounding the new construction and the portion of undeveloped area subject to capture in the vegetated swales will be subject to capture by the new on-site retention system.

Runoff from the eastern portion of the driveway, fire truck turnout, and the remainder of the of undeveloped area will not be captured and will be allowed to sheet flow down the hillside as is the current condition. (Refer to the proposed site drainage exhibit in Appendix A for details.)

The system is designed based on HydroCAD modeling of the system in the following manner:

1. Based on HydroCAD modeling, using an initial time of concentration of 5 minutes, a 36 inch diameter storage pipe with a 5.00 inch diameter metering orifice, and an 8" overflow grate, the retention system was sized so that the post-development storm events for both captured and uncaptured runoff will not exceed the 10 year pre-development storm event release rates.

   The retention system, as designed, consists of (1) 36" diameter solid pipe 80 feet long, providing a total retention volume of 565 cubic feet.

2. Based on the peak release rate and retention sizing, the HydroCAD model was run for the 10 year storm event to verify that the site peak release and retention storage volume are within the required parameters. (Refer to appendix B for site hydrology calculations and HydroCAD modeling results)

A summary of the HydroCAD modeling results is provided below:

10 year storm undeveloped site

Time of Concentration:	5 minutes
Rainfall Intensity:	4.55 in/hr
Calculated Runoff:	52.04 cfs

10 year post-construction

Time of Concentration:	5 minutes	
Rainfall Intensity:	4.55 in/hr	
Uncaptured Runoff:	50.29 cfs	
Metered Outflow:	0.92 cfs	
Total Runoff:	51.21 cfs	(< 52.04 O.K.)
Critical Duration:	13 minutes	
Rainfall Intensity:	2.96 in/hr	
Uncaptured Runoff:	33.90 cfs	
Metered Outflow:	1.02 cfs	
Total Runoff:	34.92 cfs	(< 52.04 O.K.)

Maximum Stored Runoff:	465 cf
Available Storage:	565 cf (> 465 O.K.)

Based on our calculations and the HydroCAD modeling results, Lea & Braze Engineering, Inc., believes that the proposed stormwater retention system is adequate to perform its intended function and is in conformance with the County of San Mateo design criteria.

Provision C.3 Considerations:

Regulated Project Status: Based on the results of the Provision C.3 and C.6 Development Review Checklist, this project is a single family residence that is not a special land use category and proposes to create or replace greater than 10,000 square feet of impervious surface. Therefore, the project must implement source control and low impact site design measures to the fullest extent possible.

Source Control Measures: All storm drain inlets shall be marked with the words "No Dumping – Flows to Bay" or the equivalent. Landscape source control measures include retaining the existing vegetation and minimizing the use of pesticides and fertilizers to the fullest extent possible.

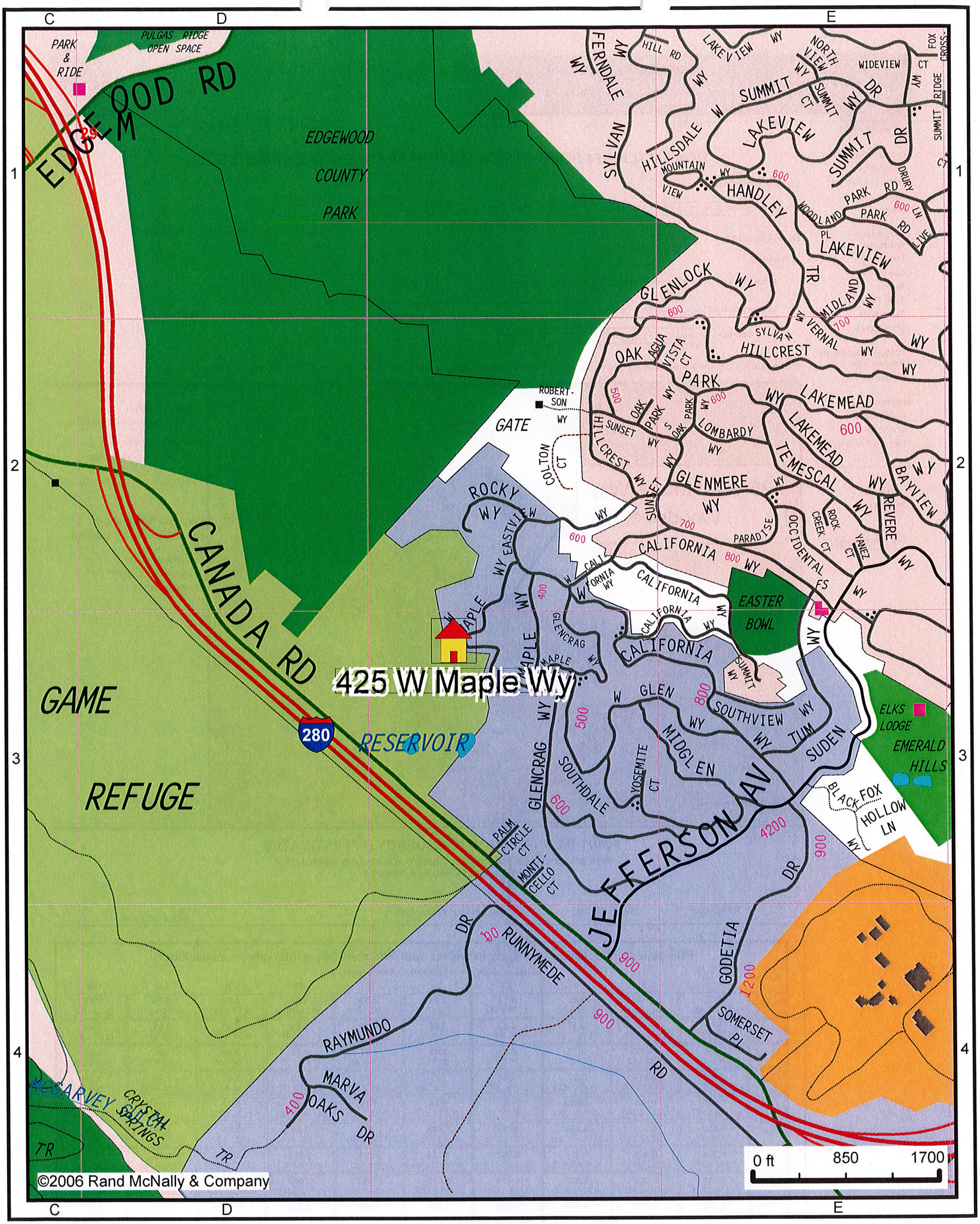
Low Impact Development Site Design Measures: Site design measures proposed for this project include directing runoff from roofs, driveways and walkways onto vegetated areas, and constructing driveways with pervious paving materials.

Conclusion:

Based on our calculations, Lea & Braze Engineering, Inc., believes that the proposed grading and drainage design is adequate to perform its intended function and is in conformance with the County of San Mateo drainage design criteria. Refer to the included exhibits and calculation sheets for specific information regarding the site drainage design.

APPENDIX A

SITE MAP, HYDROLOGY DATA
&
HYDROLOGY EXHIBITS



425 W Maple Wy: Woodside,CA 94062, 789 - E3

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation intensity | Units: English | Time series type: Partial duration

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: [ ] Longitude: [ ] Submit

b) By station (list of CA stations): Select station

c) By address: 425 W Maple Way, Woodside, CA

2) Use map (if ESRI interactive map is not loading, try adding the host: **https://js.arcgis.com/** to the firewall, or contact us at hdsc.questions@noaa.gov):

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

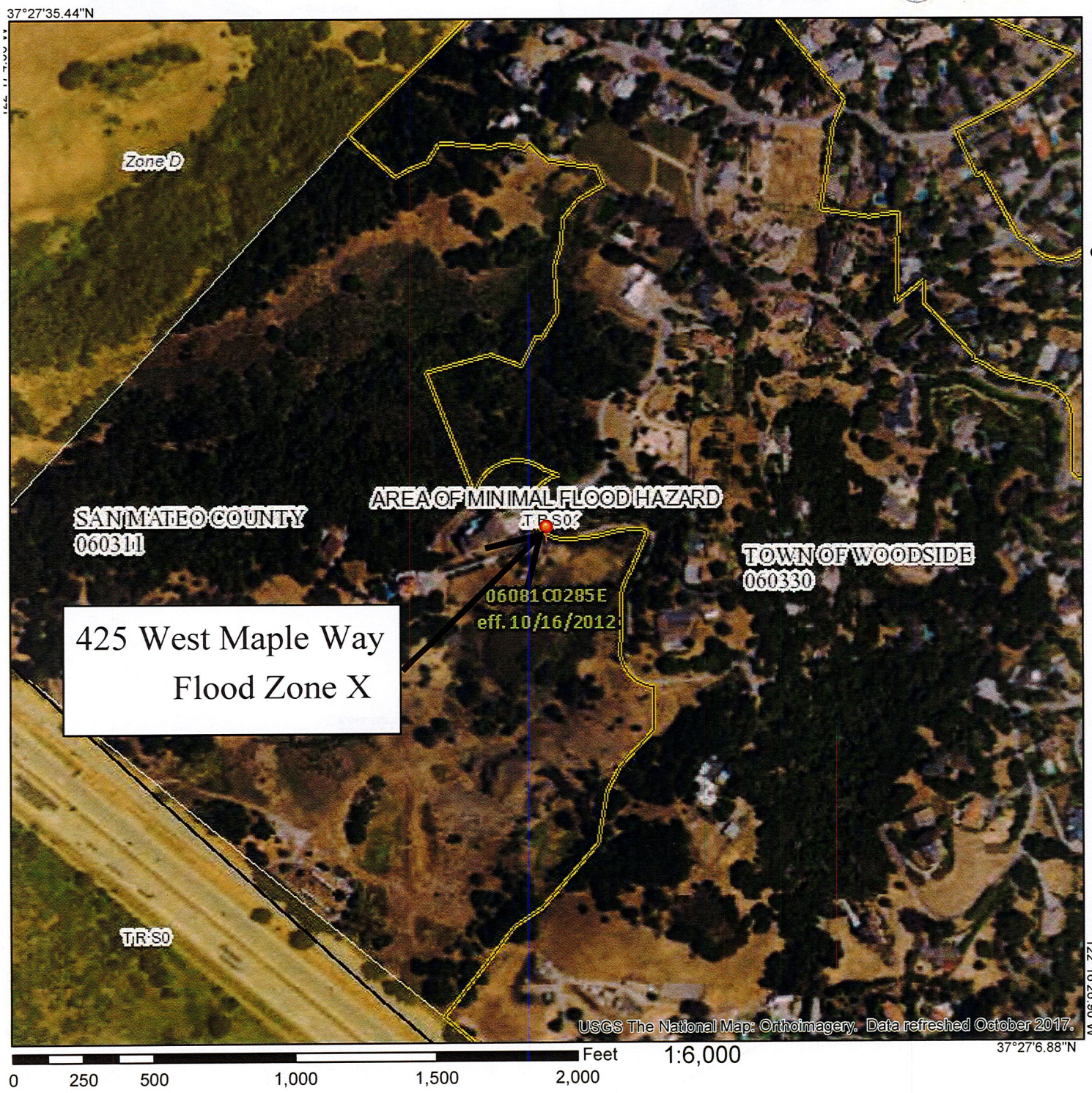
PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years) 1	2	5	10	25	50	100	200	500	1000
5-min	1.97 (1.72-2.28)	2.42 (2.11-2.81)	3.02 (2.63-3.52)	3.54 (3.05-4.15)	4.24 (3.52-5.16)	4.80 (3.89-5.99)	5.38 (4.24-6.89)	5.99 (4.57-7.92)	6.86 (5.00-9.50)	7.56 (5.30-10.9)
10-min	1.41 (1.23-1.63)	1.73 (1.51-2.01)	2.17 (1.88-2.53)	2.53 (2.18-2.98)	3.04 (2.52-3.70)	3.44 (2.78-4.29)	3.85 (3.04-4.94)	4.30 (3.28-5.68)	4.91 (3.58-6.81)	5.42 (3.80-7.81)
15-min	1.14 (0.992-1.32)	1.40 (1.22-1.62)	1.75 (1.52-2.04)	2.04 (1.76-2.40)	2.45 (2.03-2.98)	2.77 (2.24-3.46)	3.10 (2.45-3.98)	3.46 (2.64-4.58)	3.96 (2.89-5.49)	4.37 (3.07-6.29)
30-min	0.792 (0.690-0.916)	0.974 (0.850-1.13)	1.22 (1.06-1.42)	1.42 (1.23-1.67)	1.71 (1.41-2.08)	1.93 (1.56-2.41)	2.16 (1.70-2.77)	2.41 (1.84-3.19)	2.76 (2.01-3.82)	3.04 (2.14-4.38)
60-min	0.559 (0.488-0.647)	0.689 (0.601-0.799)	0.862 (0.749-1.00)	1.01 (0.866-1.18)	1.21 (1.00-1.47)	1.36 (1.11-1.70)	1.53 (1.20-1.96)	1.70 (1.30-2.25)	1.95 (1.42-2.70)	2.15 (1.51-3.10)
2-hr	0.410 (0.358-0.474)	0.501 (0.437-0.581)	0.623 (0.542-0.724)	0.724 (0.624-0.850)	0.864 (0.716-1.05)	0.974 (0.788-1.21)	1.09 (0.857-1.39)	1.21 (0.923-1.60)	1.38 (1.00-1.91)	1.52 (1.06-2.18)
3-hr	0.344 (0.300-0.398)	0.421 (0.367-0.488)	0.523 (0.454-0.608)	0.607 (0.523-0.713)	0.724 (0.600-0.882)	0.816 (0.661-1.02)	0.911 (0.718-1.17)	1.01 (0.773-1.34)	1.15 (0.840-1.60)	1.27 (0.889-1.82)
6-hr	0.245 (0.214-0.284)	0.302 (0.263-0.350)	0.377 (0.327-0.438)	0.439 (0.378-0.515)	0.525 (0.435-0.639)	0.593 (0.480-0.739)	0.662 (0.522-0.849)	0.736 (0.562-0.974)	0.839 (0.612-1.16)	0.922 (0.647-1.33)
12-hr	0.160	0.200	0.254	0.298	0.360	0.408	0.459	0.512	0.586	0.645

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Are of 1% annual chance flood with averag depth less than one foot or with draina areas of less than one square mile *Zone*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zo*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

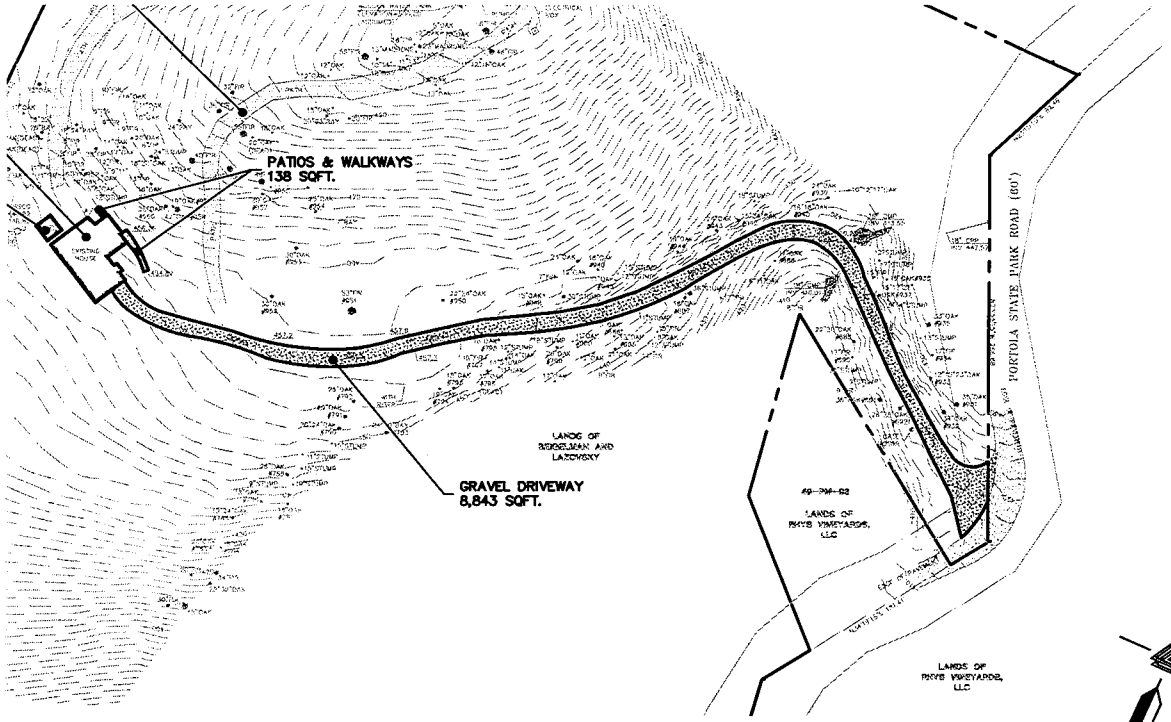
N

The pin displayed on the map is an approxima point selected by the user and does not repres an authoritative property location.

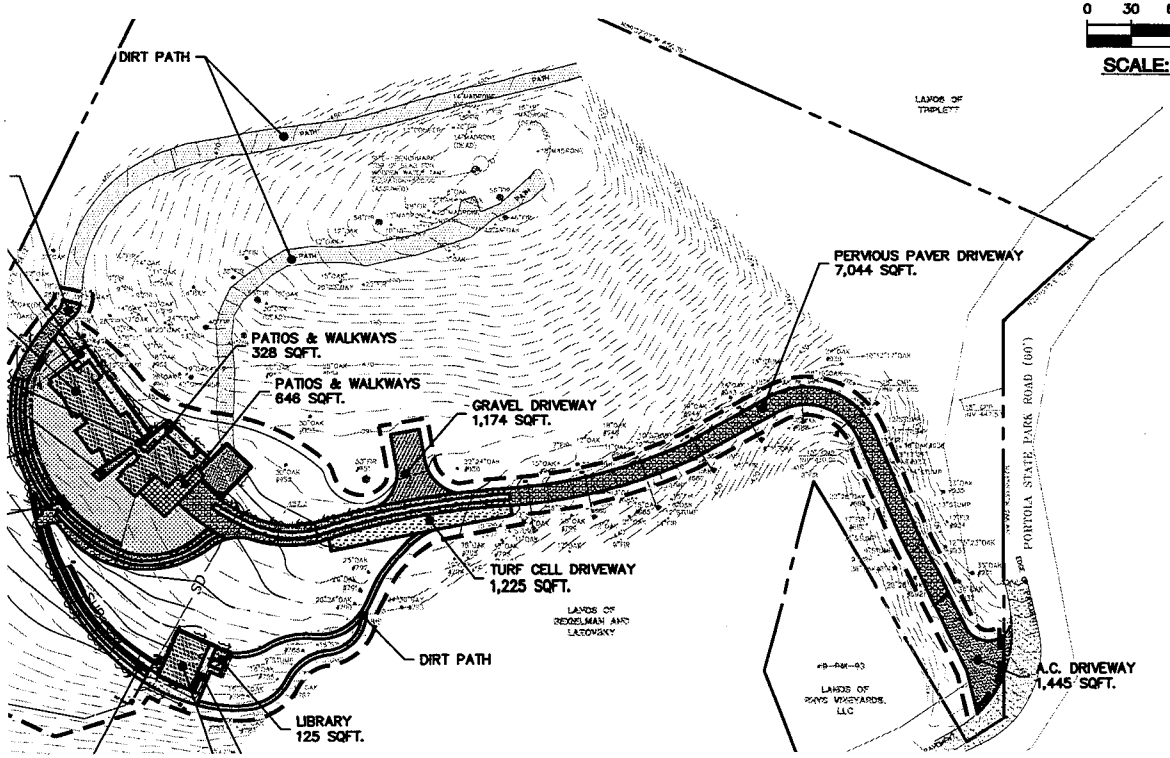
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/6/2018 at 4:47:42 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



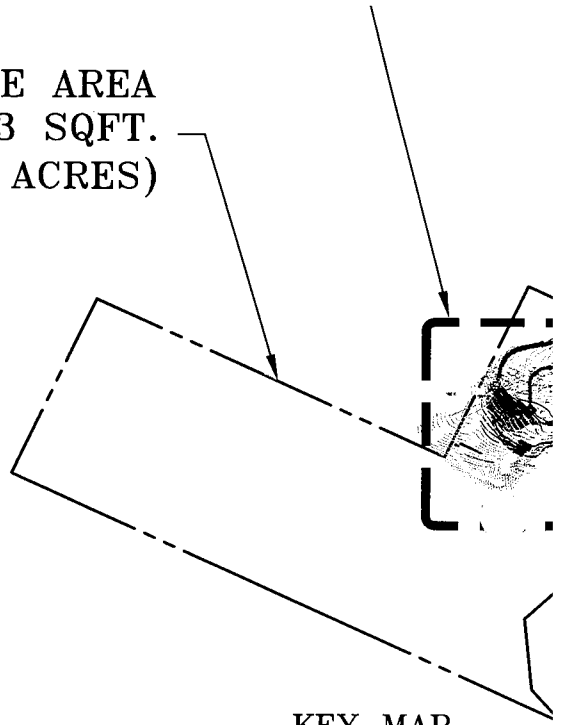
EXISTING



0 30 60 120

SCALE: 1" = 60'

GROSS SITE AREA
1,706,663 SQFT.
(39.180 ACRES)



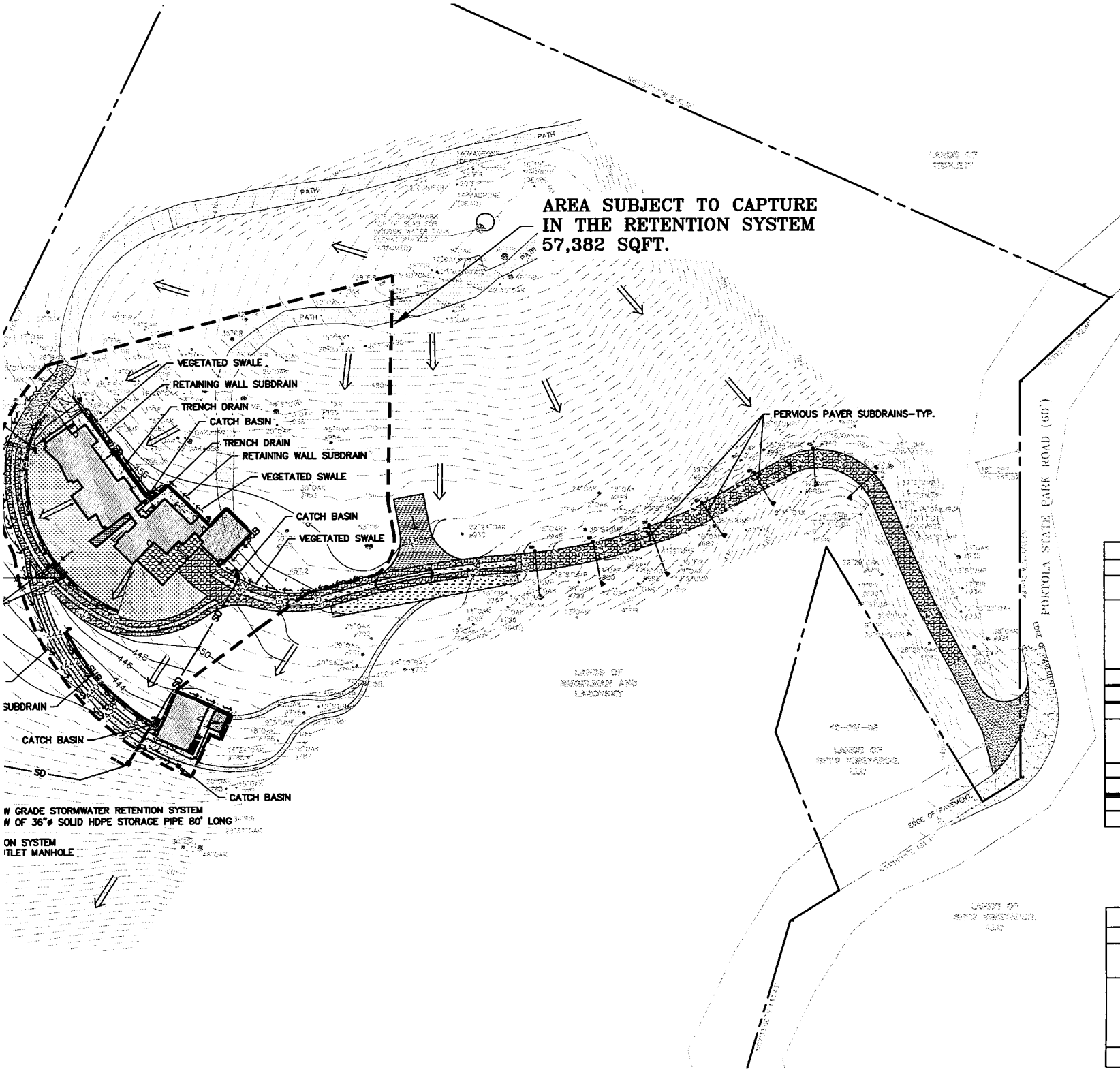
KEY MAP

0 500 300 600

SCALE: 1" = 300'

DEVELOPMENT INF

TOTAL SITE AREA	1,706,663 SQUARE FE	
TOTAL DISTURBED AREA	83,000 SQUARE FE	
IMPERVIOUS AREAS	TOTAL S.F. EXISTING	TOT RE
RESIDENCE	1,793	1
SHED	167	
GREEN HOUSE	0	
LIBRARY	0	
A.C. / CONCRETE DRIVEWAY	0	
CONCRETE PATIOS & WALKWAYS	138	
TOTAL IMPERVIOUS AREA	2,098	2
NET CHANGE IN IMPERVIOUS AREA	+7,952 SQFT (NET INC	



DEVELOPMENT INF

TOTAL SITE AREA	1,706,663 SQUARE FE	
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IMPERVIOUS AREAS	TOTAL S.F. EXISTING	TOT RE
RESIDENCE	1,793	
SHED	167	
GREEN HOUSE	0	
LIBRARY	0	
A.C. / CONCRETE DRIVEWAY	0	
CONCRETE PATIOS & WALKWAYS	138	
TOTAL IMPERVIOUS AREA	2,098	
NET CHANGE IN IMPERVIOUS AREA	+7,952 SQFT (NET INC	
SEMI-PERVIOUS AREAS		
PERVIOUS PAVER DRIVEWAY	0	
GRAVEL DRIVEWAY	8,843	
TURF CELL DRIVEWAY	0	
GRAVEL PATIOS & WALKWAYS	0	
TOTAL SEMI-PERVIOUS AREA	8,843	
NET CHANGE IN SEMI-PERVIOUS AREA	+2,421 SQFT (NET DEC	
TOTAL DEVELOPED AREA	10,941	1
NET CHANGE IN DEVELOPED AREA	+10,373 SQFT (NET INC	

RETENTION SYSTEM I

HYDROLOGY STUDY AREA	1,706,663 SQUARE FE
AREA SUBJECT TO CAPTURE	57,382 SQUARE FEE
IMPERVIOUS AREA	PROPOSED TOTAL S.F.
RESIDENCE	3,930
SHED	0
GREEN HOUSE	779
LIBRARY	125
A.C. / CONCRETE DRIVEWAY	3,109
CONCRETE PATIOS & WALKWAYS	2,107
TOTAL IMPERVIOUS AREA	10,050

APPENDIX B

HYDROLOGY CALCULATIONS

HYDROCAD MODELING RESULTS

LEA & BRAZE ENGINEERING, INC.
CIVIL ENGINEERS · LAND SURVEYORS
2495 Industrial Parkway West
Hayward, California 94545
(510) 887-4086
Fax (510) 887-3019
WWW.LEABRAZE.COM

PROJECT	DATE
222 Portola State Park Road	July 18, 2019
JOB NO.	BY
2181412	R. West

SITE DEVELOPMENT CALCULATIONS

NET SITE AREA:	1,706,663 sqft.	=	39.180 acre	
EXISTING AREA:				
Impervious:	2,098 sqft.	=	0.048 acre	
Semi-Pervious:	8,843 sqft.	=	0.203 acre	
Developed Area:	10,941 sqft.	=	0.251 acre	
Pervious:	1,695,722 sqft.	=	38.929 acre	
PROPOSED AREA:				
Impervious:	10,050 sqft.	=	0.231 acre	
Semi-Pervious:	11,264 sqft.	=	0.259 acre	
Developed Area:	21,314 sqft.	=	0.490 acre	
Pervious:	1,685,349 sqft.	=	38.690 acre	
NET CHANGE OF AREAS:				
Impervious:	7,952 sqft.	=	0.183 acre	(Net Increase)
Semi-Pervious:	2,421 sqft.	=	0.056 acre	(Net Increase)
Developed Area:	10,373 sqft.	=	0.239 acre	**(Net Increase)**

BREAKDOWN OF DEVELOPED AREA

Existing:

Impervious

Residence	1,793 sqft.
Shed	167 sqft.
Green House	0 sqft.
Library	0 sqft.
A.C. / Concrete Driveway	0 sqft.
Concrete Patios & Walkways	138 sqft.
Sub-Total	2,098 sqft.

Semi-Pervious

Pervious Paver Driveway	0 sqft.
Gravel Driveway	8,843 sqft.
Turf Cell Driveway	0 sqft.
Gravel Patios & Walkways	0 sqft.
Sub-Total	8,843 sqft.
TOTAL	**10,941 sqft.**

Proposed:

Impervious

Residence	3,930 sqft.
Shed	0 sqft.
Green House	779 sqft.
Library	125 sqft.
A.C. / Concrete Driveway	3,109 sqft.
Concrete Patios & Walkways	2,107 sqft.
Sub-Total	10,050 sqft.

Semi-Pervious

Pervious Paver Driveway	8,865 sqft.
Gravel Driveway	1,174 sqft.
Turf Cell Driveway	1,225 sqft.
Gravel Patios & Walkways	0 sqft.
Sub-Total	11,264 sqft.
TOTAL	**21,314 sqft.**

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PROJECT	DATE
222 Portola State Park Road	July 18, 2019
JOB NO.	BY
2181412	R. West

SITE HYDROLOGY CALCULATION SUMMARY

Calculations based on a 10 year event with a 5 Minute Initial Time of Concentration

"C" Values

Impervious Areas: C= 0.90
Semi-Pervious Areas: C= 0.60
Pervious Areas = C= 0.30

Rain Fall intensity (I)

I = 4.550 in/hr (From NOAA Web Site)

Un-Developed:

Pervious = 1,706,663 sqft = 39.180 acre
Q = 53.481

Total Undeveloped Run-off = 53.481 cfs

Pre-Construction:

Impervious = 2,098 sqft = 0.048 acre
Q = 0.197

Semi-Pervious = 8,843 sqft = 0.203 acre
Q = 0.831

Pervious = 1,695,722 sqft = 38.928 acre
Q = 53.137

Total Pre-Construction Run-off = 54.165 cfs

Post-Construction Without Metering:

Impervious = 10,050 sqft = 0.231 acre
Q = 0.946

Semi-Pervious = 11,264 sqft = 0.259 acre
Q = 1.061

Pervious = 1,685,349 sqft = 38.690 acre
Q = 52.812

Total Post-Construction Run-off = 54.819 cfs Without Metering

Change in Run-Off Without Metering

$\Delta Q = Q_{POST} - Q_{EXISTING}$

ΔQ = 0.654 c.f.s. **(NET INCREASE)**

Post-Construction Runoff With Metering: (From Metering & Retention Calculations)

Total Post-Construction Run-off = 53.219 cfs

Change in Run-Off With Metering

$\Delta Q = Q_{POST} - Q_{EXISTING}$

ΔQ = -0.946 c.f.s. **With Metering** **(NET DECREASE)**

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2181412	R. West

PRELIMINARY METERING & RETENTION CALCULATIONS

Calculations based on a 10 year event with a 5 Minute Initial Time of Concentration

DESIGN CRITERIA

Retain and Meter runoff from a 10 year storm event with a 5 minute initial time of concentration without increasing the peak runoff rate above the undeveloped condition flow rate

MAXIMUM TOTAL POST-CONSTRUCTION RUNOFF ALLOWED (Undeveloped Rate) **53.481 cfs**

Impervious Area (Un-Captured)	1,545 sqft 0.036 acre	Q =	0.147 cfs
Semi-Pervious Area (Un-Captured)	8,287 sqft 0.191 acre	Q =	0.521 cfs
Pervious Area (Un-Captured)	1,639,549 sqft 37.639 acre	Q =	51.377 cfs
Total Runoff Rate For Non-Captured Areas		Q =	52.045 cfs

MAXIMUM METERING RATE ALLOWED FOR CAPTURED AREA **1.436 cfs**

METERED RELEASE VOLUME

$(Q)_{gal/min}$ = (Orifice Diameter)^2 * (19.63 * Orifice Coefficent * sqrt(h))

Orifice Coefficent = 0.62 (for a circular orifice, thickness < d/4)
h = Headwater - Tailwater (diameter of storage pipe)

Orifice Calculator

Given Input Data:

Solving for ..... Peak Release Rate Based on Orifice Diameter

Orifice Diameter	**5.000 in**
Coefficient	0.62
Storage Pipe Diameter	3.00 ft

Computed Results:

Flow Rate	527.002 gal/min
	1.174 cf/sec
	4,226 cf/hr
Volume Metered in 60 minutes	4,226.40 cf
Flow Rate	1.174 cfs

1.174 < 1.436 O.K.

TOTAL RUNOFF WITH METERING **53.219 < 53.481 O.K.**

STORAGE VOLUME REQUIRED

Impervious Area (Captured)	8,505 sqft		
	0.195 acre	Q =	0.799 cfs
Semi-Pervious Area (Captured)	2,977 sqft		
	0.068 acre	Q =	0.186 cfs
Pervious Area (Captured)	45,800 sqft		
	1.051 acre	Q =	1.435 cfs
		T otal Captured Q =	2.420 cfs

Post-Construction Runoff Volume	726 cuft	5 min = 300 sec
Metered Release Volume	352 cuft	5 min = 300 sec
Calculated Storage Volume	374 cuft	
Factor of Safety	1.5	
Minimum Required Storage Volume	561 cuft	

RETENTION SYSTEM SIZING CALCULATIONS

Diameter of Pipe =	36 in
Number of Pipes =	1
Length of Pipes =	80.00 ft.
Area of Pipe =	7.07 sf.
Volume of Pipes =	565 cf.

Storage Volume =	**565 cf.**	**>**	**561 cf.**	**O.K.**

LEA & BRAZE ENGINEERING, INC.
CIVIL ENGINEERS · LAND SURVEYORS
2495 Industrial Parkway West
Hayward, California 94545
(510) 887-4086
Fax (510) 887-3019
WWW.LEABRAZE.COM

PROJECT	DATE
222 Portola State Park Road	July 18, 2019
JOB NO.	BY
2181412	R. West

HYDROCAD MODELING RESULT SUMMARY

DESIGN CRITERIA

Retain and Meter runoff from a 10 year storm event with a 5 minute initial time of concentration without increasing the peak runoff rate above the undeveloped condition flow rate

10 Year Storm Undeveloped Condition

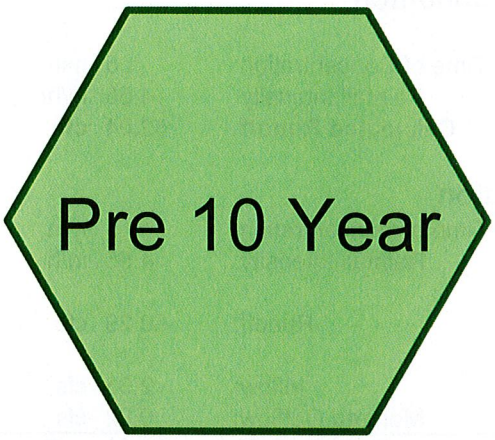
	Time of Concentration:	5	min			
	Rainfall Intensity:	4.55	in/hr			
	Calculated Runoff:	**52.04**	**cfs**			

10 Year Storm Post-Construction

	Time of Concentration:	5	min			
	Rainfall Intensity:	4.55	in/hr			
Non-Captured Runoff	Runoff:	50.29	cfs			
Captured Runoff	Inflow:	2.33	cfs			
	Metered Outflow:	0.92	cfs			
	Total Runoff:	**51.21**	**cuft**	**<**	**52.04**	**OK**

Retention System Critical Duration Analysis

	Critical Duration:	12	min			
	Rainfall Intensity:	2.96	in/hr			
Non-Captured Runoff	Runoff:	33.90	cfs			
Captured Runoff	Inflow:	1.57	cfs			
	Metered Outflow:	1.02	cfs			
	Total Runoff:	**34.92**	**cuft**	**<**	**52.04**	**OK**
	Detention Time:	5.3	min	(Plug Flow Method)		
	Maximum Depth of Runoff in Retention System:	2.50	ft	@	13.8 min	
	Maximum Runoff Stored in System:	465	cuft			
	Avalable Storage Volume:	**565**	**cuft**	**>**	**465**	**OK**



Pre-Construction 10 Year Storm

Routing Diagram for 2181412 Pre Development 10 Year
Prepared by Lea & Braze Engineering, Inc.

Summary for Subcatchment Pre 10 Year: Pre-Construction 10 Year Storm

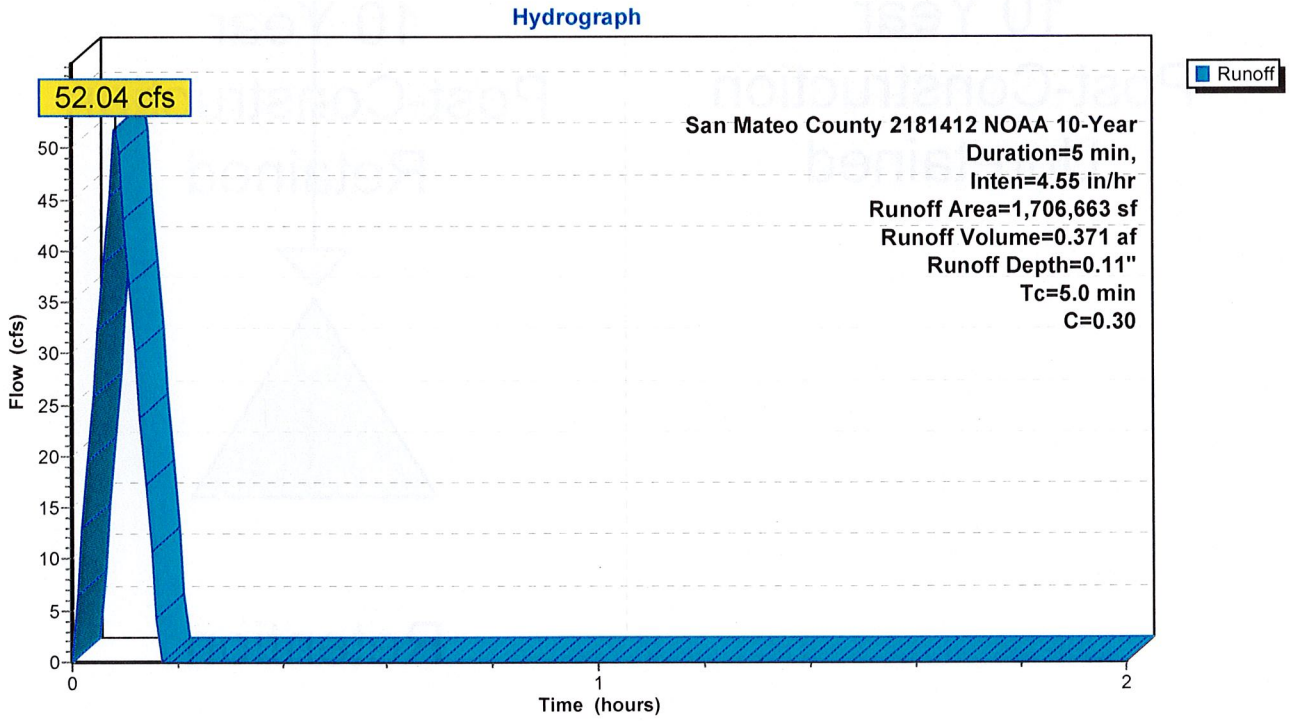
Runoff = 52.04 cfs @ 0.08 hrs, Volume= 0.371 af, Depth= 0.11"

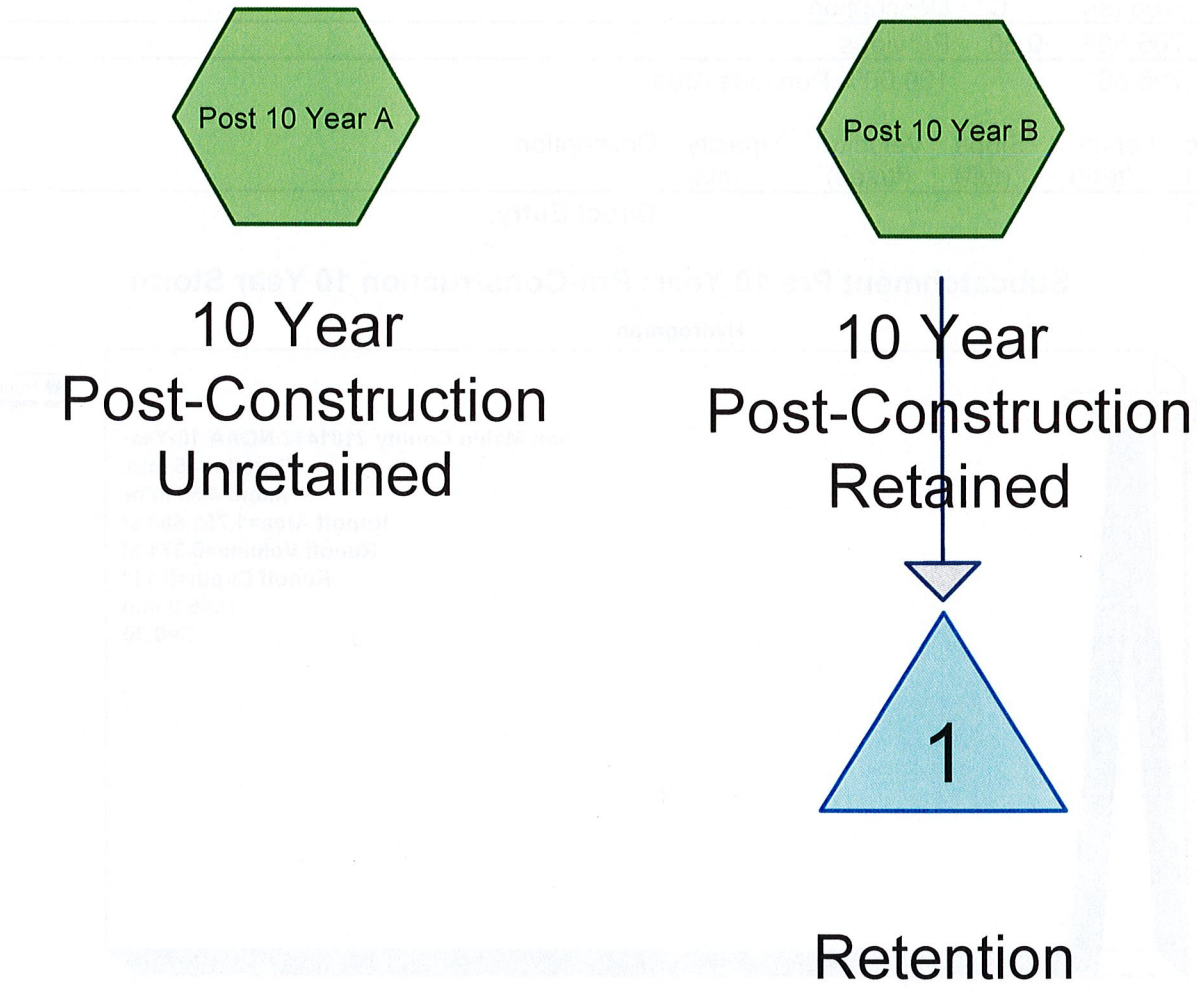
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs
San Mateo County 2181412 NOAA 10-Year Duration=5 min, Inten=4.55 in/hr

Area (sf)	C	Description
1,706,663	0.30	Pervious
1,706,663		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment Pre 10 Year: Pre-Construction 10 Year Storm





Subcat Reach Pond Link

Routing Diagram for 2181412 Post Development 10 Year
Prepared by Lea & Braze Engineering, Inc.

Summary for Subcatchment Post 10 Year A: 10 Year Post-Construction Unretained

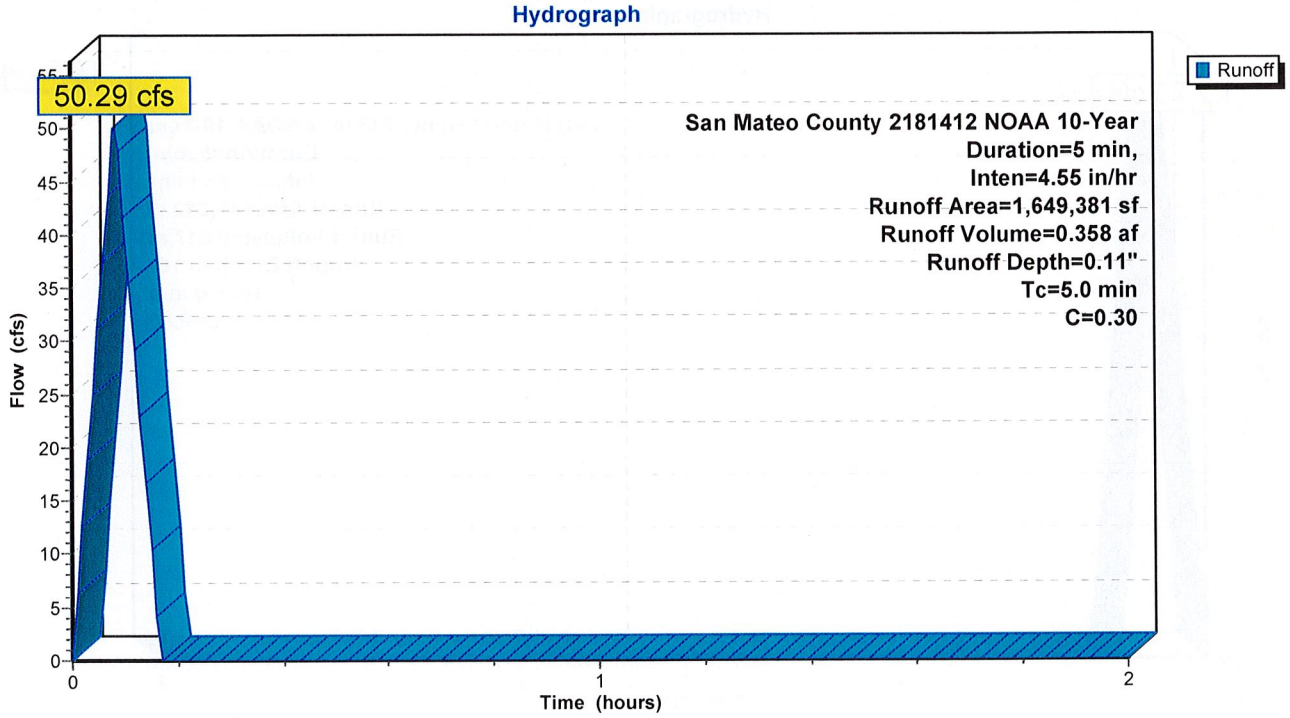
Runoff = 50.29 cfs @ 0.08 hrs, Volume= 0.358 af, Depth= 0.11"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs
San Mateo County 2181412 NOAA 10-Year Duration=5 min, Inten=4.55 in/hr

Area (sf)	C	Description
1,545	0.90	Impervious
8,287	0.60	Semi-Pervious
1,639,549	0.30	Pervious
1,649,381	0.30	Weighted Average
1,649,381		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment Post 10 Year A: 10 Year Post-Construction Unretained



Summary for Subcatchment Post 10 Year B: 10 Year Post-Construction Retained

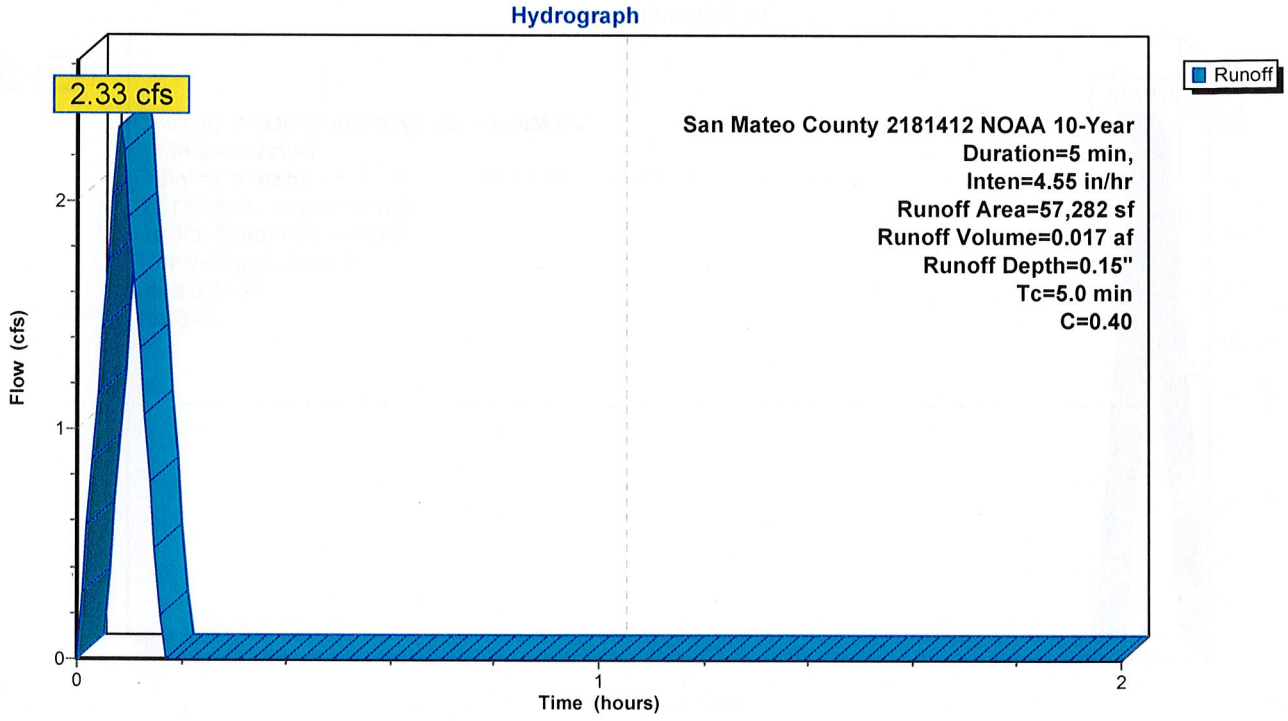
Runoff = 2.33 cfs @ 0.08 hrs, Volume= 0.017 af, Depth= 0.15"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs
San Mateo County 2181412 NOAA 10-Year Duration=5 min, Inten=4.55 in/hr

Area (sf)	C	Description
8,505	0.90	Impervious
2,977	0.60	Semi-Pervious
45,800	0.30	Pervious
57,282	0.40	Weighted Average
57,282		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment Post 10 Year B: 10 Year Post-Construction Retained



Summary for Pond 1: Retention

Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth = 0.15" for 10-Year event
Inflow = 2.33 cfs @ 0.08 hrs, Volume= 0.017 af
Outflow = 0.92 cfs @ 0.13 hrs, Volume= 0.017 af, Atten= 60%, Lag= 3.1 min
Primary = 0.92 cfs @ 0.13 hrs, Volume= 0.017 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 421.33' @ 0.13 hrs Surf.Area= 231 sf Storage= 373 cf

Plug-Flow detention time= 4.5 min calculated for 0.017 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (9.5 - 5.0)

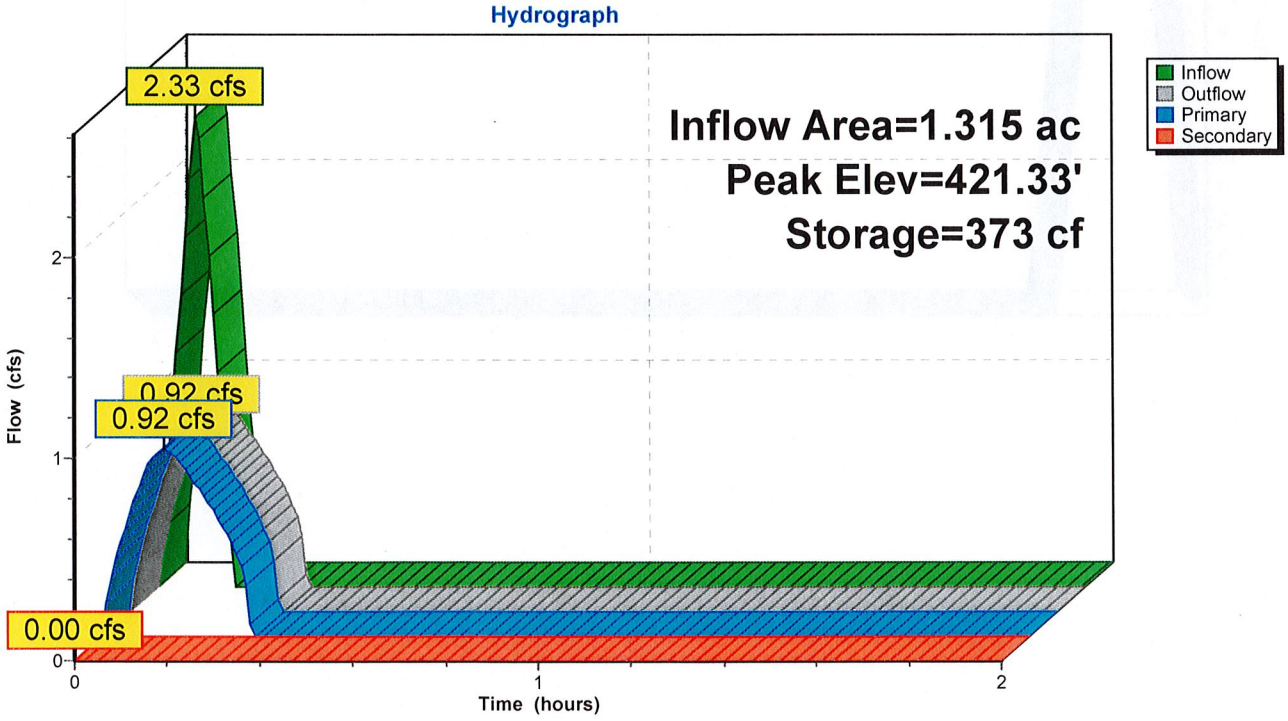
Volume	Invert	Avail.Storage	Storage Description
#1	419.25'	565 cf	**36.0" Round Pipe Storage** L= 80.0' S= 0.0050 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	419.15'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	423.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.92 cfs @ 0.13 hrs HW=421.33' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.92 cfs @ 6.75 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=419.25' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1: Retention



Summary for Subcatchment Post 10 Year A: 10 Year Post-Construction Unretained

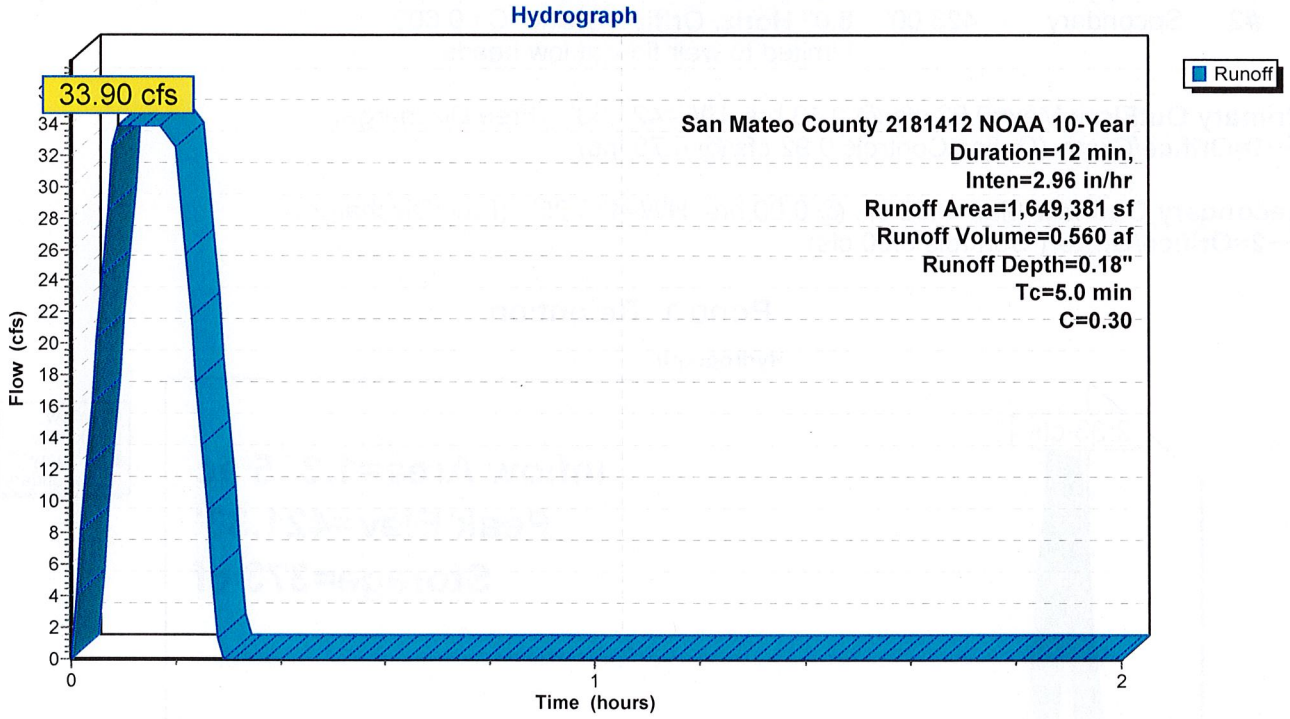
Runoff = 33.90 cfs @ 0.09 hrs, Volume= 0.560 af, Depth= 0.18"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs
San Mateo County 2181412 NOAA 10-Year Duration=12 min, Inten=2.96 in/hr

Area (sf)	C	Description
1,545	0.90	Impervious
8,287	0.60	Semi-Pervious
1,639,549	0.30	Pervious
1,649,381	0.30	Weighted Average
1,649,381		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment Post 10 Year A: 10 Year Post-Construction Unretained



Summary for Subcatchment Post 10 Year B: 10 Year Post-Construction Retained

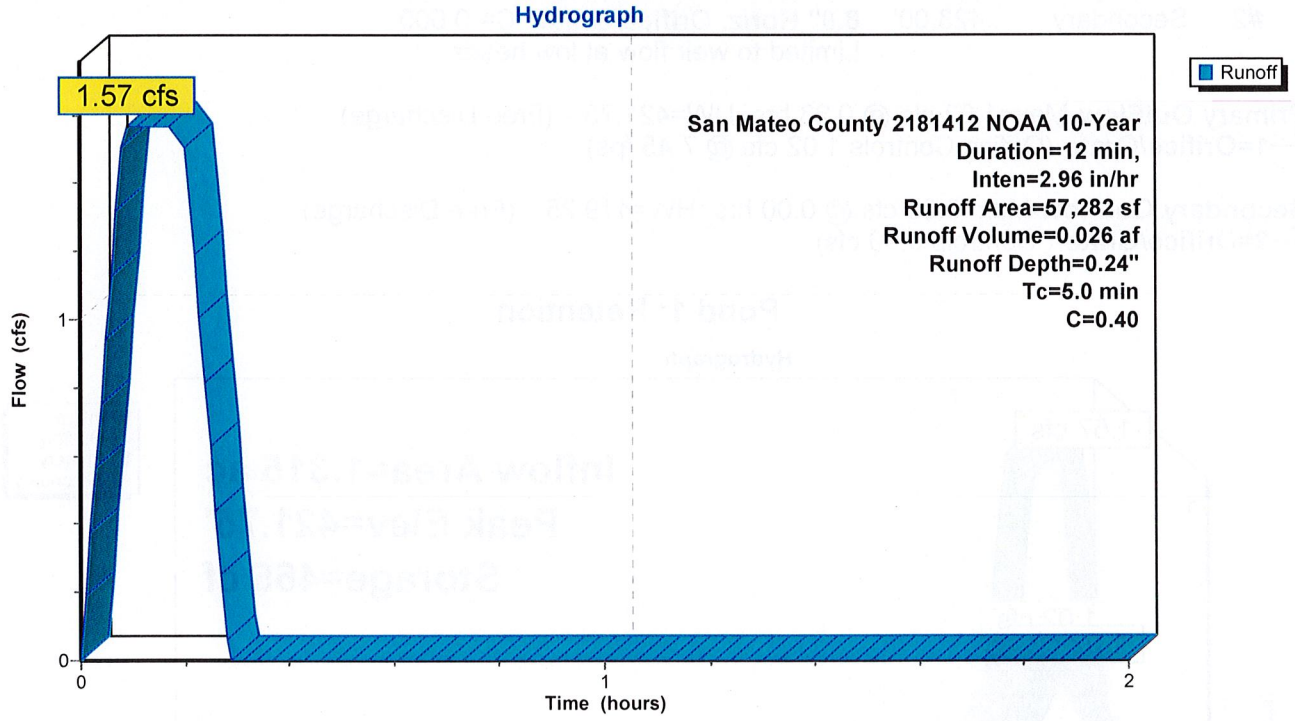
Runoff = 1.57 cfs @ 0.09 hrs, Volume= 0.026 af, Depth= 0.24"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs
San Mateo County 2181412 NOAA 10-Year Duration=12 min, Inten=2.96 in/hr

Area (sf)	C	Description
8,505	0.90	Impervious
2,977	0.60	Semi-Pervious
45,800	0.30	Pervious
57,282	0.40	Weighted Average
57,282		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment Post 10 Year B: 10 Year Post-Construction Retained



Summary for Pond 1: Retention

Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth = 0.24" for 10-Year event
Inflow = 1.57 cfs @ 0.09 hrs, Volume= 0.026 af
Outflow = 1.02 cfs @ 0.23 hrs, Volume= 0.026 af, Atten= 35%, Lag= 8.4 min
Primary = 1.02 cfs @ 0.23 hrs, Volume= 0.026 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-2.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 421.75' @ 0.23 hrs Surf.Area= 202 sf Storage= 465 cf

Plug-Flow detention time= 5.3 min calculated for 0.026 af (100% of inflow)
Center-of-Mass det. time= 5.3 min (13.8 - 8.5)

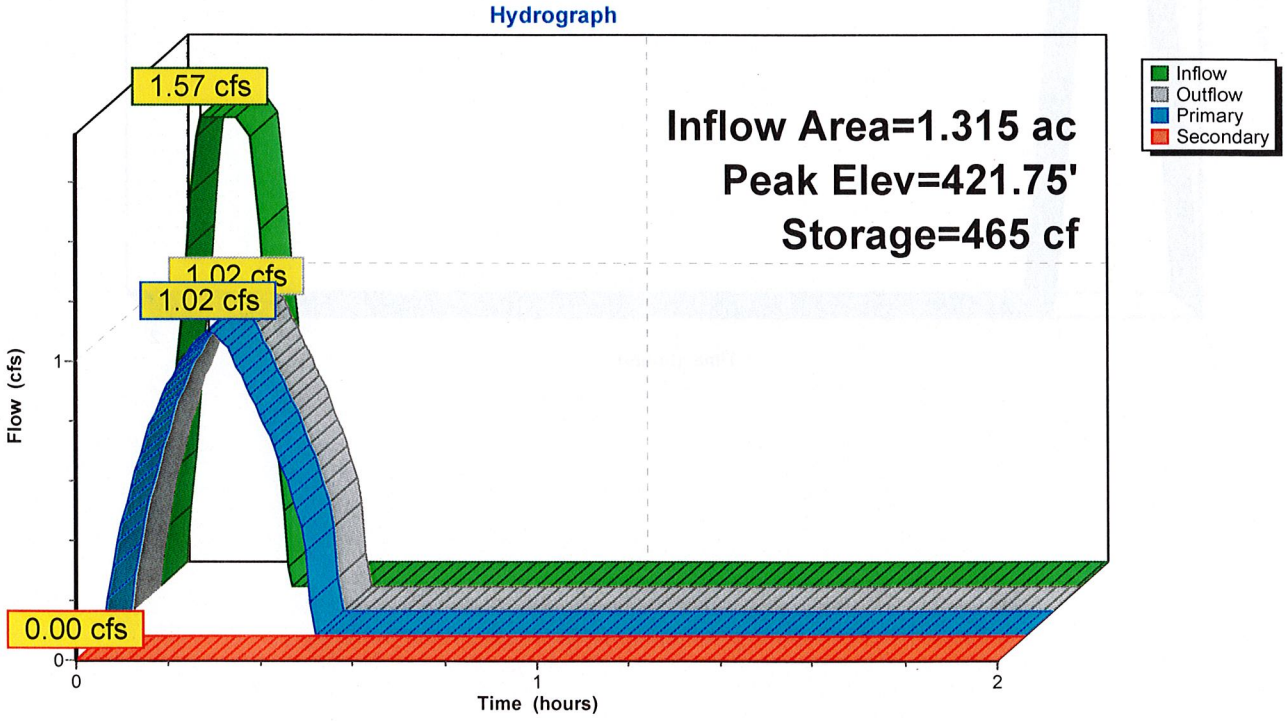
Volume	Invert	Avail.Storage	Storage Description
#1	419.25'	565 cf	**36.0" Round Pipe Storage** L= 80.0' S= 0.0050 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	419.15'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Secondary	423.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

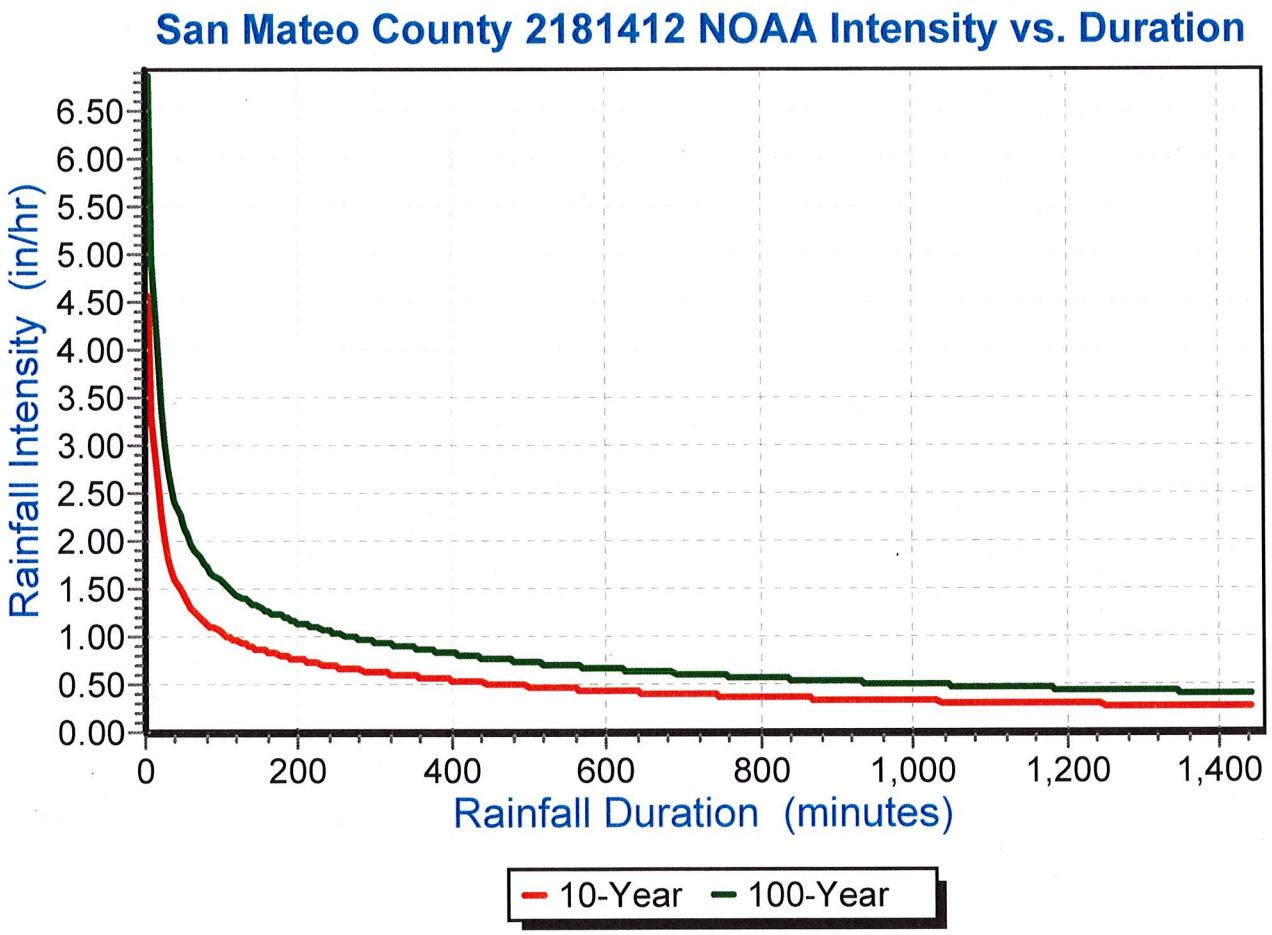
Primary OutFlow Max=1.02 cfs @ 0.23 hrs HW=421.75' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.02 cfs @ 7.45 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=419.25' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1: Retention

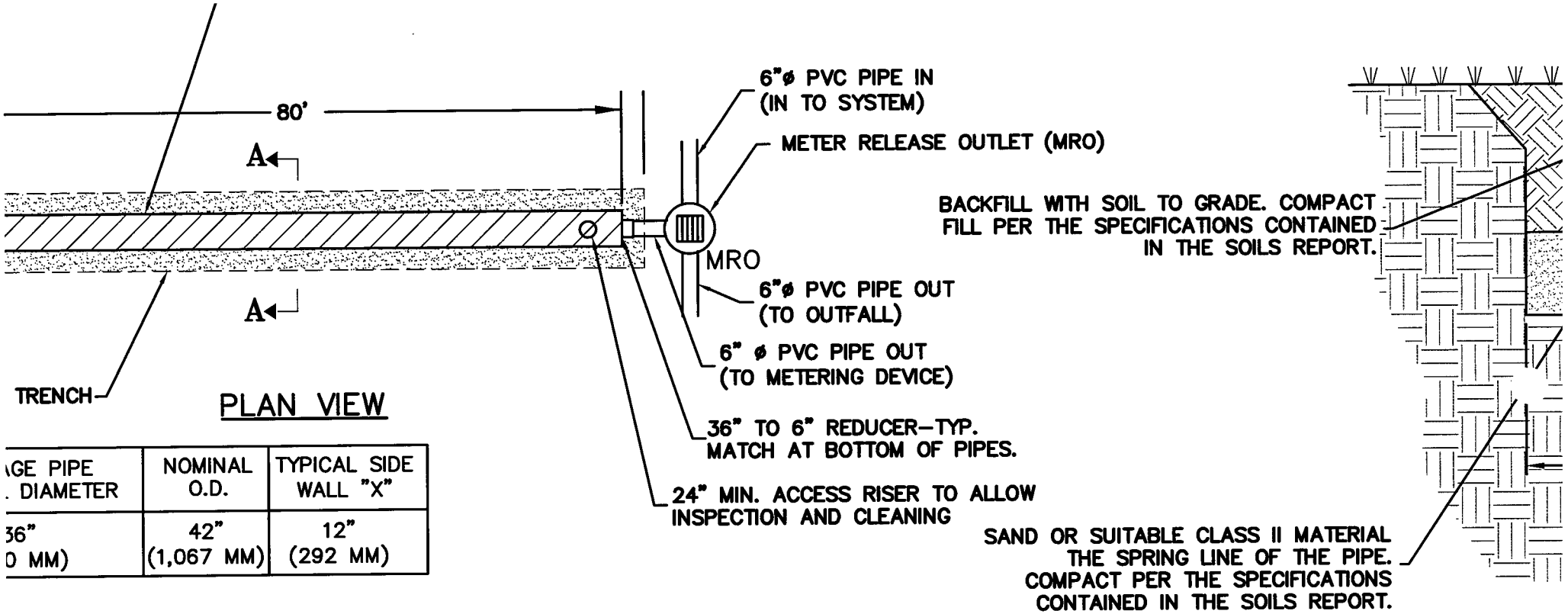


IDF Curve Report



APPENDIX C

RETENTION SYSTEM DETAILS



PLAN VIEW

...GE PIPE . DIAMETER	NOMINAL O.D.	TYPICAL SIDE WALL "X"
36" 0 MM)	42" (1,067 MM)	12" (292 MM)

...FERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D2321 "STANDARD ...OR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND ...VITY FLOW APPLICATIONS", LATEST EDITION.

...ORM DRAIN SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, ...TION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.

...RES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE ...IATERIAL, WHEN REQUIRED. SEE ASTM D2321.

...ATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL ...TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE ...AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION ...SIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE

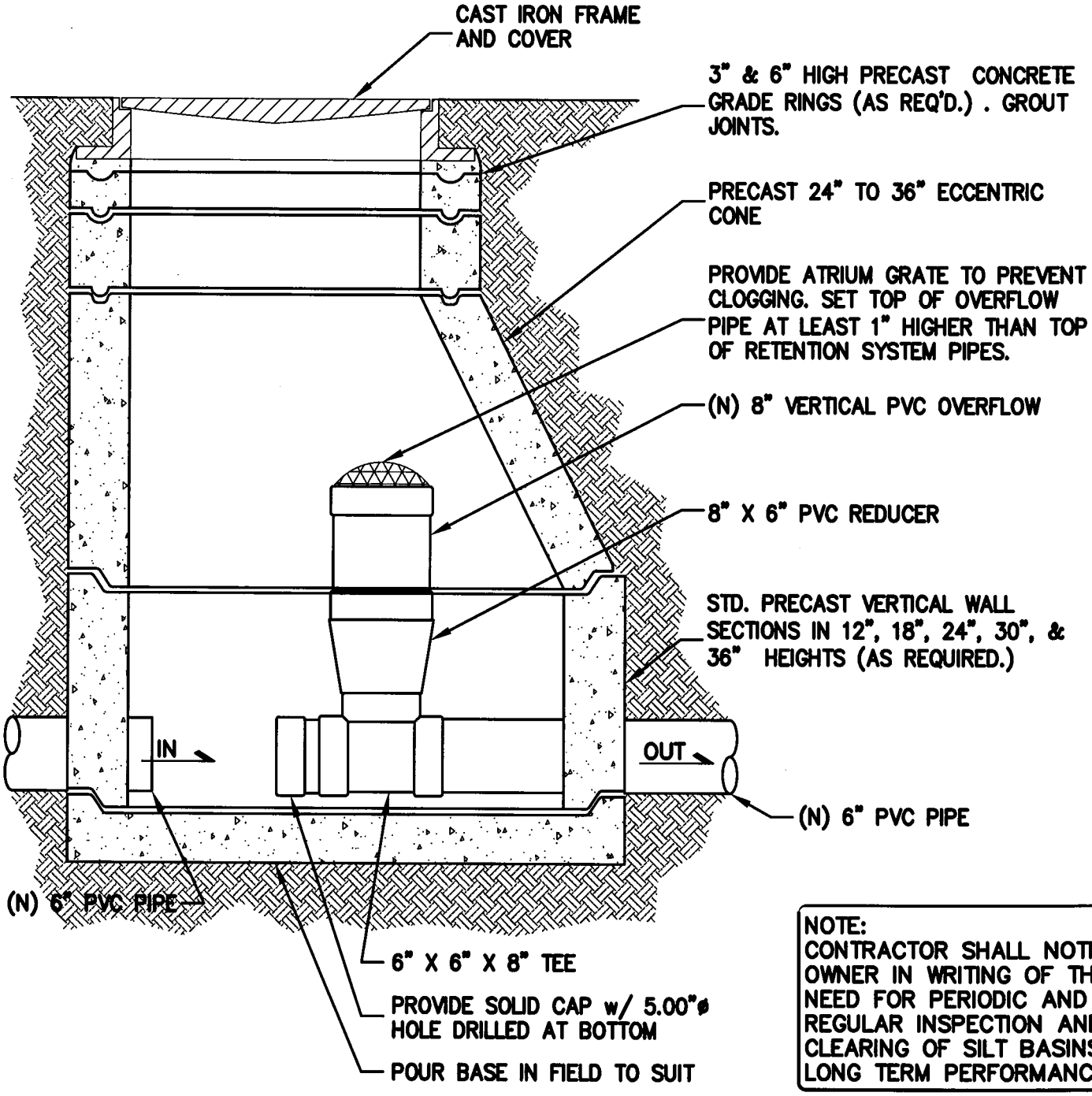
5. BEDDING: SUITABLE MATERIAL SHALL BE SAND OR ... PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION ... NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS ... 30"–60" COMPACTED TO 90% SPD.

6. INITIAL BACKFILL: SUITABLE MATERIAL SHALL B... SA... SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPE... IC... BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDI...

7. MINIMUM COVER: MINIMUM COVER OVER ALL STORM ... APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 18" FR... SURFACE, COMPACT AS RECOMMENDED BY THE SOILS EN... REQUIRED TO PREVENT FLOATATION.

NOTE:
REFER TO THE PLANS F...
OUTLET LOCATIONS.
REFER TO THE PLANS F...
LOCATIONS.

STORMWATER RETENTION SYSTEM DETAILS



NOTE:
CONTRACTOR SHALL NOTIFY OWNER IN WRITING OF THE NEED FOR PERIODIC AND REGULAR INSPECTION AND CLEARING OF SILT BASINS FOR LONG TERM PERFORMANCE.

METERED RELEASE OUTLET

NTS

COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT D

CULTURAL RESOURCE EVALUATION OF THE PROPOSED PROJECT AT 222 PORTOLA STATE PARK ROAD IN THE COUNTY OF SAN MATEO

FOR

ATTN: MR. LEONID BEIGELMAN
991 EAST GRANT PLACE
SAN MATEO, CA 94402
NWIC# 18-2170

BY

Archaeological Resource Management
Dr. Robert Cartier, Principal
496 North 5th Street
San Jose, CA 95112
Phone: (408) 295-1373
Fax: (408) 286-2040
email: armcartier@netscape.net

JUNE 4, 2019

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archaeological sites in the region of the project area, and indiscriminate distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to ensure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archaeologists.

THE PRINCIPAL INVESTIGATOR

ABSTRACT

This report contains the results of a cultural resource evaluation for the proposed project at 222 Portola State Park Road (APN 085-100-260) in the County of San Mateo. The research included an archival search in the State records and a surface survey of the property. The archival research revealed that there are no previously recorded archaeological sites within the proposed project area. However, the California Historical Resources Information System has determined that the proposed project area has the possibility of containing unrecorded archaeological sites, and recommended the evaluation of the property by a qualified archaeologist. No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance. Therefore, it is concluded that the proposed project will have no impact on cultural resources. In the event, however, that prehistoric traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archaeologist retained to examine the find and make appropriate recommendations.

REQUEST FOR CULTURAL RESOURCE EVALUATION

The cultural resource evaluation was carried out to determine the presence or absence of any significant cultural resources. Cultural resource services were requested in May of 2019 in order to provide an evaluation that would undertake an archival study of the cultural resources within the project area and in its vicinity, conduct a surface survey of the property, and provide a written report of the findings and any appropriate recommendations.

QUALIFICATIONS OF ARCHAEOLOGICAL RESOURCE MANAGEMENT

Archaeological Resource Management has been specifically engaged in cultural resource management projects in central California since 1977. The firm is owned and supervised by Dr. Robert Cartier, the Principal Investigator. Dr. Cartier has a Ph.D. in anthropology, and is certified by the Register of Professional Archaeologists (RPA) for conducting cultural resource investigations as well as other specialized work in archaeology.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The proposed project area consists of approximately 1.07 acres out of a 39.16 acre parcel of land at 222 Portola State Park Road (APN 085-100-260) in the County of San Mateo. On the USGS 7.5 minute quadrangle of Mindigo Hill the Transverse Mercator Grid (UTMG) center point for the proposed project area is: 10S 5 69 580m/E 41 26 923m/N. The elevation is approximately 1500 feet MSL, and the nearest source of fresh water is Evans Creek which runs within approximately 200 feet east of the proposed project area.

The proposed project consists of the construction of a new residence, associated features including a library, and a greenhouse, as well as a septic system, access roads, landscaping, and other improvements. This will involve the necessary grading, trenching, excavation, and other earthmoving activities.

METHODOLOGY

The methodology used in this investigation consists of an archival search, a surface reconnaissance, an evaluation of the potential significance of the property according to the California Register of Historic Resources (CRHR), and a written report of the findings with appropriate recommendations. The archival research is conducted by transferring the study location to a state archaeological office which maintains all records of archaeological investigations. This is done in order to learn if any archaeological sites or surveys have been recorded within a half mile of the subject area. Each archival search with the State is given a file number for verification. The surface reconnaissance portion of the evaluation is done to determine if traces of historic or prehistoric materials exist within the study area. This survey is conducted by a field archaeologist who examines exposed soils for cultural material. The archaeologist is looking for early ceramics, Native American cooking debris, and artifacts of stone, bone, and shell. For historic cultural resources, the field evaluation also considers older structures, distinctive architecture, and subsurface historic trash deposits of potentially significant antiquity. A report is written containing the archival information, record search number, the survey findings, and appropriate recommendations. A copy of this evaluation is sent to the State archaeological office by requirements of State procedure.

A cultural resource is considered "significant" if it qualifies as eligible for listing in the California Register of Historic Resources (CRHR). Properties that are eligible for listing in the CRHR must meet one or more of the following criteria:

1. Association with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the
   United States;
2. Association with the lives of persons important to local, California, or national history;
3. Embodying the distinctive characteristics of a type, period, region, or method of construction, or representing the work of a master, or possessing high artistic values; or
4. Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Most Native American prehistoric sites are eligible due to their age, scientific potential, and/or burial remains.

The CRHR interprets the integrity of a cultural resource based upon its physical authenticity. An historic cultural resource must retain its historic character or appearance and thus be recognizable as an historic resource. Integrity is evaluated by examining the subject's location, design, setting, materials, workmanship, feeling, and association. If the subject has retained these qualities, it may be said to have integrity. It is possible that a cultural resource may not retain sufficient integrity to be listed in the National Register of Historic Places yet still be eligible for listing in the CRHR. If a cultural resource retains the potential to convey significant historical/scientific data, it may be said to retain sufficient integrity for potential listing in the CRHR.

ARCHIVAL BACKGROUND

Prior to reconnoitering the subject area, a study of the maps and records was conducted by the California Historical Resources Information System and given the file number of NWIC# 18-2170. This research into the records at the Northwest Information Center was done to determine if any known archaeological resources were reported in or around the subject area. The archival research revealed that there are no recorded archaeological sites within the proposed project area. However, the California Historical Resources Information System has determined that the proposed project area has the possibility of containing unrecorded archaeological sites, and recommended the evaluation of the property by a qualified archaeologist.

SURFACE RECONNAISSANCE

A "general surface reconnaissance" was conducted by a field archaeologist on all open land surfaces in the subject area. A "controlled intuitive reconnaissance" was performed in places where burrowing animals, exposed banks and inclines, and other activities had revealed subsurface stratigraphy and soil contents. The proposed project boundaries were established in the field by project maps and existing property boundaries. Accessibility to the project area was good; all areas were accessible for a walking survey. Soil visibility was fair; much of the surface area was obscured by dense grasses and brush. However, small exposures of soil were present throughout. Vegetation consisted primarily of dense low grasses and weeds, along with mature conifer and oak trees. Where native soils were exposed, a light reddish brown silty loam was observed. Rock types noted included metamorphic cobbles and gravel. No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance.

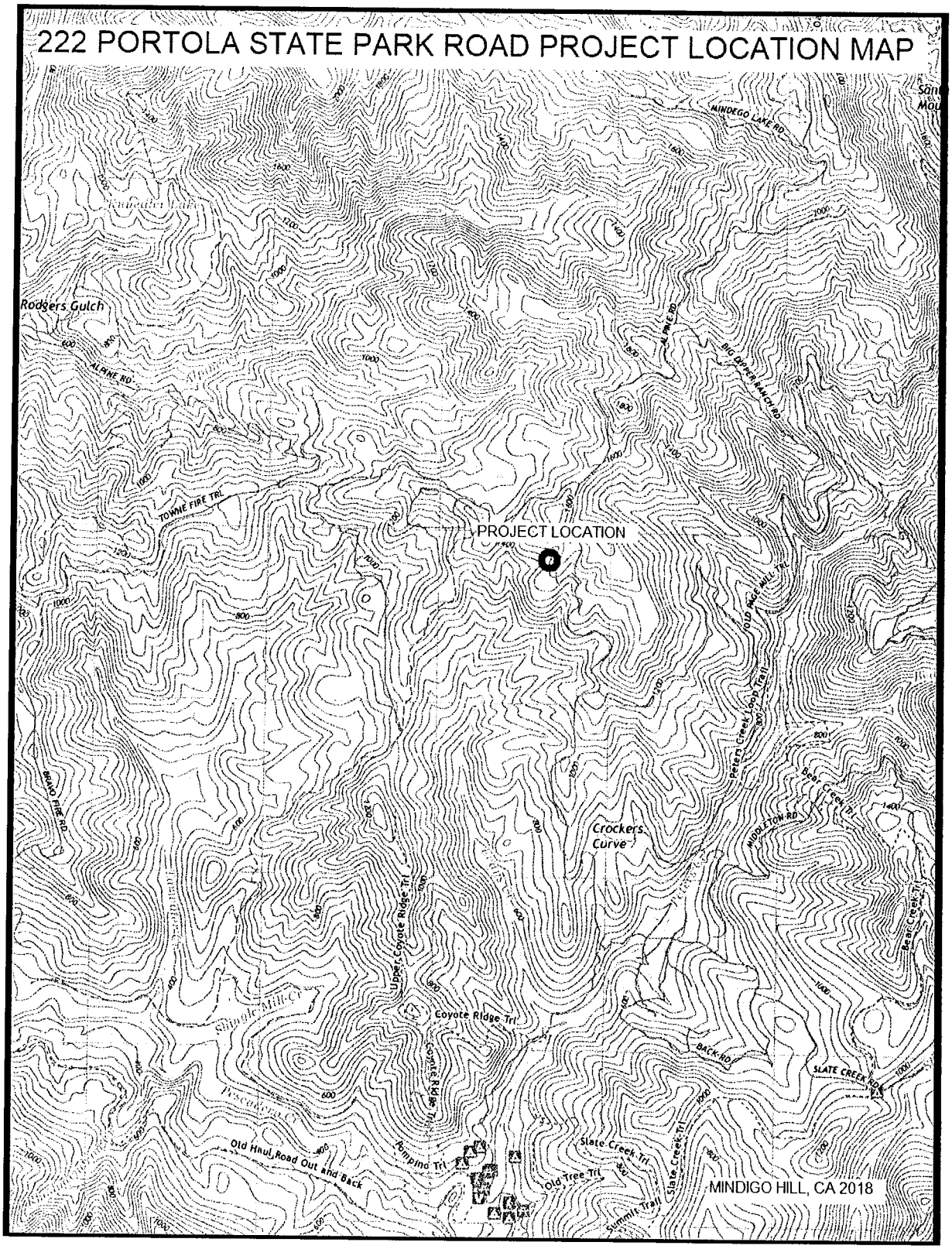
CONCLUSION AND RECOMMENDATIONS

The archival research revealed that there are no recorded archaeological sites within the proposed project area. However, the California Historical Resources Information System has determined that the proposed project area has the possibility of containing unrecorded archaeological sites, and recommended the evaluation of the property by a qualified archaeologist. No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance. Therefore, it is concluded that the proposed project will have no impact on cultural resources. In the event, however, that prehistoric traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archaeologist retained to examine the find and make appropriate recommendations.

LITERATURE CITED AND CONSULTED

Northwest Information Center
2019 Archival search number 18-2170 on file at the Northwest Information Center, Department of Anthropology, Sonoma State University, Rohnert Park.

222 PORTOLA STATE PARK ROAD PROJECT LOCATION MAP



222 PORTOLA STATE PARK ROAD PROJECT AREA MAP