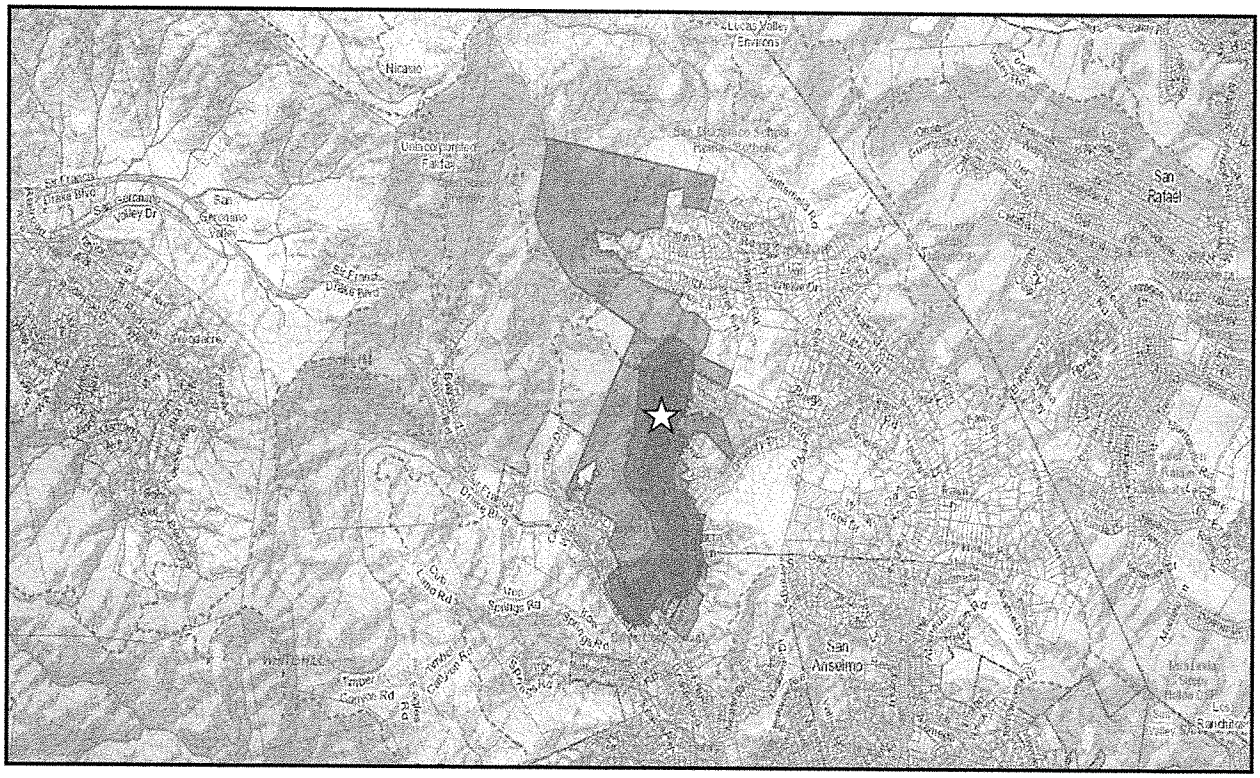
TOWN OF FAIRFAX
STAFF REPORT
Department of Planning and Building Services

TO:	Fairfax Planning Commission
DATE:	June 16, 2016
FROM:	Jim Moore, Director of Planning and Building Services Linda Neal, Principal Planner
LOCATION:	615 Oak Manor Drive; Assessor's Parcel No. 174-070-71
ZONING:	Residential Single-family RS 6 Zone District
PROJECT:	Single-family residence and Residential second unit
ACTION:	Hill Area Residential Development Permit, Design Review and Excavation Permit; Application # 16-24
APPLICANT:	Shelley Brock, Architect
OWNER:	Robert Schwartz
CEQA STATUS:	Categorically exempt § 15303(a) and 15303(e)



615 OAK MANOR DRIVE

AGENDA ITEM # 6

BACKGROUND

The 50.2-acre site runs from Sir Francis Drake Boulevard almost to the top of the ridge and lies west of the homes located in the County on Oak Manor Drive. The site slopes up from Sir Francis Drake Boulevard at an average rate of 47%. The parcel was created as the result of a May 1991 settlement agreement between the Town and Fairfax Hills, the sub-divider of the Fairfax Hills Subdivision that created the Snowden Lane and Arrowood developments that are accessed through Marin County from Oak Manor Drive (Exhibit C).

DISCUSSION

The project encompasses a 3,765-square-foot, 5 bedroom, 4 bath, single-family residence, a 2-car carport, a 690-square foot,1-bedroom, accessory residential second unit and a lap pool. The project includes construction of a 16-foot-wide, roughly 230-foot-long private driveway and associated retaining walls.

	Front Setback	Rear Setback	Combined Front/rear Setback	Side Setbacks	Combined Side Setbacks	FAR	Lot Coverage	Height
Required/ Permitted	**6 ft.**	**12 ft.**	**35 ft.**	**5 ft. & 5 ft.**	**20 ft.**	**.40**	**.35**	**28.5 ft., 2 stories**
Proposed	**56 ft.**	**over 250 ft.**	**over 306 ft.**	**81 ft. & at least 625 ft.**	**at least 706 ft.**	**.002**	**.001**	**23 ft, 2 stories**

Hill Area Residential Development Permit

Town Code Chapter 17.072-"Hill Area Residential Development Overlay Zone (HRD)", governs development of hillside lots. Certain characteristics of a property can result in a project on a hillside property being subject to the HRD Ordinance. The purpose of the HRD Ordinance is to encourage maximum retention of natural topographic features, minimize grading of hillside areas, provide a safe means of ingress and egress for vehicular and pedestrian traffic, minimize water runoff and soil erosion during and after construction, prevent loss of life, reduce injuries and property damage, minimize economic dislocations from geologic hazards and ensure that infill development is of a size and scale appropriate to the property and consistent with other properties in the vicinity under the same zone classification.

The characteristics of this project and property that result in this proposal being subject to the HRD Ordinance regulations are as follows [Town Code § 17.072.020(A) through (D)]:

- The property has a 47% slope and the project would require the excavation/fill of over 50 cubic yards of material; and

- The property falls within a landslide hazard zone.

Because the property falls within a landslide hazard zone and the construction of the project would require the excavation/fill of 800 cubic yards of material, the project is subject to the HRD Ordinance.

The applicants have submitted a geotechnical report prepared by Miller Pacific Engineering Group for the project. The report states that there are areas of this very large site that contain small- to large-sized debris-flow landslides but the area where the house has been proposed is underlain by bedrock. The Town Engineer reviewed the following plans and reports to determine whether the project could be constructed in accord with the Town Code provisions regarding hillside development:

> Architectural plans by Shelley Brock, Brock Architecture, pages A0.0, A1.1, A2.1, A3.1, site plan by ILS Associates, sheet C1 through C3, topographic map by ILS, Associates, sheet 1 of 1, overall schematic site plan by ILS Associates, sheet 1 of 1, vegetative management, tree protection plan and landscape plan by Roth-Lamotte Landscape Architects, pages L0.0, L0.1, L0.2 and L1.0.
>
> Geotechnical report by Miller Pacific Engineering Group, dated 12/18/2015 and geotechnical plan review dated 4/18/16 (Attachment C).
>
> Hydrology and Hydraulic of Existing 12" Corrugated Metal Pipe (CMP) and Ditches dated 4/18/16 and Inspection and Evaluation of the 12" CMP pipe dated 4/19/13 by ILS Associates.
>
> Note: The grading and drainage information for the project and the Urban Run-off Pollution Prevention Plan are shown on the ILS Associates plan page C1 and C2.

A drainage system and other improvements are proposed to avoid soil movement and resultant damage to the structures, road and pool include but are not limited to: a) the use of retaining structures and/or debris barriers and new surface and subsurface drainage improvements; b) Setbacks from adjacent slope and debris barriers or walls designed to act a debris barriers along the east side of the main house; c) retaining walls and debris catchment barriers between the historic landslide scarps on the hillside above the second unit or minor grading to improve slope stability in this area; and d) construction of a retaining wall system capable of supporting the pool and slope below the pool to reduce the risk of future slope movement (such a system should consist of a tied-back, reinforced, concrete retaining wall founded on drilled piers that extends through the unstable soil and into rock).

After reviewing the above plans and reports, and performing a site inspection, the Town Engineer has determined that the project can be constructed as designed using accepted engineering and drainage techniques that will ensure the safety of the

residents and without negatively impacting neighboring properties, the Town's roadway improvements or the neighborhood (Attachment C).

Parking

Two of the parking spaces for the main house would be located within a carport north of the house and the guest space would be located with the parking space for the second unit along the frontage of the residential second unit. The proposed parking configuration complies with the parking requirements for a 5-bedroom, 4-bathroom house and 1-bedroom residential second unit [Town Code §§ 17.048.040(D), 17.082.010(D), 17.052.030(A)(1)(d) and A(2), and 17.-52.040(B)].

Excavation Permit

Town Code § 12.20 080 indicates that an excavation permit is required from the Planning Commission for any project that involves the excavation and/or fill of over 100 cubic yards of material.

The only new excavation/fill that would occur on the site is in the area of the driveway, new fire truck turn-around and pool, and for the new foundation piers, drainage improvements and supply lines that are necessary to facilitate development of the site in a safe manner. Therefore, the proposed excavation/fill of 800 cubic yards of material is the minimum necessary to build the project.

Design Review Permit

The modern architecture of the structures would fit in with the natural surroundings through the use of stone walls, stucco siding, a metal roof, window and door finishes and red cedar siding all in earth shades of tan, browns and gray (see the colors and materials sheet with the plans). The roofing material would be metal with an earth tone called, "Deep Champagne", the exterior siding would alternate between stucco in 2 shades of tan (La Habra; X-25 Sadddleback and La Habre: X56 French Gray) and fire retardant Western Red Cedar, the window/door finish, cladding, railings and door and window canopies would be a dark brown (Marvin Liberty Bronze).

The structure has been articulated through the use of two different siding materials, windows of different shapes and sizes and by stepping the living area down the hillside. The extensive exterior articulation minimizes the visual bulk and mass of the structure.

Three (3) oak trees would be removed with the project– 2 in the area of the house and 1 adjacent to the driveway. The rest of the mature trees on the site would be protected during and after construction (see sheet L0.2 of the project plans, tree protection plan).

Other residences in the adjacent Oak Manor neighborhood on some of the larger parcels range from a 3,822-square-foot, 5-bedroom, 4-bathroom, residence on a 38,364-square-foot parcel (40 Steven Court) to a 5,057-square-foot, 5-bedroom, 4 1/2-

bathroom residence on a 10-acre parcel (31 Ellsworth). Therefore, the 3,765-square-foot, 5 bedroom, 4 bath, single-family residence, 2-car carport, and 690-square-foot, 1-bedroom, accessory residential second unit on this 50.2-acre parcel is modest and would not be out of scale with the size of the site or other residences found throughout the neighborhood.

Other Agency/Department Conditions/Comments

Ross Valley Fire Department

1. A purposed fire truck turn-around shall be installed and made serviceable prior to the delivery of combustible materials to the site.

2. The project requires installation of a fire sprinkler system that complies with the National Fire Protection Association regulation 13-D and local standards. The system would require a permit from the Fire Department and the submittal of plans and specifications for system submitted by an individual or firm licensed to design and/or design-build sprinkler systems.

3. The property is located within the Wildland Urban Interface Area for Fairfax and the new construction must comply with Chapter 7A of the California Building Code or equivalent.

4. All smoke detectors in the residence shall be provided with AC power and be interconnected for simultaneous alarm. Detectors shall be located in each sleeping room, outside of each sleeping room in a central location in the corridor and over the center of all stairways with a minimum of 1 detector on each story of the occupied portion of the residence.

5. Carbon monoxide alarms shall be provided in existing dwellings when a permit is required for alterations, repairs, or addition and the cost of the permit exceeds $1,000.00. Carbon monoxide alarms shall be located outside of each sleeping area in the immediate vicinity of the bedrooms and on every level of the dwelling, including basements.

6. Address numbers at least 4 inches tall must be in place adjacent to the front door. If not clearly visible from the street, additional numbers must be placed in location that is visible from the street. The numbers must be internally illuminated or illuminated by and adjacent light controlled by a photocell that can be switched off only be a breaker so it will remain illuminated all night.

7. Alternative materials or methods may be proposed for any of the above conditions in accordance with Section 104.9 of the Fire Code.

8. All approved alternatives requests, and their supporting documentation, shall be included in the plan sets submitted for final approval by the Fire Department.

9. A Vegetation Management plan designed in accordance with Ross Valley Fire Standard #220 is required. A separate deferred permit shall be required for this plan. Please note that permission from your neighbors may be required if the required clearance extends beyond the property lines. If permission cannot be obtained the structure may require exterior hardening to be in compliance with the intent of the code.

Marin Municipal Water District

1. A water service permit is required for this project.

2. The plans must comply with all the indoor and outdoor requirements of District Code Title 13, Water Conservation. Plans must be submitted to the District and be approved.

3. The District's backflow prevention requirements must be met and if installation of a backflow device is required, the device shall be tested/inspected and be approved by a District Inspector prior to the project final inspection and issuance of the occupancy permit.

4. Comply with ordinance No. 429, requiring the installation of gray water recycling systems when practicable for all projects required to install new water service and existing structures undergoing "substantial remodel" that necessitates an enlarged water service.

Ross Valley Sanitary District

A Sanitary District sewer connection permit is required prior to the project final inspection and issuance of an occupancy permit for the residence.

Fairfax Police, Public Works and Building Departments

The police, public works and the building department did not provide conditions of approval or comments on the project.

RECOMMENDATION

1. Open the public hearing and take testimony.

2. Close the public hearing.

3. Move to approve Application # 16-24 by adopting Resolution No. 16-21 setting forth the findings and conditions for project approval.

ATTACHMENTS

Attachment A – Resolution No. 16-21
Attachment B – Applicant' s supplemental information
Attachment C – Surrounding development map
Attachment D – Geotechnical Report
Attachment E – Hydrology Report
Attachment F - Town Engineer's review memorandums

RESOLUTION NO. 16-21

A Resolution of The Fairfax Planning Commission Approving Application No. 16-24 for a Hill Area Residential Development Permit, Excavation Permit and Design Review Permit for a Single-Family Residence and Residential Second Unit at 615 Oak Manor Drive

WHEREAS, the Town of Fairfax has received an application from Robert Schwartz to build a 3,765-square-foot, 5 bedroom, 4 bath, single-family residence, a 2-car carport, a 690-square-foot, 1-bedroom, accessory residential second unit and a lap pool; and

WHEREAS, the Planning Commission held a duly noticed Public Hearing on June 16, 2016, at which time the Planning Commission determined that the project complies with the Hill Area Residential Development Overlay Ordinance; and

WHEREAS, based on the plans and other documentary evidence in the record the Planning Commission has determined that the applicant has met the burden of proof required to support the findings necessary to approve the Hill Area Residential Development, Design Review and Excavation Permits; and

WHEREAS, the Commission has made the following findings:

Hill Area Residential Development

1. The proposed development is consistent with the General Plan and the Residential Single-family RS 6 Zone regulations.

2. The site planning preserves identified natural features as much as possible while also complying with other agencies' regulations.

3. Vehicular access and parking are adequate.

4. The proposed development harmonizes with surrounding residential development and meets the design review criteria contained in Town Code § 17.020.040.

5. The approval of the Hill Area Residential Development permit for 1 single-family residence and 1 residential second unit on this 50-acre parcel shall not constitute a grant of special privilege and shall not contravene the doctrines of equity and equal treatment.

6. The development and use of the property as approved under the Hill Area Residential Development Permit will not cause excessive or unreasonable detriment to adjoining properties or premises, or cause adverse physical or economic effects thereto, or create undue or excessive burdens in the use and

enjoyment thereof, or any or all of which effects are substantially beyond that which might occur without approval or issuance of the use permit.

7. Approval of the proposed Hill Area Residential Development permit is not contrary to those objectives, goals or standards pertinent to the particular case and contained or set forth in any Master Plan, or other plan or policy, officially adopted by the Town.

8. Approval of the Hill Area Residential Development permit will result in equal or better development of the premises than would otherwise be the case.

Excavation Permit

The Town Engineer has reviewed the following plans and reports and has determined the project can be constructed, with certain conditions of approval, without creating any hazards:

Architectural plans by Shelley Brock, Brock Architecture, pages A0.0, A1.1, A2.1, A3.1, site plan by ILS Associates, sheet C1 through C3, topographic map by ILS, Associates, sheet 1 of 1, overall schematic site plan by ILS Associates, sheet 1 of 1, vegetative management, tree protection plan and landscape plan by Roth-Lamotte Landscape Architects, pages L0.0, L0.1, L0.2 and L1.0.

Geotechnical report by Miller Pacific Engineering Group, dated 12/18/2015 and geotechnical plan review dated 4/18/16 (Attachment C).

Hydrology and Hydraulic of Existing 12" Corrugated Metal Pipe (CMP) and Ditches dated 4/18/16 and Inspection and Evaluation of the 12" CMP pipe dated 4/19/13 by ILS Associates.

Note: the grading and drainage information for the project and the Urban Run-off Pollution prevention plan are shown on the ILS Associates plan page C1 and C2.

Based on the Town Engineer's review and recommendation that the project can be safely constructed, the Planning Commission finds that:

1. The health safety and welfare of the public will not be adversely affected;

2. Adjacent properties are adequately protected by project investigation and design from geologic hazards as a result of the work;

3. Adjacent properties are adequately protected by project design from drainage and erosion problems as a result of the work;

4. The amount of the excavation or fill proposed is not more than that required to allow the property owner substantial use of his or her property;

5. The visual and scenic enjoyment of the area by others will not be adversely affected by the project more than is necessary;

6. Natural landscaping will not be removed by the project more than is necessary; and

7. Town code § 17.072.090(c)(4) prohibits grading of hillside properties from October 1st through April 1st of each year. Therefore, the time of year during which construction will take place is such that work will not result in excessive siltation from storm runoff nor prolonged exposure of unstable excavated slopes.

WHEREAS, the Commission has approved the project subject to the applicant's compliance with the following conditions:

1. Architectural plans by Shelley Brock, Brock Architecture, pages A0.0, A1.1, A2.1, A3.1, site plan by ILS Associates, sheet C1 through C3, topographic map by ILS, Associates, sheet 1 of 1, overall schematic site plan by ILS Associates, sheet 1 of 1, vegetative management, tree protection plan and landscape plan by Roth-Lamotte Landscape Architects, pages L0.0, L0.1, L0.2 and L1.0.

2. Prior to issuance of any of the building permits for the project the applicant or his assigns shall:

a. Submit a construction plan to the Public Works Department which may include but is not limited to the following:

- Construction delivery routes approved by the Department of Public Works.
- Construction schedule (deliveries, worker hours, etc.)
- Notification to area residents
- Emergency access routes

b. The applicant shall prepare, and file with the Public Works Director, a video tape of the roadway conditions on the public construction delivery routes (routes must be approved by Public Works Director).

c. Submit a cash deposit, bond or letter of credit to the Town in an amount that will cover the cost of grading, weatherization and repair of possible damage to public roadways. The applicant shall submit contractor's estimates for any grading, site weatherization and improvement plans for approval by the Town Engineer. Upon approval of the contract costs, the applicant shall submit a cash deposit, bond or letter of credit equaling 100% of the estimated construction costs.

d. The foundation and retaining elements shall be designed by a structural engineer certified as such in the state of California. Plans and calculations of the foundation and retaining elements shall be stamped and signed by the structural engineer and submitted to the satisfaction of the Town Structural Engineer.

e. The grading, foundation, retaining, and drainage elements shall also be stamped and signed by the site geotechnical engineer as conforming to the recommendations made by the project Geotechnical Engineer.

f. Prior to submittal of the building permit plans, the applicant shall secure written approval from the Ross Valley Fire Authority, Marin Municipal Water District and the Ross Valley Sanitary District noting the development conformance with their recommendations.

g. Submit 3 copies of the record of survey with the building permit plans.

h. All retaining walls that are visible from the street and are constructed of concrete shall be heavily textures or colorized in a manner approved by the planning staff prior to issuance of the building permit. This condition is intended to mitigate the visual impact of the proposed walls.

i. The applicant shall secure a tree cutting permit, if required, from the Town prior to removal of any on-site trees subject to a permit under Town Code Chapter 9.36. To further minimize impacts on trees and significant vegetation, the applicant shall submit plans for any utility installation (including sewer, water and drainage) which incorporates the services of an International Society of Arborists (ISA) certified arborist to prune and treat trees having roots 2 inches or more in diameter that are disturbed during the construction, excavation or trenching operations. In particular, cross-country utility extensions shall minimize impacts on existing trees. Tree root protection measures may include meandering the line, check dams, rip rap, hand trenching, soil evaluation and diversion dams. Any pruning shall take place during the winter when trees are dormant for deciduous species and during July to August for evergreen species.

3. During the construction process the following shall be required:

a. The geotechnical engineer shall be on-site during the grading process (if there is any grading remaining to be done) and shall submit written certification to the Town Staff that the grading has been completed as recommended prior to installation of foundation and/or retaining forms and piers.

b. Prior to the concrete form inspection by the building official, the geotechnical and structural engineers shall field check the forms of the foundations and retaining elements and provide written certification to the Town staff that the work to this point has been completed in conformance with their recommendations and

the approved building plans. The Building Official shall field check the concrete forms prior to the pour.

c. All construction-related vehicles including equipment delivery, cement trucks and construction materials shall be situated off the travel lane of the adjacent public right(s)-of-way at all times. This condition may be waived by the Building Official on a case-by-case basis with prior notification from the project sponsor.

d. Any proposed temporary closures of a public right-of-way shall require prior approval by the Fairfax Police Department and any necessary traffic control, signage or public notification shall be the responsibility of the applicant or his/her assigns. Any violation of this provision will result in a stop work order being placed on the property and issuance of a citation.

4. Prior to issuance of an occupancy permit, the following shall be completed:

a. The geotechnical engineer shall field check the completed project and submit written certification to the Town Staff that the foundation, retaining, grading and drainage elements have been installed in conformance with the approved building plans and the recommendations of the soils report.

b. The Planning Department and Town Engineer shall field check the completed project to verify that all and planning commission conditions and required engineering improvements have been complied including installation of landscaping and irrigation prior to issuance of the certificate of occupancy.

5. Excavation shall not occur between October 1st and April 1st of any year. The Town Engineer has the authority to waive this condition depending upon the weather.

6. The roadways shall be kept free of dust, gravel and other construction materials by sweeping them, daily, if necessary.

7. Any changes, modifications, additions or alterations made to the approved set of plans will require a modification of Application # 16-24. Any construction based on job plans that have been altered without the benefit of an approved modification of Application 16-24 will result in the job being immediately stopped and red tagged.

8. Any damages to the public portions of Oak Manor Drive or Sir Francis Drake Boulevard or other public roadway used to access the site resulting from construction activities shall be the responsibility of the property owner.

9. The applicant and its heirs, successors, and assigns shall, at its sole cost and expense, defend with counsel selected by the Town, indemnify, protect, release, and hold harmless the Town of Fairfax and any agency or instrumentality thereof, including its agents, officers, commissions, and employees (the "Indemnitees") from any and all claims, actions, or proceedings arising out of or in any way relating to the processing

and/or approval of the project as described herein, the purpose of which is to attack, set aside, void, or annul the approval of the project, and/or any environmental determination that accompanies it, by the Planning Commission, Town Council, Planning Director, Design Review Board or any other department or agency of the Town. This indemnification shall include, but not be limited to, suits, damages, judgments, costs, expenses, liens, levies, attorney fees or expert witness fees that may be asserted or incurred by any person or entity, including the applicant, third parties and the Indemnitees, arising out of or in connection with the approval of this project, whether or not there is concurrent, passive, or active negligence on the part of the Indemnitees. Nothing herein shall prohibit the Town from participating in the defense of any claim, action, or proceeding. The parties shall use best efforts, acting in good faith, to select mutually agreeable defense counsel. If the parties cannot reach agreement, the Town may select its own legal counsel and the applicant agrees to pay directly, or timely reimburse on a monthly basis, the Town for all such court costs, attorney fees, and time referenced herein, provided, however, that the applicant's duty in this regard shall be subject to the Town's promptly notifying the applicant of any said claim, action, or proceeding.

10. The applicant shall comply with all applicable local, county, state and federal laws and regulations. Local ordinances which must be complied with include, but are not limited to: the Noise Ordinance, Chapter 8.20, Polystyrene Foam, Degradable and Recyclable Food Packaging, Chapter 8.16, Garbage and Rubbish Disposal, Chapter 8.08, Urban Runoff Pollution Prevention, Chapter 8.32 and the Americans with Disabilities Act.

11. Conditions placed upon the project by outside agencies or by the Town Engineer may be eliminated or amended with that agency's or the Town Engineer's written notification to the Planning Department prior to issuance of the building permit.

12. The building permit plans shall be reviewed and approved by the Town Engineer, at the expense of the applicant, prior to issuance of the building permit. The project shall be inspected by the Town Engineer prior to issuance of the occupancy permit for the residential structures for compliance with the engineering plans.

Ross Valley Fire Department

1. Project has been deemed a "substantial remodel" and as such requires installation of a fire sprinkler system that complies with the National Fire Protection Association regulation 13-D and local standards. The system will require a permit from the Fire Department and the submittal of plans and specifications for a system submitted by an individual or firm licensed to design and/or design-build sprinkler systems.

2. The property is located within the Wildland Urban Interface Area for Fairfax and the new construction must comply with Chapter 7A of the California Building Code or equivalent.

3. All smoke detectors in the residence shall be provided with AC power and be interconnected for simultaneous alarm. Detectors shall be located in each sleeping room, outside of each sleeping room in a central location in the corridor and over the center of all stairways with a minimum of 1 detector on each story of the occupied portion of the residence.

4. Carbon monoxide alarms shall be provided in existing dwellings when a permit is required for alterations, repairs, or addition and the cost of the permit exceeds $1,000.00. Carbon monoxide alarms shall be located outside of each sleeping area in the immediate vicinity of the bedrooms and on every level of the dwelling, including basements.

5. Address numbers at least 4 inches tall must be in place adjacent to the front door. If not clearly visible from the street, additional numbers must be placed in location that is visible from the street. The numbers must be internally illuminated or illuminated by and adjacent light controlled by a photocell that can be switched off only be a breaker so it will remain illuminated all night.

6. Alternative materials or methods may be proposed for any of the above conditions in accordance with Section 104.9 of the Fire Code.

7. All approved alternatives requests, and their supporting documentation, shall be included in the plan sets submitted for final approval by the Fire Department.

Marin Municipal Water District

1. A high pressure water service permit is required for this project.

2. The plans must comply with all the indoor and outdoor requirements of District Code Title 13, Water Conservation. Plans must be submitted to the District and be approved.

3. The District's backflow prevention requirements must be met and if installation of a backflow device is required, the device shall be tested/inspected and be approved by a District Inspector prior to the project final inspection and issuance of the occupancy permit.

4. Comply with Ordinance No. 429, requiring the installation of gray water recycling systems, when practicable, for all projects required to install new water service and existing structures undergoing "substantial remodel" that necessitates an enlarged water service.

Ross Valley Sanitary District

A Sanitary District sewer connection permit is required to either replace the existing sewer lateral, or demonstrate to a District Inspector that the existing lateral meets current requirements, prior to the project final inspection and issuance of an occupancy

permit for the residence.

NOW, THEREFORE BE IT RESOLVED, the Planning Commission of the Town of Fairfax hereby finds and determines as follows:

The approval of the Hill Area Residential Development Permit, Excavation Permit, Covered Parking Variance and Design Review Permit is in conformance with the 2010 – 2030 Fairfax General Plan and the Fairfax Zoning Ordinance, Town Code Title 17; and

Construction of the project can occur without causing significant impacts on neighboring residences and the environment.

The foregoing resolution was adopted at a regular meeting of the Planning Commission held in said Town, on the 16th, day of June, 2016 by the following vote:

AYES:
NOES:
ABSTAIN:

_____
Chair, Kehrlein

Attest:

_____
Jim Moore, Director of Planning and Building Services

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Schwartz Residence - Design Review Planning Application
APN 174-070-71
Oak Manor Drive, Fairfax, CA
March 10, 2016

Prepared by: Shelley Brock, Architect

Description of Proposed Project and Compliance with Design Review criteria, Section 17.020.040, Fairfax Town Code

The proposed residence consists of a new single-family home with accessory cottage and carport. The building site is located in the northern portion of a 50 acre parcel adjacent to Oak Manor Drive.

Access to the house would be via a newly constructed driveway following an existing rough-graded fire access road that extends into the property from an existing entrance located immediately to the north of 575 Oak Manor Drive.

The proposed residence and accessory cottage will be placed on a previously graded, relatively flat area of the property surrounded by live oak, Manzanita and bay trees located uphill from Oak Manor Drive. The residence and cottage will be tucked in to the hillside slopes and sheltered by oak and bay trees with the intention of respecting the hilly topography, blending in with the landscape and limiting any excavation required. The residence is located on the site to capture focused views of Mount Tam and the valley while remaining mostly invisible to neighboring houses and roads.

The proposal complies with Fairfax Zoning codes, Hillside Design Review requirements and other applicable codes as noted below.

a. The proposed development seeks to create **a well-composed design that harmoniously relates to other single-family structures** in the immediate area. It does so first by its placement on the site, approximately 180' uphill from the right of way, where it is screened by existing trees and shrubs. In addition, proposed roof heights are below the Fairfax Zoning allowable height requirements (35' above natural grade and three stories for principal structures on 10% slope or greater, and 15' above natural grade and one story for an accessory unit). The maximum roof height above existing grade for the proposed main residence is 23'-8", which is well under the allowable 35'.

To minimize scale and visual impact further, the footprint of the upper level is limited to approximately 30% of the main level footprint. This results in a smaller upper volume that is stepped-back from the main level walls, breaking up the vertical volumes of the house. See architectural elevations, sheet A3.1.

The lower level bedroom areas, totaling 970 sq ft., will be placed down-slope from the main level, and are also screened by existing mature oak trees, further reducing visibility of these areas from offsite. See architectural elevations, sheet A3.1, and notes below for more information regarding appearance and materials of proposed structures.

b. **The proposed materials of the house and landscaping** are: stone walls and paving, exterior plaster, siding and trim in colors that reflect the stone, soil, tree and plant tones of the surrounding

ATTACHMENT B

land. Both vertical and horizontal volumes are offset with setbacks so that the composition will not be visually bulky or tall.

All elements that significantly affect the exterior appearance of the structures including proposed heights (see note above), arrangement of structures on the site, exterior material types, colors and textures, landscaping paths, plantings and lighting are compliant with the Fairfax Hillside Design Review provisions and can be reviewed in the drawings and supplementary materials submitted with the development application.

c. As a custom designed home, the proposed development will be of **a quality and character** that is intended to significantly enhance the value of the property and would in turn benefit private and public investments in the immediate area. Significant time, effort and expertise have been devoted to developing a design that harmonizes with the site topography, hydrology, and plant life. The owner is working closely with an architect, landscape architect, civil engineer, arborist and geotechnical consultants to ensure the highest possible quality, safety and care in the design, construction and future maintenance of the proposed structures, landscaping and entire property.

d. The proposed development, as shown in the submitted architectural, civil and landscape site plans, **conforms to all requirements for usable open space,** landscaping, screening, and off street parking (4 total spaces and fire truck access and turnaround) for a residential project. The distance of the proposed structures from Oak Manor Drive (180'+), as well as the 10-16% slope and existing trees to be retained, serve to substantially and naturally screen them from the public right of way. Off street loading areas are not required as this is a single-family residential project.

e. The proposed design **complies with all Fairfax Town Code** and General Plan requirements.

f. Any monotony of **external appearance** is avoided in several ways: by breaking up building volumes so they follow the contours of the land, by setting the structures in to the existing hillside slopes, not on them, by maintaining existing mature trees for screening and shade, and by alternating exterior materials and textures to provide interesting, but simple rhythms and patterns, using muted and earth tone exterior plaster colors and wood. See Materials Board for additional information on specific materials.

g. **Size and design of structure:** The Fairfax Town Code, Chpt. 17.136 allows 5,000 sq ft maximum floor area for single-family residential projects in the Hillside, R-6 zone. The total square footage of the proposed living areas for this project is 4,455 sq ft, and is divided between two structures: the main house and the accessory cottage. As the property is approximately 50 acres in area, (2,178,000 sq ft) and the proposed floor area is 4,455 sq ft, the F.A.R. is .0019, a fraction of the allowable F.A.R. at .40. In addition, all structures and landscape retaining walls have been carefully designed to fit into the existing topography, in the effort to limit excavation as much as possible.

h. **The proposed general character and appearance of the structures does not depart significantly** from the suburban, detached single-family homes in the vicinity. See architectural elevations, sheet A3.1.

i. **The proposed structures will be "rustic modern" in character** with little additional applied ornament. This style is characteristic of many structures in the Fairfax/San Anselmo public corridors in both commercial and residential structures. See architectural elevations on sheet A3.1. Wood/painted metal handrails and simple canopies over exterior doors, all matching the dark-toned window mullions and casings, will be carefully detailed to add a finer scale of visual variety and interest, while remaining subdued and non-reflective in color and texture.

j. **Existing natural features** including trees, shrubs, and natural grade are retained to the greatest extent possible. There are no existing creeks in evidence on the site (see attached Geotechnical report, dated 12/18/15). The removal of two small stunted trees is recommended by the arborist with the intention of improving the health of larger adjacent trees and will not reduce screening of the proposed structures. Existing shrubs are to be retained for screening purposes and removed only to the extent required by fire area clearing. See Landscape plan for proposed trees and shrubs to be added. Rain runoff from the proposed roofs will be held in on-site bio-retention areas, to limit runoff to storm drains, per code. See Civil Site Plan, sheet C-1.

k. **Off street parking** will be located adjacent to the proposed structures, well off the public street right of way, approximately 180' uphill from where the current driveway meets the current curb cut at Oak Manor Drive. Existing mature oak trees on the property frontage and along the driveway provide effective screens to both new parking spaces and proposed structures.

l. **Proposed paving** will be limited to a new 16' wide driveway, a fire-truck turnaround area and parking spaces for four cars as required by the Fairfax Town Code and fire department. See site plans A1.1, C-1 and L1.0 for the layout of proposed paved driveway areas. As the proposed project is a single-family house, no parking lots or large areas of paving are included. As previously noted, numerous existing mature oak trees will provide substantial screening between the proposed parking spaces and structures and the street public right of way and adjacent residences.

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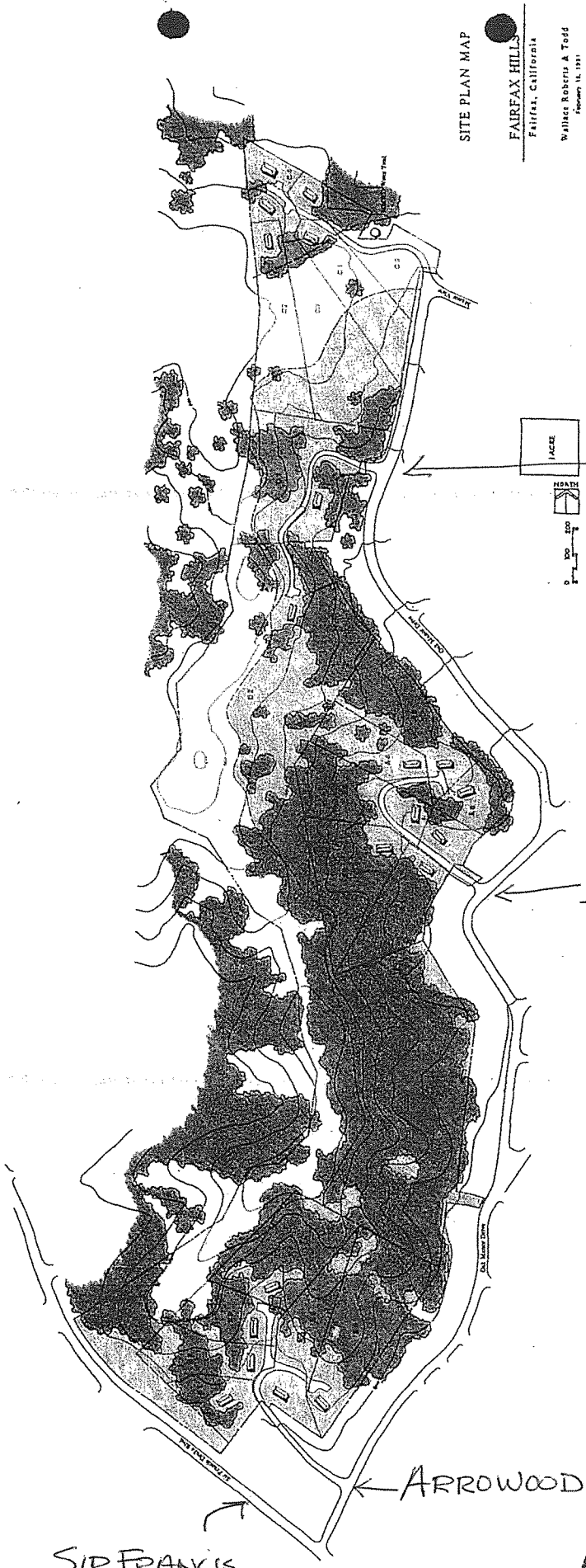


ATTACHMENT C

MILLER PACIFIC ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW SINGLE-FAMILY RESIDENCE
AND ASSOCIATED IMPROVEMENTS
0 OAK MANOR DRIVE (APN 174-070-71)
FAIRFAX, CALIFORNIA

December 18, 2015

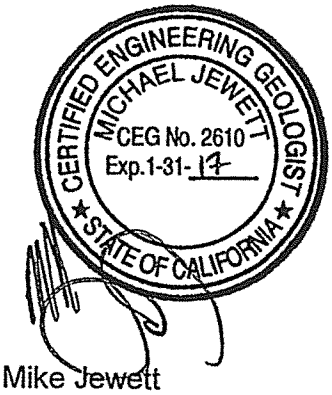
Project No. 2108.001

Prepared For:
Mr. Robert Schwartz
425 Jefferson Street
San Francisco, California 94109

CERTIFICATION

This document is an instrument of service, prepared by or under the direction of the undersigned professionals, in accordance with the current ordinary standard of care. The service specifically excludes the investigation of radon, asbestos, toxic mold and other biological pollutants, and other hazardous materials. The document is for the sole use of the client and consultants on this project. Use by third parties or others is expressly prohibited without written permission. If the project changes, or more than two years have passed since issuance of this report, the findings and recommendations must be reviewed by the undersigned.

MILLER PACIFIC ENGINEERING GROUP
(a California corporation)



Mike Jewett
Engineering Geologist No. 2610
(Expires 1/31/17)

REVIEWED BY

Scott Stephens
Geotechnical Engineer No. 2398
(Expires 6/30/17)

ATTACHMENT D

MILLER PACIFIC
ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW SINGLE-FAMILY RESIDENCE
AND ASSOCIATED IMPROVEMENTS
0 OAK MANOR DRIVE (APN 174-070-71)
FAIRFAX, CALIFORNIA

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MILLER PACIFIC
ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW SINGLE-FAMILY RESIDENCE
AND ASSOCIATED IMPROVEMENTS
0 OAK MANOR DRIVE (APN 174-070-71)
FAIRFAX, CALIFORNIA

I. INTRODUCTION

This report summarizes our design-level Geotechnical Investigation for the planned new residence and associated improvements on an undeveloped, approximately 50-acre parcel at 0 Oak Manor Drive (APN 174-070-71) in Fairfax, California. A Site Location Map is provided as Figure 1. The purpose of our Phase 2 services is to investigate site geologic conditions and provide geotechnical recommendations and criteria for use in project design and construction. We previously performed a Phase 1 Geologic and Geotechnical Feasibility Evaluation, as summarized in our letter report dated January 27, 2015.

The scope of our Phase 2 services is described in our proposal letter dated November 18, 2015, and includes the following:

- Summary of regional and local geology and seismicity;
- Summary of subsurface exploration and laboratory testing;
- Summary of geologic hazards evaluation and conceptual mitigation measures;
- Seismic design criteria in accordance with the 2013 California Building Code;
- Recommendations for site preparation and grading, including soil-type designation in accordance with Cal/OSHA regulations and discussion of anticipated excavation difficulty, excavation shoring requirements, and construction sequencing considerations;
- Recommendations and criteria for new shallow (footing) and deep (drilled pier) foundations;
- Recommendations and criteria for new retaining walls, including discussion of optional wall types;
- Recommendations and criteria for new concrete slabs-on-grade and moisture vapor barriers;
- Recommendations for geotechnical site drainage;
- Recommendations for underground utility construction and backfill;
- Recommendations for exterior concrete flatwork;
- Recommendations for new asphalt pavements; and
- Other geotechnical items as warranted by project features.

Issuance of this report completes our Phase 2 services. Future phases of work are anticipated to include geotechnical consultation, plan review, and construction observation and testing.

II. PROJECT DESCRIPTION

Based on our review of preliminary project plans (Brock Architecture, 2015; ILS Associates Inc., 2015), we understand the project includes construction of a new, approximately 2,500 square-foot, two-story, single-family residence sited near the eastern property boundary toward the north end of the parcel. The development will also include a detached garage and guest house located north of the main house, and a new asphalt-paved driveway which will provide access from Oak Manor Drive. Ancillary improvements are expected to include a swimming pool, new site retaining walls, new utilities and drainage improvements, exterior walkways and other hardscape, new landscaping, and other improvements typically associated with residential construction. A Site Plan indicating the approximate extents of the planned improvements is shown on Figure 2.

III. SITE CONDITIONS

A. Regional Geology

The project site is located in the Coast Ranges geomorphic province of California, which is typified by generally northwest-trending ridges and intervening valleys formed as a result of movement along a group of northwest-trending fault systems, including the San Andreas Fault. Bedrock geology within Marin County is dominated by sedimentary, igneous, and metamorphic rocks of the Jurassic-Cretaceous age Franciscan Complex. Sandstone and shale comprise the majority of Franciscan rock types, while less common rocks include chert, serpentinite, basalt, greenstone, and exotic low- to high-grade metamorphic rocks, including phyllite, schist, and eclogite.

Regional geologic mapping (Rice et al, 2015) indicates that the northern portion of the parcel is generally underlain by Franciscan melange bedrock of Jurassic-Cretaceous age, while the southern portion is underlain by Cretaceous Franciscan sandstone and shale bedrock. Melange is defined as a tectonic mixture of resistant rock types, principally sandstone, chert, greenstone, and serpentinite, but including lesser quantities of volcanic, exotic metamorphic and meta-sedimentary rocks, embedded in a pervasively sheared shale matrix. Creataceous sandstone and shale typically consists of fine- to medium-grained arkosic and arkosic-wacke sandstone with interbedded shale, mudstone, and lesser conglomerate. Mapping indicates the presence of several small to relatively large-sized debris-flow landslides, originating from the prominent ridgeline along the western site boundary and extending downslope to the east, within those areas underlain by melange bedrock. In the southern portion of the parcel, underlain by Cretaceous sandstone and shale, landslides are generally fewer and farther between, generally confined to the southernmost extent of the property, near Sir Francis Drake Boulevard. The proposed building site is mapped as being underlain by Melange bedrock, while deeply-incised ravines to the north and south are mapped as being underlain by both older (dormant) and active landslides. A Regional Geologic Map is provided as Figure 3.

B. Seismicity

The project site is located within the seismically active San Francisco Bay Area and will therefore experience the effects of future earthquakes. Earthquakes are the product of the build-up and sudden release of strain along a "fault" or zone of weakness in the earth's crust. Stored energy may be released as soon as it is generated or it may be accumulated and stored for long periods of time. Individual releases may be so small that they are detected only by sensitive instruments, or they may be violent enough to cause destruction over vast areas.

Faults are seldom single cracks in the earth's crust but are typically comprised of localized shear zones which link together to form larger fault zones. Within the Bay Area, faults are concentrated along the San Andreas Fault zone. The movement between rock formations along either side of a fault may be horizontal, vertical, or a combination and is radiated outward in the form of energy waves. The amplitude and frequency of earthquake ground motions partially depends on the material through which it is moving. The earthquake force is transmitted through hard rock in short, rapid vibrations, while this energy becomes a long, high-amplitude motion when moving through soft ground materials, such as bay mud.

1. Active Faults in the Region - An "active" fault is one that shows displacement within the last 11,000 years (i.e. Holocene) and has a reported average slip rate greater than 0.1 mm per year. The California Division of Mines and Geology (1998) has mapped various active and inactive faults in the region. These faults, defined as either California Building Code Source Type "A" or "B," are shown in relation to the project site on the attached Active Fault Map, Figure 4. The nearest known active faults to the site are the San Andreas and San Gregorio Faults, located approximately 9.7 kilometers and 10.6 kilometers southwest of the site, respectively.

2. Historic Fault Activity - Numerous earthquakes have occurred in the region within historic times. The results of our computer database search indicate that at least 32 earthquakes (Richter Magnitude 5.0 or larger) have occurred within 100 kilometers (62 miles) of the site area between 1769 and 2014. The six most significant historic earthquakes to affect the project site are summarized in Table A.

TABLE A
SIGNIFICANT HISTORIC EARTHQUAKE ACTIVITY
0 Oak Manor Drive
APN 174-070-71
Fairfax, California

Epicenter (Latitude, Longitude)	Historic Richter Magnitude	Year	Distance
37.80, -122.20	6.8	1836	41 km
37.60, -122.40	7.0	1838	47 km
37.70, -122.10	6.8	1868	55 km
38.20, -122.40	6.2	1898	27 km
37.70, -122.50	8.2	1906	36 km
38.22, -122.31	6.0	2014	34 km

Reference: USGS Circular Area Earthquake Catalogue Search, accessed December 2015.

3. Probability of Future Earthquakes – The site will likely experience moderate to strong ground shaking from future earthquakes originating on active faults in the San Francisco Bay region. The historical records do not directly indicate either the maximum credible

earthquake or the probability of such a future event. To evaluate earthquake probabilities in California, the USGS has assembled a group of researchers into the "Working Group on California Earthquake Probabilities" (USGS, 2003; USGS, 2008) to estimate the probabilities of earthquakes on active faults. The results of these studies have been respectively published as the Uniform California Earthquake Rupture Forecasts, Versions 1 and 2 (UCERF and UCERF 2). In these studies, potential sources were analyzed considering fault geometry, geologic slip rates, geodetic strain rates, historic activity, and micro-seismicity, to arrive at estimates of earthquakes of various magnitudes on a variety of faults in California.

The 2003 study (UCERF) specifically analyzed fault sources and earthquake probabilities for the seven major regional fault systems in the Bay Area region of northern California. The 2008 study (UCERF 2) applied many of the analyses used in the original UCERF to the entire state of California, in addition to updating some of the analytical methods and models.

In addition to the seven major Bay Area regional fault systems, the 2003 study included probabilities of "background earthquakes." These earthquakes are not associated with the identified fault systems and may occur on lesser faults (i.e., West Napa) or previously unknown fault traces (i.e., the 1971 Northridge and 1989 Loma Prieta earthquakes) When the probabilities on all seven fault systems and the background earthquakes are combined mathematically in conjunction with the updated models and analytics from the 2008 study, there is a 63 percent chance for a magnitude 6.7 or larger earthquake to occur in the Bay Area by the year 2036. Smaller earthquakes (between magnitudes 6.0 and 6.7), capable of considerable damage depending on proximity to urban areas, have about a 92 percent chance of occurring in the Bay Area by 2036 (USGS, 2008).

Conclusions from the 2008 UCERF 2 indicate that the mean probability of an M>6.7 earthquake in all of California by 2036 are 99.7%, while northern California specifically has lower odds of about 93%. Additionally, UCERF 2 assigns probabilities of an M>6.7 event on each of the nearest mapped active fault by 2036, the San Andreas Fault, of 31%.

Additional studies by the USGS regarding the probability of large earthquakes in the Bay Area are ongoing. These current evaluations include data from additional active faults and updated geological data.

C. Surface Conditions

We performed a site reconnaissance for observation of existing conditions and wide-scale mapping of site geology on January 19, 2015. The results of our geologic mapping are shown on the Site Plan and Site Geologic Map, Figures 2 and 5. Additionally, we performed a follow-up site visit on January 23, 2015 to discuss preliminary project features and more closely observe conditions in the vicinity of the proposed building site. It should be noted that, given our understanding that no development is currently planned in the steeply-sloping, heavily vegetated southern portion of the site, our field mapping and evaluation efforts were generally focused on the northern portion of the parcel. The most significant observations made during performance of our site reconnaissance are summarized below.

- As noted above, the project site consists of an approximately 50-acre parcel, elongate in the north-south direction, which is bounded immediately to the east by existing single-family residential development within the Oak Manor subdivision. The parcel may generally be described as a narrow, north-south trending ridgeline along the eastern property line, with steep, east-facing slopes comprising the majority of the parcel's remainder. Existing improvements at the site are limited to a dirt-surfaced fire road which follows the ridgeline along the east property line and a partially-paved access road which extends east from Oak Manor Drive just north of the residence at #575 before turning south and climbing the hillside to a junction with the fire road at the ridgeline in the north-central portion of the parcel as shown on Figure 5.

- Cut slopes along the north side of the access road (before it turns to the south) expose weathered, fractured sandstone bedrock, are generally inclined between about 0.5:1 (horizontal:vertical) and 1:1, (and locally near-vertical, particularly where small "cornices" of residual soils exist near the top of the slope). Cut slopes range from about 25- to 50-feet high. Small piles of gravel- to cobble-size rock fragments are locally present along the base of the slope, indicative of historic sloughing and raveling of the fractured bedrock. The scar of a relatively recent, moderate-sized debris flow or rockslide is present at the west end of the cut slope, adjacent to the scar of a larger, older debris flow landslide that is generally contained within the ravine, as shown on Figure 5. The upslope side of the access road has been provided with a shallow drainage ditch and a chain-link fence to limit the potential for debris deposition within the roadway.

- The proposed development area, located in the northern portion of the property, just west of (above) 575 Oak Manor Drive, is located along the existing access road, approximately 100-feet south of the point where the road crosses a prominent drainage ravine. The building site consists of a relatively level pad which appears to have been created chiefly via excavation into the hillside, with only minor fill placement (approximately 20-feet wide and up to about 8- to 10-feet thick) along the downslope (east) edge. The building site is bounded to the east by natural slopes, inclined at about 2:1, which are approximately 50-feet high and abut the existing single-family residences along Oak Manor Drive at the bottom. West (upslope) of the building site, natural slopes inclined between about 1:1 and 2:1 extend up for approximately 300-feet to the prominent ridgeline along the eastern property line. A few small scarps, up to about 5-feet high and indicative of relatively recent shallow landsliding, were observed upslope of the site. To the south, the building site is bounded by the side scarp of an older, relatively large debris-flow landslide. The side scarp is about 30-feet high, inclined at approximately 1.5:1, and generally follows the existing access road alignment south of the building site, as shown on Figure 5.

- South of the building site, the access road continues along topographic contours and the adjacent slide scarp before crossing the slide's debris field. We noted that the access road is washed out over a length of about 50-feet at this location, and a corrugated metal culvert has been constructed and suspended from a cable support system to convey surface water runoff within the access road's upslope ditch across the slide area. Given that the slide's headscarp is just upslope of the access road, it is suspected that slide activation may have been the result of poor or non-existent maintenance of the access road's upslope drainage ditch.

- The northernmost portion of the project site, generally between the existing access road/cut slope and northern property line, generally consists of flatter slopes (typically

between about 3:1 and 5:1) with lesser vegetation consisting mainly of low grasses and widely-scatter oak trees. A few spatially-limited and likely shallow landslides exist along the eastern property line, but most other areas appear to be relatively stable and underlain by melange bedrock.

- The central portion of the site, generally including those areas south of the proposed building site and underlain by melange bedrock (as shown on Figure 5), generally include a narrow ridgeline along the west property line that is underlain by shallow bedrock and moderate to steep, heavily vegetated slopes to the west which are variously underlain by shallow, highly weathered bedrock or landslide debris of variable thickness. In a few areas, the ridgeline is as little as 10- to 12-feet wide, flanked to the east and west by very steep slopes (likely old landslide scarps) which are inclined as steep as 0.5:1, but typically on the order of 1.5:1, and which are locally 25-feet high or more.

- The southernmost portion of the project site, generally consisting of areas underlain by sandstone bedrock and adjacent lands to the east and west, is generally comprised of steep slopes, inclined between about 1:1 (horizontal:vertical) and 3:1, which are underlain by relatively resistant and shallow sandstone and shale bedrock and heavily vegetated with thick stands of mature oak, madrone, and bay trees. Fewer landslides were generally noted in these areas. However, it should be noted that the lower slopes in these portions of the site are not easily accessible, and the mapping shown on Figure 5 was done on the basis of minimal field mapping, "windshield" observation of topography from Oak Manor Drive and Sir Francis Drake Boulevard, and correlation of our observation with existing regional mapping. If development is planned in these areas, more detailed mapping and reconnaissance may be needed depending on the planned improvements.

D. Subsurface Exploration by Others

Subsurface conditions at the proposed development site were previously explored by Salem Howes Associates (2001) to the extent of 4 shallow test pits at the approximate locations shown on Figure 2. Little detail regarding site soils is included in their report, and no laboratory testing was apparently performed. Test pits encountered relatively shallow Franciscan bedrock throughout the development area, with rock generally encountered at depths between about 1.0- and 8.0-feet below the ground surface.

E. Subsurface Exploration and Laboratory Testing

Subsurface conditions were explored at the project site with 4 borings drilled on November 23, 2015 at the approximate locations shown on Figure 2. The borings were excavated to a maximum explored depth of about 18 feet below ground surface by use of a track-mounted drill rig equipped with 4-inch solid-stem continuous flight augers. Materials encountered were examined and logged in the field by our Geologist and samples were collected at select intervals for laboratory testing. Brief explanation of the terms and methodology used in classifying earth materials is shown on the Soil and Rock Classification Charts, Figures A-1 and A-2, respectively. Exploratory boring logs are shown on Figures A-3 through A-6.

Laboratory testing of relatively undisturbed samples from the exploratory borings included determination of moisture content, dry density, percentage of particles passing the No. 200 sieve, unconfined compressive strength, and plasticity index in general accordance with applicable ASTM standards. Laboratory test results are shown on the boring logs. The field exploration and laboratory testing program is discussed in further detail in Appendix A.

E. Subsurface Conditions

The results of our subsurface exploration generally confirm geologic conditions as previously mapped on a regional scale by Rice, Strand, and Smith (1976) and on a site-specific scale by Miller Pacific (2015). The borings encountered approximately 1 to 5 feet of fill and colluvial soils generally consisting of medium dense clayey sand. Weathered, highly fractured and relatively weak Franciscan sandstone bedrock underlies the fill/colluvium. The sandstone generally grades stronger and more competent with depth.

F. Groundwater

Groundwater was not encountered in any of our borings which were drilled during November following an unusually dry year. Since the borings were not left open for an extended period of time, a stabilized depth to groundwater may not have been observed. Based on our experience with nearby sites underlain by similar geologic conditions, groundwater should generally be expected to exist within about a foot of the soil-rock interface and may be shallower during the winter months or following periods of heavy rainfall.

IV. GEOLOGIC HAZARDS EVALUATION

A. Summary

This section summarizes our review of commonly considered geologic hazards, discusses their potential impacts on the planned improvements, and identifies proposed mitigation options. The primary geologic hazards which could affect development of the project site are strong seismic ground shaking, slope instability/landsliding, and erosion. Other geologic hazards are judged to be less than significant at the site. Each geologic hazard considered is discussed in further detail in the following paragraphs.

B. Fault Surface Rupture

Under the Alquist-Priolo Earthquake Fault Zoning Act (CDMG, 1978), the California Division of Mines and Geology (now known as the California Geological Survey) produced 1:24,000 scale maps showing known active and potentially active faults and defining zones within which special fault studies are required (CDMG, 2000). The nearest known active faults, the San Andreas and San Gregorio Faults, are located approximately 9.7 kilometers and 10.6 kilometers southwest of the site, respectively, and the site is not mapped as lying within an Alquist-Priolo Earthquake Fault Zone. Therefore, the likelihood of fault surface rupture at the site is remote.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are anticipated.*

C. Seismic Shaking

The site will likely experience seismic ground shaking similar to other areas in the seismically active Bay Area. The intensity of ground shaking will depend on the characteristics of the causative fault, distance from the fault, the earthquake magnitude and duration; and site specific geologic conditions. Estimates of peak ground accelerations are based on either deterministic or probabilistic methods.

Deterministic methods use empirical attenuation relations to provide approximate estimates of median peak ground accelerations. A summary of the active faults that could most significantly

affect the planning area, their maximum credible magnitude, closest distance to the center of the planning area, and probable peak ground accelerations are summarized in Table B.

TABLE B
ESTIMATED PEAK GROUND ACCELERATION
FOR PRINCIPAL ACTIVE FAULTS
0 Oak Manor Drive
APN 174-070-71
Fairfax, California

Fault	Moment Magnitude for Characteristic Earthquake[1]	Closest Estimated Distance (kilometers)[1]	Median Peak Ground Acceleration (g)[1,2]
San Andreas	8.0	10	0.34
San Gregorio	7.4	11	0.28
Hayward	7.3	19	0.17
Rodgers Creek	7.3	26	0.14
West Napa	6.6	37	0.07

1) Caltrans (2014), ARS Online (web-based acceleration response spectra calculator tool), http://dap3.dot.ca.gov/ARS_Online/, accessed November 12, 2014.

2) Values determined using Vs^{30} = 760 m/s for "Rock" subsurface conditions (Site Class "B") in accordance with the 2013 California Building Code.

The calculated bedrock accelerations should only be considered as reasonable estimates. Many factors (soil conditions, orientation to the fault, etc.) can influence the actual ground surface accelerations.

Ground shaking can result in structural failure and collapse of structures or cause non-structural building elements (such as light fixtures, shelves, cornices, etc.) to fall, presenting a hazard to building occupants and contents. Compliance with provisions of the California Building Code (CBC) should result in structures that do not collapse in an earthquake. Damage may still occur and hazards associated with falling objects or non-structural building elements will remain.

The potential for strong seismic shaking at the project site is high. Due to their proximity and historic rates of activity, San Andreas and San Gregorio Faults present the highest potential for severe ground shaking. The significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation: *Less than significant with mitigation.*
Mitigation: *Minimum mitigation includes design of new structures in accordance with the provisions of the 2013 California Building Code. Preliminary recommended seismic design coefficients are presented in Section V of this report.*

Liquefaction and Lateral Spreading

Liquefaction refers to the sudden, temporary loss of soil strength during strong ground shaking. This phenomenon can occur in saturated, loose, granular deposits (typically sand) when the sediments are subjected to seismic shaking. Liquefaction can result in flow failure, lateral spreading, and settlement.

That vast majority of the project site is underlain either by relatively shallow bedrock, landslide deposits derived of such bedrock, colluvium, or relatively shallow fill. No alluvial soils or other deposits anticipated to contain liquefiable horizons are shown within the property limits on the regional map, nor were such deposits observed during our site investigation. Therefore, we judge the likelihood of damage to improvements due to liquefaction at the site is low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

E. Seismically-Induced Ground Settlement

Ground shaking can induce settlement of loose granular soils. Regional geologic mapping indicates that the majority of the project site is underlain either by relatively shallow bedrock or colluvium and landslide deposits. Significant deposits of loose granular materials were not observed during our site investigation and are generally not expected at the site. Therefore, the risk of seismically-induced ground settlement is judged to be low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

F. Lurching and Ground Cracking

Lurching and associated ground cracking can occur during strong ground shaking. The ground cracking generally occurs along the tops of slopes where stiff soils are underlain by soft deposits or along steep slopes or channel banks. Such conditions are generally not present at the site; therefore the risk of damage due to lurching or ground cracking is judged low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

G. Erosion

Sandy soils on moderately steep slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated surface water flow. The potential for erosion is increased when established vegetation is disturbed or removed during construction activity. During our site reconnaissance, we noted that vast majority of the site consists of moderately- to steeply-sloping terrain which shows abundant evidence of widespread erosion. Therefore, the risk of damage to improvements due to erosion is high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *For new improvements at the site, careful attention should be paid to finished grades and the project Civil Engineer should design the site drainage system to collect surface water into a storm drain system and discharge water at appropriate locations. Surface water runoff from the access road should be collected and conveyed to an established storm drain system. Re-establishment*

of vegetation on disturbed areas will minimize erosion. Erosion control measures during and after construction should be in accordance with a prepared Storm Water Pollution Prevention Plan and should conform to the most recent version of the California Stormwater Quality Association (CASQA) Construction Best Management Practice Handbook (2003).

H. Seiche and Tsunami

Seiche and tsunamis are short duration, earthquake-generated water waves in enclosed bodies of water and the open ocean, respectively. The extent and severity of a seiche would be dependent upon ground motions and fault offset from nearby active faults.

The site is located at elevations well over +150-feet MSL and is more than 5-miles east of San Pablo Bay. Therefore, the likelihood of inundation by seiche or tsunami is remote.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

I. Flooding

The primary adverse impact from flooding is water damage to structures. The site consists of moderately- to steeply-sloping terrain at elevations well over +150-feet MSL. Therefore, the risk of large-scale flooding at the site is judged to be low.

Evaluation: *Less than significant.*
Mitigation: *The project Civil Engineer should carefully consider the potential for ponding of water around buildings and localized small-scale flooding during design of site finished grades. Site drainage improvements should be designed to accommodate runoff associated with the maximum credible rainfall event.*

J. Expansive Soils

Moderate and highly plastic silts and clays, when located near the ground surface, can exhibit expansive characteristics (shrink-swell) that can be detrimental to structures and flatwork during periods of fluctuating soil moisture content. Our subsurface exploration does not indicate the presence of highly expansive soils and the risk of damage due to expansive soil behavior is therefore judged to be low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

K. Settlement

Based on our subsurface exploration, the proposed building site is underlain mainly by shallow bedrock, though some fill exists around the eastern edge of the existing graded pad. Because of the site's sloping terrain, development is likely to require a combination of excavation and fill placement. Depending on the exact location and extents of planned improvements, some risk of differential settlement will exist where new structures cross cut/fill transitions.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The risk of differential settlement may be effectively mitigated by siting new*

structures entirely within "cut" areas such that they bear uniformly on firm native materials or by use of deep foundations bearing on bedrock that underlies fill areas. Recommendations and criteria for new foundations are presented in Section V.D of this report.

L. Slope Instability and Landsliding

The project site is located in an area historically subject to widespread landsliding and slope instability. Regional geologic mapping (Rice et al, 1976) and our own site reconnaissance indicates the presence of several small- to large-sized, debris-flow landslides on the east flank of the prominent ridgeline which parallels the western property line. Thus large portions of the 50-acre parcel, particularly in the east-central part, are underlain by landslide debris as shown on Figures 3 and 5.

The proposed building site is bordered to the south by a relatively large debris-flow landslide which has left a side scarp adjacent to the building site inclined at about 1:1 (horizontal:vertical) and approximately 25- to 30-feet high. The ravine immediately northeast of the building site, which is crossed by the existing access road, is also occupied by an older debris-flow slide. A more recent slide scarp is present along the east side of this older landslide. A few smaller scarps, generally indicative of relatively recent, relatively small debris flows and soil slumps, were also observed on the steep slopes above the proposed building site. The building site itself is underlain by relatively shallow bedrock, with a small amount of fill on the downslope (east) side which is undocumented and of unknown quality.

Therefore, we judge there is a high risk of damage to improvements, both on the subject property and adjacent parcels, due to slope instability and landsliding originating within the subject parcel.

Evaluation: *Less than significant with mitigation.*

Mitigation: *Based upon the proposed locations for the new improvements shown in the preliminary drawings (Brock, 2015; ILS, 2015), we anticipate mitigation measures would likely include a combination of avoidance/minimum building setbacks, new retaining structures and/or debris barriers, and new surface and subsurface drainage improvements as discussed in the following paragraphs. As project design advances, slope stability analyses may need to be performed to confirm existing and proposed slopes will have adequate factors of safety against slope instability.*

The main residence is located at the base of a steep slope between mapped debris-flow landslides. The residence should generally be provided with a minimum 20-foot setback from the toe of the adjacent slope. Alternatively, given the height and steep inclination of the slope, mitigation may include protecting new structures from impact in the event of future raveling or debris originating on the slope. Such measures could include construction of debris barriers or designing the walls along the east side of the structure to withstand impact from falling rock/debris.

The guest house is located adjacent to the northern ravine and just south of the older debris-flow slide runout area Several small scarps indicative of historic shallow landsliding exist on native slopes above the guiest house, and mitigation for instability could potentially include retaining walls at the scarp location, debris

catchment barriers between the scarps and the structure, incorporation of a catchment wall into the structure itself, or minor remedial grading to reduce scarp inclinations and improve stability.

The proposed swimming pool encroaches upon the side scarp of the debris-flow landslide adjacent to the southern portion of the proposed building site. The pool is also located upslope of the neighboring residence at 575 Oak Manor Drive, adjacent to the eastern property boundary. Given the proximity of the pool to the existing landslide and downslope improvements, mitigation measures should include constructing a retaining wall system capable of supporting the pool and slope to reduce the risk of future movements. Such a system would likely consist of a tied-back, reinforced concrete retaining wall founded on drilled piers that extend through potential slide debris and into rock.

M. Soil Corrosion

Corrosive soil can damage buried metallic structures and underground utilities, deteriorate rebar reinforcement, and cause spalling of concrete. Soils high in soluble sulfates and chlorides, as well as acidic soils and soils of low electrical resistivity, tend to have high corrosive potential. Based on our experience with other projects in the area, corrosive soils are not anticipated at the site

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are anticipated.*

N. Radon-222 Gas

Radon-222 is a product of the radioactive decay of uranium-238 and raduim-226, which occur naturally in a variety of rock types, chiefly phosphatic shales, but also in other igneous, metamorphic, and sedimentary rocks. While low levels of radon gas are common, very high levels, which are typically caused by a combination of poor ventilation and high concentrations of uranium and radium in the underlying geologic materials, can be hazardous to human health. The project site is located in Marin County, California, which is mapped in radon gas Zone 3 by the United States Environmental Protection Agency. Zone 3 is classified by the EPA as exhibiting a "low" potential for Radon-222 gas with average predicted indoor screening levels less than 2pCi/L; therefore the potential for hazardous levels of radon at the project site is low.

Evaluation: *Less than significant.*
Mitigation: *Installation of a vapor barrier could be considered to further reduce the risk of Radon exposure.*

O. Volcanic Eruption

Several active volcanoes with the potential for future eruptions exist within northern California, including Mount Shasta, Lassen Peak, and Medicine Lake in extreme northern California, the Mono Lake-Long Valley Caldera complex in east-central California, and the Clear Lake Volcanic Field, located in Lake County approximately 65 miles north of the project site. The most recent volcanic eruption in northern California was at Lassen Peak in 1917, while the most recent eruption at the nearest volcanic center to the project site, the Clear Lake Volcanic Field, was about 10,000 years ago. All of northern California's volcanic centers are currently listed under "normal" volcanic alert levels by the USGS California Volcano Observatory. While the

aforementioned volcanic centers are considered "active" by the USGS, the likelihood of damage to the proposed improvements due to volcanic eruption is generally low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

P. Naturally-Occurring Asbestos

Asbestos is a generic term for a group of naturally-occurring fibrous minerals which, when airborne, can be hazardous to the respiratory system. Crystals of asbestiform minerals may be liberated from the host rock and become airborne during crushing or grading operations. The most common asbestos mineral is chrysotile, though other minerals such as tremolite and actinolite take the same fibrous crystal form. While relatively rare in occurrence, these minerals are commonly associated with ultramafic and related metamorphic rocks, chiefly serpentinite but also including low- to high-grade schists such as chlorite schist and blueschist. These rocks are a major constituent of the Franciscan Complex which underlies vast portions of the greater San Francisco Bay Area.

Regional mapping and our own site reconnaissance indicates the entirety of the project site is underlain by bedrock of the Franciscan Complex. The southern portion of the site is underlain by Cretaceous-age sandstone and shale, a geologic unit which typically does not contain asbestos-bearing rocks. The northern and central portions of the site are underlain by melange, which commonly contains inclusions of serpentinite and other asbestos-bearing rocks. During our site reconnaissance, we did not observe outcrops of serpentinite or other ultramafic rock types anywhere on the property, and they are generally not anticipated in the immediate vicinity of the proposed building site, which is underlain by sandstone. We judge the likelihood that naturally-occurring asbestos will be encountered at the site is generally low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Based on the results of our exploration, laboratory testing and our geologic hazards evaluation, we judge that development of the proposed single-family residence and associated improvements is feasible from a geotechnical standpoint. Primary geotechnical considerations for the project will include avoidance or stabilization of existing landslides within and/or adjacent to the planned development area, providing protection for new structures from landslides originating in upland areas along the western site boundary, providing uniform foundation support for new structures, providing site drainage to reduce the risk of erosion and instability, and potentially difficult grading and excavation conditions in hard bedrock materials. Geotechnical recommendations and criteria to address these and other geotechnical project facets are presented in the following sections.

B. Seismic Design

Minimum mitigation of seismic ground shaking includes seismic design of the structure in conformance to the provisions of the most recent version (2013) of the California Building Code.

However, since the goal of the building code is protection of life safety, some structural damage may still occur during strong ground shaking.

We recommend using the coefficients and site values shown in Table C below to calculate the design base shear for the new construction. To determine site seismic coefficients, we used the USGS Seismic Hazard Curves and Uniform Hazard Response Spectra, Version 5.0.9a, using the latitude and longitude shown on Figure 4.

TABLE C
SEISMIC DESIGN CRITERIA
0 Oak Manor Drive
APN 174-070-71
Fairfax, California

2013 California Building Code

Factor Name	Coefficient	CBC Table/ Figure[1]	Site Specific Value[2,3,4]
Site Class[5]	$S_{A,B,C,D,E, or F}$	1613.5.2	S_B
Spectral Acc. (short)	S_s	1613.5(3)	1.500 g
Spectral Acc. (1-sec)	S_1	1613.5(4)	0.605 g
Site Coefficient	F_a	1613.5.3(1)	1.0
Site Coefficient	F_v	1613.5.3(2)	1.0

(1) For facilities regulated by the Division of the State Architect – Structural Safety (DSA-SS), the Office of Statewide Health Planning and Development (OSHPD), or other agencies (e.g. schools, hospitals, etc.) use the "A" equations and tables in lieu of the equations and tables noted above. "Site specific" values in the table apply to all structures.

(2) Values determined in accordance with the 2010 ASCE-7 standard.

(3) Values determined using the USGS Seismic DesignMaps web application, http://earthquake.usgs.gov/designmaps/us/application.php, accessed January 26, 2015.

(4) Values determined using Vs^{30} = 760 m/s for Site Class "B" per the 2013 CBC.

(5) Soil Profile Type S_B ("Site Class B") Description: Rock, shear wave velocity between 2,500 and 5,000 feet per second.

C. Site Grading

We anticipate that moderate to extensive grading, including excavations up to about 10-feet deep, will be required for the project. We also anticipate that it will be desired to "balance" the site grading, and as such we anticipate placement of new fills in the lower portions of the property, although anticipated new fill thicknesses are not yet known. All site grading should be performed in general accordance with the recommendations outlined in the following paragraphs.

1. Site Preparation – Clear all trees, brush, roots, over-sized debris, and organic material from areas to be graded. Trees that will be removed (in structural areas) must also include removal of stumps and roots larger than four inches in diameter. Existing concrete slabs and foundations should also be completely removed where they conflict with planned grades to reduce the risk of damage due to reflection cracking. Existing utilities may either be completely removed or abandoned in-place, provided that cement grout completely fills all voids in the utility conduit. Excavated areas (e.g. excavations for stump removal) should be restored with properly moisture-conditioned and compacted fill as described in the following sections. Any loose soil or rock at subgrade will need to be excavated to expose firm natural soils or bedrock. Debris, rocks larger than six inches and vegetation are not suitable for structural fill and should be removed from the site. Alternatively, vegetation strippings may be used in landscape areas.

   Where fills or other structural improvements are planned on level ground, the subgrade surface should be scarified to a depth of about 12-inches, moisture conditioned to above the optimum moisture content, and compacted to a minimum of 90 percent relative compaction. Areas exposing weathered bedrock at subgrade elevation need not be scarified and compacted. Subgrade preparation should extend a minimum of 5-feet beyond the planned building envelope in all directions. Relative compaction should be increased to a minimum of 95% where new pavements are planned. Relative compaction, maximum dry density, and optimum moisture content of fill materials should be determined in accordance with ASTM Test Method D 1557, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop." If soft, wet or otherwise unsuitable materials are encountered at the subgrade elevation during construction, we will provide supplemental recommendations to address the specific condition.

2. Excavations – Site excavations for new foundations, underground utilities, and other improvements will generally encounter medium-dense sandy to clayey fill and colluvial soils over weak to moderately strong, weathered Franciscan sandstone and melange bedrock. Based on our subsurface exploration, we judge the majority of site excavation can be reasonably performed with "traditional" equipment, such as medium-size dozers, excavators, and auger-type drilling equipment. However, Franciscan bedrock often contains inclusions and zones of harder, more resistant rock which cannot be efficiently excavated with typical equipment and requires specialized techniques or equipment to excavate (e.g. jackhammers, hoe-rams, or core barrels). Therefore, we recommend inclusion of a line item and clear definition for "hard rock excavation" in the project bid documents. If hard rock is encountered during construction which prohibits excavation to the required depths, we should be consulted to observe conditions and revise our recommendations and/or design criteria as appropriate.

3. Fill Materials and Compaction – Fill should be placed on a prepared subgrade as described above. The fill material should consist of non-expansive materials free of organic matter, have a Liquid Limit of less than 40, a Plasticity Index of less than 20, and a minimum R-value of 20. Fill material should include no particles larger than 6-inches and should include no more than 50% fines (particles passing a No. 200 sieve). Onsite excavations will generally yield clayey to gravelly mixtures that may be suitable for re-use as fill provided they can be processed to meet the aforementioned gradation requirements. Spoils from deeper excavations into Franciscan bedrock may yield

cobble- or boulder-sized material that requires substantial processing to achieve the required gradation.

Fill materials should be placed in loose horizontal lifts no greater than eight inches thick. Structural fills less than five feet thick should be moisture conditioned above the optimum moisture content and uniformly compacted to a minimum of 90 percent relative compaction. Structural fills in excess of five feet should be moisture conditioned above the optimum moisture content and uniformly compacted to a minimum of 92 percent relative compaction to reduce the potential for significant settlements. In non-structural (landscape) areas fill compaction may be reduced to at least 85 percent. The upper twelve inches of pavement subgrade (i.e., access roads and driveways) should be compacted to a minimum of 95 percent relative compaction to provide a smooth, uniform, and unyielding surface when proof-rolled with heavy rubber-tire construction equipment.

4. Temporary and Permanent Cut Slopes – Temporary (steeper) cut slopes may be required during construction until retaining walls are constructed and backfilled. For planning purposes, these cut slopes in onsite fill or colluvial soils should be inclined no steeper than 1.5:1 based on an OSHA "Type C" soil profile. Cut slopes in bedrock may be inclined at 1:1 based on an OSHA Type "B" soil profile, and could be steeper where competent rock is encountered. Geologic inspection during excavation will be required to verify that the above recommendations are appropriate for the conditions encountered.

   Performance of temporary cut slopes will be heavily dependent on the amount of time the cut is unsupported, seepage and surface runoff over the face, bedding and fracture planes of rock and soil materials, and other factors. The steeper (temporary) cut slopes may exhibit some sloughing, especially during wet weather conditions, and cleanup of soil and rock debris at the base of slopes may be required. We recommend the project grading contractor be responsible for the performance of temporary cut slopes. We should be present intermittently during construction to verify that the above recommendations remain appropriate for actual conditions encountered. Permanent cut slopes should be inclined no steeper than 2:1.

5. Fill Slopes – Fill slopes will need to bear on keyways and benches excavated into firm native bedrock, and keyways and benches will need to be provided with subdrains to reduce the risk of future instability. New fill slopes may require drilled pier-founded retaining walls to support the toe of the slope, depending on local topography and slope inclinations. A Typical Hillside Fill Construction Detail is included as Figure 6. Fill slopes higher than 25-feet will require an intermediate bench and v-ditch for positive surface drainage. Fill slopes steeper than 2:1 may be feasible; however, they will require synthetic geotextile reinforcement and will need to be specifically designed.

D. Foundation Design

Due to the steep existing slopes and history of instability at the site, shallow foundations are judged appropriate only in "cut" areas where they will bear directly on weathered bedrock. In fill areas, in areas of thicker soil or slide debris deposits, and in areas adjacent to steep slopes, deep foundations, likely consisting of drilled, cast-in-place concrete piers, will be required. Foundation piers should be interconnected with a series of grade beams and transverse tie beams. Isolated piers or footings should be avoided to reduce the risk of damage due to slope "creep" and

instability. Design criteria for new shallow foundations and drilled-pier foundations are presented in Table D.

TABLE D
DEEP FOUNDATION DESIGN CRITERIA
0 Oak Manor Drive
APN 174-070-71
Fairfax, California

Shallow Footings[1]:	
Minimum Width:	
Single-Story:	12 inches
Two-Story:	15 inches
Three or More Stories:	18 inches
Minimum Embedment into Weathered Bedrock[2]:	12 inches
Allowable bearing pressure (Bedrock)	
Dead Plus Live Loads[3]	3,500 psf
Base Friction Coefficient:	0.35
Lateral Passive Resistance[4,5]	
Bedrock:	400 pcf
Drilled Piers:	
Minimum Diameter:	18 inches
Minimum Embedment into Weathered Bedrock[6]:	5 feet
Skin Friction	
Colluvial/Residual Soils:	Ignore
Weathered Bedrock:	2,000 psf
Lateral Passive Resistance[7,8]:	
Colluvial/Residual Soils:	Ignore
Weathered Bedrock:	350 pcf

Notes:
(1) In weathered bedrock ("cut") areas, load all shallow foundations to similar bearing pressures, i.e. size footing widths to design loads instead of uniform foundation widths.
(2) Maintain minimum 7-feet horizontal confinement from the face of adjacent slopes.
(3) May increase by 1/3 for total design loads (including wind and seismic).
(4) Equivalent Fluid Pressure, not to exceed 10 times value in psf.
(5) Foundations on sloping ground or at the crest of slopes should be designed to resist "creep" loads equivalent to a 120 pcf active pressure on the upslope side of the foundations. "Creep" loads should be applied over the effective width of 2 pier diameters.
(6) Minimum depth may be reduced if hard rock is encountered, to be determined by the Geotechnical Engineer during construction.
(7) Dead plus live loads. May increase by 1/3 for total design loads (including wind and seismic).
(8) Apply values over effective width of 2 pier diameters.

D. Interior Concrete Slabs-on-Grade

Reinforced concrete slab-on-grade interior floors are also judged to be appropriate for the site conditions. The concrete slabs-on-grade may be poured monolithically to the foundations or separated with a cold joint. We generally recommend interior concrete slabs be a minimum of 5-inches thick. Concrete slabs should be reinforced with steel rebar, not wire mesh, and rebar should extend through crack control joints. The project Structural Engineer should design the new concrete slabs.

Where interior spaces are sensitive to moisture conditions (i.e., where floor coverings or material storage would be adversely affected by water vapor migrating up through the slab), a 4-inch layer of clean, free draining, 3/4-inch angular gravel should be placed beneath the interior concrete slabs to form a capillary moisture break. The rock must be placed on a properly moisture-conditioned and compacted subgrade that has been approved by the Geotechnical Engineer. A plastic membrane vapor barrier, 15 mils or thicker, should be placed over the rock layer. The vapor retarder should meet the ASTM E 1745 Class A requirements and be installed per ASTM E 1643. Eliminating the gravel (capillary moisture break) and/or plastic vapor retarder may result in excess moisture intrusion through the floor slabs resulting in poor performance of floor coverings, mold growth or other adverse conditions. For slabs that are not sensitive to moisture vapor, we recommend at least four inches of Class 2 Aggregate Base compacted to 95 percent below the slab.

It should be noted that where the gravel capillary break layer is placed beneath floor slabs there is potential for water to collect in the gravel layer and become trapped. If this condition occurs, the potential for moisture problems at the surface of the slab will be increased. One method of minimizing the potential for this to occur would be to construct a subdrain trench through and just below the gravel layer so that water collected in this area can escape. The subdrain should extend at least 12-inches below the base of the slab and 6-inches below the bottom of the gravel layer, and would consist of a 3-inch diameter, perforated pipe (Schedule 40 PVC) surrounded by gravel. The subdrain would connect to the gravel layer beneath the slab, and the pipe should lead (at a minimum one percent slope) to a storm drain or another suitable outlet point. The outlet pipe should transition to nonperforated pipe at a point two feet inside the perimeter grade beam of the structure. A compacted clayey soil plug or other type of cutoff should be placed around the pipe at the point where the outlet pipe leaves the building footprint to prevent seepage from back-flowing into the underslab gravel layer.

This industry standard approach to floor slab moisture control, as discussed above, does not assure that floor slab moisture transmission rates will meet the building use requirements or that indoor humidity levels will be low enough to inhibit mold growth. Building design, construction, and intended use have a significant role in moisture problems and should be carefully evaluated by the owner, designer, and builder in order to meet the project requirements.

F. Retaining Wall Design Criteria

New retaining walls will be required to support new cuts and fills at the site. Many retaining wall options are available, including soldier-pile and timber lagging, reinforced, cast-in-place concrete, mechanically-stabilized earth (MSE), and soil-nail and shotcrete. For cut areas, soldier-pile and timber lagging or soil nail and shotcrete walls are often the most cost-efficient. For fill areas, MSE walls may be more cost-effective.

Retaining walls that can deflect a small amount at the top, such as site or landscape walls, can be designed using the unrestrained criteria shown in Table E. Walls that are structurally connected at the top and not allowed to deflect, such as basement or tied-back walls, are considered restrained. Restrained conditions are commonly designed using a uniform earth pressure distribution rather than an equivalent fluid pressure. Lateral support can be obtained from either passive soil resistance (i.e. keyways), frictional sliding resistance of footings, or from tiebacks. In addition to soil loads, the retaining walls should be designed to resist temporary seismic loads.

TABLE E
RETAINING WALL DESIGN CRITERIA
0 Oak Manor Drive
APN 174-070-71
Fairfax, California

Foundation

Refer to the foundation design criteria in Table E.

Lateral Earth Pressure	Unrestrained[1,2]	Restrained[1,3]
Level Ground	40 pcf	30 X H psf
2:1 Slope	60 pcf	40 X H psf

Seismic Surcharge[3,4]: 15 X H psf

Tiebacks/Soil Nails/MSE Walls[5]

	Phi[6]	C (psf)[7]	Gamma (pcf)[8]
Colluvial/Residual Soils	30	50	115
Weathered Bedrock	35	1,000	135

Min. Soil Nail/Tieback Diameter: 6 inches

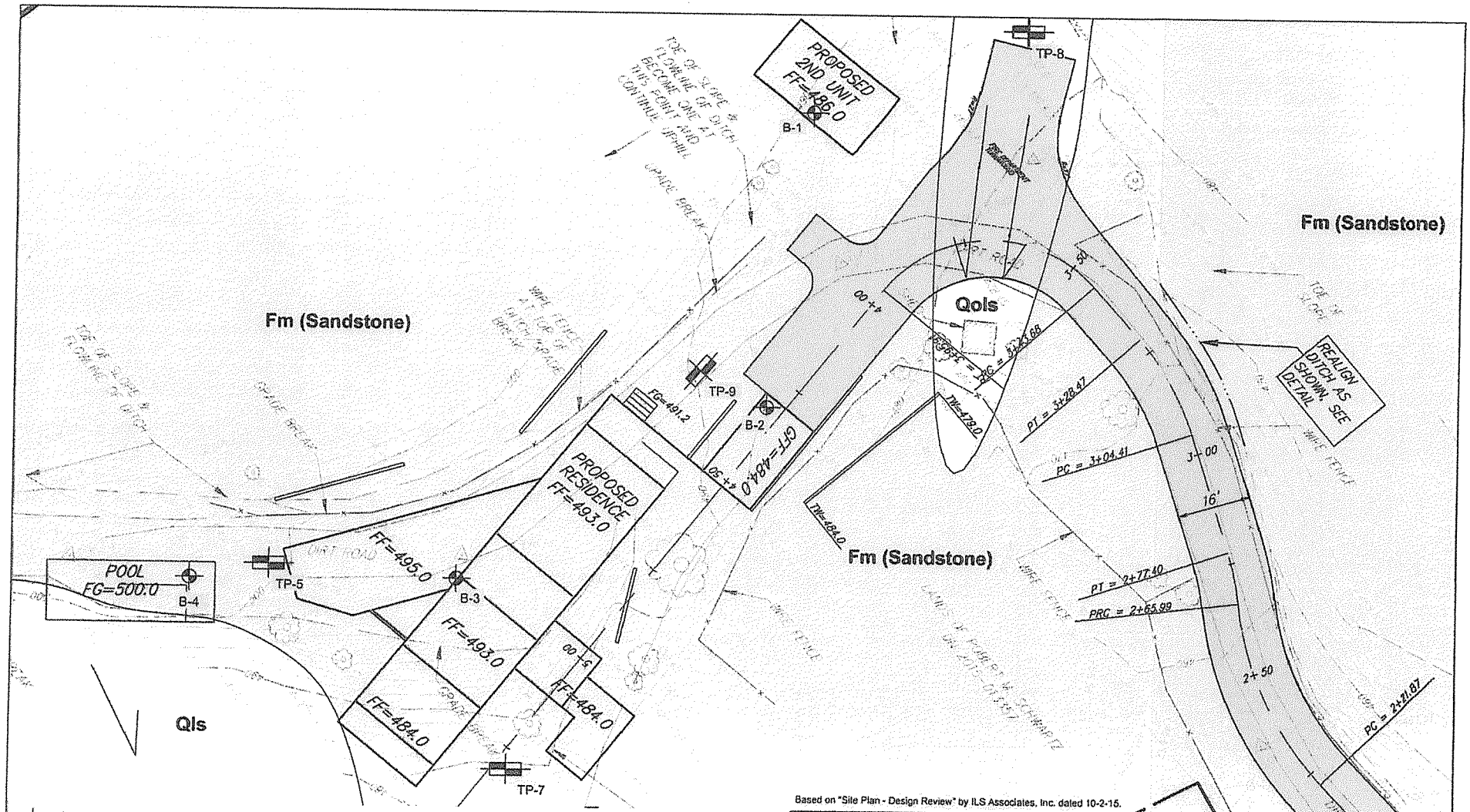
Skin Friction:

Colluvial/Residual Soils: Ignore

Weathered Bedrock: 2,000 psf

Notes:

(1) Interpolate earth pressures for intermediate slopes.
(2) Equivalent fluid pressure.
(3) Rectangular uniform pressure distribution (H = height of wall).
(4) Use minimum factor of safety of 1.0 for seismic design.
(5) Design soil nails for load testing up to 150% of design load. Load testing to be performed in accordance with procedures per Post-Tensioned Institute (1996).
(6) Angle of Internal Friction, effective stress, unitless
(7) Apparent (effective) Cohesion, for seismic conditions 250 psf of additional cohesion may be included.
(8) Unit Weight of Soil



Approximate location of test boring (Miller Pacific, 2015)

Approximate location of test pit (Salem Howes, 2001)

NORTH

SCALE

0 10 20 40 FEET

Based on "Site Plan - Design Review" by ILS Associates, Inc. dated 10-2-15.

Miller Pacific
ENGINEERING GROUP

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Suite 220
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FILE: 2108 001P.dwg

SITE PLAN

0 Oak Manor Drive
APN 174-070-71
Fairfax, California

Project No. 2108.001 Date: 12/3/15

Drawn MEJ
Checked

2
FIGURE