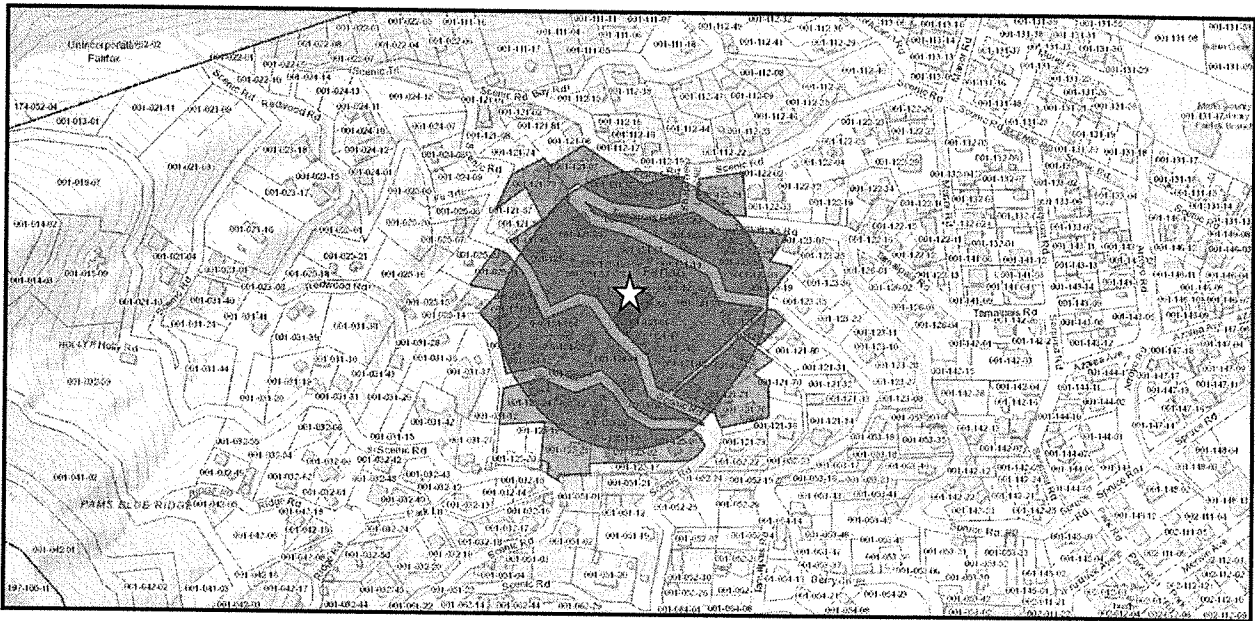


**TOWN OF FAIRFAX
STAFF REPORT
Department of Planning and Building Services**

TO: Fairfax Planning Commission
DATE: March 21, 2019
FROM: Linda Neal, Principal Planner
LOCATION: 251 Scenic Road; Assessor's Parcel No. 001-121-50
ZONING: Residential Single-family RS-6 Zone
PROJECT: Single-family residence
ACTION: Hill Area Residential Development, Design Review, Encroachment, Combined Side-yard Setback, and Parking Variance permits; Application # 19-06
APPLICANT: Bryan Murdock, Murdock Architecture
OWNER: David Boesel
CEQA STATUS: Categorically exempt, sections 15303(a), 15305(a) and (b)



**251 SCENIC ROAD
ASSESSOR'S PARCEL NO. 001-121-50**

DESCRIPTION

The proposed project consists of the following: a) construction of 3-story, 33-foot 10-inch tall, 2,128 square-foot residential structure with 928 square feet of area on the upper (main) floor, 1,102 square feet on the lower floor and a 98 square-foot entryway; b) a 365 square-foot, 3-car carport; and c) 365 square feet of deck area. The total proposed project grading consists of 17 cubic yards of cut and 17 cubic yards of fill, for a net off-haul of 0 cubic yards. See Attachment IB and C1 for the applicant's supplemental information and response to Town Engineering comments.

The proposed residential structure would contain 3 bedrooms, 2 ½ bathrooms, dining room, living room/sitting room, a laundry closet and an entryway adjacent to the carport.

The residence complies with the regulations set forth in the Residential Single-family RS-6 Zone District as follows:

	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	35 ft., 3 stories
Proposed	6 ft.	63 ft.	69 ft.	8 ft. 6 in., 10 ft.	18 ft. 6 in.	.34	.28	33 ft., 10 in., 3 stories

BACKGROUND

The 6,306 square-foot, bay tree-covered site slopes steeply down from Scenic Road at an average rate of 60%.

The site is situated in a northeastern facing slope within a larger swale that has experienced at least 3 slides previously. Records show that the first slide in the larger swale that includes the project site occurred in March 1982. This slide filled a downhill house at 120 Tamalpais Road with mud and rendered it uninhabitable. The Town Engineers, after performing their site inspection, believed the first slide originated at the location of the scarp below the proposed residence. The second slide in 1986 took out a section of Tamalpais Road at the top of the project site. This slide was repaired by the Town in order to reopen Tamalpais Road with a bin wall structure consisting of several panel sets on a bedrock bench with the panels extending below grade some distance. The panels are backfilled and compacted to support up to 40,000 lbs. gross vehicle weight (fire truck). The third slide occurred below the house at 120 Tamalpais Road in 2011, and blocked and threatened Tamalpais Road, after which the Town retained the road-cut with a rip-rap and concrete wall.

The applicants have redesigned the project two times at the direction of the staff – first to decrease the amount of encroachment into the combined side-yard setback, and second to pull the structure closer to the hillside to decrease the underfloor area and overall mass. The application was declared complete on March 1, 2019.

REQUIRED DISCRETIONARY PERMITS

The project requires the approval of a Hill Area Residential Development permit, Encroachment Permit, Design Review Permit, and Combined Side-yard Setback and Parking Variances. The required discretionary permits and analysis of project compliance with the related sections of the Town Code and Zoning Ordinance are found below.

Hill Area Residential Development

The purpose of the Hill Area Residential Development Permit is to encourage the maximum retention of natural topographic features, minimize grading of hillside areas, provide a safe means of ingress and egress to and within hillside areas, minimize water run-off and soils 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 on hillside lots is of a size and scale appropriate to the property and is consistent with other properties in the vicinity under the same zone classification [Town Code sections 17.072.010(A)].

Drainage and Slope Stability

The house would be supported by a drilled pier, grade beam, and tie back foundation system due the steep property slope, soil composition, and depth of bedrock. The applicants have designed the drainage improvements to mimic the existing drainage patterns on the site and will route water from the roof, decks and driveway through inlets and downspouts to a 20 foot long storm-water dissipater, which is designed to evenly spread the flow of water across the hillside slope. The increased drainage due to the proposed development would be slowed through a combination of the storage provided in the horizontal dissipater pipe, the pipe's perforated design, and the drain rock below the dissipater. Site stability would be improved through the construction of the proposed residence foundation system, and the installation of a 4-foot slope-stability retaining wall 28 to 30 feet downslope of the residence.

The Town Engineers have reviewed the entire body of information provided by the applicant on the project, including the project engineering and architectural plans as well as the geotechnical response to comments, the addendum to the geotechnical report by SalemHowes Associates, dated 9/5/18, the original report dated 1/23/17, and the drainage report by DVC Group, dated 7/13/18 (Attachments C1, C2, C3 and C4). After completing their review and visiting the site, they have determined that the project

can be constructed as proposed without creating any significant geologic or hydrologic hazards for adjacent public or private properties as long as the following conditions are met:

1. A slope stability analyses as described in the Town Engineer's second review letter of 9/28/18, pages 3 and 4, shall be submitted with the building permit application, for review and subject to approval, in conjunction with the drainage and stability improvement plans, by the Town Engineers (Miller Pacific Engineering) prior to issuance of the building permit. The analysis shall either provide documentation of the correlation between the standard penetration test (SPT) blow counts and the friction angle, strength and cohesion values used in the analysis; or an updated analysis shall be provided which utilizes soils parameters developed on the basis of laboratory testing of on-site samples, or via back-calculation of previous land sliding on the site. The model shall also be revised to accurately reflect site conditions and encompass the entire parcel and include the existing roadway and bin wall, the proposed grading/structural improvements, the location of the upslope and downslope property lines and the location of the existing slide scarp in the lower portion of the property and shall extend beyond the property line onto the downslope property at 120 Tamalpais Road as needed to evaluate offsite impacts of the new development. The cost for the Town Engineer's review of the slope stability analysis prepared by the applicant's consultant shall be borne by the applicant.
2. The primary drainage dissipation system shall be located above the sub-grade, slope stability wall unless approved below it by the Town Engineers after reviewing the building permit application plans and study described above.
3. The project plans and submittal information shall be reviewed, and if acceptable, approved by the Town Engineers prior to issuance of the project building permit

The Town Engineer's review memoranda are included with this report as Attachment numbers D1, D2 and D3.

The above conditions have been incorporated into the conditions of approval contained in the attached Resolution No. 2019-06.

House Siting and Design

The house siting and design comply with the purpose section of the Hill Area Residential Development Chapter 17.072 of the Town Code. The house has been redesigned at staff's direction, and currently features a compact 72-foot by 33-foot footprint with the minimum underfloor area necessary to keep the house and garage at an elevation where the driveway can meet Marin cities' and County driveway slope regulations (Standard # 140), while also keeping the house below the 35-foot height limit required by Town Code § 17.080.060(A), and complying with Ross Valley Fire Department regulations for distance of structures from the fire truck staging area.

The steep 60% slope of the site dictates that the required three on-site parking spaces be located parallel to each other and perpendicular to the Scenic Road roadbed, resulting in the third required guest parking space for the residence being designed as an 8 ft. x 16 ft. compact stall and encroaching 1.5 feet into the required 20-foot combined side-yard setback.

Design Review

Town Code §17.020.030(A) requires that the design of new residences be reviewed and approved by the Fairfax Planning Commission for compliance with the design review criteria contained in Town Code §17.020.040.

These criteria include but are not limited to the following:

“The proposed development shall create a well composed design harmoniously related to other facilities in the immediate area and to the total setting as seen from hills and other key vantage points in the community”.

“The size and design of the structure shall be considered for the purpose of determining that the structure is in proportion to its building site and that it has balance and unity among its external features so as to present a harmonious appearance”.

“The extent to which natural features, including trees, shrubs, creeks and rocks and the natural grade of the site are to be retained”.

The proposed structure complies with the Design Review Criteria. The structure conforms to the general character of other structures in the vicinity, will require minimal disturbance to the site for grading to accommodate the house footprint, water and sewer laterals, and drainage system improvements. The construction will require the removal of 15 bay trees, All of these are in the footprint or within 5 to 6 feet of the house, and are required to be removed by the Fire Department because they are prophytic and in too close proximity to the house, or within the footprint of the house or stability wall below the house. The Fairfax Tree Committee reviewed and approved removal of the bay trees subject to the applicant's providing the Planning Commission with an arborist's report prior to the Commission's review (Attachment G – Tree Committee minutes). The project arborist, Peter Brooks, reviewed the redwoods within the vicinity of the project on the neighboring lot to the southeast and verified that the project will not negatively impact these heritage trees (Attachment E). The submitted arborist report does not include a tree protection plan which is required by Town Code § 8.36.080 of Fairfax Tree Ordinance. Staff has included a condition in Resolution No. 2019-06 requiring the submittal of a tree protection plan with the building permit application. Recommendations to ensure the continued health of the bay trees to be retained on the site are also conditions of the project approval.

The exterior of the structure would be articulated through the use of both horizontal board and batten siding painted gray (Benjamin Moore CSP 60 – City Shadow) and

parallel Hardie V Groove siding painted a brown shade (Benjamin Moore CSP 205 – Cathedral Gray). The exterior will be accented by the cedar-paneled front door with a clear coat finish and the corrugated metal roof over the parking deck and the pedestrian and parking deck railings that will be painted slate grey and have a wood rail cap. The window sizes and shapes have been varied and the house has been stepped down the hillside following the contour of the slope to further break up the external façade. Gutters and downspouts would be metal and painted a slate gray (W8) and the window and door frames will be dark bronze aluminum clad Marvin windows. The roof will be slate colored class A composite shingle roofing, and the exterior lighting fixtures meet “dark sky” criteria and will be shielded from direct offsite illumination.

The house has been designed to be in scale with the project site and similar in size to other structures in the neighborhood and on similar sized and sloped sites throughout the Fairfax Manor Subdivision where the property is located (see table below).

251 Scenic Road – SIMILAR PROPERTIES DEVELOPMENT							
APN #	ADDRESS	LOT SIZE	HOUSE SIZE	# BEDROOMS	# BATHS	GARAGE	FAR
On similar lots							
001-051-12	300 Scenic	5000	2065	4	2	0	.41
001-051-21	294 Scenic	7900	802	2	2	0	.10
001-052-07	305 Scenic	6050	2665	4	3.5	0	.44
001-052-26	317 Scenic	7420	1419	2	20		.19
001-121-02	185 Scenic	3600	1118	2	1	0	.31
001-121-51	245 Scenic	7125	1164	2	2	252	.16
001-121-52	235 Scenic	6750	1604	2	2		.24
001-121-56	217 Scenic	5400	1324	2	1	0	.25
001-121-65	219 Scenic	5700	1232	2	2	0	.22
001-121-66	255 Scenic	6000	1638	3	2	441	.27
001-121-001-121-73	285 Scenic	7800	2014 (2 units)	3	2	0	.26
001-121-76	223 Scenic	7400	1144	3	2	0	.15
Project Site							
001-121-50	251 Scenic	6306	2128	3	2.5	0	.34

Excavation

Town Code §17.20.080 requires that an Excavation Permit be obtained from the Planning Commission for excavation and fill amounts of over 100 cubic yards. The project will only require the total excavation and fill of 34 cubic yards of material, with excavation being equal to the fill so there will be no off-haul of material required.

Encroachment Permit

Town Code § 12.32.010 gives the Planning Commission the authority to grant encroachment permits for carports and other structures upon portions of the public rights-of-way that are not being used for vehicular or pedestrian travel. These encroachments are revocable and are memorialized through the recording of a "Revocable Encroachment" agreement at the Marin County Recorder's Office prior to issuance of the building for any project that proposes use of the public right-of-way for private improvements.

The driveway deck leading to the proposed carport is proposed to be constructed 8 to 9 feet into the Scenic Road right-of-way, which requires the approval of an encroachment permit. Many/most developed properties within the steep hillside areas of Fairfax have been issued some type of encroachment permit because the Town roads are rarely developed to the full width of the right-of-way and there has to be an encroachment for vehicles to get from the street level to the on-site parking improvements.

The 8- to 9-foot encroachment being requested is in staff's opinion the minimum necessary to allow development of the house and access to the required parking in the carport. Approval of the encroachment is conditioned upon the applicant completing and recording a revocable encroachment agreement prior to issuance of the project building permit.

Parking and Combined Side-yard Setback Variance

As described above the site is narrow and very steep, and has an irregular front property line that is not parallel to the edge of the paved roadway. The existence of the bin wall at the top supporting the road is also a feature not commonly found on most hillside sites. All these features make it difficult to meet the parking requirements, driveway grade break regulations, height limitation and setback regulations (Town Code sections 17.052.030(A)(1) and (2), 17.080.060(A) and Marin County Standard # 140). If the house were pushed further from the front property line so that all the parking spaces met the minimum 9 ft. x 19 ft. size requirement, the height of the residence would increase beyond the 35 ft. height limit and require a Height Variance. The house cannot be placed lower on the site without creating access issues for the driveway slope and transition between the driveway and the carport. The grade break would exceed Marin County Standards and result in vehicles bottoming out when accessing any level parking spaces in the carport from the road (Attachment F – Marin County Standard 140). The steep slope and narrow width also drive the need for a slight 1.5 foot encroachment into the required 20-foot. combined side-yard setback, in order to provide room for an entryway in addition to the required 3 parking spaces

In order to meet the requirement for 3 on-site parking spaces, the driveway will exceed the permitted 20-foot width. fronting the right-of-way. Therefore, this project will also require the approval of a driveway width variance from the Fairfax Town Council per Town Code § 17.052.020(A).

Front Setback Variance

Town Code § 17.080.070(B)(1) requires that structures in the Residential Single-family RS-6 Zone maintain a minimum front setback of 6 feet. However, Town Code § 17.052.020(C) allows down-sloping properties with over a 15% slope to have uncovered parking decks within the front setback. The carport cover structure has been designed to maintain the required 6-foot front setback so the project does not require the approval of a front setback variance. Only the uncovered portions of the driveway access apron and parking are in the front setback. Properties on steeply down-sloping sites are also exempt from the covered parking requirement per Town Code § 17.052.020(D) so the portion of the parking spaces that are uncovered are not an issue.

OTHER DEPARTMENT/AGENCY COMMENTS/CONDITIONS

Ross Valley Fire Department (RVFD)

RVFD submitted written requirements which have been incorporated into conditions of approval in the attached resolution and are summarized as follows:

All vegetation and construction materials are to be maintained away from the residence during construction, hydrant flow and location are to be identified prior to the start of construction, a fire sprinkler system shall be installed throughout the entire building, smoke detectors shall be installed throughout the entire building and be provided with AC power and be interconnected for simultaneous alarm, carbon monoxide alarms shall be provided outside each sleeping area in the immediate vicinity of the bedrooms and address numbers at least 4 " tall visible from the street and internally illuminated or illuminated by and adjacent light controlled by a photocell and switched off only by a breaker so it will remain illuminated all night.

Marin Municipal Water District (MMWD)

MMWD submitted written requirements which have been incorporated into conditions of approval in the attached resolution and are summarized as follows:

A water service application must be submitted to the District, a copy of the building permit must be provided to the district along with the required applications and fees, the foundation must be completed within 120 days of the date of application, all indoor and outdoor requirements or District Code Title 13, Water Conservation must be complied with, any landscaping plans must be reviewed and approved by the District, backflow prevention requirements must be met and Ordinance 420, requiring installation of grey water recycling system when practicable, must be incorporated into the project building permit plans or an exemption letter from the District must be provided to the Town, all of the District's rules and regulations in effect at the time service is requested must be complied with.

Ross Valley Sanitary District (RVSD)

RVSD submitted written requirements which have been incorporated into the conditions of approval in the attached resolutions and are summarized as follows:

A sewer connection permit and a side sewer connection permit are required for new buildings, fees depend on the number of fixture units in the new structure, a hold will be placed on the property when the building permit is issued and will not be released for occupancy until the District permit and sewer requirements have been fulfilled.

Fairfax Police, Building and Public Works Departments

The Public Works Department has submitted requirements which have been incorporated into the conditions of approval in the attached resolution and are summarized as follows:

Complete road closures will be limited to concrete pours and steel placement, temporary road closures will require coordination with the Fairfax Police Department and Ross Valley Fire Department, a detailed construction management plan must be submitted with the building permit application that includes construction delivery routes approved by the Department of Public Works, construction schedule (deliveries, worker hours, etc.), notification to area residents, emergency access and egress routes and proposed employee parking locations during construction. The applicant shall prepare, and file with the Public Works Director, a video of the roadway conditions on the construction delivery routes (routes must be approved by Public Works Director) and a bond will be submitted prior to issuance of the building permit in an amount that will cover the cost of grading, weatherization and repair of possible roadway damage in an amount equaling 100% of the estimated construction costs and pay for the Town Engineer's time to review and confirm the contractor's estimate.

Police and Building Departments

The police and building department had no comments on the project.

RECOMMENDATION

1. Conduct the Public Hearing.
2. Move to approve application # 19-06 by adopting Resolution No. 2019-06 setting forth the findings and conditions for the project approval.

ATTACHMENTS

Attachment A – *Resolution No. 2019-06*

Attachment B – Applicant's Project Description, support for findings

Attachment C1 – 1/10/19 response to comments for Geologic, Geotechnical and Civil Engineering Review

- C2 – Salem Howes 9/5/18 supplemental letter
- C3 – Salem Howes 1/23/17 Geotechnical Report
- C4 – DVC Drainage Report
- Attachment D1 – Town Engineer's (Miller Pacific Engineering) final review letter of 1/21/19
- D2- Town Engineer's second review letter of 9/28/18
- D3 – Town Engineer's first review letter of 8/8/18
- Attachment E- Brooks Tree Care 3/1/19 Arborist Report
- Attachment F - Marin County Standard 140
- Attachment G - Tree Committee minutes 2/25/2019
- Attachment H - Letter of support for the project design from neighbor, Rich Rushton, 3/5/2019

RESOLUTION NO. 2019-06

A Resolution of The Fairfax Planning Commission Approving Application No. 19-06 for a Hill Area Residential Development Permit, Encroachment Permit, Parking and Combined Side Setback Variance, and Design Review Permit for a Residence at 251 Scenic Road

WHEREAS, the Town of Fairfax has received an application from David Boesel to build 3-story, 2,128 square-foot, 3 bedroom, 2 ½ bathroom single-family residence and attached 365 square-foot carport on January 22, 2018; and

WHEREAS, the Planning Commission held a duly noticed Public Hearing on March 21, 2019 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, Encroachment, Parking and Combined Side-yard Setback Variance, and Design Review Permits; and

WHEREAS, the Commission has made the following findings:

The project is consistent with the 2010-2030 Fairfax General Plan as follows:

Policy LU-1.2.3: New and renewed development shall be designed and located so as to minimize the visual mass. The Town will require exterior materials and colors that blend the exterior appearance of structures with the surrounding natural landscape, allowing for architectural diversity.

Policy LU-7.1.5: New and renewed residential development shall preserve and enhance the existing character of the Town's neighborhoods in diversity, architectural character, size and mass.

Policy LU-7.2.2: to the extent feasible natural features including the existing grade, mature trees and vegetation shall be preserved for new and renewed development.

Policy LU-4.1.4: New and renewed development shall be designed to minimize run-off in a manner that does not cause undue hardship on neighboring properties.

Policy LU-7.2.2: To the extent feasible natural features including the existing grade, mature trees, and vegetation shall be preserved for new and renewed development.

Hill Area Residential Development

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

1. The site planning preserves identified natural features as much as possible while also complying with other agency and department regulations.
2. Vehicular access and parking are adequate.
3. The proposed development harmonizes with surrounding residential development and meets the design review criteria contained in Town Code § 17.020.040.
4. The approval of the Hill Area Residential Development permit for 1 single-family residence on this 6,306 square foot parcel shall not constitute a grant of special privilege and shall not contravene the doctrines of equity and equal treatment.
5. The development and use of 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 as long as the conditions of approval contained within Resolution No. 2019-06 are complied with.
6. 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 City.
7. Approval of the Hill Area Residential Development permit will result in equal or better development of the premises than would otherwise be the case because the construction should make the site more stable than it has been in the past.

Excavation Permit

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

Architectural plans by Murdock Architecture, pages A0.1 through A0.3 (dated 7/10/18), A1.0 (dated 10/25/18) , A4.0 and A4.1, A6.1 and A6.2, A7.0 through A7.2 (all dated 7/10/18) , Vegetative Management Plan page VMP-1 (7/10/18), topography map by DVC Group page 1 (April 2017) and grading and drainage plans by DVC Group pages C1 through C4 (dated 1/9/19).

9. Based on the Town Engineer's review and recommendation that the project can be safely constructed, the Planning Commission finds that:
 - a. The health safety and welfare of the public will not be adversely affected;
 - b. Adjacent properties are adequately protected by project investigation and design from geologic hazards as a result of the work;
 - c. Adjacent properties are adequately protected by project design from drainage and erosion problems as a result of the work;
 - d. 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;
 - e. The visual and scenic enjoyment of the area by others will not be adversely affected by the project more than is necessary;
 - f. Natural landscaping will not be removed by the project more than is necessary; and
 - g. 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.

Parking and Combined Side-yard Setback Variances

10. The site has a 60% slope, the road easement is 40 feet wide placing the front property line 7 to 8 feet from the edge of the road pavement and the site is only 53 feet wide. These are the special circumstances applicable to the property, including size, shape, topography, location of surroundings that would result in the strict application of the standard 9 ft. x 19 ft. parking space size regulations and the combined 20 ft. side-yard setback regulation depriving the applicant of privileges enjoyed by other property owners in the vicinity and under identical zone classification.
11. The variance or adjustment will not constitute a grant of special privilege, is consistent with the limitations upon other properties in the vicinity and under identical zone classification, and is consistent with the objectives of this title. Both the residences at 255 and 257 Scenic Road were granted variances of the combined 20 foot side-yard setback requirement to construct new single family residences in 1990 and 2003.
12. The strict application of this title would result in excessive or unreasonable hardship.

13. The granting of the variance of adjustment will not be detrimental to the public welfare or injurious to other property in the vicinity in which the property is situated.

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

1. The project is approved based on the following plans:

Architectural plans by Murdock Architecture, pages., pages A0.1 through A0.3 (dated 7/10/18), A1.0 (dated 10/25/18) , A4.0 and A4.1, A6.1 and A6.2, A7.0 through A7.2 (all dated 7/10/18) , Vegetative Management Plan page VMP-1 (7/10/18), topography map by DVC Group page 1 (April 2017) and grading and drainage plans by DVC Group pages C1 through C4 (dated 1/9/19).

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:
 - I. Construction delivery routes approved by the Department of Public Works.
 - II. Construction schedule (deliveries, worker hours, etc.)
 - III. Notification to area residents
 - IV. 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.
3. 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.

4. The grading, foundation, retaining, and drainage elements shall also be stamped and signed by the project geotechnical engineer as conforming to the recommendations made by the project Geotechnical Engineer.
5. 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.
6. Submit 3 copies of the record of survey with the building permit plans.
7. All retaining walls that are visible from the street and are constructed of concrete shall be heavily textured 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.
8. Prior to the removal of any trees not approved by the Planning Commission through this action, the applicant shall secure a tree cutting permit, if required, from the Fairfax Tree Committee 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 the project arborist to prune and treat trees having roots 2 inches or more in diameter that are disturbed during the construction, excavation or trenching operations. 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.
9. During the construction process the following shall be required:
 - a. The geotechnical engineer and the project arborist shall be on-site during the grading process and both shall submit written certification to the Town Staff that the grading and tree protection measures have been completed as recommended prior to installation of foundation and/or retaining forms and drainage improvements, piers and supply lines.
 - 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.
 - c. The Building Official shall field check the concrete forms prior to the pour.

- d. 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.
 - e. 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.
10. 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.
11. 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.
12. The roadways shall be kept free of dust, gravel and other construction materials by sweeping them, daily, if necessary.
13. Any changes, modifications, additions or alterations made to the approved set of plans will require a modification of Application # 19-06. Modifications that do not significantly change the project, the project design or the approved discretionary permits **may** be approved by the Planning Director. Any construction based on job plans that have been altered without the benefit of an approved modification of Application 19-06 will result in the job being immediately stopped and red tagged.
14. Any damages to the public portions of Scenic Rd. Azalea Ave., Tamalpais Rd., or Sequoia Rd. or other public roadway used to access the site resulting from construction activities shall be the responsibility of the property owner.
15. 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.

16. 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 and Best Management Practices for Stormwater Pollution Prevention.
17. Conditions placed upon the project by outside agencies, Town department or by the Town Engineer may be eliminated or amended with that agency's, department's or the Town Engineer's written notification to the Planning Department prior to issuance of the building permit.
18. Conditions placed upon the project by the project arborist may be amended or eliminated by the approval of the Planning Director after receiving a request for the elimination/amendment in writing from the project arborist. May require a review by the Town Arborist and/or the Town Engineer at the owner's expense prior to Planning Director determination.
19. 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 structure for compliance with the engineering plans.

Ross Valley Fire Department

20. All vegetation and construction materials are to be maintained away from the residence during construction,
21. Hydrant flow and location are to be identified prior to the start of construction.
22. 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 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.
23. 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.
24. 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.
25. 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.
26. 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 by a breaker so it will remain illuminated all night.
27. Alternative materials or methods may be proposed for any of the above conditions in accordance with Section 104.9 of the Fire Code.
28. 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 (MMWD)

- 29. A copy of the building permit must be provided to the district along with the required applications and fees.
- 30. The foundation must be completed within 120 days of the date of application.
- 31. All indoor and outdoor requirements or District Code Title 13, Water Conservation must be complied with.
- 32. Any landscaping plans must be reviewed and approved by the District.
- 33. Backflow prevention requirements must be met.
- 34. Ordinance 420., requiring installation of grey water recycling system when practicable, must be incorporated into the project building permit plans or an exemption letter from the District must be provided to the Town.
- 35. All of the District's rules and regulations if effect at the time service is requested must be complied with.

Ross Valley Sanitary District (RVSD)

- 36. A sewer connection permit and a side sewer connection permit are required for new buildings.
- 37. Fees must be paid to the District and will depend on the number of fixture units in the new structure.
- 38. A hold will be placed on the property when the building permit is issued and will not be released for occupancy until the District permit and sewer requirements have been fulfilled.

Fairfax Public Works Department

- 39. Complete road closures will be limited to concrete pours and steel placement.
- 40. Temporary road closures will require coordination with the Fairfax Police Department and Ross Valley Fire Department.
- 41. A detailed construction management plan must be submitted with the building permit application that includes construction delivery routes, construction schedule (deliveries, worker hours, etc.), notification to area residents, emergency access and egress routes and proposed employee parking locations during construction and be approved by the Department of Public Works.

42. The applicant shall prepare, and file with the Public Works Director, a video of the roadway conditions on the construction delivery routes.
43. A bond will be submitted prior to issuance of the building permit in an amount that will cover the cost of grading, weatherization and repair of possible roadway damage in an amount equaling 100% of the estimated construction costs and pay for the Town Engineer's/Plan Checker's time to review and confirm the contractor's estimate.

Miscellaneous

44. The Revocable Encroachment Document memorializing the approved encroachments must be signed, notarized and recorded at the Marin County Recorder's Office prior to issuance of the Building permit.
45. A tree protection plan and inspection schedule must be prepared by the project arborist and must be submitted with the building permit. The protection measures and recommended arborist inspection schedule will be conditions of the building permit approval. Letters verifying that the protection measures have been installed and that the inspections were made by the project arborist will be required prior to the project final inspection.
46. A slope stability analyses as described in the Town Engineer's second review letter of 9/28/18, pages 3 and 4, shall be submitted with the building permit application, for review and subject to approval, in conjunction with the drainage and stability improvement plans, by the Town Engineers (Miller Pacific Engineering) prior to issuance of the building permit. The analysis shall either provide documentation of the correlation between the standard penetration test (SPT) blow counts and the friction angle, strength and cohesion values used in the analysis; or an updated analysis shall be provided which utilizes soils parameters developed on the basis of laboratory testing of on-site samples, or via back-calculation of previous land sliding on the site. The model shall also be revised to accurately reflect site conditions and encompass the entire parcel and include the existing roadway and bin wall, the proposed grading/structural improvements, the location of the upslope and downslope property lines and the location of the existing slide scarp in the lower portion of the property and shall extend beyond the property line onto the downslope property at 120 Tamalpais Road as needed to evaluate offsite impacts of the new development. The cost for the Town Engineer's review of the slope stability analysis prepared by the applicant's consultant shall be borne by the applicant.
47. The exterior lighting fixtures must meet "dark sky" criteria and will be shielded from direct offsite illumination.

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, Encroachment Permit, Parking and Combined Side-yard Setback Variances and Design Review Permit are in conformance with the 2010 – 2030 Fairfax General Plan, the Fairfax Town Code 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 21 day of March, 2019 by the following vote:

AYES:

NOES:

ABSTAIN:

Chair, Swift

Attest:

Ben Berto, Director of Planning and Building Services

JUL 10 2018

PROJECT DESCRIPTION

RECEIVED

New three-bedroom, two and half bath home with three decks. Proposed three parking spaces located on a partial covered parking deck. A variance is proposed to allow one of the three required parking spaces to be compact (guest space), a 1'-6" encroachment into the 10'-0" Eastern side yard setback, and a 31'-0" curb cut to accommodate all three required parking spaces, safe entry access the entry access. A total of 13 Bay trees are proposed to be removed.

DESIGN REVIEW FINDINGS

- A. The proposed development shall create a well composed design, harmoniously related to other facilities in the immediate area and to the total setting as seen from hills and other key vantage points in the community

The massing and placement of the propose single family structure is located to preserve neighbor's views and privacy, maintain heritage trees, and preserve and enhance views from the public right of way. The structure is terraced and utilized sloping roofs to better blend into the hillside topography. With these project attributes, the proposed structure is harmonious with the adjacent natural and built context.

- B. Only elements of design which have significant relationship to exterior appearance of structures and facilities shall be considered; these elements may include height, arrangement on the site, texture, material, color, signs, landscaping and appurtenances.

The exterior features of the proposed structure maintain the height limit with terraced massing, sloped roofs and pushing the structure further down site. The color palette is chosen to mimic seasonal colors found throughout the site. No new landscape is proposed, rather the existing landscape is to remain and be restored at areas of disturbance. Due to the steep slope of the site, outdoor areas are achieved by decks over living areas.

- C. The proposed development shall be of a quality and character appropriate to, and serving to protect the value of, private and public investments in the immediate area.

The proposed structure preserves the views, privacy, access and property values of the immediate properties.

- D. The proposed development shall conform with all requirements for landscaping, screening, usable open space and the design of parking and off-street loading areas set forth in this title.

The proposed project maintains existing trees at the sidyards where screening is of concern. Some trees in these areas are to be trimmed per fire code requirements. Parking and off-street loading is satisfied with onsite parking facilities with the requirement of a variance to allow a portion of the parking area to occur within the sideyard setback and a reduced size parking space for the required guest parking along with a widened curb-cut to allow for safe access to all parking spaces. See Variance Findings.

- E. Where the proposed development is located in an area where a neighborhood plan or precise plan has been adopted by the town, the design of the development shall conform in all significant respects with the plans.

There are no precise neighborhood plans other than the HRD Overlay requirements. The proposed project follows the HRD guidelines.

- F. There shall exist sufficient variety in the design of the structures and grounds to avoid monotony in external appearance

The project has variation in massing, exterior siding texture and color. Building massing is articulated with terraced floor levels under sloping roofs, roof decks and overhangs. The siding has both board and batt vertical oriented siding combined with horizontal siding aligning with windows to achieve more variation in detail which further breaks down apparent building massing. View windows are mostly under the shadow of overhangs and are located to respect privacy of neighbors.

- G. The size and design of the structure shall be considered for the purpose of determining that the structure is in proportion to its building site and that it has a balance and unity among its external features so as to present a harmonious appearance.

The project is designed to have a low profile compared to the street level giving the appearance of a small single-story structure while maintaining heights under the 35ft height limit by cascading down the site without encroaching into neighbor's view lines. This is consistent with other house in the immediate vicinity.

- H. The extent to which the structure conforms to the general character of other structures in the vicinity insofar as the character can be ascertained and is found to be architecturally desirable.

Scenic Road offers no one architectural style, rather it is an eclectic mix of many different styles. The architectural intent of the proposed structure is to blend with the site and have a current style that shares material textures with traditional building styles, color and materials that blend with environmental natural colors and materials. The massing is organized to mimic the slope of the hillside, maintain easy way finding to the building entry, and safe parking ingress and egress.

- I. The extent to which ornamentation is to be used and the extent to which temporary and second-hand materials, or materials which are imitative of other materials, are to be used.

Ornamental/secondary materials, as related to the exterior appearance, are to be used at the front entry with an enhanced material at the entry door, a projecting overhang and articulated building massing. These enhancements are intended to provide better way finding for visitors and curbside appeal to beautify the street side. The remainder of the exterior structure has been detailed only to achieve an apparent smaller massing as seen from neighbors as it is out of view due to the steep slope of the site and existing tree canopies.

- J. The extent to which natural features, including trees, shrubs, creeks and rocks and the natural grade of the site are to be retained.

The natural features of the site are to be maintained with minimal grading and heritage tree preservation. No terraces or other site manipulation is proposed outside of the building footprint.

- K. The accessibility of off-street parking areas and the relation of parking areas with respect to traffic on adjacent streets.

Scenic Road along the frontage for the proposed structure is a one-way street. The parking deck approach has been shaped to allow safe vehicle approach for ingress and

egress. There is ample room for oncoming cars to see egressing vehicles and plenty of backup space for the egressing cars to see oncoming traffic on Scenic Road. There are no intersections within the immediate vicinity of the proposed parking.

- L. The reservation of landscaping areas for the purpose of separating or screening service and storage areas from the street and adjoining building sites, breaking up large expanses of paved areas, separating or screening parking lots from the street and adjoining building sites and separating building areas from paved areas to provide access from buildings to open space areas.

The parking is screened all around by +/- 42" walls at the parking deck. The majority of the parking deck is set below the street level helping to screen the parked cars. Due to the slope of the site, paved surfaces are minimized to the parking deck and driveway approach.

- M. In the case of any commercial or industrial structure, the Planning Commission shall consider its proximity to any residential district and shall consider the effect of the proposed structure upon the character and value of the adjacent residential district area.

Not applicable to this project.

- N. The Planning Commission and Town Council may adopt design guidelines in order to further the objectives of this section and to illustrate design criteria.

JUL 16 2018

VARIANCE FINDINGS

RECEIVED

1. List below special circumstances applicable to the property, including size, shape, topography, location, or surroundings, to show why the variance should be granted; and why the granting of the variance will not be a granting of special privileges inconsistent with the limitations upon other properties in the vicinity and zone (you may attach a statement).

The steep slope combined with the narrow frontage and location of front property line and setback occurring beyond the drop-off of an existing street retaining wall make it difficult to achieve the required parking for three spaces per Section 17.052 under the height limit constraints. Allowing a variance for an exception to the required parking space size for the required 3rd "guest" parking space to be a compact space, a 31'-0" wide curb-cut and a 1'-6" encroachment into the Eastern side yard setback will have no effect on the neighbors or public safety and welfare.

2. List below your reasons why the variance will not materially adversely affect the health or safety of persons residing or working in the neighborhood or be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood (you may attach a statement).

The size of the proposed compact guest parking space is 8.5ft x 16ft, same as many other existing parking spaces found along Scenic Road and fitting the description of many current compact car designs traversing such roads. The parking deck level encroaches 1'-6" into the 10'-0" Eastern side yard setback to accommodate enough room for the entry and width of the three parking spaces within the narrow lot width. The shape and back-up area of the driveway approach make it easy for ingress and egress from this space without compromising the safety of oncoming traffic. This is further enhanced with the proposed 31'-0" curb-cut to accommodate driveway access to all three spaces. Note, there is no actual "curb" or sidewalk for the majority of Scenic Rd. The entry is set at in approximately in the middle of the parking deck beyond the guardrail of the street fully within the property line and maintains clear view of the street for obvious and safe pedestrian wayfinding. Therefore, the proposed variances preserve the health and safety of the public and occupants.

3. Explain why complying with the Town Ordinance requirements will be a hardship for the owner.

Strictly complying with the town requirements will make it very difficult to achieve the required number of parking spaces with safe ingress/egress and good intuitive wayfinding for the building entrance.

1/10/19

Responses to comments for Geologic, Geotechnical, and Civil Engineering Review:

Comment from Fairfax Planning Dept. regarding requirement for location and sizing of Sanitary sewer, water and storm drainage lines.

Response: ***Water and sewer line locations and sizes have been shown on the revised Architectural Site Plan, sheet A1.0. Storm and subsurface drainage line locations and sizes have been shown on the revised Grading and Drainage Plan, sheet C2.***

Please note the following response to Miller Pacific Engineering Group comments dated 9/28/2018. Numbering for comment responses below coincide with comment numbers from 9/28/18 letter.

1. We understand that options for dispersal of site drainage are limited due to the lack of existing municipal storm drain systems, and the inability to acquire easements or other means of more appropriately conveying runoff away from the steep site. In general, we respectfully disagree with the Geotechnical Engineer's opinion that "it will [not] cause any up or downslope increase in slope instability" and anticipate that such a system could potentially reduce local stability, especially if poorly-maintained. Regardless, we anticipate that the effects of such instability as may be caused by the proposed dissipation system would be limited to impacts on this and the adjacent downslope property, and essentially result in an issue to be handled amongst private property owners.

Response from Civil Engineer, DVC Group: ***The plans have been updated to include a slope stability retaining wall. See updated Civil Drawings for Wall Design and added Excavation values, sheets C2 for wall location and updated excavation calculations, sheet C5 for wall design. The wall is designed to stabilize the soil and address potential soil instability issues and dispersal concerns. Such a wall would be installed as may be required and recommended by the project geotechnical engineer and designed as part of the building permit submittal. Please also note excavation values have been updated for the stability wall, see Earthwork table on sheets C1 and C2.***

5. We understand from Salem Howes' response that the earlier slide which affected Scenic Road and resulted in construction of the exiting bin wall occurred in 1986. From the original project geotechnical report, we understand "the latest slide occurred at an unknown site and forced a downslope residence to be condemned" _ Our review of site conditions and of the Site Plan included in the project report suggest that this "latest" referenced slide originated at the location of the scarp below the planned residence. in the vicinity of the planned drainage dissipater. The provided slope-stability analyses do not indicate the presence of landslide debris at the site, although the site plan indicates "hummocky topography". Based on apparent site history and review of the boring logs, we judge it is likely some or all of the soil materials onsite are in fact the debris of a previous landslide, as opposed to colluvial or residual soils. The provided analyses utilize soil properties apparently developed via correlation with SPT blow counts. Please provide documentation of such correlations between SPT blow counts and the friction angle, strength, and cohesion values used in the analysis. If none can be provided, please provide updated analyses which utilize soil parameters developed on the basis of laboratory testing of onsite samples, or via back-calculation of previous landsliding at the site. The provided analyses are based on a model

which appears to extend 75 linear feet, while the parcel is 125-feet long. Please revise the model to accurately reflect site conditions and encompass the entire parcel. The model must show the existing roadway and bin wall, the proposed grading/structural improvements, the location of the upslope and downslope property lines, and the location of the existing slide scarp in the lower portion of the property. The model must be extended beyond the lower property line as needed to evaluate possible offsite impacts of the new development. The model must consider the phreatic (groundwater) surface and be evaluated under both static and seismic conditions.

Response from Architect, Bryan Murdock: ***The project design Team met with Scott Stephens and Mike Jewitt of Miller Pacific regarding site History and determined that the information for the condemnation of the lower property could not be determined factual. Upon site review it appears the dilapidated structure is due to neglect rather than resulting from a slide on or above 251 Scenic. All present at the meeting agreed that further analyses of the lower portion of site via test borings could be presented at building permit application along with engineering drawings. Regarding new development design for existing site soils conditions, the Geotech has prepared updated load values for pier reinforcing and diameter, see enclosed loading diagram and preliminary pier design and calculations by Pheif Engineering,***

7. We acknowledge that the project likely can be designed to resist damage in the event of future instability as suggested and apparently evidenced by the provided photographs. However, it is not clear that the proposed development will NOT have an appreciable negative effect on slope stability. Future instability could result in significant damage to adjacent downslope properties, and to non-structural elements of this property.

Response from Civil Engineer, DVC Group: ***See response to Comment 1 above.***

Contact Information:

Salem Howes Associates Inc.
Vince Howes
415.892.8528
Email: howesgeo@aol.com

DVC Group
Dan Hughes
707.775.8986
Email: dan@dvcgroup.net



SALEMHOV ASSOCIATES INC.
GEOLOGISTS AND GEOTECHNICAL ENGINEER

Scenic 251 5Sep
1612083

TOWN OF FAIRFAX

5 September 2018

SEP 12 2018

RECEIVED

Terra Spiritus Purgamus

Linda Neal, Principal Planner
Town of Fairfax
142 Bolinas Road
Fairfax, CA 94930

Subject: Geotechnical Response to;
Miller Pacific Engineering Group (MPEG)
Letter 8 August 2018
251 Scenic Road, Fairfax

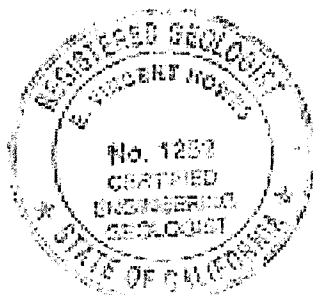
- Item 1. We do not have any problem with the location of the dissipater shown on DVC drawing sheet C2 and do not think it will cause any up or downslope increase in slope instability. DVC has agreed to extend the dissipater ten feet to the southwest, on contour, for a total length of 30-feet to increase dissipation area.
- Item 2. No structural plans were available at this date. We will review the drawings when available.
- Item 7. Our records indicate the failure of the Scenic Road roadway occurred in April of 1986. Unfortunately the camera used at the time did not have a date stamp so exact date is unknown. If MPEG has better documentation we would certainly change that statement.

In 25 years of working on landslides in Marin, unlike the Oakland hills, we have yet to see one that involved the deep seated failure of the underlying bedrock. All have been confined to the overlying soil layer. Determining the top of the bedrock is sufficient to evaluate the safety of the site and recommend the foundation design. "No laboratory testing was performed; since all foundations will be in rock, soil properties, such as moisture and density, do not provide any relevant engineering data for foundation design. In view of the fact that bedrock features in the Franciscan Formation can rarely be correlated over short distances, testing of small rock pieces provides no viable data for use in design. We based our recommendations on assessment of rock mass properties. During exploration in situ testing and sampling of the soil was performed by Standard Penetration Tests [SPT] (ASTM D-1586) to obtain soil properties " [Page 5 in the report]. Bedrock is exposed in the cutbank of Scenic Road across from the site.

We have attached some Rockslope® models with parameters obtained from the SPT with varying parameters and found adequate slope Factors of Safety. If MPEG can provide an analysis that indicates the slope is unstable we will be pleased to consider it.

Item 8. We appreciate MPEG for noticing that. The sentence referring to footing foundations should not be there and will be removed from the revised issue.

Item 11. We disagree that the report "does not adequately address the potential of slope instability". All foundations will be on drilled piers with moment embedment into the stable bedrock. The piers, tied together by grade beams in a grid configuration, will increase the slope stability. Any minor failure of the soil below the structure will not affect the structure (see attached picture of a slope failure under a drilled pier foundation)



For SalemHowes Associates Inc.

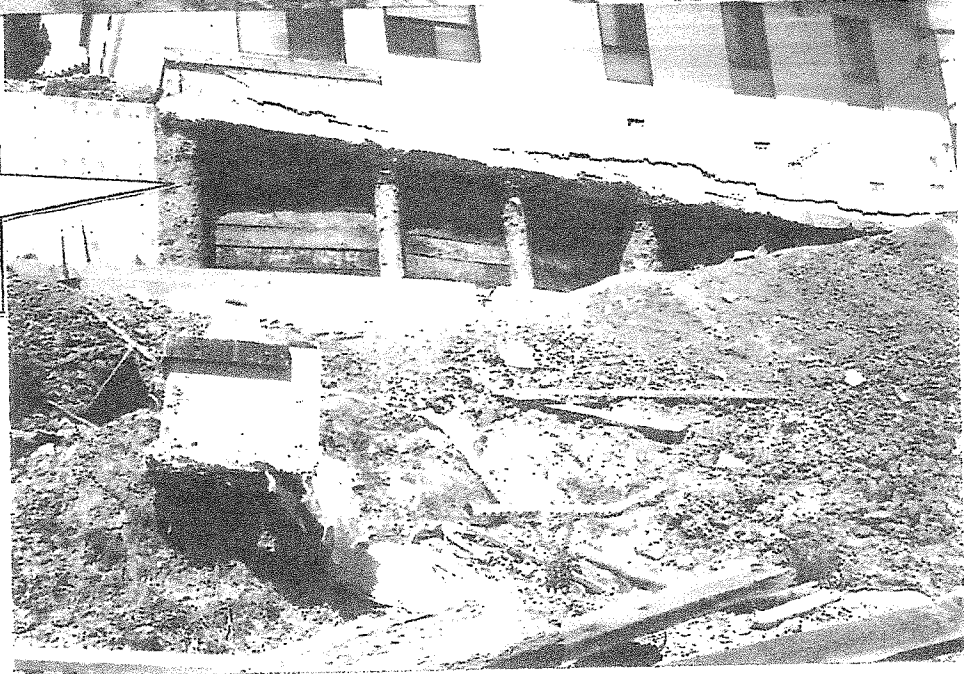
A handwritten signature in cursive script that reads "E. Vincent Howes".

E Vincent Howes

Geotechnical Engineer
GE #965 Exp. 31 Mar 20
Engineering Geologist
CEG #1252 Exp. 31 Aug 19

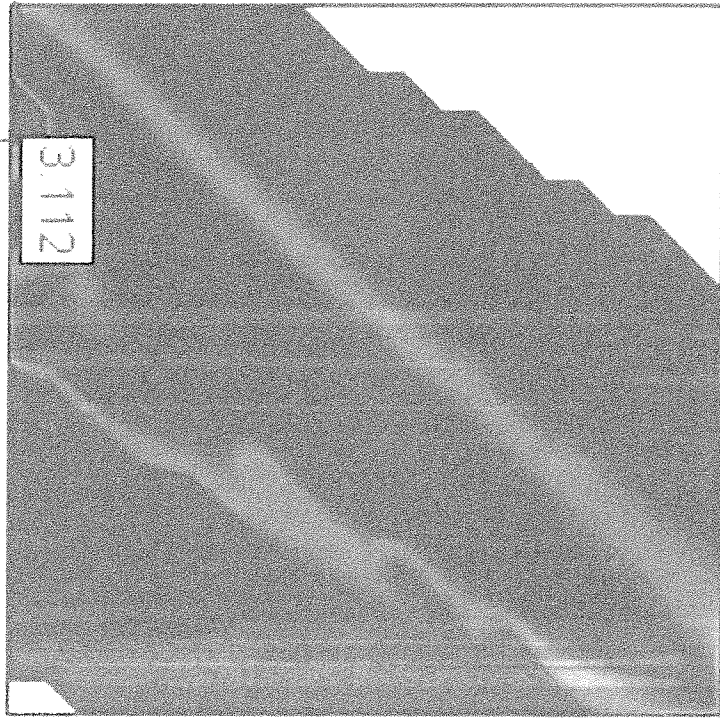


A landslide removed the soil from under the beam without harming the structure.

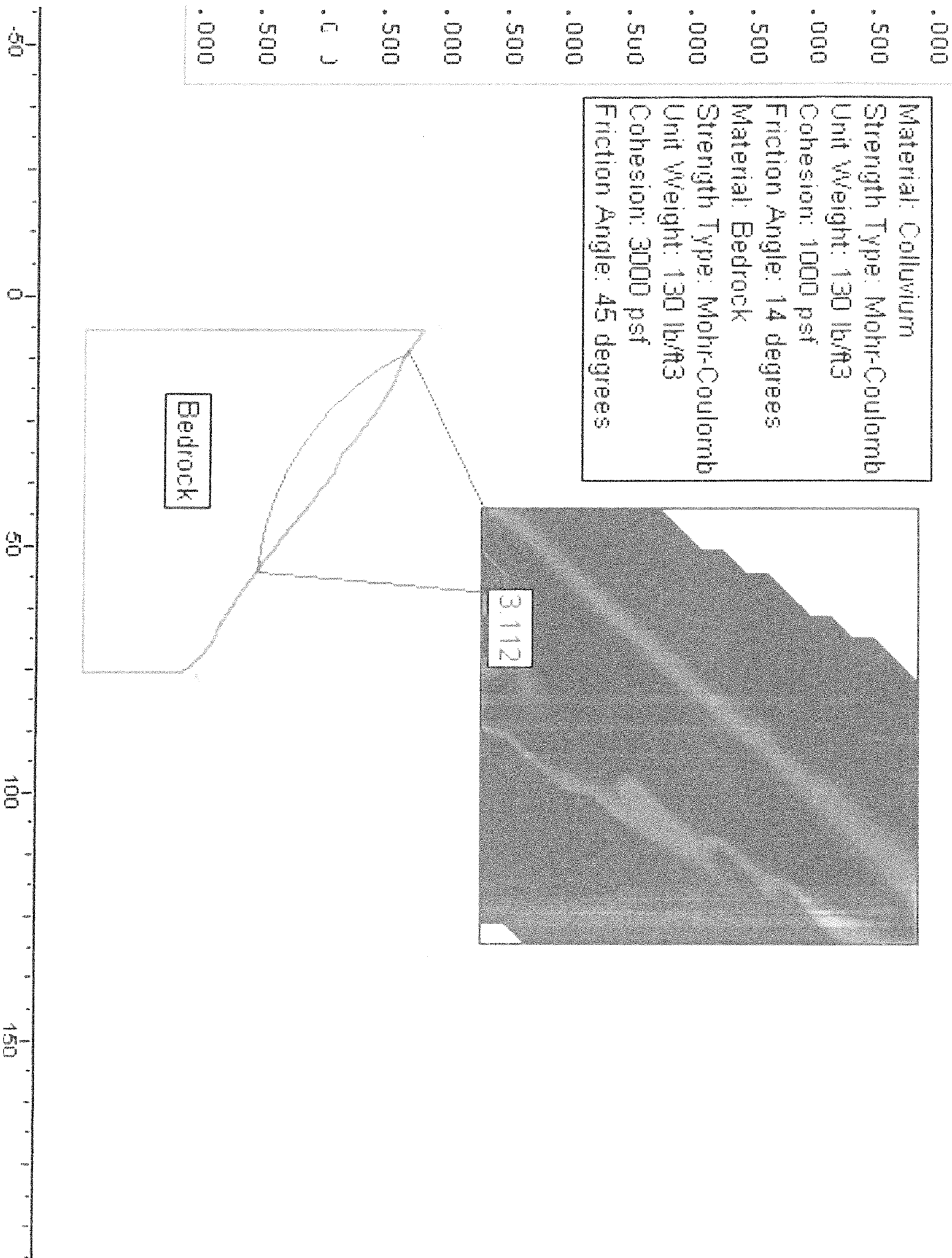


Another pier and grade beam where a landslide failed under the structure with damage to it. (The wood lagging and lower grade beam we added after the slide occurred)

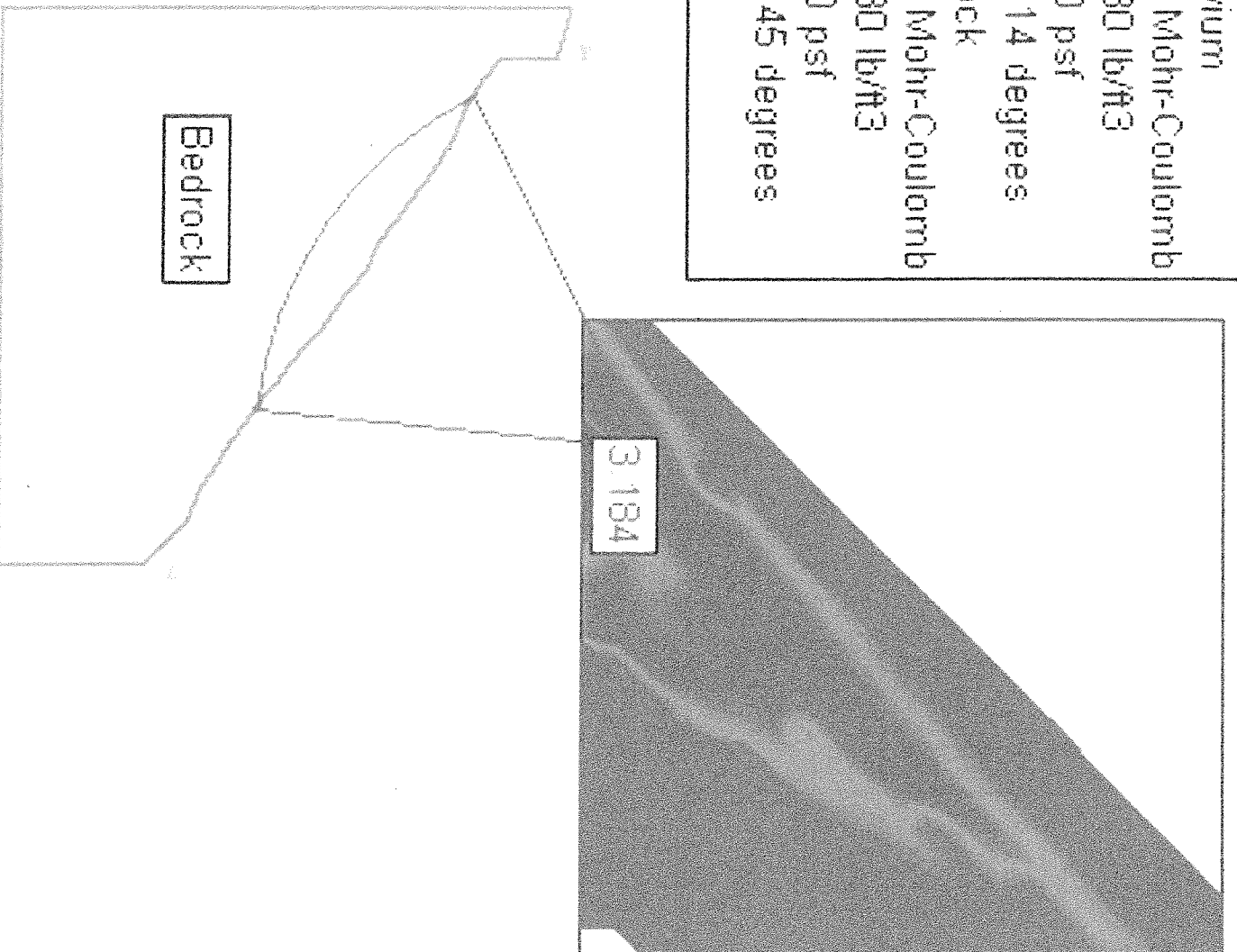
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Unit Weight: 130 lb/ft³
Cohesion: 1000 psf
Friction Angle: 14 degrees
Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft³
Cohesion: 3000 psf
Friction Angle: 45 degrees



Bedrock



Material: Colluvium
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft³
Cohesion: 1000 psf
Friction Angle: 14 degrees
Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft³
Cohesion: 3000 psf
Friction Angle: 45 degrees

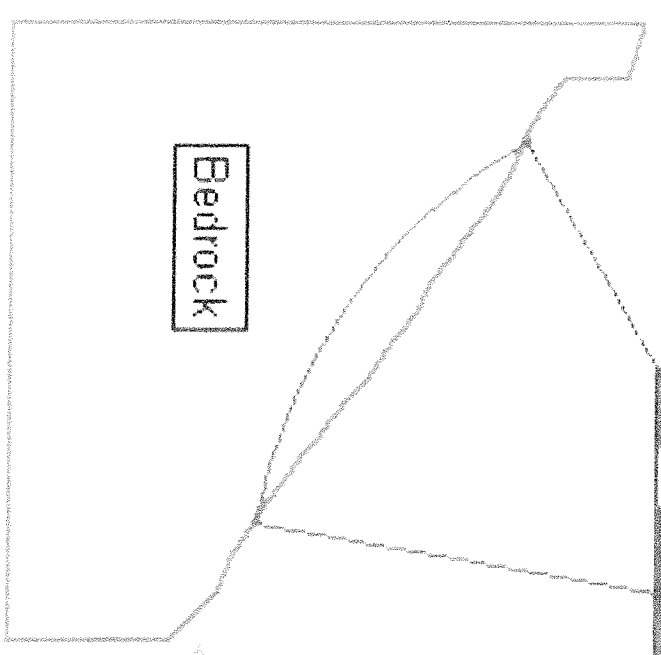
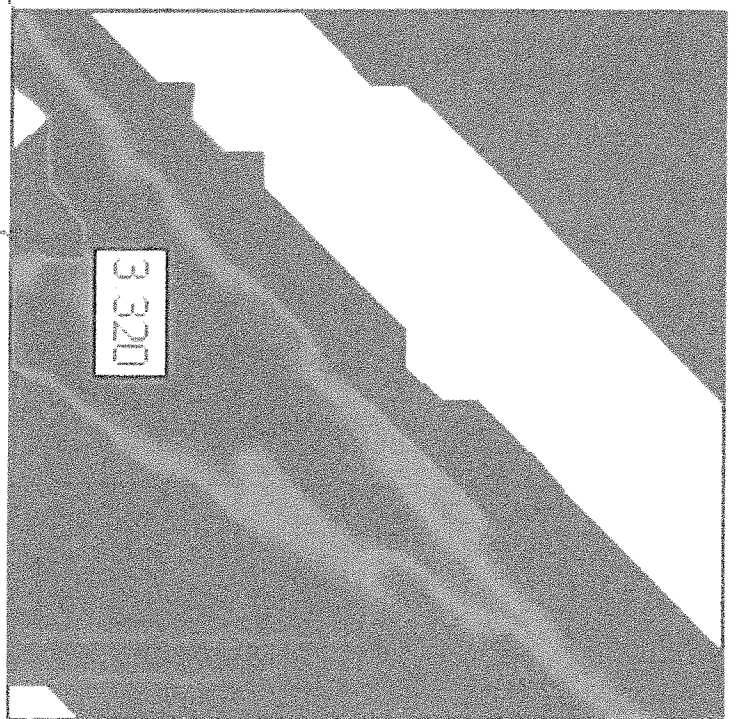


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Material: Material 1
Strength Type: Colluvium
Unit Weight: 130 lb/ft³
Cohesion: 1000 psf
Friction Angle: 14 degrees
Material: Bedrock
Strength Type: Mohr-Coulomb
Unit Weight: 130 lb/ft³
Cohesion: 3000 psf
Friction Angle: 45 degrees



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TOWN OF FAIRFAX

JAN 23 2018

RECEIVED

SALEM HOWES ASSOCIATES INC

GEOTECHNICAL CONSULTANTS

1202 Grant Avenue, Suite F
Novato, CA 94945
415/892-8528
howesgeo@aol.com

REPORT GEOTECHNICAL INVESTIGATION

NEW RESIDENCE
AP 001-121-50
FAIRFAX, CA.

23 JANUARY 2017
Revision 1

ATTACHMENT **CS**



SALEMHOWES ASSOCIATES INC.
GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Fairfax Lots AP-001-121-50 Rpt

23 January 2017
Revision 1

David Boesel
Boesel Design & Construction
<boeselbuilt@msn.com>

Job :1612083b

SUBJECT: Report
Geotechnical Investigation,
AP 001-121-50 (at bin wall)
Scenic Drive
Fairfax

Contents

Page 2	Introduction
Page 2	Discussion and Summary
Page 3	Site Conditions
Page 3	Geology and Slope Stability
Page 4	Ground Water
Page 4	Earthquake Hazards and Seismic Design
Page 5	Foundation Conditions
Page 6	Design Recommendations
Page 6	Summary of Design Parameters
Page 7	Drilled Piers
Page 9	Retaining Walls
Page 10	Tiebacks
Page 10	Shoring
Page 11	Geotechnical Considerations for Slab on Grade Construction
Page 11	Cuts and Fills
Page 12	Geotechnical Drainage Considerations
Page 14	Drainage Checklist
Page 14	Construction Observations
Page 15	Key Observation Points
Page 15	Additional Engineering Services
Page 15	Limitations on the Use of This Report
Attachments	
References	

Introduction

This report presents the results of our geotechnical investigation of the proposed residential building site located at the above address. It conforms to the requirements of section 1803 in the 2013 California Building Code (CBC). The purpose of our investigation was to evaluate the geotechnical feasibility of the proposed development, assess the suitability of the building site, and provide detailed recommendations and conclusions as they relate to our specialty field of practice, geotechnical engineering and engineering geology. The scope of services specifically excluded any investigation needed to determine the presence or absence of issues of economic concern on the site, or of hazardous or toxic materials at the site in the soil, surface water, ground water, or air.

If this report is passed onto another engineer for review it must be accompanied by the approved architectural and structural drawings so that the reviewer can evaluate the exploration and data in the context of the complete project. Ground conditions and standards of practice change; therefore, we should be contacted to update this report if construction has not been started before the next winter or one-year from the report date.

For us to review the drawings for compliance with our recommendations the four following notes must be on the structural drawings:

- The geotechnical engineer shall accept the footing grade / pier holes prior to placing any reinforcing steel in accordance with the CRC requirements. Notify geotechnical engineer before the start of drilling. (If that isn't stated they may require inspections in accordance with CBC Section 1702-Definitions, "Special Inspections, Continuous". This would require a full time inspector during drilling.)
- Drainage details may be schematic, refer to the text and drawings in the geotechnical report for actual materials and installation.
- Refer to Geotechnical Report for geotechnical observation and acceptance requirements. Along with the structural drawings, to complete the review, we need the pertinent calculations from the structural engineer or the geotechnical design assumptions should be included on the drawings notes per requirements of the 2013 CBC.
- ***It is the owner's responsibility*** that the contractor knows of and complies with the BMP's (Best Management Practices) of the Regional Water Quality Control Board, available at www.swrcb.ca.gov, ↓ water quality ↓ stormwater ↓ construction

The fieldwork consisted of reconnaissance mapping of exposed geologic features on the site and in the immediate surrounding area and the drilling of four test borings. The borings were advanced using a portable hydraulic drill rig with 3-inch flight augers and sampled by Standard Penetration Tests* (see "notes to borings logs"). Fieldwork was conducted in December of 2016. During this period we reviewed select geotechnical references pertinent to the area and examined stereo-paired aerial photographs of the site, which were available from Pacific Aerial Surveys in Oakland.

Discussion and Summary

This site is underlain by sheared shale bedrock at depths between 9½ and 15 feet below the ground surface. Albeit the site is steep and bedrock is very deep below the bin wall; it is not outside Marin County building conditions. The steepness of the site and the thick weak soil cover will necessitate the use of a drilled pier (CIDH) moment embedment (In the bedrock) type foundation. The structural engineer may require tiebacks to stabilize the foundation. The presents of the bin wall presents

some design considerations which must be worked around. Bin walls are just that, bins that are set on a bedrock bench, and function as a gravity block to retain the backslope. There are normally not any parts of the structure that protrude the projected face of the wall underground.

During our investigation we did not observe any local geologic hazards that would adversely affect the site. We judge that following the recommendations in this report and standard Marin County hillside construction practices a structure can be safely constructed on this site without adversely impacting the slope stability or changing the drainage in any measurable manner. Detailed discussions and recommendations are covered in the following sections of this report.

Site Conditions

The building site is located on the eastern slope below Scenic Road north of 255 Scenic Road below a "Bin Wall" type retaining wall that is in place to secure the road after a historic slide that dates back roughly twenty years ago. Sheared shale bedrock within the Cretaceous Sandstone [Ks] was encountered at boring "A" at fifteen and one half feet below a five foot gravel zone and additional soils. The colluvium and residual soil is stiff, reddish brown, moist, clayey [CL] with sandstone clasts, can exhibit weathered rock texture and can pose a hazard if left exposed and left to become saturated during winter months or dry out during the summer months. However, hard massive areas may require the use of an excavator mounted "hoe ram". Soil slopes over five feet high will require shoring. This is normally most economically accomplished by doweling and covering with wire mesh in lifts as the excavation progresses downward. Rock slopes if encountered will stand vertically for short periods of time; however, as they are exposed to air and start to dry out block failures will occur; this can happen as soon the night after excavation

Geology and Slope Stability

The site has been mapped by others ⁽¹⁾ as the Cretaceous Sandstone [Ks] member of the Franciscan Geologic Assemblage. The sandstone is described in the literature as containing massive sandstones, with occasional zones of interbedding with shales and can contain zones of sheared shale bodies that are disassociated from its constituent rock source. The site is situated upon a northeastern facing slope within a swale that has been the site of a few historic slide that, according to the neighbor, are approximately dated twenty years ago and a more recent one at ten years ago. The latest slide occurred at an unknown site and forced a down slope residence to be condemned. The location of that down slope residence is located down slope of a confined swale and a scarp is visible upslope of the area of confinement. It may be reasonable to assume that the scarp is associated with the most recent slide event. The twenty year old event was severe enough to close Scenic Rd for roughly one year and force the road to be repaired with a "Bin Wall" type structure consisting of nine panels that extend from below grade at the base of the wall to the existing street grade. The panels are of unknown depth into the slope and may extend many feet below the surface. Down slope of the retaining wall, the slope is hummocky and uneven with areas of high and low surface topography that is confined roughly to the width of the "Bin Wall" extending six to seven panels wide with the center of the wall being roughly center of the older slide. Boring "A" is located at the junction of panels four and five when looking down hill and counting from left to right. The boring is located upon a small bench area that is relatively level with the northern end of the bench terminating in the slope as it decreases in width and tapers into the slope as grade increases in elevation. The southern end of the bench ends roughly at the base of a spoils pile that appears to be loose in deposition and soft underfoot. Boring "A" encountered five feet of coarse

gravel that may be part of a drainage system for the "Bin Wall" with colluvium soil [Qc] extending down to the top of the residual soil at twelve feet with sheared shale bedrock at fifteen and one half feet. The colluvium is stiff to hard near the base of the section with a clayey [CL] soil with sandstone and shale clasts within the soil horizon. The residual soil is a clayey [CL] soil with relict rock texture and is clastized with angular sandstone and shale fragments throughout with increasing rock texture with depth. The bedrock encountered is hard, sheared, weak in hand with hard inclusions of sandstone. Boring "B" is located down slope west of a large redwood adjacent to the corner of the eastern residence. The boring appears to be outside of the slide zone as deeper soils were not encountered. Similar soils were encountered from three feet as a six foot section of residual soil was encountered with sheared shale bedrock encountered at nine and one half feet.

Rock of this formation has been classified ⁽¹⁾ as moderately stable on natural slopes and fresh sandstone and shale will stand in vertical cuts except where blocks slip along outward dipping joints or bedding planes for a short period of time. The site is situated within the borders of a historic slide zone with at least two occurrences in the last twenty years. The rock weathers readily to a silty, non-swelling, easily erodible soil. Rock surfaces of low relief are covered with a thick layer of deeply weathered soil; however steep slopes are stripped essentially bare of soil cover. Landslides and debris flows in this formation are confined to well-developed swales and drainages where deep soil deposits have accumulated. Other occurrences of slides and debris flows appear where the deep soils have accumulated upon evenly slope topography, potentially hiding subsurface conditions that can contribute to slope failure.

Ground Water

Ground water was not observed in the test borings /pits during our investigation and there were no seeps or clumps of Pampas Grass or Sedge (Cortaderia Selloana and Carex), which are indicators of high ground water. However, ground water conditions vary with the seasons and annual fluctuations in weather. A general rise in ground water can be expected after one or more seasons of above average rainfall. Based on the limited time we have been able to collect ground water data on this site, it is not possible to accurately predict the range of ground water fluctuations in the future. Therefore, ground water sensitive structures such as basements, wine cellars and retaining walls should be designed to anticipate a rise in the water level that could potentially affect their function and stability. During construction it should be anticipated that ground water will be encountered at the rock/soil contact.

Earthquake Hazards and Seismic Design

This site is not subject to any unusual earthquake hazards, located near an active fault, within a current Alquist-Priolo Special Studies Zone or Seismic Hazards Zone as shown on the most recently published maps from the California Geologic Society. There were no geomorphic features observed in the field or on air photos, or geologic features in the literature that would suggest the presence of an active fault or splay fault traces. However, historically the entire San Francisco Bay Area has the potential for strong earthquake shaking from several fault systems, primarily the San Andreas Fault which lies approximately 14 miles to the southwest and the Hayward/Rodgers Creek Faults, 14 miles to the northeast. The U.S. Geologic Survey estimates ⁽²⁾ (we realize these percentage estimates have been up dated practically every year; however, the basic message is that we live in earthquake country and one should be prepared) there is up to 21 percent chance of a major quake (Magnitude 8) from 2000 to 2030 on the San Francisco Bay region segment of the San Andreas

Fault. The probability is lower north of San Francisco and increases to the south. However, in the same period, there is a 32 percent chance of a major event (Magnitude 7) on the Hayward fault and Rodgers Creek Faults. The total 30-year probability of one or more large earthquakes occurring in the entire San Francisco region is 70 percent (see Plate 1). Based on the bedrock and soils observed at the site, we do not anticipate those seismically induced hazards, specifically: liquefaction, settlement and differential compaction, landsliding, and flooding are present. Generally speaking structures founded on bedrock fare far better during an earthquake than structures on soil, fill or bay mud.

For California Building Code design purposes on this site the top 100 feet of the ground has an average Soil Profile Site of Class B per section 1613.3.2. Seismic design criteria in conformance with the latest edition of the CBC and ASCE-7 should be obtained from the USGS web site. In California, the standard of practice requires the use of a seismic coefficient of 0.15, and minimum computed Factor of Safety of 1.5 for static and 1.1 to 1.2 for pseudo-static analysis of natural, cut and fill slopes.

Retaining walls which support rock cuts will stand vertical with only nominal shoring to prevent weathering. This inherently means there is no active pressure in the rock zone. Therefore, only a nominal value for active pressure is required to support the rock. For seismic analysis the dynamic loads from a slope only occur from the Rankine wedge, which in soils is typically 30 to 40-degrees (from the vertical) in a ϕ type material. However, with rock slopes the Rankine wedge is non-existent to near vertical. Consequently there is no measurable seismic force from the slope on the wall in a rock section. In a thin soil section (< 4-ft) the active pressure of 45 lbs/ft³ is sufficiently conservative to account for any additional seismic loading. In thicker soil sections a simple approach⁽⁶⁾ is to include in the design analysis an additional horizontal force P_E to account for the additional loads imposed on the retaining wall by the earthquake, as follows:

$$P_E = \frac{3}{8} (\alpha_{max}) \gamma_t H^2 \text{ (acting at a distance of } 0.6H \text{ above the base of the soil layer)}$$

Where H = height of soil section, $\alpha_{max} = 0.15$ & γ = unit weight of soil in slope. Because P_E is a short-term loading it is common to allow a $\frac{1}{3}$ increase in bearing pressure and passive resistance for earthquake analysis. Also, for the analysis of sliding and overturning of the retaining wall it is acceptable to lower the factor of safety to 1.1 under the combined static and earthquake loads⁽⁷⁾.

As a homeowner there are a number of measures one can take to limit structural damage, protect lives and valuable objects in the event of a major earthquake. To be prepared and understand the mechanics of earthquakes we strongly recommend that you purchase a very practical book entitled "Peace of Mind in Earthquake Country" by Peter Yanev. This book is written for the homeowner and, while currently out of print, used copies are available in paperback (Chronicle Books/S.F.) from Amazon.com and other locations.

Foundation Conditions

Sheared shale bedrock lies an between 10 and 16 feet below the surface. The depth to the top of bedrock at the location of the test borings is shown on Drawing A. The overlying soil is soft and will not stand in vertical cuts when dry. Shoring will be required. In wet weather ground water can be expected at the soil/rock contact. The rock, albeit hard, is generally highly fractured and can normally be excavated by common means; however, hard massive areas may be encountered that could require the use of an excavator mounted "hoe ram" or core barrel. CalOSHA regulations

require shoring on rock cuts over five feet. Temporary slopes and shoring design are the responsibility of the contractor. For planning and design the top six feet of soil is an OSHA Type C, below that it is a Type B. For example, shoring is most economically accomplished by rock doweling and covering with wire mesh in lifts as the excavation progresses downward. Rock slopes will stand vertically for short periods of time; however, as they are exposed to air and start to dry out block failures will occur; this can happen as soon as the night after excavation.

No laboratory testing was performed; since all foundations will be in rock, soil properties, such as moisture and density, do not provide any relevant engineering data for foundation design. In view of the fact that bedrock features in the Franciscan Formation can rarely be correlated over short distances, testing of small rock pieces provides no viable data for use in design. We based our recommendations on assessment of rock mass properties. During exploration in situ testing and sampling of the soil was performed by Standard Penetration Tests (ASTM D-1586)*. We will continue to evaluate the ground conditions during excavation and modify our recommendation if warranted.

Bedrock is exposed in the road cut across Scenic Drive for evaluation of engineering properties. The contractor may use these exposures to determine the difficulty of excavation and the appropriate type of equipment to use.

Design Recommendations

All foundations must bear on the unweathered sandstone bedrock by drilled pier type foundations (CIDH) with moment embedment in the bedrock. The depth to rock can be interpolated from the data on Drawing A. Retaining walls bottomed in a full rock cut with the recommended toe confinement may use footing type foundations. For tall retaining walls the use of tiebacks for lateral restraint should be considered in lieu of deep keyways or piers. Per CalOSHA regulations shoring will be required on cuts over six feet.

Structures with foundations on rock will not experience any measurable settlement and there are no conditions that require provisions to mitigate the effects of expansive soils, liquefaction, soil strength or adjacent loads. The slope setback provisions in §1808.7 of the CBC do not apply to foundations on slopes that are bottomed in bedrock. Except for seismic none of the requirements in CBC § 1803.5.11 and .12 apply.

Summary of Design Parameters

The design engineer should compare the topography, building elevations and geotechnical report to determine the appropriate active earth pressures and type of foundation to be used. The actual type of foundation should be determined by the architect and design engineer based on construction and economic considerations. The use of a mixed foundation design is usually a practical solution. Design parameters in this report were determined by field observations and testing and per section 1806.2 of the CBC supersede the presumptive values in the CBC table 1806.2.

- Seismic Design (See Earthquake Hazards Section)
Soil Profile Site Class Type B, Ground motion parameters from USGS web site at <http://earthquake.usgs.gov/research/hazmaps/design> with site coordinates.

- Active earth pressure: (see lateral loading formula in Eq. and Seismic Design Section)
In a Soil Section = 55 lbs/ft³ equivalent fluid pressure for sloping backslope
In a Rock Section = 35 lbs/ft² (pounds per square foot)
- Allowable Bearing Capacity (P_{allow}) On Bedrock⁽¹⁾
 $P_{allow} = 0.33 * 10.0 * (\text{footing width in feet}) = (\text{kips/ft}^2)$ (Not to exceed 10.0)
A 20-percent increase is allowed for each additional foot, beyond one-foot, of depth that the footing is excavated into the bedrock subgrade.
- Lateral Bearing In Bedrock
Passive equivalent fluid pressure of 750 lbs/ft³ and a friction factor of 0.45 to resist sliding. They may be combined and a one third increase is allowed for transitory loading.
- Pier Design (Per 2013 CBC section 1807)
- Rock passive pressure: 800 lbs/ft²/ft to calculate S_1 or S_3 (1.5-ft below the top of rock on slopes)
- Adhesion: (skin friction) 900 lbs/ft² (In the rock)
- Tiebacks
Refer to Table 1
- Foundation Drainage
Include items in "Drainage Check List"

Details on the application of these design values are included in the following sections of this report.

Drilled Piers

Drilled, cast-in place, reinforced concrete piers should be a minimum of 18 inches in diameter and should extend at least six feet into competent bearing stratum as determined by the Engineer in the field. The structural engineer may impose additional depths. The piers shall extend into the bearing stratum six feet below a 30° line projected up from the bottom of the nearest cut slope or bank. Piers should be designed to resist forces from the gravitational creep of the soil layer. The height of the piers subject to the creep forces is equal to the depth to the top of rock. For design purposes this may be, interpolated from the data on Drawing A. Creep forces should be calculated using an equivalent fluid pressure⁽³⁾ of 55 lbs/ft³ acting on two pier diameters. Because the rock and soil are discontinuous media, for geotechnical considerations, the piers should have a nominal spacing of eight feet or less on center and connected by tie and grade beams in a grid like configuration. The piers should be no closer than two-diameters, center to center. In general, isolated interior and deck piers should be avoided. Normally end bearing should be neglected (see conditions below).

Piers should be designed by the formula in section 1807 the 2013 CBC, with 'P' equal to the soil creep forces between the surface and top of rock (plus any lateral loads from the structure) and 800 lbs/ft²/ft used to calculate ' S_1 ' or ' S_3 '. **Note** that in this formula 'b' is the actual diameter of the pier not a multiple and 'h' is measured from the point of fixity. These values are not appropriate for other methods of design. The structural engineer should contact us for the applicable values if another method of pier design is to be used.

Note: (The value used to calculate "s" for the fractured bedrock was selected by rock mass classification and conservatively assuming the bedrock to be a dense gravel with a $\phi = 50^\circ$ ⁽⁴⁾ then equating the results of Bowles⁽³⁾ design for cantilevered sheet piles in a granular soil to the CBC formula. Since bed rock features in the Franciscan Formation can rarely be correlated over short distances, testing of small rock pieces provides no viable data for design. Using these values to calculate "s" in the CBC formula results in a conservative pier depth calculation. The "s" values are not passive pressure in the technical soil mechanics sense; they are only related to the CBC formula)

We judge that when piers are in a full rock cut or the tops are connected by rigid moment connections, in the upslope-downslope direction, fixity occurs at the rock surface and the conditions result in a constrained top of the pier. For this case the depth may be calculated by using the CBC formula in section **1807.3.2.2 Constrained**.

Design Parameters

Depth of fixity below top of bedrock surface for a sloping area:	1.5 feet
Soil active pressure on pier	55 lbs/ft ³
Rock active pressure:	$K_a = 0.0$
Rock passive pressure:	800 lbs/ft ² /ft to calculate S_1 or S_3
Adhesion: (skin friction)	900 lbs/ft ²
<i>Neglect adhesion in the soil section</i>	

The values recommended for the calculation of "S" incorporate a 1.5 factor of safety. There is no requirement for the retaining wall designer to add an additional factor of safety for overturning.

Piers drilled into bedrock are completely confined and should not be designed as columns; there is no shear in the pier below the rock surface.

In order for these strength values to be realized, the sides of the pier holes must be scaled of any mudcake.

End bearing may be used if the bottoms of the holes are thoroughly cleaned out with a "PG&E" spoon or other means. Drilled piers may be any convenient diameter that allows for readily cleaning the bottom of the holes. The end allowable bearing capacity may be determined as follows:⁽¹⁾

$$P_{\text{allow.}} = 0.33 * 10.0 * (\text{pier width in feet}) = (\text{kips/ft}^2) \quad (\text{Not to exceed } 10.0)$$

Bearing may be increased 10 percent of the allowable value for each foot of depth extending below one foot of the rock surface.

Notice: We will not accept the foundation for concrete placement if the pier holes are over 48 hours old and will require that they be redrilled. One should plan ahead and have the pier cages assembled prior to drilling the holes so that there is no delay in placing the concrete. The contractor may submit plans for remedial measures, such as spraying or covering the excavation, to extend this time period. However, acceptance is always subject to the condition of the foundation grade immediately prior to the pour.

Ground water may be encountered in the drilled pier holes and it may be necessary to dewater, case the holes and/or place the concrete by tremie methods. All construction water displaced from the pier holes must be contained on site and filtered before discharging into the storm water system or natural drainages. Hard drilling will be necessary to reach the required depths. The contractor should be familiar with the local conditions in order to have the appropriate equipment on hand. The rock to be encountered in the drilling can be observed in outcrops in the area.

Retaining Walls

All retaining walls should be supported on rock by piers type foundations. Design parameters for retaining wall foundations are covered under the appropriate section for footings or drilled piers. The toe of footing type retaining walls should be excavated below grade and the concrete poured against natural ground, the toe should not be formed.

Retaining walls supporting *sloping soil slopes* or the soil portion of the cut above the rock contact should be designed for a coefficient of active soil pressure (K_a) equal to 0.42, or an equivalent fluid pressure of 55 lbs/ft³⁽⁴⁾. Level backslope may use 35 lbs/ft³ for active pressure. For seismic loading from the soil portion of the cut, refer to the previous section on Seismic Design. Since the backfill never truly provides rigid support that prevents mobilization of the active pressure, this value is appropriate for normal or restrained walls. Based on the principles of Rock Mechanics, when protected from erosion intact bedrock does not produce an active fluid pressure with a triangular distribution; therefore, the portion of any wall *supporting a rock backslope may be designed for a nominal pressure of 35 lbs/ft²* (yes, that is square feet). See Drawing A for the depth of the soil layer. Any wall where the backfill is subject to vehicular loads within an area defined by a 30-degree (from vertical) plane projected up from the base of the wall or *top of bedrock*, should have the design pressure increased equivalent to a 200-lbs/ft² (q') surcharge. In this case if a uniform surcharge load q' acts on the soil behind the wall it results in a pressure P_s in lbs/ft. of wall equal to:

$$P_s = q' * (\text{height of wall}) * K_a \text{ (where } K_a \text{ is taken as 0.41)}$$

It acts midway between the top and bottom of the wall. Or the design height of wall may be increased two feet to account for the surcharge.

When determining wall loads the civil structural engineer should consult with us if using a proprietary design program to be sure the soil loads are appropriately applied.

Allowable foundation bearing and lateral resistance to sliding should be obtained from the formulae in the respective sections on pier or footing foundations. The factor of safety may be reduced to 1.1 for combined static and dynamic loading.

All retaining walls should have a backdrainage system consisting of, as a minimum, drainage rock in a filter fabric (e.g. Mirafi™ 140N) with at least three inch diameter perforated pipe laid to drain by gravity. If Caltrans specification Class 2 Permeable is used the filter fabric envelope may be omitted. The pipe should rest on the ground or footing with no gravel underneath. **The pipe should be rigid drainpipe, 3000 triple wall HDPE, 3 or 4 inch ID, ASTM F810 or Schedule 40.** Pipes with perforations greater than 1/16 inch in diameter shall be wrapped in filter fabric. A bentonite seal should be placed at the connection of all solid and perforated pipes. All backdrainage shall be maintained in a separate system from roof and other surface drainage. The two systems may be joined two-feet in elevation below the lowest backdrain at a bubbler to prevent surface water from backing up and into the backdrainage system. Cleanouts should be provided at convenient locations, per §1101.12 of the CPC; however, that is a plumbing and maintenance consideration and not a geotechnical concern.

Retaining walls which are adjacent to living areas should have additional water proofing such as three dimensional drainage panels and moisture barriers (e.g. "Miradrain™ 6000" panels and

"Paraseal™") and the invert of the drainage pipe should be a minimum of four inches below the adjacent interior finished floor or crawl space elevation. Drainage panels should extend to 12 inches below the surface and be flashed to prevent the entry of soil material. The heel of the retaining wall footing should be sloped towards the hill to prevent ponding of water at the cold joint; the drainage pipe should be placed on the lowest point on the footing. The backslope of the retaining walls should be ditched to drain to avoid infiltration of surface run-off into the backdrainage system. All waterproofing materials must be installed in strict compliance with the manufacturer's specifications. A specialist in waterproofing should be consulted for the appropriate products, we are not waterproofing experts and do not design waterproofing, we only offer general guidelines that cover the geotechnical aspect of drainage. We have worked with Division 7 in Novato for waterproofing design services.

Tiebacks

The anchor section of the tieback must be in unweathered bedrock. The capacity of tiebacks should be determined by the methods in Table 1, Capacity of Anchor Rods in Fractured Rock⁽¹⁾, which does not use an unbonded length. While a ten-foot long unbonded length is preferred it is not necessary to develop the low capacity tieback normally required for retaining wall stability. One should observe the property lines and not extend the tiebacks into the adjacent property.

Regardless of the type of anchor used (e.g. mechanical, grouted or helical) tiebacks must meet the following two criteria:

- Proof testing to 1.25 times the design capacity
- Depth of anchor must equal or exceed that determined by Table 1

The structural engineer should prepare detailed shop drawings, for approval, of the specific materials and connection methods to be used at the bulkhead. Installation should follow manufacturer's specifications. The anchor rods should be high strength threaded rods specifically manufactured for this application, such as "Williams" or "Dywidag" threadbars. For corrosion protection contact the manufacturer.

Grout should be tremmied to the bottom of each hole so that when the bar is inserted the grout will be displaced to the surface. The bar should be provided with centering guides, and when placed in the hole rotated and vibrated several times to assure thorough contact between the bar and grout.

When the grout has obtained the desired strength the anchor bars should be tested to 125 percent of the design load and tied off at a designated post tensioning load, normally about 33 percent of the design load. The lift-off readings should be taken after the nut has been set to confirm the post tensioning. Typical tieback configuration is attached.

Shoring

For shoring ("soil nailing"), non-stressed anchors such as Williams Form Engineering Corp "All Thread" bars may be used. For rock and soil shoring the anchors are typically six to eight feet long installed in a 4x4 foot staggered pattern and covered with wire fabric. Shoring should be installed

downward in, not more than, six-foot lifts as the excavation progresses. One should observe the property lines and not extend the rock anchors into the adjacent property.

For temporary shoring the "Mackenzie" system is quick and inexpensive to install. The #6 bars are grouted in place, the chain link fabric placed, then #5 horizontal bars are pressed against the fabric and welded to the heads of the #6 dowels acting as wales across the fabric covered slope. In severely fractured rock, vertical bars may also be required.

Typical shoring details are attached.

Geotechnical Considerations for Slab on Grade Construction

Slab on grade construction which spans cut and fill or rock and soil sections will settle differentially and crack. Therefore this type of construction is not recommended for living areas or garages unless the areas are completely excavated into rock or underlain by compacted fill or the slab is designed as a structural slab. If the slab is underlain by a wedge of fill or natural soil over rock a floating slab will still settle differentially, sloping towards the thickest section of fill. Because the loads on a floating slab are usually small the settlement may be negligible.

The base for slabs on grade should consist of a 4-inch capillary moisture break of clean free draining crushed rock or gravel with a gradation between 1/4 and 3/4 inch in size. The base should be compacted by a vibratory plate compactor to 90 percent maximum dry density as determined by ASTM D-1557. A 10-mil impermeable membrane moisture vapor retarder should be placed on top of the gravel. An under-slab drain system, as shown on the attached drawing, should be installed in/under the drainrock. The gravel should be "turned down" by a vibratory roller or plate to provide a smooth surface for the membrane. Recycled material is never acceptable.

Where migration of moisture vapor would be undesirable (e.g. under living spaces and areas covered by flooring) a "true" under-slab vapor barrier, such as "Stego® Wrap", should be installed. In this case one should consult an expert in waterproofing, our recommendations only apply to the geotechnical aspect of drainage and do not address the prevention of mold or flooring failures.

The top of the membrane should be protected during construction from puncture. Any punctures in the membrane will defeat its purpose. The contractor is responsible for the method of protecting the membrane and concrete placement. *Drains and outlets should be provided from the slab drain rock.* (See attached Drawing for Typical Under-slab Drains)

Cuts and Fills

Unsupported cuts and fills are generally not recommended for this site. Fills behind retaining walls should be of material approved by the geotechnical engineer and compacted to a maximum dry density of 90 percent as determined by ASTM D-1157. Fills underlying pavements and slabs shall have the top 12 inches compacted to 95 percent maximum dry density. For fill specifications in utility trenches refer to the project civil drawings; do not use standard PG&E trench specification, as the trench will act as a drain and has has known to cause landslides.

Geotechnical Drainage Considerations

These recommendations apply to the geotechnical aspect of the drainage as they affect the stability of the construction and land. They do not include site grading and area drainage, which is within the design responsibility of civil engineers and landscape professionals. The civil and landscape professionals should make every effort to comply with the Marin County "Stormwater Quality Manual for Development Projects In Marin County" by the Marin County Stormwater Pollution Prevention Program (MCSTOPPP www.mcstoppp.org) and Bay area Stormwater Management Agencies Association (BASMAA www.basmaa.org) when possible.

The site has been stable for the last 20-years with the present "sheet" distribution of the surface runoff. It is reasonable to believe that if the drainage distribution is maintained there will be no further instability. Therefore we recommend reducing the surface runoff as much as possible by directing available roof runoff into the stormwater system of Scenic Avenue. This is imperative to reduce the runoff and improve downslope conditions. Roof runoff which cannot be directed to the street should be dispersed below the structure across the width of the property as shown in the attached typical sketch. While it is normally not desirable to discharge the roof drainage on to the street stormwater system, in this case it is necessary to improve the downslope slope stability.

The site should be graded to provide positive drainage away from the foundations at a rate of 5 percent within the first ten feet (per requirements of the CBC section 1804.3). All roofs should be equipped with gutters and downspouts that discharge into a solid drainage line. Gutters may be eliminated if roof runoff is collected by shallow surface ditches or other acceptable landscape grading. All driveways and flat areas should drain into controlled collection points and all foundation and retaining walls constructed with backdrainage systems. Surface drainage systems, e.g. roofs, ditches and drop inlets *must be maintained separately* from foundation and backdrainage systems. The two systems may be joined into one pipe at a drop-inlet that is a minimum of two feet in elevation below the invert of the lowest back or slab drainage system. A bentonite seal should be placed at the transition point between drainpipes and solid pipes.

One should observe the ponding of water during winter and consult with you landscape professional for the location of surface drains and with us if subdrains are required.

All drop inlets that collect water contaminated with hydrocarbons (e.g. driveways) should be filtered before discharged in to a natural drainage.

All cross slope foundations should have backdrainage. In compliance with section 1805.4.2 of the CBC foundation drains should be installed around the perimeter of the foundation. On sloping lots only the upslope foundation line requires a perimeter drain. Interior and downslope grade beams and foundation lines should be provided with weep holes to allow any accumulated water to pass through the foundation. The top of the drainage pipe should be a minimum of four inches below the adjacent interior grade and constructed in accordance with the attached Typical Drainage Details. All drainpipes should rest on the bottom of the trench or footing with no gravel underneath. Drain pipes with holes greater than 1/8-inch should be wrapped with filter fabric, if Class 2 Permeable is used, to prevent piping of the fines into the pipe. If drain rock, other than Class 2 Permeable, is used the entire trench should be wrapped with filter fabric to prevent the large pore spaces in the drain rock from silting up. On hillside lots it may not be possible to eliminate all moisture from the substructure

area and some moisture is acceptable in a well-ventilated area. Site conditions change due to natural (e.g. rodent activity) and man related actions and during years of below average rainfall, future ground water problems may not be evident. One should expect to see changes in ground water conditions in the future that will require corrective actions.

All surface and ground water collected by drains or ditches should be dispersed across the property below the structure. Since a legally recognized storm drainage system is not present downslope, we recommend that your attorney be consulted to determine the legal manner of discharging drainage from the roof and surface area drains. It should be noted that improperly discharged concentrated drainage might be a source of liability and litigation between adjacent property owners. The upslope property owner is always responsible to the adjacent lower property owner for water, collected or natural, which may have a physical effect on their property.

One suggestion is that water from drains or ditches should be naturally dissipated across the surface of the slope along a length equal to that of the collected area. Some engineers believe that a buried dispersal system might increase the risk of slope instability and surficial soil sliding. There are numerous civil engineering and landscape solutions to the dispersal of surface water; some are more aesthetically pleasing than others, for instance the dispersion pipe can be located behind garden walls or in shrubbery. We should discuss possible solutions with your landscape professional at an appropriate time. Suggested dispersion field details are attached. The owner should be diligent in maintaining the dissipation system and correcting minor slumps as they occur. The upslope property owner is always responsible to the adjacent lower property owner for water, collected or natural, which may have a physical effect on their property.

All laterals carrying water to a discharge point should be SDR 35, Schedule 40 or 3000 triple wall HDPE pipe, depending on the application and should be buried. 'Flex pipe' is never acceptable. Cleanouts for stormwater drains should be installed in accordance with §1101.12 of the CPC, without pressure testing. However, this is not a geotechnical consideration and is the responsibility of the drainage contractor.

Retaining walls should be graded to prevent water from running down the face of the slope. Diverted water should be collected in a lined "V" ditch or drop inlet leading to a solid pipe.

If the crawl space area is excavated below the outside site grade for joist clearance, the crawl space will act as a sump and collect water. If such construction is planned, the building design must provide for *gravity or pumped drainage from the crawl space*. If it is a concern that moisture vapor from the crawl space will affect flooring, a specialist in vapor barriers should be consulted, we only design drainage for geotechnical considerations.

The owner is responsible for periodic maintenance to prevent and eliminate standing water that may lead to such problems as dry rot and mold.

Construction grading will expose weak soil and rock that will be susceptible to erosion. Erosion protection measures must be implemented during and after construction. These would include jute netting, hydromulch, silt barriers and stabilized entrances established during construction. Typically fiber rolls are installed along the contour below the work area. Refer to the current ABAG⁽⁹⁾ manual

for detailed specifications and applications. Erosion control products are available from Water Components in San Rafael. The ground should not be disturbed outside the immediate construction area. Prevention of erosion is emphasized over containment of silt. Post construction erosion control is the responsibility of your landscape professional. ***It is the owner's responsibility*** that the contractor knows of and complies with the BMP's (Best Management Practices) of the Regional Water Quality Control Board, available at www.swrcb.ca.gov, ↓ water quality ↓ stormwater ↓ construction. In addition, summer construction may create considerable dust that should be controlled by the judicious application of water spray. After construction, erosion resistant vegetation must be established on all slopes to reduce sloughing and erosion this is the responsibility of a landscape professional. Periodic land maintenance should be performed to clean and maintain all drains and repair any sloughing or erosion before it becomes a major problem.

Drainage Checklist

Before submitting the project drawings to us for review the architect and structural engineer should be sure the following applicable drainage items are shown on the drawings:

- Under-slab drains and outlets
- Crawl space drainage
- Cross-slope footing and grade beam weep holes
- Retaining wall backdrainage pipes with no gravel under the pipes
- Top of retaining wall heel sloped towards rear at $\frac{1}{8}$ - inch per foot
- Drain pipe located at lowest part of footing
- Invert of foundation drains located 4-inches below interior grade
- No gravel under any drainpipe
- Upslope exterior foundation drains
- Drains installed in accordance with §1101.12 of the CPC
- Bentonite seals at drainpipe transition to solid pipe
- Proper installation of the drainage panels
- Outfall details and location

In lieu of the above details actually being shown on the drawings there may be a:

- ***Note on the structural drawings:*** "Drainage details may be schematic and incomplete, refer to the text and drawings in the geotechnical report for actual materials and installation"

Construction Observations

In order to assure that the construction work is performed in accordance with the recommendations in this report, SalemHowes Associates Inc. must perform the following applicable inspections. We will provide a full time project engineer to supervise the foundation excavation, drainage, compaction and other geotechnical concerns during construction and accept the footing grade / pier holes prior to placing any reinforcing steel in accordance with the CRC or CBC Section 1702-Definitions and Table 1704.9 continuous inspections for drilled piers and earthwork, if required. Otherwise, if directed by the Owner, these inspections will be performed on an "periodic as requested basis" by the Owner or Owner's representative. We will not be responsible for construction we were not called to inspect. In this case it is the responsibility of the Owner to assure that we are notified in a timely manner to observe and accept each individual phase of the project.

Key Observation Points

- Map excavations in progress to identify and record rock/soil conditions.
- Observe and accept pier drilling and final depth and conditions of all pier holes. *We must be on site at the start of drilling the first hole.* We will perform special inspections in accordance with the CRC or, unless otherwise required by the building official, CBC Section 1704-Definitions, "Special Inspections, Continuous".
- Accept final footing grade prior to placement of reinforcing steel.
- Accept subdrainage prior to backfilling with drainage rock.
- Accept drainage discharge location.

Additional Engineering Services

We should work closely with your project engineer and architect to interactively review the site grading plan and foundation design for conformance with the intent of these recommendations. We should provide periodic engineering inspections and testing, as outlined in this report, during the construction and upon completion to assure contractor compliance and provide a final report summarizing the work and design changes, if any.

Any engineering or inspection work beyond the scope of this report would be performed at your request and at our standard fee schedule.

Limitations on the Use of This Report

This report is prepared for the exclusive use of Boesel Design & Construction and their design professionals for construction of the proposed new residence. This is a copyrighted document and the unauthorized copying and distribution is expressly prohibited. Our services consist of professional opinions, conclusions and recommendations developed by a Geotechnical Engineer and Engineering Geologist in accordance with generally accepted principles and practices established in this area at this time. This warranty is in lieu of all other warranties, either expressed or implied.

All conclusions and recommendations in this report are contingent upon SalemHowes Associates being retained to review the geotechnical portion of the final grading and foundation plans prior to construction. The analysis and recommendations contained in this report are preliminary and based on the data obtained from the referenced subsurface explorations. The borings and exposures indicate subsurface conditions only at the specific locations and times, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. The validity of the recommendations is based on part on assumptions about the stratigraphy made by the geotechnical engineer or geologist. Such assumptions may be confirmed only during earth work and foundation construction for deep foundations. If subsurface conditions are different from those described in this report are noted during construction, recommendations in this report must be re-evaluated. It is advised that SalemHowes Associates Inc. be retained to observe and accept earthwork construction in order to help confirm that our assumptions and preliminary recommendations are valid or to modify them accordingly. SalemHowes Associates Inc. cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

In preparation of this report it is assumed that the client will utilize the services of other licensed design professionals such as surveyors, architects and civil engineers, and will hire licensed contractors with the appropriate experience and license for the site grading and construction.

We judge that construction in accordance with the recommendations in this report will be stable and that the risk of future instability is within the range generally accepted for construction on hillsides in the Marin County area. However, one must realize there is an inherent risk of instability associated with all hillside construction and, therefore, we are unable to guarantee the stability of any hillside construction. For houses constructed on hillsides we recommend that one investigate the economic issues of earthquake insurance.

In the event that any changes in the nature, design, or location of the facilities are made, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by SalemHowes Associates Inc. We are not responsible for any claims, damages, or liability associated with interpretations of subsurface data or reuse of the subsurface data or engineering analysis without expressed written authorization of SalemHowes Associates Inc. Ground conditions and standards of practice change; therefore, we should be contacted to update this report if construction has not been started before the next winter.

We trust this provides you with the information required for your evaluation of geotechnical properties of this site. If you have any questions or wish to discuss this further please give us a call.

Prepared by:

SalemHowes Associates, Inc.

California Corporation

Reviewed by:



E Vincent Howes

Geotechnical Engineer
GE #965 exp. 31 Mar 18



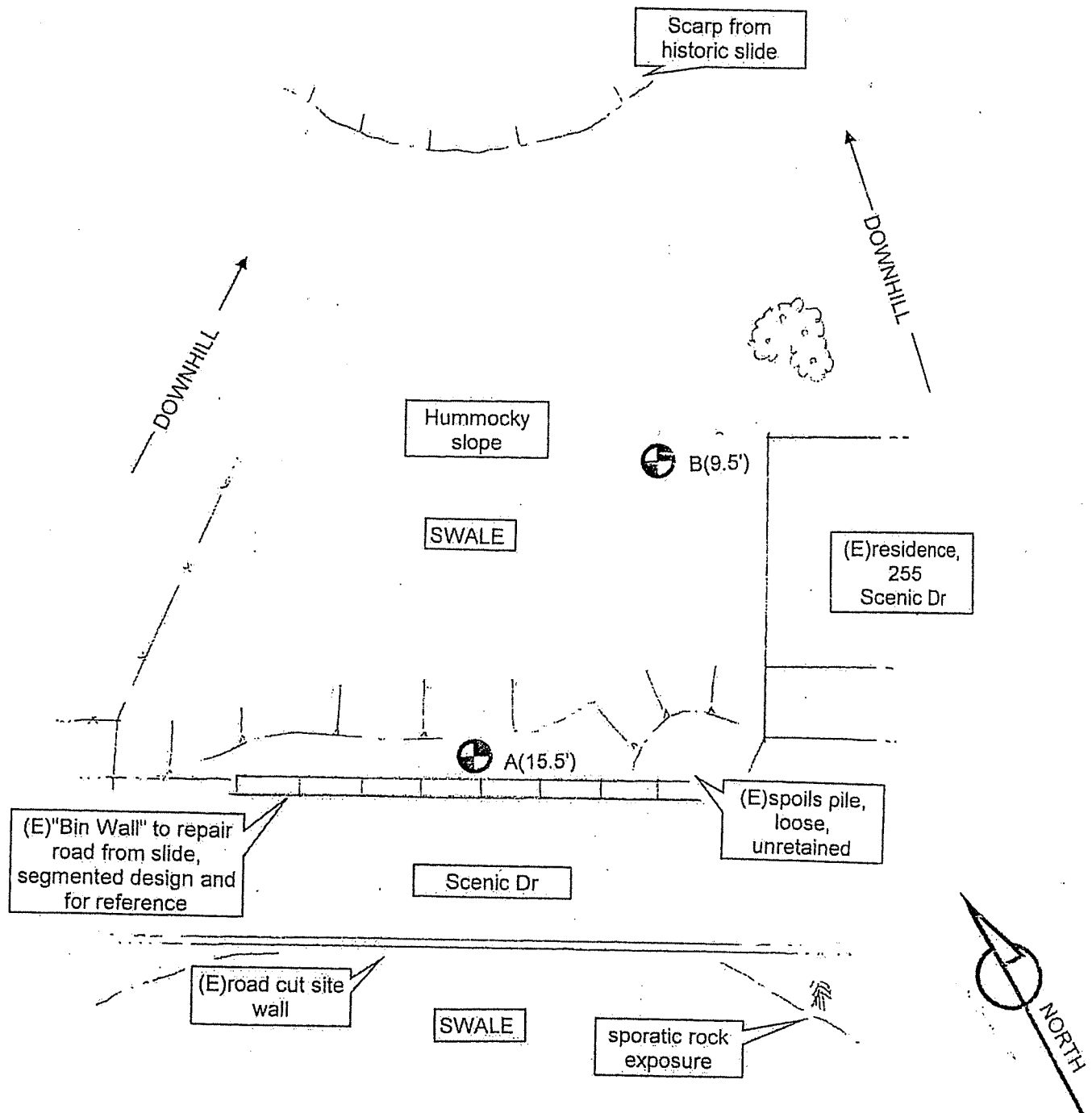
Attachments: Drawing A, Site Plan and Location of Test Borings
Table 1 Capacity of Anchor Rods in Fractured Rock
Typical Shoring Details
Typical Under-slab Drains
Typical Drain Detail
Typical Dispersion Field Details
Typical Retaining Wall Drainage
Logs of Test Borings
Plate 1, San Francisco Bay Region Earthquake Probabilities

References:


General: 2013 California Building Code and Residential Building Code

- ⁽¹⁾ Rice, Salem J; Smith, Theodore C and Strand, Rudolph G.; Geology for Planning Central and Southeastern Marin County, California, California Divisions of Mines and Geology, 1976 OFR 76-2 SF.
- ⁽²⁾ USDA, Soil Conservation Service, Soil Survey of Marin County California, March 1985
- ⁽²⁾ U.S. Geological Survey, Probabilities of Large Earthquakes in the San Francisco Bay Region, 2000 to 2030, Open-File Report 99-517, 1999
- ⁽³⁾ California Department of Conservation, Division of Mines and Geology, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, February 1988, International conference of Building Officials
- ⁽⁴⁾ Department of the Navy, Naval Facilities Engineering Command, Soil Mechanics, Design Manual 7.1, 7.2, (NAVFAC DM-7) May 1982,
- ⁽⁵⁾ Uniform Construction Standards, most recent edition, Marin County Building Department
- ⁽⁶⁾ Leps, Thomas M., Review of Shearing Strength of Rockfill, Journal of the Soil Mechanics and Foundation Division, Proc. ASCE, Vol.96 No.SM4, July 1970, pp1159
- ⁽⁷⁾ Bowles, Joseph, E., Foundation Analysis and Design, fourth edition, McGraw-Hill, 1988 pg. 614
- ⁽⁸⁾ Seed, H.B. and Whitman, R.V. (1970) Design of Earth Structures for Dynamic Loads. Lateral Stresses in the Ground and Design of Earth Retaining Structures, ASCE, Cornell University
- ⁽⁹⁾ Association of Bay Area Governments (ABAG), Manual of Standards for Erosion & Sediment Control Measures. Most recent edition.
Storm Water Quality Task Force, California Storm Water Best Management Practice Handbooks, Construction Activity, March 1993.
- ⁽¹⁰⁾ USGS web site at <http://earthquake.usgs.gov/research/hazmaps/design>

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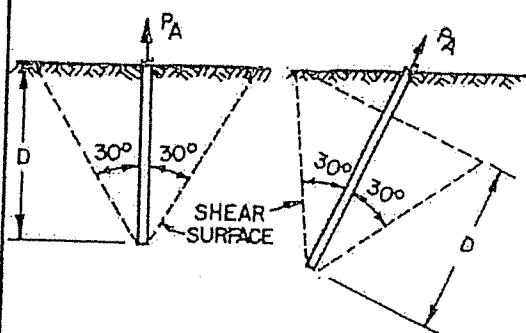
LEGEND

-  Location of Borings
- (n') Depth to rock in feet



SITE PLAN AND LOCATION OF TEST BORINGS

SKETCH == S.A.D.



SINGLE BAR ANCHORAGES

P_A = ALLOWABLE ANCHOR PULL

D = EMBEDMENT DEPTH, MEASURED AS SHOWN

C_{all} = ALLOWABLE ROCK SHEAR STRESS

f_s = ALLOWABLE BAR STRESS, $0.66 f_y$

$brqd$ = BOND STRESS ON BAR PERIMETER REQUIRED TO DEVELOP C_{all}

A = BAR CROSS-SECTION AREA

$$P_A = (2.1) D^2 (C_{all}) \text{ AND } P_A = A f_s$$

$$brqd = \frac{P_A}{\text{BAR PERIMETER} \times D}$$

TESTS INDICATE THAT FOR BAR IN ORDINARY FRACTURED ROCK NEAR THE SURFACE:

$$\text{MINIMUM } D (\text{FT}) = (1.25) \sqrt{P_A} \text{ (KIPS)}$$

AT THIS DEPTH $C_{all} = 0.3 \text{ KSF}$ AND SHOULD NOT BE TAKEN GREATER THAN THIS VALUE WITHOUT PULLOUT TESTS

SPACING OF BARS IN PLAN SHOULD EXCEED 1.2D

EXAMPLE:

GIVEN: $P_A = 20 \text{ K}$ FOR 1 IN. SQUARE BAR

MINIMUM $D = 1.25 \sqrt{20} = 5.6 \text{ FT.}$

BAR SPACING = $1.2 (5.6) = 6.7 \text{ FT.}$

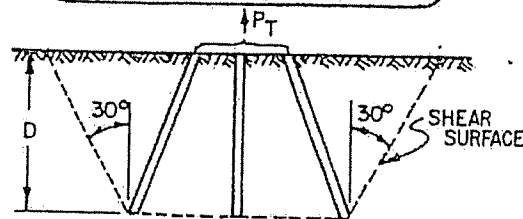
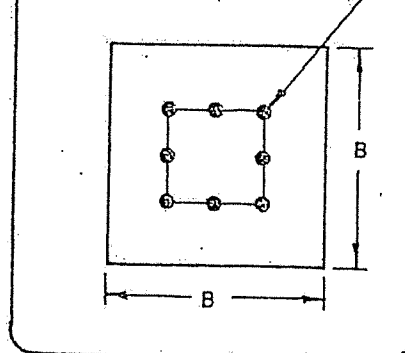
$$brqd = \frac{20,000}{4(5.6)(12)} = 74 \text{ PSI}$$

Not to exceed 100 psi.

(*) Minimum depth for any application is 6 feet, as measured above.

PLAN

BARS IN SQUARE ARRANGEMENT



BAR GROUP ANCHORAGE

P_T = ALLOWABLE ANCHOR PULL FOR GROUP OF BARS.

N = NUMBER OF BARS IN SQUARE ARRANGEMENT

$$P_T = 4.6D(B + 0.58D) C_{all} \text{ AND}$$

$$P_T = N A f_s$$

$$brqd = \frac{P_T}{\text{BAR PERIMETER} \times D}$$

TESTS INDICATE THAT FOR BAR GROUP IN ORDINARY FRACTURED ROCK NEAR THE SURFACE:

MINIMUM $D (\text{FT})$

$$D = \frac{-4.6 B C_{all} + \sqrt{21.2 B^2 (C_{all})^2 + 10.7 C_{all} \times N A f_s}}{5.34 C_{all}}$$

AT THIS DEPTH $C_{all} = 0.3 \text{ KSF}$ AND SHOULD NOT BE TAKEN GREATER THAN THIS VALUE WITHOUT PULLOUT TESTS

EXAMPLE:

GIVEN $P_T = 80 \text{ K}$, USE 4 - 1 IN SQUARE BARS

$B = 4.5 \text{ FT}$ $f_s = 20 \text{ KSI}$

MIN. D : WITHOUT TESTS:

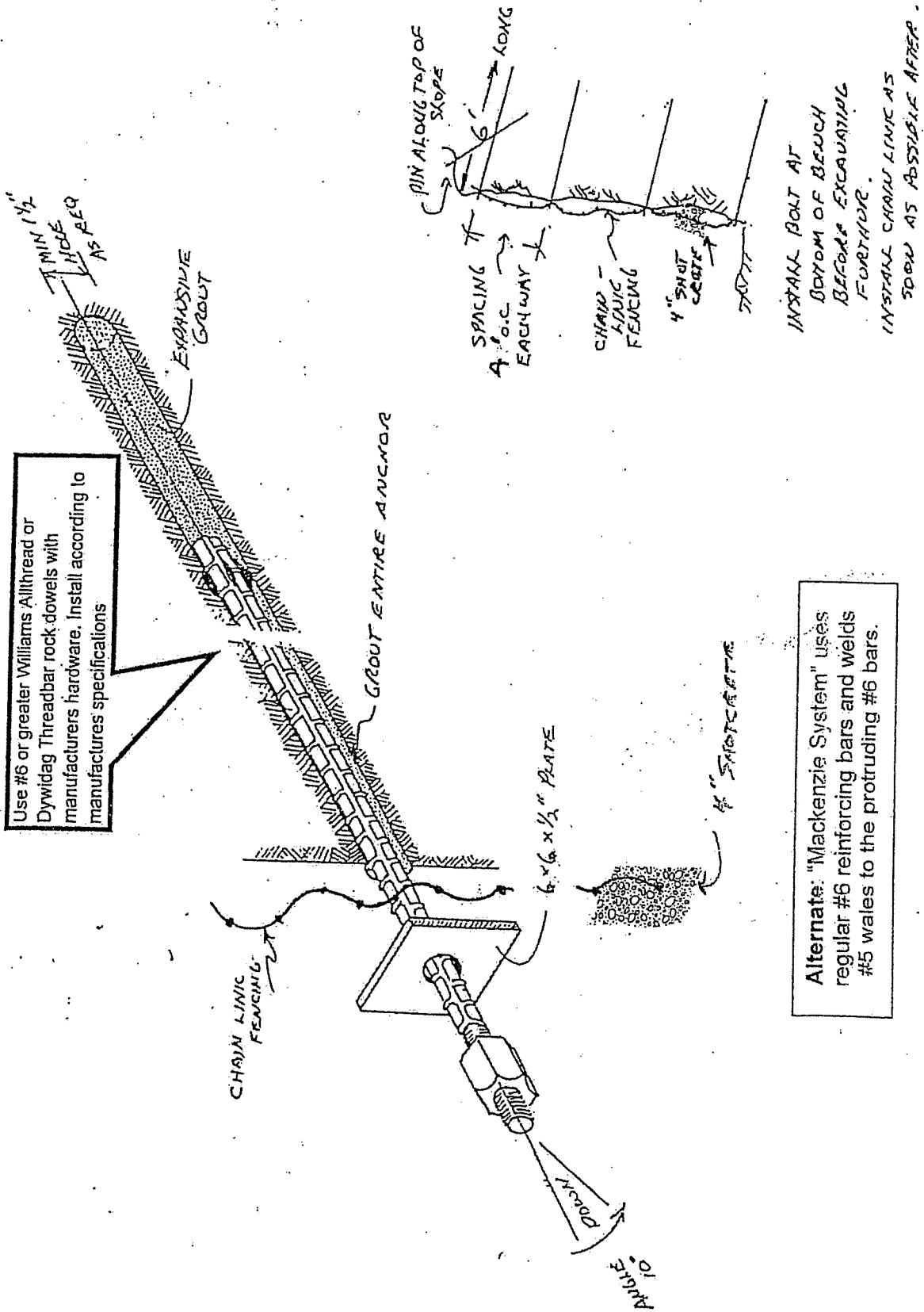
$$D = \frac{-4.6 \times 4.5 \times 0.3 + \sqrt{21.2 \times 4.5^2 \times 0.3^2 + 10.7 \times 0.3 \times 4 \times 1 \times 200}}{5.34 \times 0.3}$$

$$= 6.9 \text{ FT}$$

$$brqd = \frac{80,000}{(4)(4)(6.9)(12)} = 60 \text{ PSI}$$

Capacity of Anchor Rods in Fractured Rock

Table 1

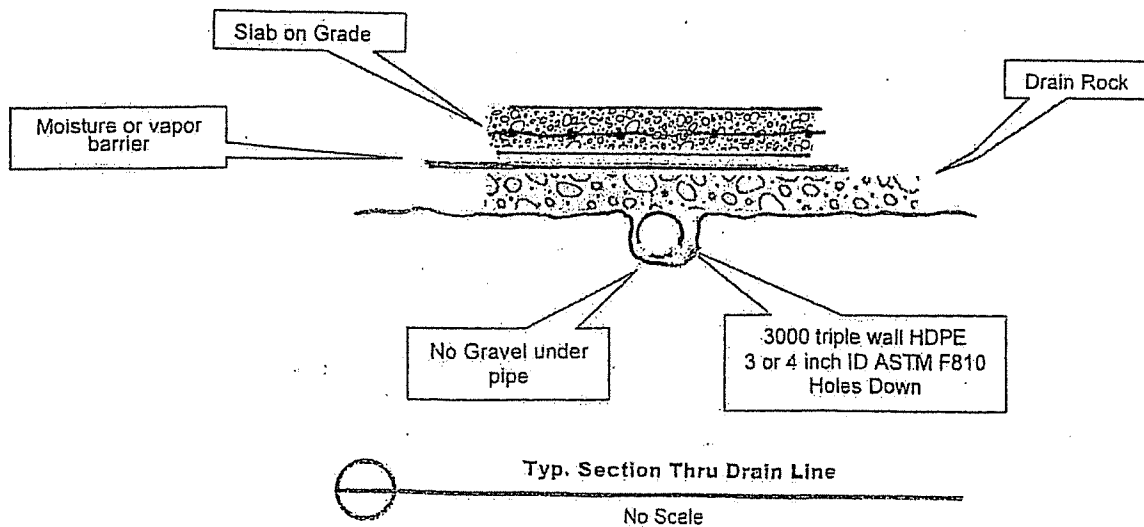
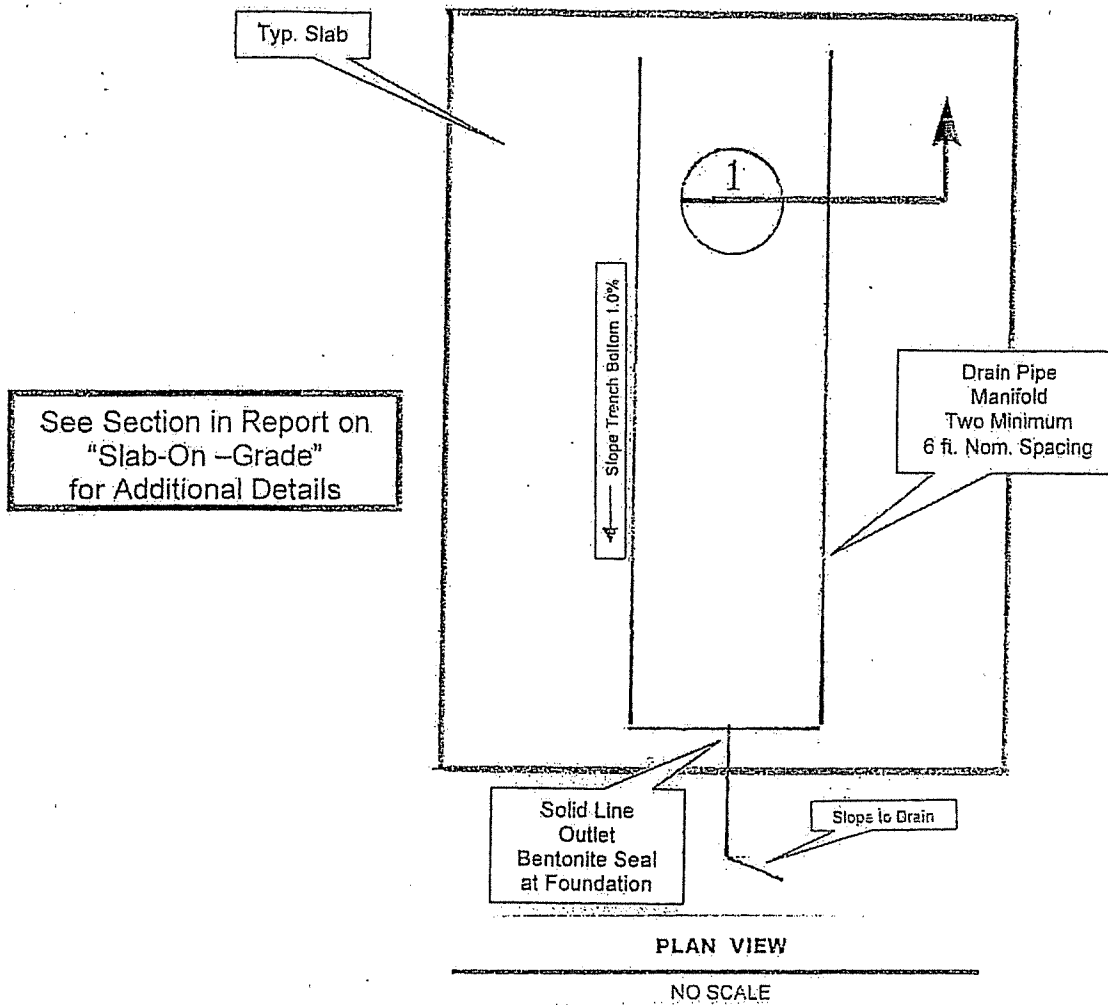


Use #6 or greater Williams Allthread or Dywidag Threadbar rock dowels with manufacturers hardware. Install according to manufacturers specifications

Alternate: "Mackenzie System" uses regular #6 reinforcing bars and welds #5 wales to the protruding #6 bars.

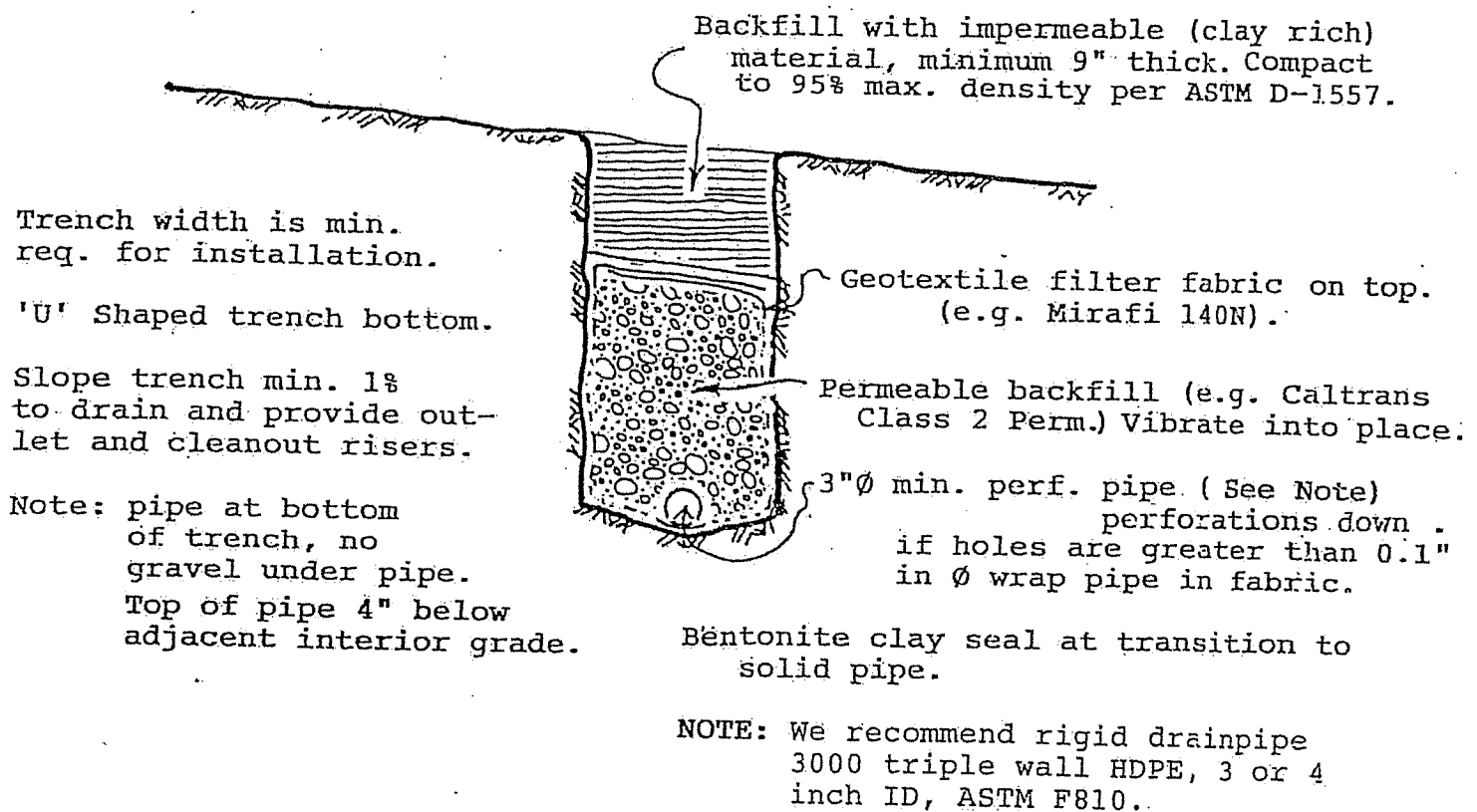
TYPICAL SHORING INSTALLATION

NO SCALE

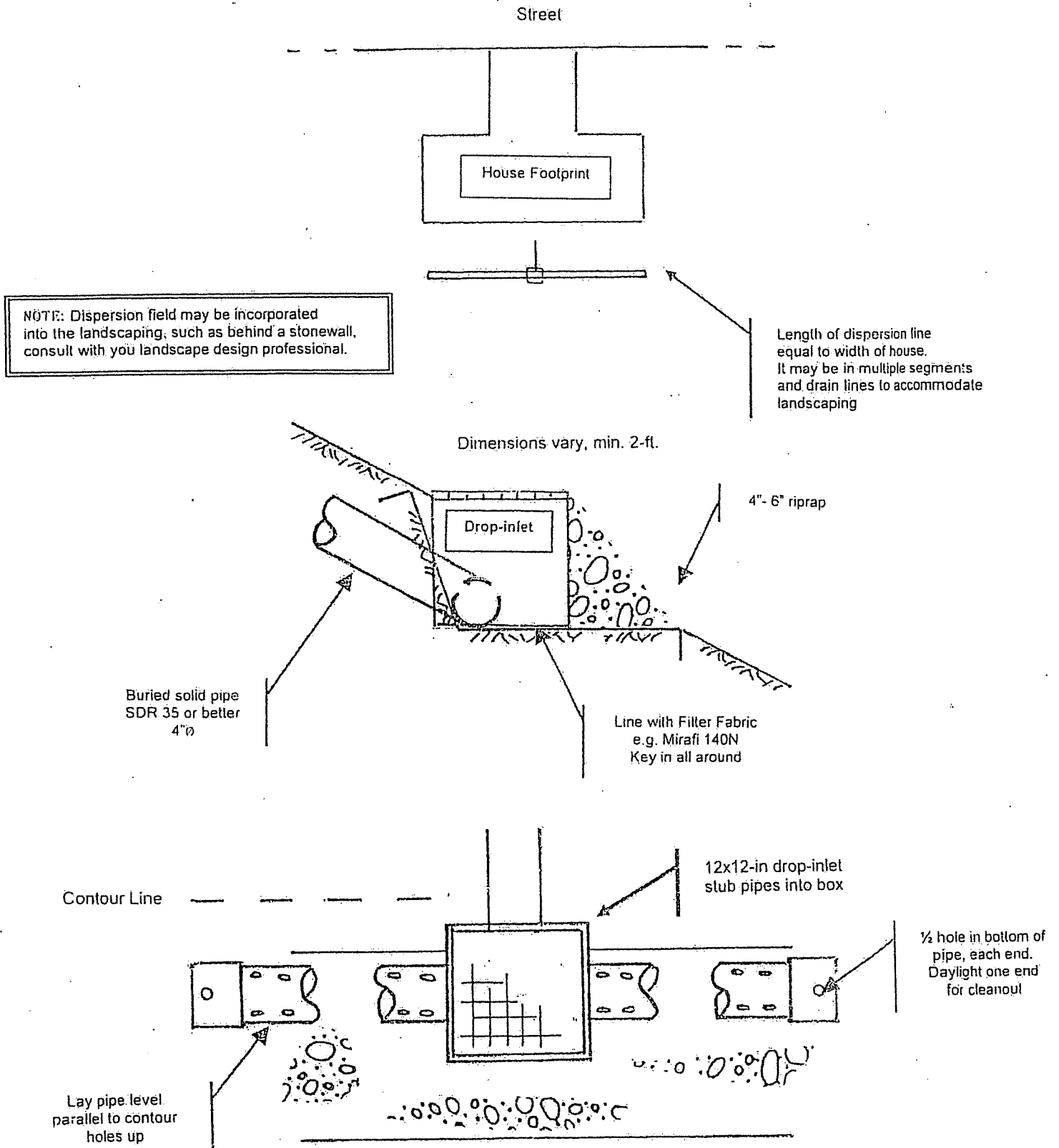


TYPICAL UNDERSLAB DRAINS

NO SCALE

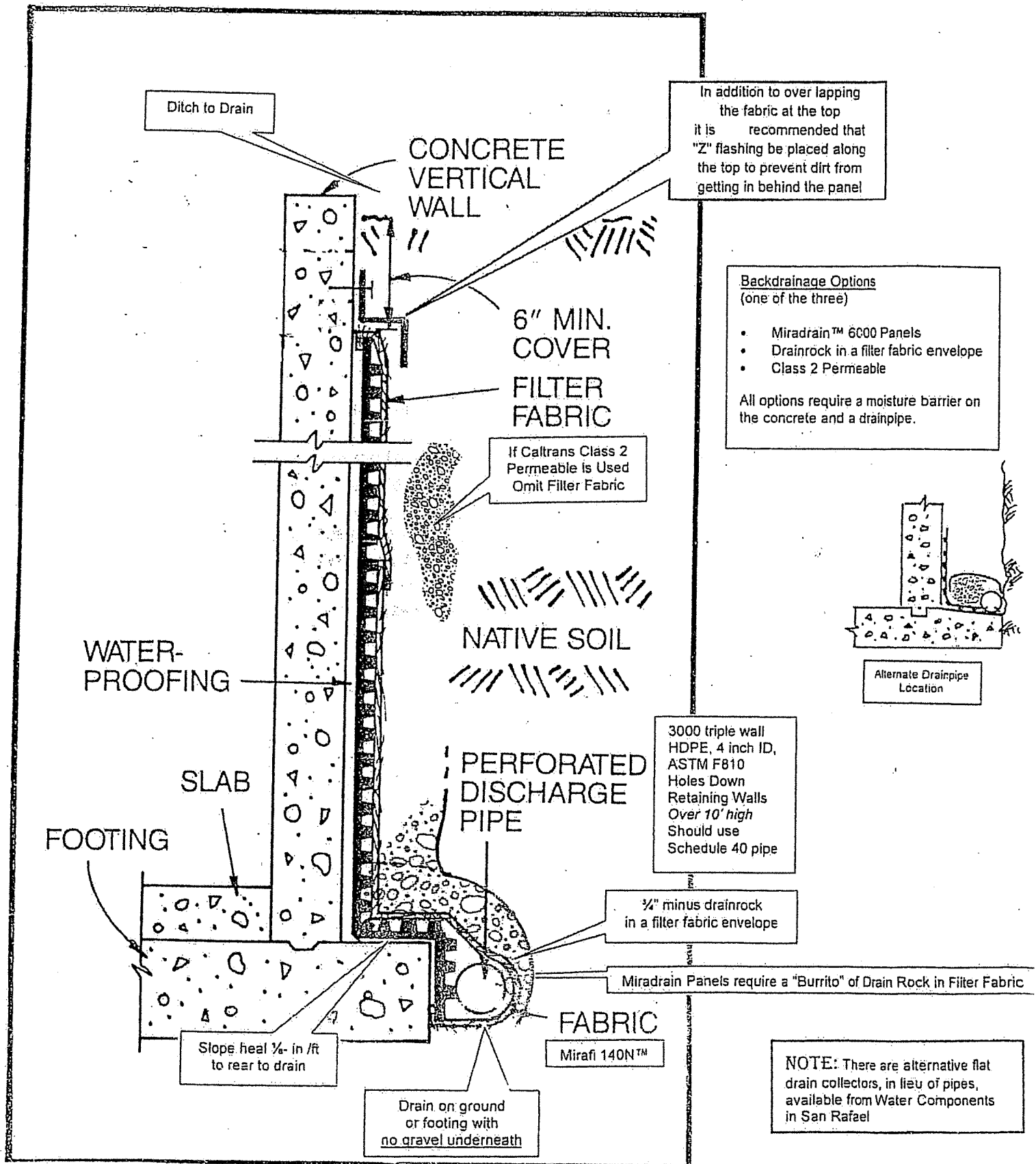


TYPICAL DRAIN DETAILS



SKETCH-TYPICAL DISPERSION FIELD DETAILS

NO SCALE



TYPICAL RETAINING WALL DRAINAGE DETAILS



PROJECT: A.P. 001-121-50

BORING: A

ENGINEER: E. V. Howes

LOGGED BY: J. Gillis

JOB #: 1612083

DATE: 28 December 2016

PLASTICITY INDEX (PI)	LIQUID LIMIT	SAMPLE TYPE	(N) Blows Per foot	DEPTH (feet)	WATER LEVEL	DESCRIPTIVE LOG	GRAPHIC LOG	REMARKS
				1				
				2				
				3		GRAVEL FILL [Qaf] 0.0'-5.0'		
				4		coarse gravels, 3/4", no soil matrix base of		
				5		gravels encountered at 5.0', no rooting, slightly		
				6		moist		
		SPT	10	7				
				8		COLLUVIUM [Qc] 5.0'-12.0'		
				9		stiff to hard, brown to reddish brown colluvium		
				10		and residual comingling within historic slide		
		SPT	24	11		debris zone, slightly moist with clayey [CL] relict		
				12		residual soil texture with clast rich clayey [CL]		
				13		colluvium soil, slightly moist throughout, grades		
				14		to residual soil at 12.0'		
		SPT	27	15		RESIDUAL SOIL 12.0'-15.5'		
				16		brown to reddish brown, clayey soil matrix with		
				17		sheared shale texture, somewhat clastized with		
				18		clayey veining with sandstone and weathered		
		SPT	70	19		shale inclusions, grades to bedrock at 15.5'		
				20		SHEARED SHALE [Ks] 15.5'-16.5'		
						brown, sheared shale texture shale and		
						sandstone, sandstone found as inclusions within		
						sheared shale and sheared sandstone bedrock		
						matrix, slightly moist, no rooting		
						End of Log		

Ground water was not
Encountered in boring

Top of rock 15.5'
SHEARED SHALE [Ks]

DRILLED BY: TransBay

EQUIPMENT: Portable Hydraulic

BORING SIZE: 3"

SHEET: 1 of 1



PROJECT: A.P. 001-121-50

BORING: B

ENGINEER: E. V. Howes

LOGGED BY: J. Gillis

JOB #: 1612083

DATE: 28 December 2016

PLASTICITY INDEX (PI)	LIQUID LIMIT	SAMPLE TYPE	(N) Blows Per foot	DEPTH (feet)	WATER LEVEL	DESCRIPTIVE LOG	GRAPHIC LOG	REMARKS
				1		TOPSOIL 0.0'-3.0'		
				2		dark brown silty [ML] duffy soil with rock		
				3		fragments from upslope areas. upon flanks of		
				4		swale. increasingly clayey [CL] with depth.		
				5		becomes rock fragment rich at 3.0'		
				6		RESIDUAL SOIL 3.0'-9.5'		
		SPT	8	7		brown to reddish brown, clayey soil matrix with		
				8		sheared shale texture. rock fragment rich at top of		
				9		section and becomes clastized with clayey		
		SPT	38	10		veining with sandstone and weathered shale		
				11		inclusions as residual soil texture develops,		
				12		grades to bedrock at 9.5'		
				13		SHEARED SHALE [Ks] 9.5'-10.5'		Top of rock 9.5'
				14		brown, sheared shale texture shale and		SHEARED SHALE [Ks]
				15		sandstone, sandstone found as inclusions within		
				16		sheared shale and sheared sandstone bedrock		
				17		matrix. slightly moist, no rooting		
				18		End of Log		Ground water was not
				19				Encountered in boring
				20				

DRILLED BY: TransBay

EQUIPMENT: Portable Hydraulic

BORING SIZE: 3"

SHEET: 1 of 1

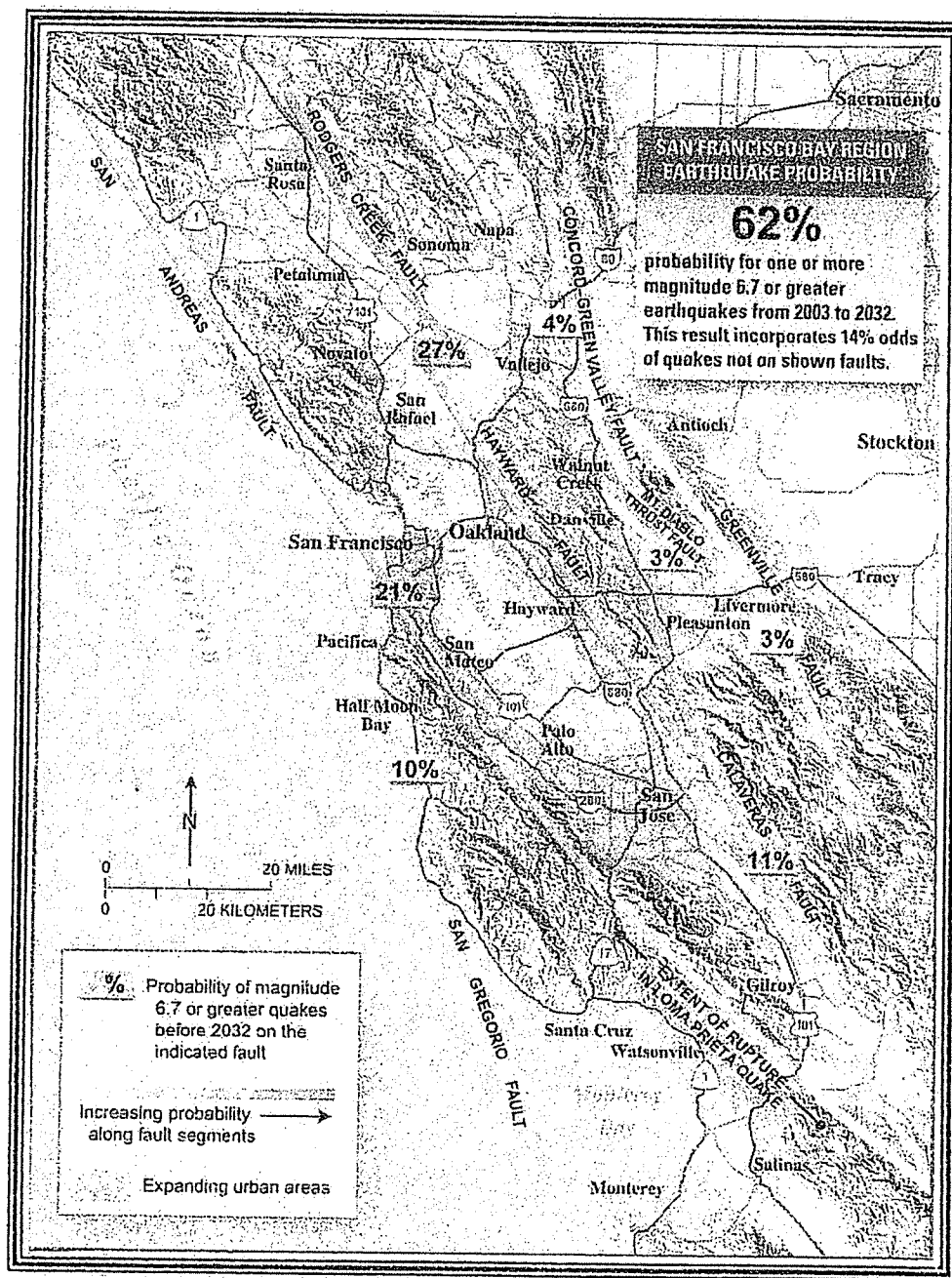
Notes to Boring Logs

- 1) Soil designations in this report conform to the Unified Soil Classifications per ASTM D22487, Classification of Soil for Engineering Purposes. Rock classifications conform to NAVFAC DM-7.
- 2) The SPT, Standard Penetration Test, is made using a standard 2" OD - 1.375" ID sampler driven by a 140# hammer falling 30" (per ASTM D-1586). A MPT, Modified Penetration Test, is made using the same standard sampler driven by a 70# hammer falling 30". Other sampler and hammer size data for information only. TW indicates a Thin Wall sampler. The sample is driven 18" and the number of blows required to penetrate the last 12" is indicated on the log. "REF" (refusal) indicates the number of blows required to penetrate 6" exceeded 50.
- 3) Borehole and test pit data are considered representative of the subsurface condition only for the time and location at which the data were obtained. Interpretation or extrapolation of these data represent an exercise in judgment based on education and experience and is not warranted as precisely representing subsurface conditions at all locations. During construction variations will be observed in the field and field design changes should be expected.
- 4) PP indicates in situ measurements made by a standard pocket penetrometer in tons per square foot unconfined compressive strength.

TV indicates in situ measurements made by a Torvane in kilograms per square centimeter.
- 5) LL indicates the Liquid Limit of soils and
PI indicates the Plasticity Index of soils per ASTM D-4318
Quc indicates the unconfined compressive strength per
ASTM D-2166
TX/UU indicates an Unconsolidated Undrained Triaxial Test,
Confinement pressure/Ultimate strength in psf.
DD indicates dry density in pcf.
mc indicates moisture content in percent.
- 6) Qaf = artificial fill
Qc = colluvium
Ks = sheared shale bedrock

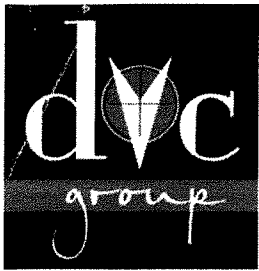
(*) Colluvium - Unconsolidated and unsorted soil material and weathered rock fragments which have accumulated on or at the base of slopes by natural gravitational or slope wash processes, derived by weathering and decomposition of the underlying bedrock material.

Residual Soil - Soil formed in place by the disintegration and decomposition of the rocks and the consequent weathering of the mineral materials. Presumably developed from the same kind of rock as that on which it lies.



Using newly collected data and evolving theories of earthquake occurrence, U.S. Geological Survey (USGS) and other scientists have concluded that there is a 62% probability of at least one magnitude 6.7 or greater quake, capable of causing widespread damage, striking somewhere in the San Francisco Bay region before 2032. A major quake can occur in any part of this densely populated region. Therefore, there is an ongoing need for all communities in the Bay region to continue preparing for the quakes that will strike in the future.

Plate 1, San Francisco Bay Region Earthquake Probabilities



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Concept Design
Feasibility Studies

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TOWN OF FAIRFAX

JUL 16 2018

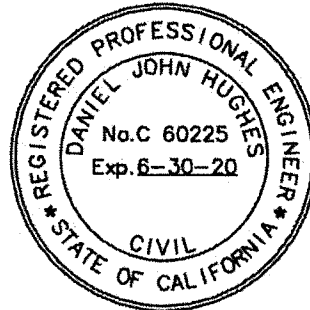
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DRAINAGE REPORT

for

SCENIC ROAD

Scenic Drive
Fairfax, CA 94930
APN 001-121-50



DANIEL JOHN HUGHES
RCE 60225 Exp. 6/30/20

Prepared for:

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Prepared under the supervision of:

Daniel J. Hughes
RCE #60225
License Expires 6/30/18

Report Date: July 13, 2018

ATTACHMENT **C4**



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Table of Contents:

1. Project Narrative
2. Design Parameters
 - a. Hydrology
 - b. Pre- vs. Post- Construction Analysis
 - c. Hydraulics

Exhibits:

- i. Pre- and Post- Construction Permeability Maps
- ii. Weighted Runoff Coefficient Calculations
- iii. Time of Concentration Calculations
- iv. 100-year Runoff Calculations
- v. Volume Retention Calculations
- vi. Marin County Hydrology Manual Charts
- vii. Worst Case Scenario 6-in Pipe

Project Narrative:

This drainage report details the methodology and calculations for the drainage improvements for the proposed new residence at Scenic Road in Fairfax, CA (APN 001-121-50). The 0.157-acre subject parcel is very steep with an average slope across the site of approximately 62%. There are neighboring properties to the northwest (245 Scenic Road) and southeast (255 Scenic Road) with similar steep grades and site conditions as the subject parcel.

The proposed project consists of a new residence and street level driveway to be constructed using a concrete pier system, tied to bedrock below the hill slope providing structure stability. (see geotechnical and structural reports/design). Minor soil excavation is proposed for the project consisting of 12 CY of cut from the structures lower level. The project drainage design attempts to mimic the existing drainage course and pattern by routing storm water from roofs, driveways and all hardscapes through inlets and downspouts, downhill to a 6-inch, 20-foot long horizontal storm water dissipater system which helps spread the flow of water across the hillslope in an evenly distributed pattern. This design feature attempts to mimic the pre-project flow conditions. Increases in storm water runoff that would result from the addition of 1,934 sf of added impervious surface will be mitigated from storage provided in the horizontal dissipater pipe and drain rock below the dissipater. Sufficient volume



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is provided in these two features to maintain or reduce the pre-project peak runoff under post-construction conditions.

This project is not required to provide permanent treatment features such as bioretention (BASMAA Post Construction BMP requirements) because the proposed new or replaced impervious surface is under the 2,500 sf limit. However, the project does provide a level of storm water treatment by promoting overland flow over vegetated areas that results from flow downstream of the horizontal dissipater.

Design Parameters

Hydrology

This drainage study was developed using the Drainage Design Criteria from the County of Marin Department of Public Works Hydrology Manual, "Revision 8/2/00". All flow calculations were performed using the Rational Method ($Q=CIA$). Detailed calculations are presented in the exhibits.

Review of the Hydrology Manual provides the following mathematical models and constant values used in the hydraulic analysis:

- Initial Time of Concentration $t_r = \frac{1.8(1.1-C_p)L}{4.8(100)} + 5 \text{ min}$
- Zone from Map V Zone C2, 0.70/0.67
- I_{60} from Map I 1.5"/hr
- Runoff Coefficient $C = 0.7$ for vegetated areas
 $C = 0.9$ for hard scape areas

The initial time of concentration was calculated following county standards with a minimum of 5 minutes. A $C(p)$ value of 0.9 was used for impervious (hardscape) area and a $C(v)$ value of 0.7 was used for pervious (vegetated) area, to calculate the weighted runoff coefficients. The rainfall intensities are calculated based on Chart K, Zone C (sub-zone 2) of the Caltrans District 4 Hydrology Procedures included in the County of Marin Drainage Criteria Standards.

The project site falls within the region of 1.5-inches for the $P(10)$ Isoleths according to the Design Rainfall Intensities – Map "I" included in the exhibits. The site falls into area "C2" (0.70/0.67) for the design rain fall variations – Map "V" included in the exhibits.



Planning
Civil Engineering
Project Management
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Concept Design
Feasibility Studies

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Refer to the following pages for 10- and 100-year hydrology calculations.

Pre- vs. Post-Construction Analysis:

Retention of post-construction runoff that exceeds pre-construction values is required as part of the project conditions of approval. Runoff retention is required to offset the increase peak flows compared to existing flows that would result from added impervious areas such as roofs, concrete and all hardscapes.

Pre-Construction Runoff: 100-Year = 0.406 cfs

Post-Construction Runoff: 100-Year = 0.439 cfs

Difference in Pre- and Post-: 100-Year = 0.033 cfs

Due to the increase between pre- and post- construction runoff, additional volume retention is required.

Hydraulics

Hydraulic analysis was used to determine the 100-year depth of flow for the worst-case scenario of storm drain pipe. Hydraflow Express Extension within AutoCAD Civil 3D was used to perform capacity calculations for the worst-case storm drain, using the circular channel calculator. Refer to the attached capacity analyses for input and output of these calculations (*Worst Case Scenario - 6 in Diameter PVC Pipe, Whole Tributary Flow, 2% Slope*). The depth of flow for the entire post-construction Q100 runoff was estimated for both the shallowest (2.0%) and steepest (62.0%) 6-inch storm drain pipes. In both scenarios, the pipes had sufficient capacity to convey the Q100 flowrate.

Weighted Runoff Coefficient Calculations
Scenic Road (APN 001-121-50)
Fairfax, CA 94930
7/13/2018

PRE-CONSTRUCTION						
Tributary	Area (ac)	Pervious Area (ac)	Pervious C	Impervious Area (ac)	Impervious C	Composite C
1A	0.157	0.157	0.7	0.000	0.9	0.700
TOTAL	0.157	0.157	0.7	0.000	0.9	0.700

POST-CONSTRUCTION						
Tributary	Area (ac)	Pervious Area (ac)	Pervious C	Impervious Area (ac)	Impervious C	Composite C
1A	0.157	0.112	0.7	0.044	0.9	0.757
TOTAL	0.157	0.112	0.7	0.044	0.9	0.757

Composite Runoff Coefficient Equation:

$$C_T = C_V \frac{A_V}{A_T} + C_P \frac{A_P}{A_T}$$

Time of Concentration
 Scenic Road (APN 001-121-50)
 Fairfax, CA 94930
 7/13/2018

PRE-CONSTRUCTION					
Tributary	Inlet/DS	Length (ft)	Slope (ft/ft)	C	Tc (min)
1A	Overland	135	0.65	0.700	7.08

POST-CONSTRUCTION OVERLAND FLOW					
Tributary	Inlet/DS	0.044399 (ft)	Slope (ft/ft)	C	Tc (min)
1A	Overland	135	0.65	0.757	6.78

Peak Flow Calculations
 Scenic Road (APN 001-121-50)
 Fairfax, CA 94930
 7/13/2018

PRE-CONSTRUCTION							
Tributary	Inlet/DS	Area (acres)	C	Tc (min)	I 100-year Chart "K"	Q 100-year (ft ³ /s)	Description
1A	OVERLAND	0.157	0.700	7.08	3.70	0.406	

Total	0.157
-------	-------

0.406	Total Pre- Runoff
-------	-------------------

0.04439853

POST-CONSTRUCTION							
Tributary	Inlet/DS	Area (acres)	C	Tc (min)	I 10-year Chart "K"	Q 10-year (ft ³ /s)	Description
1A	OVERLAND	0.157	0.757	6.78	3.70	0.439	

Total	0.157
-------	-------

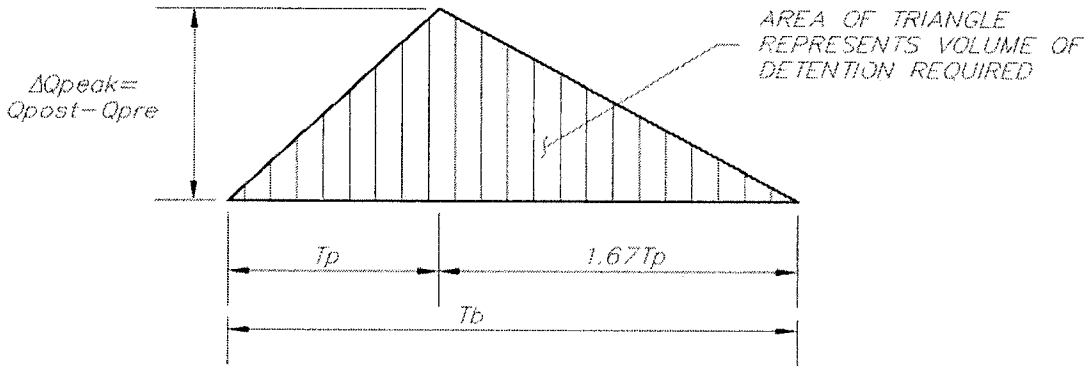
0.439	Total Post- Runoff
-------	--------------------

7/13/2018

Qpre=	0.406 cfs
Qpost=	0.439 cfs
<hr/> ΔQ=	<hr/> 0.033 cfs

Triangular Hydrograph Method*:

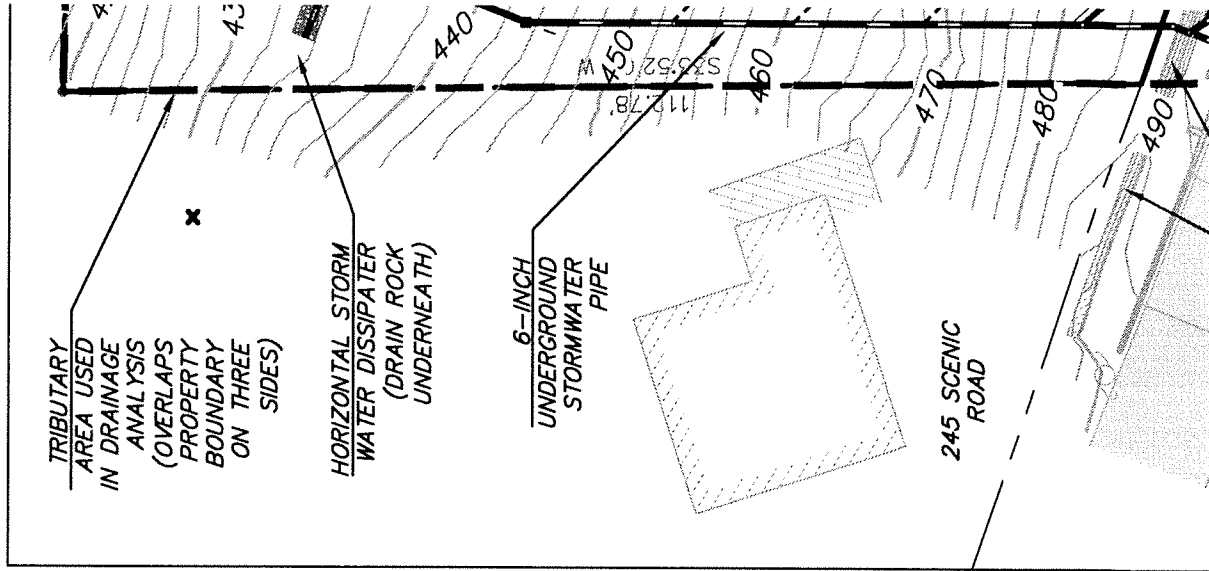
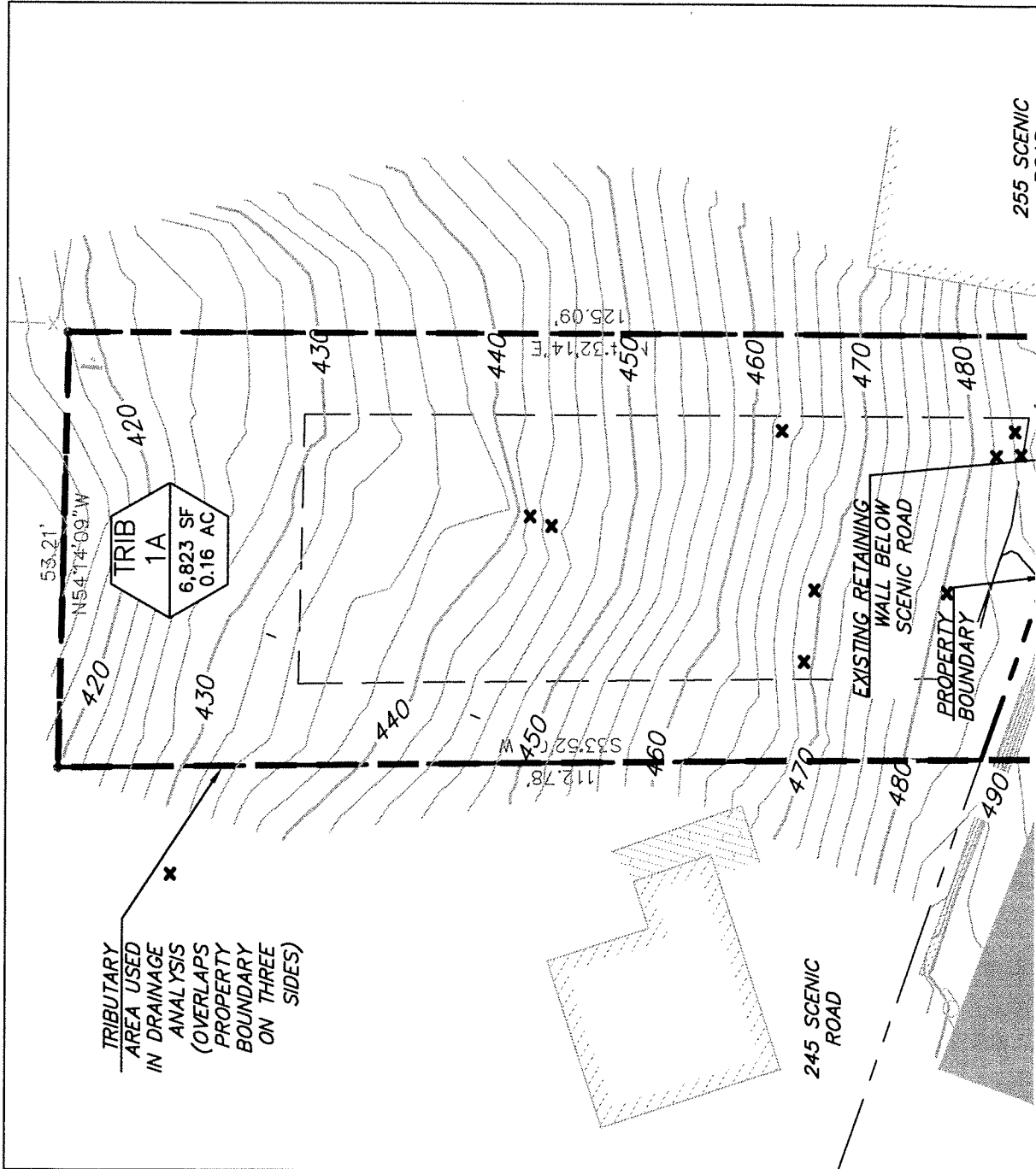
The triangular hydrograph is an approximation of the NRCS dimensionless unit hydrograph. According to Debo and Rees (1995) this method produces results that are sufficiently accurate for most stormwater management facility designs. In this model, the base of the hydrograph is 2.67 times the time of concentration (T_p).

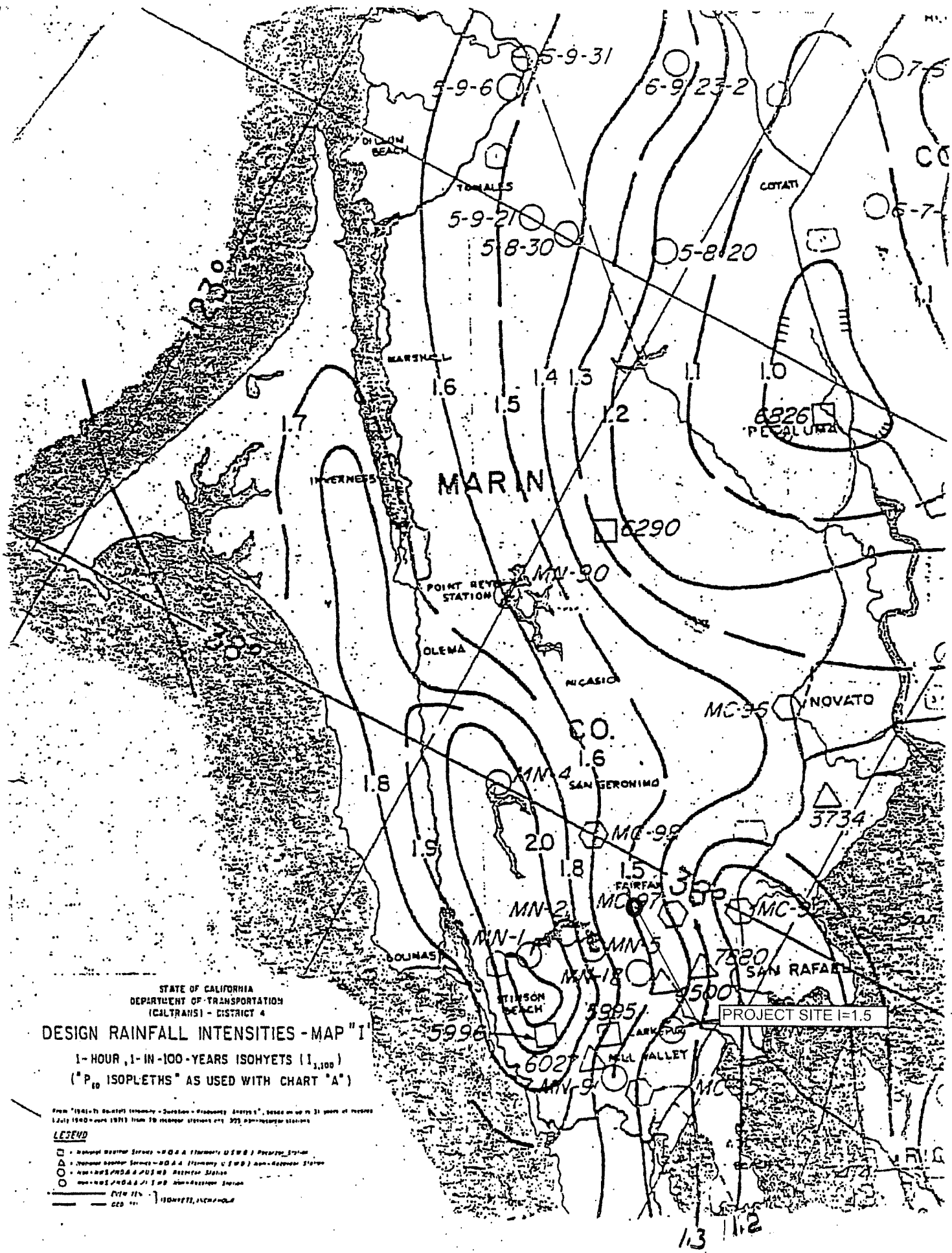


$T_c = T_p = 6.8$ minutes
 $T_p = 407.0$ seconds
 $T_b = 2.67 * T_p = 1086.8$ seconds
 $V = 0.5 * \Delta Q * T_b = 17.9$ cubic ft.

Dissipator Volume Calculations							
Retention ID	Pipe Diameter	Pipe Length	Pipe Volume	Rock Area	Rock Depth	Rock Volume (0.3 porosity)	Total Storage Volume
	(ft)	(ft)	(cf)	(sf)	(ft)	(cf)	(cf)
1	0.5	20.0	3.9	66.0	1.0	18.6	22.5
Dissipator Volume (cf):						22.5	

PROPOSED AND EXISTING PERVIOUS/IMPERVIOUS AREAS (WITHIN LOT LIMITS)				
NOTE: TOTAL LOT SIZE = 6,823 SF ; 0.157 AC	IMPERVIOUS AREA (SF)	% OF LOT	PERVIOUS AREA (SF)	% OF LOT
PROPOSED: ROOF/CONC/STONE (TOTAL OF PROPOSED IMPERVIOUS SURFACES) (SF)	1,934 SF	28.3%	4,889 SF	71.7%
EXISTING: ROOF/CONC/STONE (TOTAL OF EXISTING IMPERVIOUS SURFACES) (SF)	0 SF	0.0%	6,823 SF	100.0%
TOTAL REPLACED ROOF/CONC/STONE (EX. TO REMAIN) (SF)	0 SF	0.0%	6,823 SF	100.0%
TOTAL NEW AND REPLACED IMPERVIOUS SURFACES (SF)	1,934 SF	28.3%	-	-





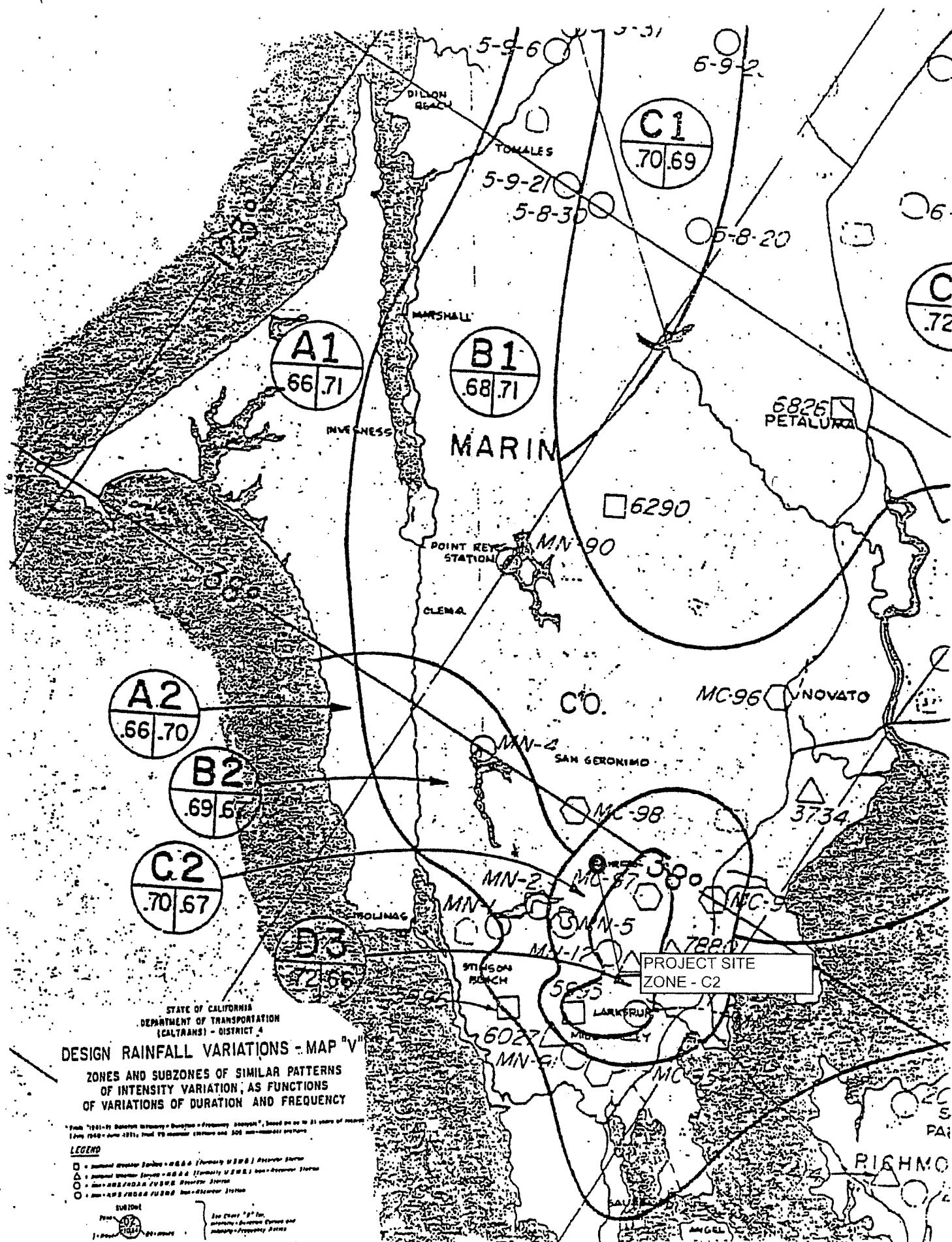
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
(CALTRANS) - DISTRICT 4

DESIGN RAINFALL INTENSITIES - MAP "I"

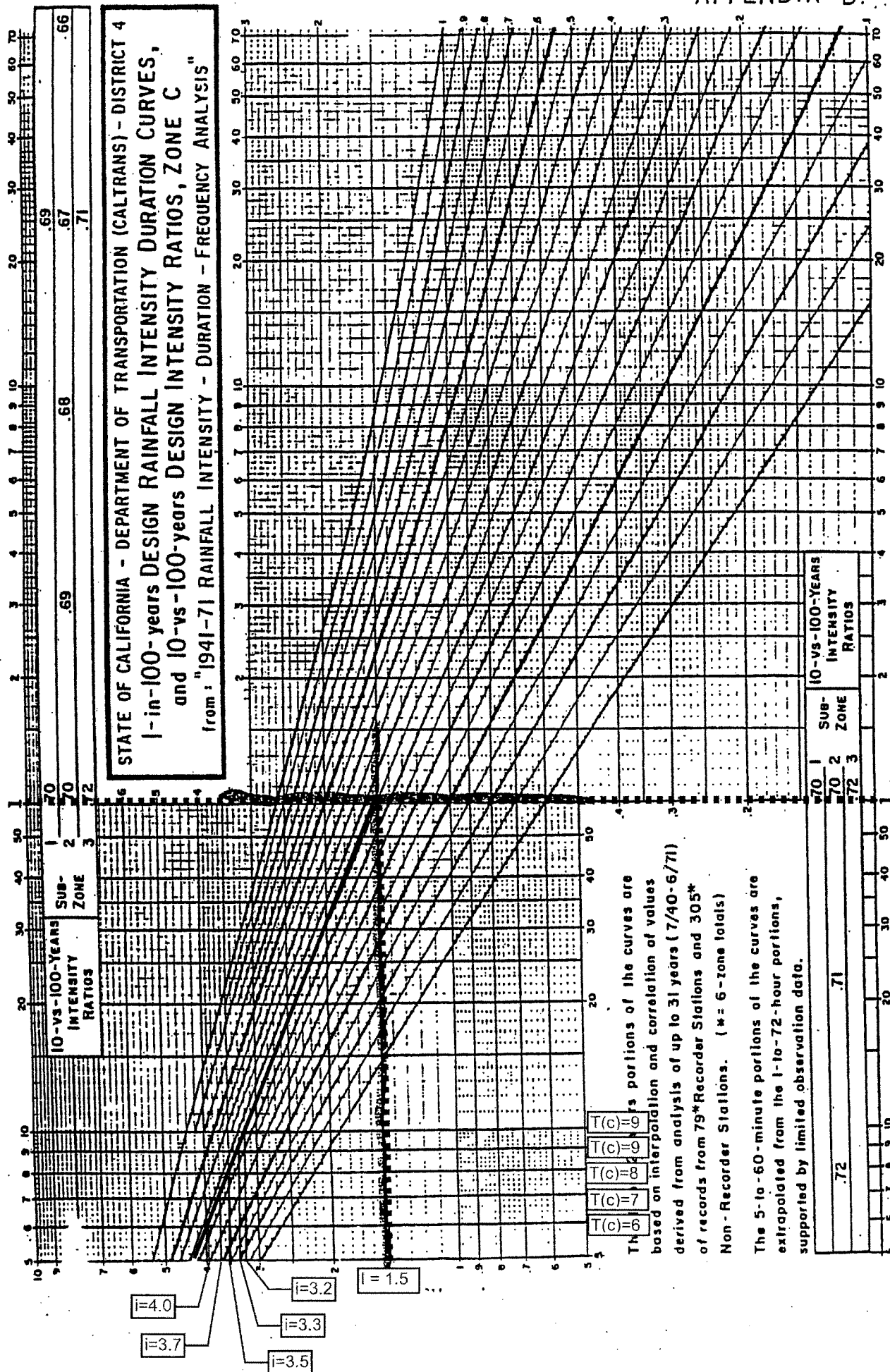
1-HOUR, 1-IN-100-YEARS ISOHYETS ($I_{1,100}$)
("P₁₀ ISOPLETHS" AS USED WITH CHART "A")

From "1941-71 Rainfall Intensity - Duration - Frequency Analysis", based on up to 31 years of records
1 July 1960 - June 1971 from 30 recorder stations and 325 non-recorder stations

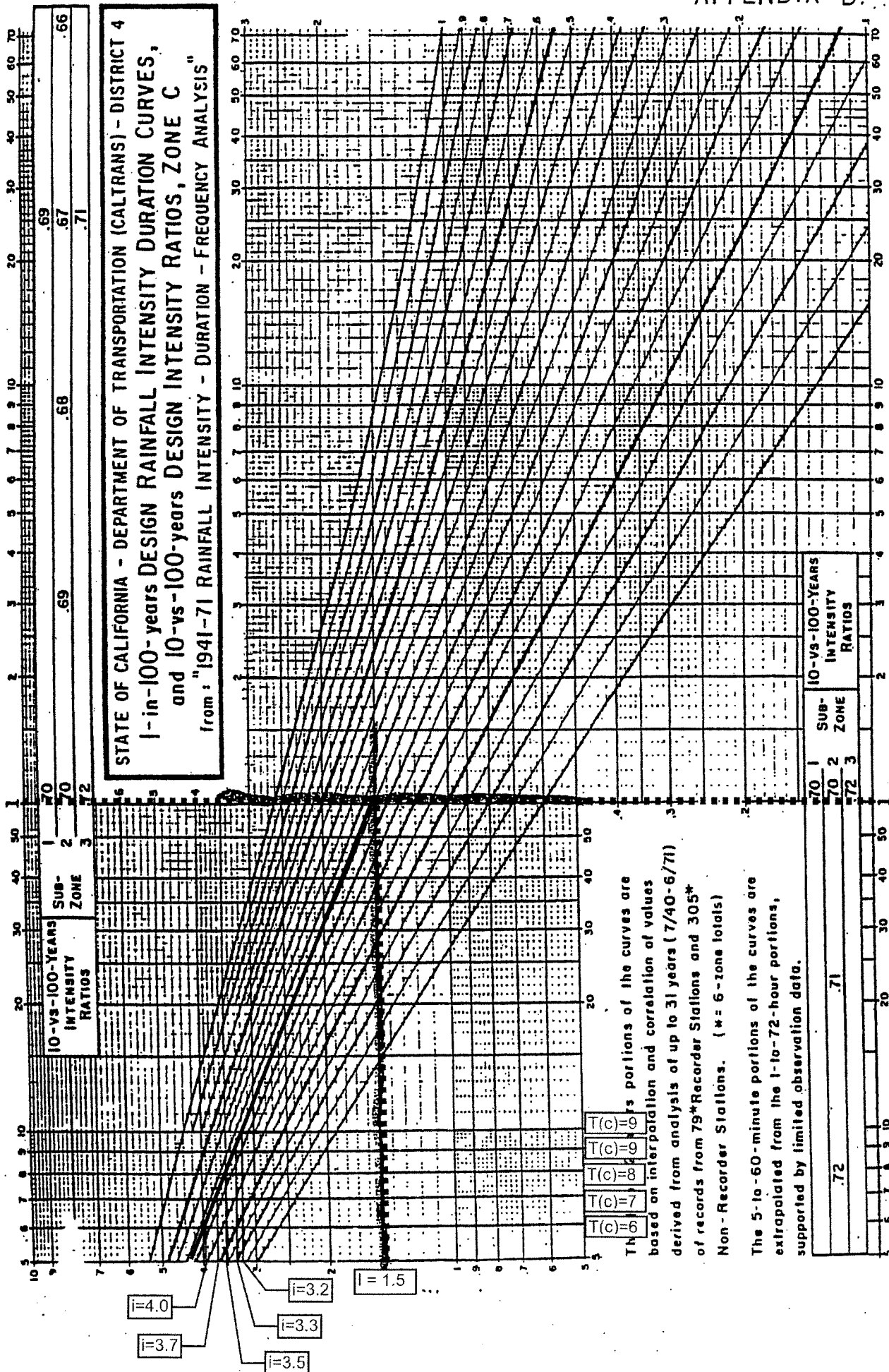
- LEGEND**
- - National Weather Service - WDA 4 (formerly USWB) Recorder Station
 - △ - National Weather Service - WDA 4 (formerly USWB) non-Recorder Station
 - - Non-WDA 4 / WDA 4 / USWB Recorder Station
 - - Non-WDA 4 / WDA 4 / USWB non-Recorder Station
- 1.0 IN/H - 1.5 IN/H ISOHYETS, INCH/HOUR



Q=C/A



Q = C/A





January 21, 2019
File: 201.164cltr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: Third Planning-Level Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residence
251 Scenic Road (APN 001-121-50)
Fairfax, California

Introduction

In response to your request and in accordance with our agreement dated March 20, 2018, we have reviewed the submitted responses to our Second Review comments¹ regarding the proposed construction of a new single-family residence and ancillary improvements at 251 Scenic Road in Fairfax, California. The purpose of our services is to review the submitted documents, comment on the completeness and adequacy of the submittal in consideration of Town requirements, and to provide a recommendation to Town Planning and Building staff regarding project approval.

The scope of our services includes:

- A site reconnaissance to observe existing conditions and review proposed development features;
- Review of provided project documents for conformance to the Town of Fairfax Hill Area Residential Development Ordinance, specifically Town Code Sections 17.072.080(B), (C), (E), and (F), and Section 17.072.110 (C).
- Development of opinions regarding project compliance with applicable Town Code requirements; and
- Development of recommendations to Town staff as to whether the project may be safely constructed in consideration of any geologic, hydrologic, or geotechnical hazards.

It should be noted that the scope of our review is limited solely to geologic, geotechnical, and civil portions of the project, and does not include review of structural, architectural, mechanical, or other items beyond the scope of our qualifications. We recommend that non-geotechnical aspects of the plans be reviewed by suitably qualified professionals.

Project Description

The project generally consists of constructing a new 1,765 square-foot, 3-bedroom residence and carport on a very steep, approximately 0.15-acre parcel with an average grade of about 59%. The property is currently undeveloped and was apparently the site of at least 2 historic landslides within the last 20-years. A 1986 event undermined Scenic Road and necessitated construction of a large

¹ Miller Pacific Engineering Group (2018), "Second Planning-Level Geologic, Geotechnical, and Civil Engineering Review, New Single-Family Residence, 251 Scenic Road, (APN 001-121-50), Fairfax, California", File No. 201.164bltr.doc, dated September 28, 2018.

steel "crib" or "bin"-type retaining wall to support the downslope edge of Scenic Road. More recently, sometime within the last 10 years or so, we understand a second event resulted in condemnation of a residence downslope of the site.

Project plans generally show a new multi-story structure "cascading" down the hill so as to mimic existing topography, with a new partially-covered carport just below street grade, the slab floor for which will be supported on new foundations to span over the existing retaining wall at the street frontage. Plans indicate all site runoff will be dispersed across steep natural slopes below the residence.

Project Review

We performed a site reconnaissance on July 17, 2018 to observe existing conditions at the site. We previously reviewed the following documents provided by the Town as summarized in our August 8, 2018 letter:

- DVC Group, Inc. (2018), "Record of Survey Being the Lands of David Nelson Boesel. "Job No 11-17, Serial #2018-0020451, recorded June 8, 2018.
- Fidelity National Title Company (2016) "Preliminary Report, Amendment A, Title No. FMNA-6011602032-JV (Vacant Lots, Fairfax, CA", dated November 30, 2016.
- Salem Howes Associates, Inc. (2017), "Report, Geotechnical Investigation, New Residence, AP 001-121-50, Fairfax, CA", Job No. 1612083b, Revision 1 dated January 23, 2017.
- DVC Group, Inc. (2018), "Topographic Map, Scenic Road, Fairfax, CA, APN 001-121-50" (Civil Plans), Job No. 11-17, Sheet 1 of 1, 3rd Revision dated January 9, 2018.
- Murdock Architecture (2018), "New Single-Family Residence, Scenic Road, Fairfax, CA 94930, APN 001-121-50" (Architectural Plans), Project #1716, Sheets A0.1 through A7.2, Design Review Set dated July 10, 2018.
- DVC Group, Inc. (2018), "Scenic Road, Fairfax, CA, APN 001-121-50" (Civil Plans), Job No. 04-18, Sheets C1 through C5, dated July 13, 2018.
- DVC Group, Inc. (2018), "Drainage Report for Scenic Road, Fairfax, CA, APN 001-121-50", dated July 13, 2018.

More recently, we reviewed additional documentation in response to our first review comments, including the following:

- DVC Group (2018), "Responses to Comments for Geologic, Geotechnical and Civil Engineering Review" (undated).
- DVC Group (2018), "001-121-50, Scenic Road, Fairfax, California" (Preliminary Civil Plans), Job No. 04-18, dated September 7, 2018.

January 21, 2019

- Salem Howes Associates, Inc. (2018), "Geotechnical Response to Miller Pacific Engineering Group (MPEG) Letter 8 August 2018, 251 Scenic Road, Fairfax", dated September 5, 2018.

Responses to our second review included the following, which were reviewed for the purpose of this letter:

- DVC Group (2019), "Responses to Comments for Geologic, Geotechnical and Civil Engineering Review" (undated).
- DVC Group, Inc. (2018), "Scenic Road, Fairfax, CA, APN 001-121-50" (Civil Plans), Job No. 04-18, Sheets C1 through C3 and C5, dated January 9, 2019.
- Murdock Architecture (2018), "New Single-Family Residence, Scenic Road, Fairfax, CA 94930, APN 001-121-50" (Architectural Plans), Project #1716, Sheet A1.0, First Revision dated January 8, 2019.
- Pheif Engineering (2019), "CIDH Structural Calculations and Details, Scenic Ave, Fairfax", dated January 8, 2019.
- Salem Howes Associates, Inc. (2019), "Calculation Sheet, 251 Scenic Road, Fairfax" (Addendum to Geotechnical Report), dated January 8, 2019.

Conclusions

Based on our document review, the applicants are proposing a new retaining structure downslope of the planned residence as a means of reducing the potential for erosion and slope instability to affect the project site and adjacent lands. We note that current plans show the retaining wall located approximately 30-feet above the downslope property boundary. Lands between the planned wall and property line appear to reflect older landslide topography, and the applicants propose locating the primary drainage dissipation system downslope of the retaining wall. We suggest the design team consider relocating the dissipation system behind the retaining structure.

We judge that, for planning level purposes, the current conceptual plans are sufficient. However, for building approval, we expect the applicant to provide slope-stability analyses (as requested in detail in our Second Review letter) which reflect the planned site conditions (including all grading, foundations, walls, structures, and groundwater conditions), which incorporate soil values based on actual laboratory test results, and which indicate acceptable factors of safety under both static and seismic conditions. We anticipate that locating the retaining wall nearer to the downslope property line could be necessary if design-level exploration and lab testing confirms the presence of weak slide debris downslope of the planned retaining wall.

Recommendations

Based on our review, we judge that our significant comments have been addressed and recommend that the project be approved at the planning level. As indicated above and in previous letters, additional information specifically regarding actual subsurface conditions and anticipated site stability in light of the planned construction will need to be provided.

MILLER PACIFIC ENGINEERING GROUP

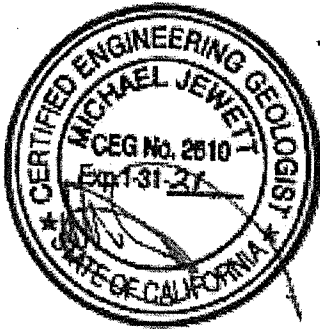
Town of Fairfax
Page 4

January 21, 2019

We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments and/or building-level review requirements with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY:



Mike Jewett
Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/21)



Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/19)



**MILLER PACIFIC
ENGINEERING GROUP**

September 28, 2018
File: 201.164bltr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: Second Planning-Level Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residence
251 Scenic Road (APN 001-121-50)
Fairfax, California

Introduction

In response to your request and in accordance with our agreement dated March 20, 2018, we have reviewed the submitted responses to our First Review comments¹ regarding the proposed construction of a new single-family residence and ancillary improvements at 251 Scenic Road in Fairfax, California. The purpose of our services is to review the submitted documents, comment on the completeness and adequacy of the submittal in consideration of Town requirements, and to provide a recommendation to Town Planning and Building staff regarding project approval.

The scope of our services includes:

- A site reconnaissance to observe existing conditions and review proposed development features;
- Review of provided project documents for conformance to the Town of Fairfax Hill Area Residential Development Ordinance, specifically Town Code Sections 17.072.080(B), (C), (E), and (F), and Section 17.072.110 (C).
- Development of opinions regarding project compliance with applicable Town Code requirements; and
- Development of recommendations to Town staff as to whether the project may be safely constructed in consideration of any geologic, hydrologic, or geotechnical hazards.

It should be noted that the scope of our review is limited solely to geologic, geotechnical, and civil portions of the project, and does not include review of structural, architectural, mechanical, or other items beyond the scope of our qualifications. We recommend that non-geotechnical aspects of the plans be reviewed by suitably qualified professionals.

Project Description

The project generally consists of constructing a new 1,765 square-foot, 3-bedroom residence and carport on a very steep, approximately 0.15-acre parcel with an average grade of about 59%. The property is currently undeveloped and was apparently the site of at least 2 historic landslides within

¹ Miller Pacific Engineering Group (2018), "Geologic, Geotechnical, and Civil Engineering Review, New Single-Family Residence, 251 Scenic Road, (APN 001-121-50), Fairfax, California", File No. 201.164altr.doc, dated August 8, 2018.

the last 20-years. A 1986 event undermined Scenic Road and necessitated construction of a large steel "crib" or "bin"-type retaining wall to support the downslope edge of Scenic Road. More recently, sometime within the last 10 years or so, we understand a second event resulted in condemnation of a residence downslope of the site.

Project plans generally show a new multi-story structure "cascading" down the hill so as to mimic existing topography, with a new partially-covered carport just below street grade, the slab floor for which will be supported on new foundations to span over the existing retaining wall at the street frontage. Plans indicate all site runoff will be dispersed across steep natural slopes below the residence.

Project Review

We performed a site reconnaissance on July 17, 2018 to observe existing conditions at the site. We previously reviewed the following documents provided by the Town as summarized in our August 8, 2018 letter:

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- Murdock Architecture (2018), "New Single-Family Residence, Scenic Road, Fairfax, CA 94930, APN 001-121-50" (Architectural Plans), Project #1716, Sheets A0.1 through A7.2, Design Review Set dated July 10, 2018.
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- DVC Group, Inc. (2018), "Drainage Report for Scenic Road, Fairfax, CA, APN 001-121-50", dated July 13, 2018.

More recently, we reviewed additional documentation in response to our first review comments, including the following:

- DVC Group (2018), "Responses to Comments for Geologic, Geotechnical and Civil Engineering Review" (undated).
- DVC Group (2018), "001-121-50, Scenic Road, Fairfax, California" (Preliminary Civil Plans), Job No. 04-18, dated September 7, 2018.

- Salem Howes Associates, Inc. (2018), "Geotechnical Response to Miller Pacific Engineering Group (MPEG) Letter 8 August 2018, 251 Scenic Road, Fairfax", dated September 5, 2018.

Conclusions

Based on our site reconnaissance and document review, the following submittal items required by the Town of Fairfax Hill Area Residential Development Ordinance remain outstanding and should be addressed at the planning level (note comment numbers are carried over from our First Review letter):

Hill Area Residential Development Ordinance

- Section 17.072.080(E)
 - 1) We understand that options for dispersal of site drainage are limited due to the lack of existing municipal storm drain systems, and the inability to acquire easements or other means of more appropriately conveying runoff away from the steep site. In general, we respectfully disagree with the Geotechnical Engineer's opinion that "it will [not] cause any up or downslope increase in slope instability" and anticipate that such a system could potentially reduce local stability, especially if poorly-maintained. Regardless, we anticipate that the effects of such instability as may be caused by the proposed dissipation system would be limited to impacts on this and the adjacent downslope property, and essentially result in an issue to be handled amongst private property owners.
- Section 17.072.080(E)
 - 5) We understand from Salem Howes' response that the earlier slide which affected Scenic Road and resulted in construction of the exiting bin wall occurred in 1986. From the original project geotechnical report, we understand "the latest slide occurred at an unknown site and forced a downslope residence to be condemned". Our review of site conditions and of the Site Plan included in the project report suggest that this "latest" referenced slide originated at the location of the scarp below the planned residence, in the vicinity of the planned drainage dissipator.

The provided slope-stability analyses do not indicate the presence of landslide debris at the site, although the site plan indicates "hummocky topography". Based on apparent site history and review of the boring logs, we judge it is likely some or all of the soil materials onsite are in fact the debris of a previous landslide, as opposed to colluvial or residual soils.

The provided analyses utilize soil properties apparently developed via correlation with SPT blow counts. Please provide documentation of such correlations between SPT blow counts and the friction angle, strength, and cohesion values used in the analysis. If none can be provided, please provide updated analyses which utilize soil parameters developed on the basis of laboratory testing of onsite samples, or via back-calculation of previous landsliding at the site.

The provided analyses are based on a model which appears to extend 75 linear feet, while the parcel is 125-feet long. Please revise the model to accurately reflect site conditions and encompass the entire parcel. The model must show the existing roadway and bin wall, the

September 28, 2018

proposed grading/structural improvements, the location of the upslope and downslope property lines, and the location of the existing slide scarp in the lower portion of the property. The model must be extended beyond the lower property line as needed to evaluate possible offsite impacts of the new development. The model must consider the phreatic (groundwater) surface and be evaluated under both static and seismic conditions.

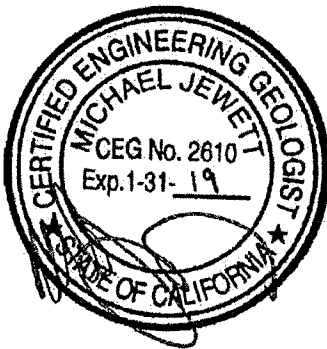
- Section 17.072.110 (C)
- 7) We acknowledge that the project likely can be designed to resist damage in the event of future instability as suggested and apparently evidenced by the provided photographs. However, it is not clear that the proposed development will NOT have an appreciable negative effect on slope stability. Future instability could result in significant damage to adjacent downslope properties, and to non-structural elements of this property.

Recommendations

It is our opinion that comments contained in our First Review letter but not reproduced here may be addressed at the Building permit level with minimal anticipated impact. However, the comments presented above are judged to reflect significant Planning-level issues, and we therefore recommend that project processing be delayed until the requested materials are provided and reviewed.

We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP



Mike Jewett
Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/19)

REVIEWED BY:



Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/19)



**MILLER PACIFIC
ENGINEERING GROUP**

August 8, 2018
File: 201.164altr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residence
251 Scenic Road (APN 001-121-50)
Fairfax, California

Introduction

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- Development of opinions regarding project compliance with applicable Town Code requirements; and
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Project Description

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Project plans generally show a new multi-story structure "cascading" down the hill so as to mimic existing topography, with a new partially-covered carport just below street grade, the slab floor for which will be supported on new foundations to span over the existing retaining wall at the street frontage. Plans indicate all site runoff will be dispersed across steep natural slopes below the residence.

Project Review

We performed a site reconnaissance on July 17, 2018 to observe existing conditions at the site. Additionally, we have reviewed the following documents provided by the Town:

- DVC Group, Inc. (2018), "Record of Survey Being the Lands of David Nelson Boesel. "Job No 11-17, Serial #2018-0020451, recorded June 8, 2018.
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Conclusions

Based on our site reconnaissance and document review, the following submittal items required by the Town of Fairfax Hill Area Residential Development Ordinance remain outstanding:

Hill Area Residential Development Ordinance

- Section 17.072.080(C)
- 1) Project Civil Plans indicate all site storm water runoff, including from impervious driveway and roof surfaces as well as foundation and retaining wall back drains, will be discharged onto the open, undeveloped slope below the planned residence. Discharge is indicated to be via a 20-foot long "level spreader" constructed at zero grade ("dead level").

The project Civil and Geotechnical Engineer should comment on the potential for new instability considering the more concentrated water at the dissipator system, potential

August 8, 2018

damage to the dissipator from future slope creep, and anticipated effects on slope stability (both onsite and off-site). Commentary should be provided on possible alternative means of drainage dispersal and/or slope stabilization, on the understanding that no municipal storm drain system currently exists within Scenic Road. If no suitable alternatives exist, the applicants should consider acquiring an easement or other legal means of extending a solid-pipe discharge line downslope to a more appropriate discharge location than the scar of multiple historic landslides.

- 2) Structural plans were not provided for our review. Because of the unique site conditions, including steep slopes and a history of slope instability, project structural design will be paramount to maintaining site stability and overall equilibrium. We anticipate potential conflict between the existing steel bin wall and proposed new excavations and foundations will require careful design and consideration in addition to extensive shoring. Project structural and temporary shoring plans and details should be prepared and provided for Town review. The Geotechnical Engineer should also review the structural plans for conformance to the recommendations in his report and any supplemental recommendations derived in response to these comments.
- 3) Civil plans indicate a new 6-inch storm drain line is to be routed through the existing bin wall along the edge of the road. Details and description regarding the means and methods of extending the pipe through the wall should be submitted and reviewed, and an encroachment permit for the work should be required. Submitted materials should be reviewed to determine whether the planned wall modification will have any net effect on stability or future maintenance needs.

It should be noted that removal of the driveway may be required for future maintenance of the bin wall (per requirements of encroachment permit). The driveway should be designed in consideration of partial driveway removal.

- 4) No easements are shown, existing or proposed. However, as discussed above, a new easement should be considered to facilitate discharge of collected surface water runoff if possible, in the interest of reducing the risk of future slope instability on a historically-prone site. Any new easements should be clearly shown on the site survey, accompanied by a legal description from the surveyor, and recorded by the County assessor prior to permit issuance.
- 5) Plans indicate new water, gas, and electrical services will extend from new tie-ins within the Scenic Road right-of-way. New utility conduits must be labelled with their sizes, and an encroachment permit should be required for work within the right-of-way.
- 6) The proposed new water service, sewer lateral, and joint trench are currently shown extending to the proposed open carport, but with no connection to the residence. Utility connections to the residence must be shown, and utility conduits labelled with their sizes. The electrical connection to the residence should be confirmed, as it is currently shown mounted to the driveway screening wall.

- Section 17.072.080(E)

- 7) The Geotechnical Investigation for the project included 2 soil borings drilled to maximum explored depths of about 16.5-feet below the ground surface, with maximum penetration of about 1-foot into weathered Franciscan bedrock. A summary of historic slope instability at the site indicates at least 2 distinct episodes of landsliding within approximately the last 20-years. Somewhat contradictorily, the report further indicates "the site has been stable for the last 20-years with the present "sheet" distribution of the surface runoff", and "it is reasonable to believe that the drainage distribution is maintained there will be no further instability".

We respectfully disagree with the assertion that "the site has been stable for the last 20-years", as at least 2 separate landslide events have occurred in that timeframe, including one which resulted in major damage to Scenic Road and the condemnation of a residence downslope of the property. We note that the project investigation included limited exploration of underlying bedrock materials, no laboratory testing of recovered soil samples, and no objective slope-stability evaluation.

In light of the history of instability at the site, it is our opinion that slope-stability analyses should be performed to confirm that the proposed site improvements and drainage conditions results factors of safety of at least 1.5 for static conditions and above 1.0 for pseudo-static (seismic) conditions. The material properties used in the analyses should be based on laboratory testing or back-calculation.

- 8) The geotechnical report (Page 9) indicates "all retaining walls should be supported on rock by piers type foundations", but then indicates "the toe of footing type retaining walls should be excavated below grade and concrete poured against natural ground . . ."

The Geotechnical Engineer should clarify whether shallow foundations are suitable for site retaining walls.

- Section 17.072.080(F)

- 9) The site grading plan indicates grading to occur on the adjoining property to the west. Written authorization must be provided by the neighboring Owner prior to performance of any work on the property.
- 10) The site grading plan indicates total earthwork quantities limited to 12CY cut, all of which will be off-hauled from the site. No structural plans are yet provided, and it is expected that excavation for drilled pier and tieback foundation elements will generate significant additional quantities of soils to be exported. Those quantities, in addition to any other debris (tree stumps, retaining wall materials, etc.) to be off-hauled, should be incorporated for a more accurate estimation of off-haul needs.

The applicant has already submitted a Construction Management Plan indicating construction staging/parking will take up 9-feet of asphalt, while leaving 10-feet available for travel. Project civil plans indicate existing asphalt width of 14-feet. The applicant should consider alternate means/locations of providing the required parking and staging areas for construction.

August 8, 2018

- Section 17.072.110 (C)

- 11) Based on our review of the provided materials, it is our opinion that the project soils report does not adequately address the potential for slope instability at the site. Contradictory language is provided regarding historic and expected future stability, and no numerical or objective analysis or significant field data is provided to justify the conclusions. The Geotechnical Engineer should review his work to clarify the history, timing, and possible causes of historic instability at the site, and provide updated commentary and recommendations regarding slope instability risks and mitigation based on review of his work and the proposed plans.

Recommendations

We recommend that project processing be delayed until the aforementioned materials are submitted for review.

We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY:



Mike Jewett
Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/19)



Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/19)



August 8, 2018
File: 201.164altr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residence
251 Scenic Road (APN 001-121-50)
Fairfax, California

Introduction

In response to your request and in accordance with our agreement dated March 20, 2018, we have reviewed project plans and supporting documentation for the proposed construction of a new single-family residence and ancillary improvements at 251 Scenic Road in Fairfax, California. The purpose of our services is to review the submitted documents, comment on the completeness and adequacy of the submittal in consideration of Town requirements, and to provide a recommendation to Town Planning and Building staff regarding project approval.

The scope of our services includes:

- A site reconnaissance to observe existing conditions and review proposed development features;
- Review of provided project documents for conformance to the Town of Fairfax Hill Area Residential Development Ordinance, specifically Town Code Sections 17.072.080(B), (C), (E), and (F), and Section 17.072.110 (C).
- Development of opinions regarding project compliance with applicable Town Code requirements; and
- Development of recommendations to Town staff as to whether the project may be safely constructed in consideration of any geologic, hydrologic, or geotechnical hazards.

It should be noted that the scope of our review is limited solely to geologic, geotechnical, and civil portions of the project, and does not include review of structural, architectural, mechanical, or other items beyond the scope of our qualifications. We recommend that non-geotechnical aspects of the plans be reviewed by suitably qualified professionals.

Project Description

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damage to the dissipator from future slope creep, and anticipated effects on slope stability (both onsite and off-site). Commentary should be provided on possible alternative means of drainage dispersal and/or slope stabilization, on the understanding that no municipal storm drain system currently exists within Scenic Road. If no suitable alternatives exist, the applicants should consider acquiring an easement of other legal means of extending a solid-pipe discharge line downslope to a more appropriate discharge location than the scar of multiple historic landslides.

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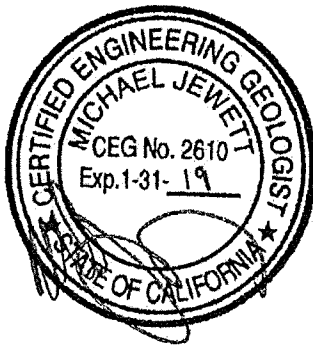
Recommendations

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We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

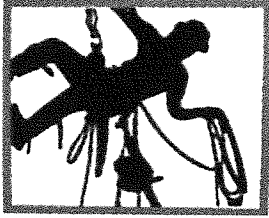
REVIEWED BY:



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Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/19)



Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/19)



3/1/19

Brooks Tree Care
BrooksTreeCare@gmail.com
415-388-1232

250 Scenic Avenue, Fairfax, Arborist Report

Task:

Inspect site and study updated site plans supplied by David Boesel of Boesel Design & Construction on a stand of Redwood trees, *Sequoia sempervirens* next-door to the site for potential construction impacts. Report findings in an arborist report for planning purposes.

Findings:

The Redwood trees are mostly located down slope of 255 Scenic Avenue, there is one that appears to be on the property line of 250 Scenic Ave just off the North East corner of the house at 255 Scenic. This particular tree is the only Redwood that is likely to be impacted by construction activities. It measures at breast height to be 30" in diameter. I estimate the this tree to be +/-60' in height.

It is a single stemmed tree with a robust root crown flair showing no external signs of decay. I took a non-intrusive sounding of the tree with a stone while my ear was placed on the trunk in several locations. No appreciable hollow or 'punky' sounds were heard leading this arborists to conclude that the tree is free of significant decay within the lower trunk to root crown interface.

There is a build up of loose soils on the upslope side of the tree that should be cleared to the root crown flair from the soil. A tree well to capture soil from building up against this tree should be installed approximately 3' above the tree to prevent future trunk burial.

The site's location eliminates the use of mechanical excavation. Since it is my expectation that no heavy equipment will be used, there is no concern of root system damage by tracking through the tree's root system or direct impact by heavy equipment. Due the distance from the subject redwood trees, It is unlikely for any significant roots to be encountered by excavation for foundations or trenching for utilities or drainage based on plans submitted

Continue;

Due to the access and slope I don't expect to have vehicle parking within the drip line of any of the retained trees. I don't expect that any welding or open flames to be used within proximity of any of the remaining trees on the project so I see no need to install exclusionary fencing or trunk armoring.

I would encourage the builder to retain and spread as much of the chipped materials (mulch) from the bay tree removals as practical to reduce foot traffic impacts and 'Post Holing' from workers walking in heavy clay soils (mud). The Mulch will help reduce soil moisture loss and lessen potential erosion of top soil. When limiting the mulch depth to under 6" the potential of fire fuel is eliminated because there is not a sustainable fuel to oxygen ratio for fire.

The stand of Redwoods are in a healthy state. Eliminating the California Bay Laurels, *Umbellularia californica*, from the property will allow the remaining trees to benefit from lessened competition for available resources.

I do not see the potential for development of a 'Wind Tunnel' effect to take place due to the elimination of the Bay trees.

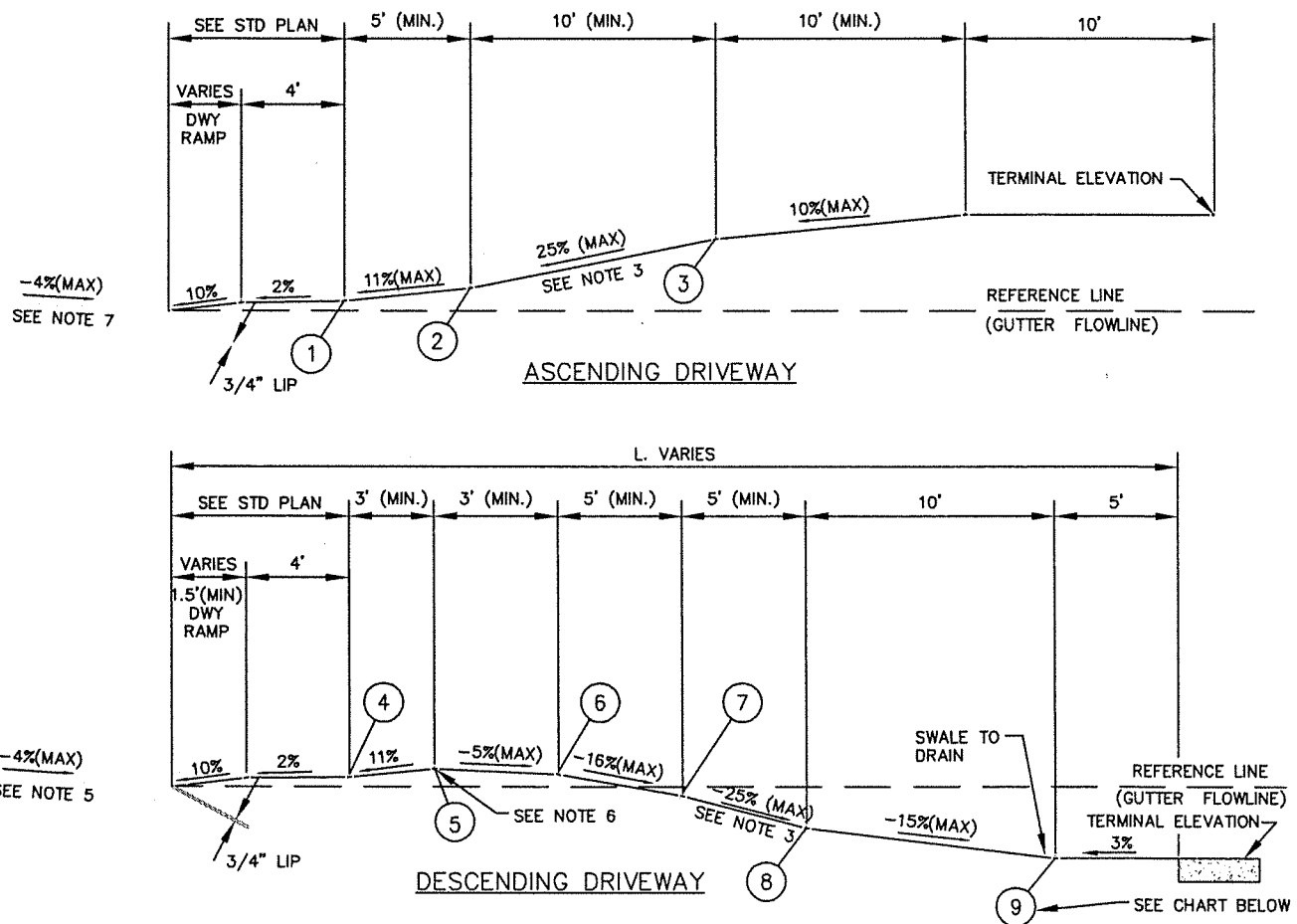
Conclusion:

I do not expect the project as presented and construction processes as described to be deleterious to the Redwood trees on and nearby the site.

Peter Brooks

Certified Arborist #319, Western Chapter of the International Society of Arboriculture
Tree Risk Assessor Qualified

California Contractor License #0660478



NOTES:

1. REFERENCE LINE IS FROM FACE OF DEPRESSED CURB OR EDGE OF PAVEMENT WHERE NO CURB EXISTS.
2. FOR MAXIMUM GRADE BREAKS, SEE CHART.
3. MAXIMUM GRADIENT MEASURED ALONG THE DRIVEWAY CENTERLINE SHOULD NOT BE STEEPER THAN 18%, AND SHALL NOT BE STEEPER THAN 25%.
4. SEE DWG. NOS. 110, 115, 120, 125, 130 AND 135 FOR DRIVEWAY RAMP DETAILS.
5. IF PAVEMENT CROSS SLOPE EXCEEDS 4%, A MODIFIED DRIVEWAY PROFILE SHALL BE USED WITH THE SLOPE OF THE DRIVEWAY RAMP REDUCED SUCH THAT THE DIFFERENCE IN SLOPE OF THE DRIVEWAY RAMP AND THE SLOPE OF A LINE BETWEEN THE GUTTER AND A POINT ON THE ROADWAY 5' FROM GUTTER LINE SHALL NOT EXCEED 15%. REDUCE DRIVEWAY RAMP SLOPE, NOT THE GUTTER SLOPE. OTHER DIMENSIONS SHALL BE MODIFIED AS APPROVED BY THE AGENCY ENGINEER.
6. THE GRADE AT (5) SHALL BE A MINIMUM OF 0.5' ABOVE REFERENCE LINE.
7. SPECIAL ENGINEERING DESIGNS MAY BE REQUIRED FOR UNIQUE SITUATIONS.
8. THE GEOMETRIC LAYOUT OF A PROPOSED DRIVEWAY SHALL BE REVIEWED AND APPROVED BY THE AGENCY ENGINEER PRIOR TO CONSTRUCTION.

GRADE BREAK CHART

#	MAXIMUM GRADE BREAK
1	9%
2	14%
3	15%
4	9%
5	16%
6	11%
7	9%
8	10%
9	12%

UNIFORM STANDARDS
ALL CITIES AND
COUNTY OF MARIN

STEEP DRIVEWAY
DESIGN

			MARCH 2018
			DWG. NO.
			140
REV.	DATE	BY	

ATTACHMENT **E**

FAIRFAX TREE COMMITTEE MINUTES

February 25, 2019

In Attendance: Susan Brandborg, Laura Kehrlein, Jane Richardson Mack,

Absent: None

Continued Items:

1. 47 Mountain View Rd.

Approved for removal of (1) Fir or Pine Tree. The tree is a hazard to adjacent properties and sewer connections. The applicant was not present.

Ayes: Brandborg, Kehrlein, Richardson Mack

New Business:

2. 18 Redwood Rd.

Approved for removal of (1) Oak. The tree has advanced sudden oak death. It was also noted that there is an adjacent Bay tree with a large broken limb that needs attention.

Ayes: Brandborg, Kehrlein, Richardson Mack

3. APN 001-121-50 Scenic Rd.

The committee has reviewed the proposed tree removal plan. The committee recommends removal of the proposed Bay trees with the condition that an arborist's report be submitted for review by the Planning Commission. The applicant was present to answer questions.

Ayes: Brandborg, Kehrlein, Richardson Mack

4. APN 003-161-01, 03-171-01-08 Toyon Rd.

The committee has reviewed the tree preservation/ protection plan prepared by Urban Forestry Associates. The committee recommends removal of the proposed trees in accordance with the recommendations in the arborist's report. The committee noted that there may be additional trees that are in poor health that are not proposed to be removed at this time.

Ayes: Brandborg, Kehrlein, Richardson Mack

5. 26 Scenic Rd.

Approved for removal of (1) Hawthorne #1 and (1) Coast Live Oak #3. In order to approve removal of the Coast Live Oak #2 in the rear yard an arborist report is needed. If the arborist's report states that this tree is an immediate danger, it may be removed on an emergency basis. The applicant was present to answer questions.

Ayes: Brandborg, Kehrlein, Richardson Mack

Tree Committee Comments:

The tree committee is disappointed that the trees in the Parkade did not come before us prior to their removal. A replacement tree species for the Liquid Amber that are becoming a nuisance was discussed by this committee for the addresses at 141 and 145 Bolinas Road at a prior meeting.

RICHARD RUSHTON

235 SCENIC ROAD

FAIRFAX, CA 94930

(415) 306-4714

Email: rich@rushtonarchitect.com

March 5, 2019

Fairfax Planning Commission and Planning Dept.
Town Hall, Fairfax CA

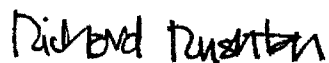
Re: Proposed New Residence at Assessor's Parcel No. 001-21-50, Scenic Road.

Dear Commissioners and Staff:

I have reviewed the Architectural and Civil drawings in detail and believe that the proposed project is well-designed and sensitive to the adjacent neighbors and the neighborhood in general. Given the physical constraints of the site, the placement of rooms and window size and placement minimizes the impact on neighbors. The forms and variety of materials break up the scale of the building and provide visual interest. The shrubs shown in perspective (Sheet A0.1) to the west of the driveway, paralleling the street, may be of particular importance to help screen the building view from the street.

I have no objection to this project.

Sincerely,



Richard Rushton

ATTACHMENT H

