RGH CONSULTANTS
Experience is the difference

Santa Rosa Office
1305 North Dutton Ave
Santa Rosa, CA 95401
707-544-1072

Napa Office
1041 Jefferson St, Suite 4
Napa, CA 94559
707-252-8105

May 16, 2019

Mike Estournes
2021 Park Vista Court
Santa Rosa, California
lakevilleauto@yahoo.com

Geotechnical Engineering Report Update
2021 Park Vista Court Garage
2021 Park Vista Court
Santa Rosa, California

Project Number: 4382.01.13.1

The purpose of this letter is to update our previous geotechnical report for the project to current design standards. The results of our geotechnical study for the site were presented in our report dated October 1, 1997. That report addressed a project that included construction of the Howarth Heights subdivision, which included the construction of 8 residential lots, including the subject property. On May 3, 2019, we visited the site and noted that the site surface conditions have not changed significantly since our report was issued.

Based on our review and reconnaissance, it is our opinion that the recommendations in our report, with the updated criteria presented below, are valid for design and construction of the improvements.

Seismic Design

Seismic design parameters presented below are based on Section 1613 titled "Earthquake Loads" of the 2016 California Building Code (CBC). Based on Table 20.3-1 of American Society of Civil Engineers (ASCE) Standard 7-10, titled "Minimum Design Loads for Buildings and Other Structures" (2010), we have determined a Site Class of C should be used for the site. Using a site latitude and longitude of 38.4461°N and 122.6641°W, respectively, and the OSHPD Seismic Design Maps website (https://seismicmaps.org), we recommend that the following seismic design criteria be used for structures at the site.

2016 CBC Seismic Criteria	
Spectral Response Parameter	**Acceleration (g)**
S_S (0.2 second period)	2.178
S_1 (1 second period)	0.899
S_{MS} (0.2 second period)	2.178
S_{M1} (1 second period)	1.168
S_{DS} (0.2 second period)	1.452
S_{D1} (1 second period)	0.779

Retaining Walls

Retaining walls should be designed to resist the following earth equivalent fluid pressures (triangular distribution):

EARTH EQUIVALENT FLUID PRESSURES		
Loading Condition	Pressure (pcf)	Additional Seismic Pressure (pcf)*
Active - Level Backfill	42	17
Active - Sloping Backfill 3:1 or Flatter	53	46
At Rest - Level Backfill	63	43

* If required

These pressures do not consider additional loads resulting from adjacent foundations or other loads. If these additional surcharge loadings are anticipated, we can assist in evaluating their effects. Where retaining wall backfill is subject to vehicular traffic, the walls should be designed to resist an additional surcharge pressure equivalent to two feet of additional backfill. Walls should be backfilled with material that has a low expansion potential. Retaining walls should be backdrained in accordance with the recommendations presented in our report.

Retaining walls will yield slightly during backfilling. Therefore, walls should be backfilled prior to building on, or adjacent to, the walls. Backfill against retaining walls should be compacted to at least 90 and not more than 95 percent relative compaction. Over-compaction or the use of large compaction equipment should be avoided because increased compactive effort can result in lateral pressures higher than those recommended above.

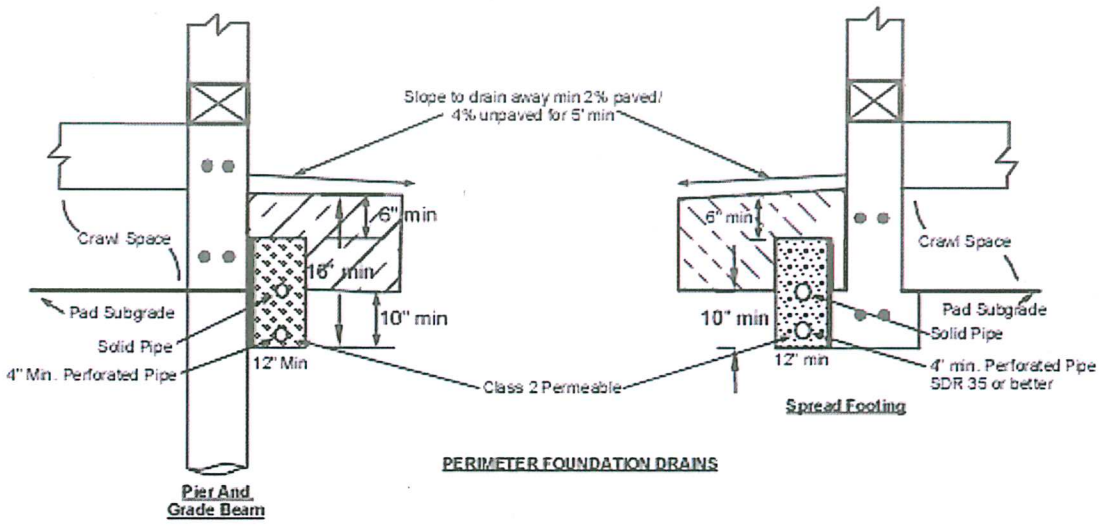
Geotechnical Drainage

Surface water should be diverted away from slopes and foundations. Surface drainage gradients should slope away from building foundations in accordance with the requirements of the CBC or local governing agency. Where a gradient flatter than 2 percent for paved areas and 4 percent for unpaved areas is required to satisfy design constraints, area drains should be installed within the rear and side yard swales with a spacing no greater than about 20 feet. Roofs should be provided with gutters and the downspouts should be connected to closed (glued Schedule 40 PVC or ABS with SDR of 35 or better) conduits discharging well away from foundations, onto paved areas or erosion resistant natural drainages or into the site's surface drainage system. Roof downspouts and surface drains must be maintained entirely separate from the slab underdrains recommended hereinafter.

Water seepage or the spread of extensive root systems into the soil subgrade of footings and slabs could cause differential movements and consequent distress in these structural elements. Landscaping should be planned with consideration for these potential problems.

Perimeter Foundation Drains

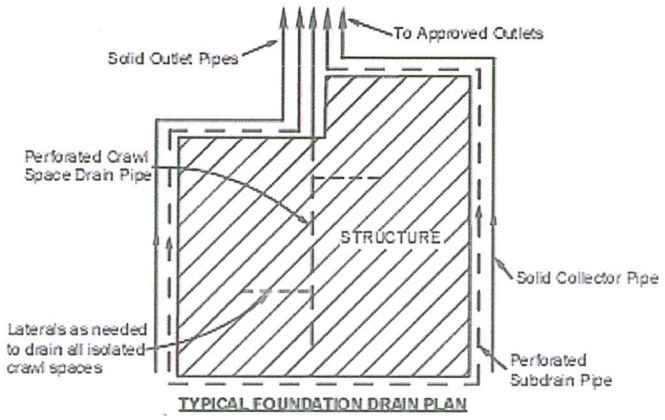
Where interior crawl spaces are lower than adjacent exterior grade, subdrains should be installed adjacent to perimeter foundations, except on the downhill side, to prevent surface runoff from entering the crawl space. Foundation drains should consist of trenches that are at least 10 inches below the crawl space surface and are sloped to drain by gravity. Four-inch diameter perforated pipe sloped to drain to outlets by gravity should be placed in the bottom of the trenches. The top of subdrain pipes should be at least 6 inches lower than the adjacent crawl space. The perimeter subdrain trenches should be backfilled to within 6 inches of the surface with Class 2 permeable material. The upper 6 inches should be backfilled with compacted soil to exclude surface water. An illustration of this system is shown below. Where perimeter foundation drains are not used, water ponding in the crawl space should be anticipated. Where retaining walls are used for perimeter foundations, retaining wall backdrains may be used in lieu of foundation drains.



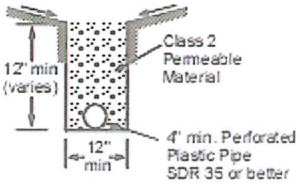
PERIMETER FOUNDATION DRAINS

Crawl Space Drains

Crawl spaces are inherently damp and humid. In addition, groundwater seepage is unpredictable and difficult to control and, regardless of the care used in installing perimeter foundation drains, can find its way into crawl spaces. The ground surface within the crawl space should be sloped to drain away from foundations and toward a 12-inch square drain trench that is excavated through the longitudinal axis of the crawl space. A 4-inch diameter perforated drain pipe (SDR 35 or better) should be embedded in Class 2 permeable materials near the bottom of the trench. The drain rock should extend to the surface of the crawl space. Piped outlets should be provided to allow drainage of the collected water through foundations and discharge into the storm drain system. An illustration of this system is shown below. Additional protection against water seepage into crawl spaces can be obtained by compacting fill placed adjacent to perimeter walls to at least 90 percent relative compaction.



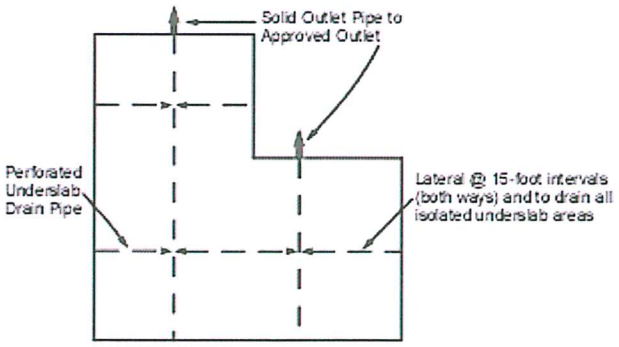
TYPICAL FOUNDATION DRAIN PLAN



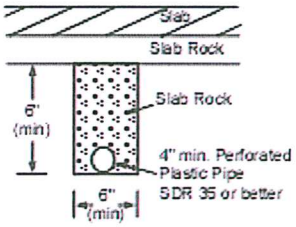
CRAWL SPACE DRAIN

Slab Underdrains

Where interior slab subgrades are less than 6 inches above adjacent exterior grade and where migration of moisture through the slab would be detrimental, slab underdrains should be installed to dispose of surface and/or groundwater that may seep and collect in the slab rock. Slab underdrains should consist of 6-inch wide trenches that extend at least 6 inches below the bottom of the slab rock and slope to drain by gravity. The slab underdrain trenches should be spaced no further than 15 feet, both ways. Additional drain trenches should be installed, as necessary, to drain all isolated under slab areas. Four-inch diameter perforated pipe (SDR 35 or better) sloped to drain to outlets by gravity should be placed in the bottom of the trenches. Slab underdrain trenches should be backfilled to subgrade level with clean, free draining slab rock. An illustration of this system is shown below. If slab underdrains are not used, it should be anticipated that water will enter the slab rock, permeate through the concrete slab and ruin floor coverings.



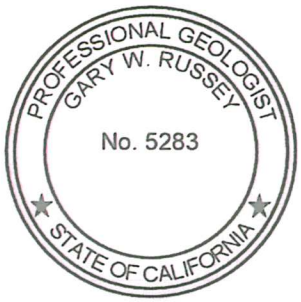
TYPICAL UNDERSLAB DRAIN PLAN



SLAB UNDERDRAIN

We trust this provides the information you require at this time. If you have questions please call.

Very truly yours,
RGH Consultants



Gary W. Russey
Project Manager

Ryan E. Padgett
Senior Engineer

GWR:REP:lfc:ejw
Electronically submitted

s:\project files\4251-4500\4382\4382.01.12.1 2021 park vista court garage\report update letter with seismic.doc

Attachments: RGH Consultants, October 1, 1997, *Geotechnical Investigation, Proposed Howard Heights*, Santa Rosa, California, Project Number 1353.01.00.1