Treadwell&Rollo

22 January 2007
Project 4560.01

Mr. Jeff Gilman
Silver Stone Communities
1733 Woodside Road, Suite 125
Redwood City, California 94601

Subject: Geotechnical Due Diligence Report
485 South Monroe Street
San Jose, California

Dear Mr. Gilman:

This letter presents our geotechnical review of the site at 485 South Monroe Street in San Jose, California. The site is bound by South Monroe Street to the east, Tisch Way to the south, and Dudley Avenue to the west. South Baywood Avenue intersects the site, and the northern portion of the site is bound by adjacent lots. This letter report is in fulfillment of our proposal dated 11 December 2006.

Our scope of services included a site reconnaissance and review of geotechnical reports for the site and other projects in the vicinity. The documents we reviewed are listed in the attached reference list. The purpose of our study was to evaluate subsurface conditions at the site and present preliminary geotechnical conclusions and recommendations for evaluating the geotechnical-related feasibility of the proposed project.

We understand proposed improvements include the demolition of an existing two story building and the construction of two new buildings. The proposed building on Lot 6 will be approximately 750 by 200 feet in plan and will consist of eleven stories of residential housing over four levels of parking. Two levels of parking will be below grade. The proposed building on Lot 2 will be approximately 300 by 100 feet in plan and will consist of three levels of residential housing over one level of below grade parking.

## SITE CONDITIONS

The site consists of two contiguous lots (Lots 2 and 6) shown on Figure 2. Lot 2 is "L" shaped, approximately 440 feet by 500 feet in plan and is adjacent to Dudley Avenue, Tisch Way, and South Baywood Avenue. A paved parking lot currently occupies Lot 2. Lot 6 is rectangular shaped, approximately 280 feet by 785 feet in plan, and is located along South Monroe Street between Tisch Way and Villa Centre Way. Lot 6 is currently occupied by a 2-story concrete building and a paved parking lot.

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The geotechnical report for the development of the existing structures indicates that one or more of the existing buildings on the site may have a basement. The existence of one or more basements should be addressed in future geotechnical work at the site.

## SUBSURFACE CONDITIONS

On the basis of a brief review of available subsurface information from other investigations within the site vicinity, we anticipate the project site is underlain by approximately 35 feet of alluvial deposits with thin beds of sand and gravelly sand. The surface alluvium is likely composed of firm to stiff silty clays over a hard, cemented clayey silt hardpan at a depth of approximately 10 to 20 feet. Beneath the alluvial deposits we expect approximately 30 feet of dense to very dense sandy gravel, underlain by moderately overconsolidated clays and dense gravelly sand. Bedrock is expected to be at a depth greater than 100 feet.

Groundwater is expected to be deeper than 35 feet, but the groundwater level at the site will likely fluctuate seasonally several feet.

## REGIONAL SEISMICITY AND FAULTING

The major active faults in the area are the Monte Vista – Shannon and San Andreas Faults. These and other faults of the region are shown on Figure 3. For each of the active faults within 50 kilometers, the distance from the site and estimated maximum Moment magnitude[1] [Working Group on California Earthquake Probabilities (WGCEP) (2003) and Cao et al. (2003)] are summarized in Table 1.

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1 Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

**TABLE 1**
**Regional Faults and Seismicity**

| Fault Segment | Approx. Distance from fault (km) | Direction from Site | Mean Characteristic Moment Magnitude |
|---|---|---|---|
| Monte Vista-Shannon | 8 | Southwest | 6.80 |
| Hayward – South East Extension | 14 | Northeast | 6.40 |
| San Andreas – 1906 Rupture | 15 | Southwest | 7.90 |
| San Andreas – Peninsula | 15 | Southwest | 7.15 |
| San Andreas – Santa Cruz Mnts. | 17 | Southwest | 7.03 |
| South Hayward | 17 | Northeast | 6.67 |
| Total Hayward | 17 | Northeast | 6.91 |
| Total Hayward-Rodgers Creek | 17 | Northeast | 7.26 |
| Total Calaveras | 18 | Northeast | 6.93 |
| Sargent | 20 | South | 6.80 |
| Zayante-Vergeles | 26 | South | 6.80 |
| Northern San Gregorio | 38 | West | 7.23 |
| Total San Gregorio | 38 | West | 7.44 |
| Greenville | 41 | East | 6.94 |
| Mt. Diablo – MTD | 47 | North | 6.65 |
| Monterey Bay-Tularcitos | 47 | Southwest | 7.10 |

Figure 3 also shows the earthquake epicenters for events with magnitude greater than 5.0 from January 1800 through January 1996. Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836 an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale (Figure 4) occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated Moment magnitude, $M_w$, for this earthquake is about 6.25. In 1838, an earthquake occurred with an estimated intensity of about VIII-IX (MM), corresponding to a $M_w$ of about 7.5. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 kilometers in length. It had a maximum intensity of XI (MM), a $M_w$ of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The most recent earthquake to affect the Bay Area was the Loma Prieta Earthquake of 17 October 1989, in the Santa Cruz Mountains with a $M_w$ of 6.9, approximately 70 km from the site.

In 1868 an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated $M_w$ for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably a $M_w$ of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake ($M_w = 6.2$).

In 2002 the Working Group on California Earthquake Probabilities (WGCEP 2003) at the U.S. Geologic Survey (USGS) predicted a 62 percent probability of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay Area by the year 2031. More specific estimates of the probabilities for different faults in the Bay Area are presented in Table 2.

**TABLE 2**
**WGCEP (2003) Estimates of 30-Year Probability (2002 to 2031) of a Magnitude 6.7 or Greater Earthquake**

| Fault | Probability (percent) |
|---|---|
| Hayward-Rodgers Creek | 27 |
| San Andreas | 21 |
| Calaveras | 11 |
| San Gregorio | 10 |
| Concord-Green Valley | 4 |
| Greenville | 3 |

## DISCUSSIONS AND CONCLUSIONS

From our research and review of the available subsurface data, we conclude the site is suitable for the proposed project from a geotechnical standpoint. Our preliminary assessment of the geotechnical issues that will need to be considered in design and construction of the proposed project are discussed in the remaining sections of this report.

**Seismic Hazards**

During a major earthquake on one of the nearby faults, strong to very strong shaking is expected to occur at the project site. Strong shaking during an earthquake can result in ground failure such as that associated with soil liquefaction[2], lateral spreading[3], and cyclic densification[4]. We used data from the available borings to evaluate the potential of these phenomena occurring at the project site. The results of our evaluation are presented below.

The seismicity of the site is governed by the activity of the Monte Vista – Shannon Fault. However, ground shaking from earthquakes on any of the nearby faults could be felt at the site. The intensity of earthquake ground motion at the site will depend upon the characteristics of the generating fault, distance to the earthquake epicenter, magnitude and duration of the earthquake, and local subsurface conditions. We judge ground shaking at the site during a large earthquake on one of the nearby faults will be strong to very strong.

When soil liquefies, it experiences a temporary loss of shear strength due to a transient rise in excess pore pressure generated by strong ground motion. Soil most susceptible to liquefaction is loose, clean, saturated, uniformly graded, fine-grained sand and silt of low plasticity that is relatively free of clay. Flow failure, lateral spreading, differential settlement, loss of bearing strength, ground fissures and sand boils are evidence of excess pore pressure generation and liquefaction. The site is not within a designated liquefaction hazard zone as designated by the California Geological Survey (CGS) seismic hazard zone map for the area titled *State of California Seismic Hazard Zones, San Jose West Quadrangle, Official Map,* dated 07 February 2002. Based on available subsurface data, we conclude the risk of liquefaction and associated lateral spreading is low.

Seismically induced compaction or cyclic densification of non-saturated sand (sand above the groundwater table) due to earthquake vibrations may cause differential settlement. Based on available subsurface data, we conclude the risk of seismically induced densification is also low.

Historically, ground surface displacements closely follow the trace of geologically young faults. The site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no known active or potentially active faults exist on the site. The nearest

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2 Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cylic loading.

3 Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

4 Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is densified by earthquake vibrations, causing ground-surface settlement.

known fault is the Monte Vista – Shannon Fault which is about 8 kilometers southwest of the site. In a seismically active area, the remote possibility exists for future faulting in areas where no faults previously existed; however, we conclude the risk of surface faulting and consequent secondary ground failure is very low. We therefore conclude the risk of fault offset at the site from a known active fault is low.

If the buildings are designed in accordance with the 2001 California Building Code (CBC), the requirements for Zone 4 should be used as a minimum. The site is about 8 kilometers from the Monte Vista – Shannon (a B-type fault). The anticipated soil conditions at the site indicate the soil profile type is an $S_D$, with near-source factors of 1.00 and 1.09 for $N_a$ and $N_v$, respectively.

**Foundations**

We anticipate that the buildings can be supported on shallow footings or a mat foundation bearing on native soil. We are presenting herein our preliminary foundation recommendations.

We conclude the proposed buildings can be supported on conventional continuous and isolated footings or a mat foundation that bear in undisturbed native soil. We anticipate that allowable bearing pressures of approximately 3500 pounds per square foot will be appropriate. Footing dimensions will be determined at a later date, but would have minimum widths and depths of about 18 to 24 inches. Tie-downs or soil anchors may also be required for uplift.

The need for, and the viability of, the various soil treatment and foundation types should be the subjects of a detailed geotechnical investigation for the project.

The preliminary indication is that groundwater will be below the lowest basement level. However, because it would have a significant impact on the foundation design, the groundwater level should be specifically studied during a geotechnical investigation of the site.

**Construction Considerations**

Site preparation will require grading for flatwork and to install the infrastructure, and excavation for the below grade parking. Extensive improvements have been constructed at the site. The site will need to be properly stripped and areas to receive improvements properly compacted. If groundwater is encountered, or if construction proceeds in the rainy season, it may be difficult to compact the soil at the site. Treating the soil with lime or cement may be required to facilitate earthwork. We anticipate the soil can be generally graded with conventional earth moving equipment.

We trust this letter contains the information you require. Should you have any questions, please contact us.

Sincerely yours,
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## REFERENCES

California Geological Survey (2002). "State of California Seismic Hazard Zones, San Jose West Quadrangle, Official Map."

McCreary Koretsky Engineers , (17 June 1963). Foundation Engineering Report – 485 S Monroe Street, San Jose, California. MKE No. 2313.

Working Group on California Earthquake Probabilities (WGCEP) (2003). "Earthquake probabilities in the San Francisco Bay region: 2002 to 2031." Open File Report 03-214.