



February 3, 2022

File No. 33348-08

Ms. Amber Gregg, Contract Planner
City of Laguna Niguel
30111 Crown Valley Parkway
Laguna Niguel, CA 92677

Subject: **RESPONSE TO QUESTIONS REGARDING GEOTECHNICAL REVIEW**
The Cove at El Niguel Project
30667 Crown Cove Parkway
Laguna Niguel, California

References: Various Reports and Other, Previous Approval Correspondence
See Appendix A

Dear Ms. Gregg,

It is our pleasure to provide this summary report given the City's interest in the geotechnical analysis of The Cove at El Niguel Project ("The Cove" or "Project") in Laguna Niguel, California. As you are aware, the Project has received conditional geotechnical approval by the City's geotechnical consultant, and we are pleased to provide this supplemental letter to respond to your additional questions for your review.

American Geotechnical ("AMGT") has a long history of involvement with the Project site and the surrounding area, as well as being involved in the design analysis and actual construction of the repair systems, and ongoing monitoring of slope behavior and groundwater conditions for two decades. AMGT has conducted significant supplemental investigation, testing and analysis for potential developments both up on the buttress, as well as in front of the buttress along Crown Valley Parkway where the current Project is proposed.

The Landslide Fix - Stabilization Components

In 1999 the Niguel Summit HOA applied to the City to remedy the Via Estoril landslide by addressing the main issues with respect to slope stability. AMGT, along with several other parties, including the City and licensed geotechnical engineers, rigorously reviewed the proposed remedial measures and approved a plan that included the following:



1. Removing driving weight in the upper reaches of the landslide area;
2. Adding a soil buttress in front of the landslide to hold back movement;
3. Providing subsurface drainage systems to limit the accumulation of groundwater;
4. Improving surface drainage systems to limit water introduction into the hillside; and
5. Designing and installing structural restraint systems (e.g., retaining walls, soil nails, high-capacity tieback systems, and approximately 110 feet deep steel reinforced caissons).

It is important to understand that, following the landslide, dozens of geologic borings, slope monitoring devices (inclinometers), and groundwater monitoring devices (piezometers) were installed to monitor slope movements and the efficacy of the geotechnical repairs to prevent a future landslide from occurring. The remedial plan and repair work were overseen by the City. Whereas the original Niguel Summit grading project had relatively few borings that investigated the site geology in the landslide area before development, the post-landslide investigation was extensive in comparison. In any hillside project, understanding the site stability is a function of how well the underlying geology is understood. Simply stated, the more information available, the greater certainty that is associated with the site stability conclusions. Accordingly, given the tremendous amount of investigation, data and analysis conducted post-landslide, the degree of certainty about the site stability is at the highest level.

Previously Proposed and Studied Redevelopment at the Project Site

Since the Via Estoril Landslide repair, AMGT has prepared two geotechnical feasibility study reports for the redevelopment at the Project site. In 2013, AMGT completed a geotechnical investigation and report for a redevelopment plan proposing a 38-unit condominium complex at the Project site. The 38-unit development proposed residential units throughout the entire 4.2-acre Project site on both the lower and the upper portions of the site, including grading into the soil buttress to create upper-level building pads. Throughout several rigorous and detailed reviews by the City's geotechnical review consultant, and with the corresponding response reports by AMGT, the proposed 38-unit condominium complex was conditionally approved by the City's consultant. Although not required due to safety concerns or from a geotechnical stability standpoint, it should be noted that the current Project proposes construction only on the lower eastern portion of the site, generally leaving the existing buttress intact.



Groundwater Observations and Drainage System Performance

AMGT has monitored the groundwater levels for two decades, including periods of heavy rainfall and relative drought. The subsurface drain system installed in conjunction with the landslide stabilization has proven to be successful in maintaining suitably low groundwater levels, during periods of heavy rainfall and drought, thereby contributing to stability in all conditions. The successful performance of the subsurface drain system and controlling the groundwater level as low as feasible are the primary contributing factors to the slope stability at the Project Site. Monitoring of this area includes piezometer readings at seven locations since 2002.

Normal Slope Creep

With the exception of a few formations (e.g., granite slopes in the Yosemite Valley) all hillside slopes are prone to creep and this hillside is no exception. The creep of this slope is well within normal limits consistent with slope conditions throughout Orange County, as is borne out by over two decades of study at the Project site further detailed below.

A total of 31 inclinometers (slope movement monitoring devices) were installed by AMGT before, during, and after the landslide repair. The inclinometer data indicates that the hillside, which includes expansive soil, is experiencing normal creep-related movement in upper reaches of the inclinometer casings. Inclinometer AGI-31 did indicate a very small offset, about 0.6 inches over a 17.5-year period. This very small, very slow offset, 0.034 inches per year, is not interpreted as mass landslide movement. One reason for this interpretation is that similar behavior was not repeated in any of the surrounding inclinometer casings. A closer look at the AGI-31 inclinometer casing behavior indicates a type of deformation that is commonly associated with casing compression, which occurs with expected settlement of the fill mass. In short, the inclinometers at the Project site support the conclusion that the slope is stable, and the project is safely buildable as proposed.

Although the landslide happened over 22 years ago, AMGT suggests continued inclinometer monitoring following completion of the Project. While the Project site is stable and will remain stable with construction, all involved should take advantage of the highly accurate and expensive monitoring equipment in place. Having investigated or advised on more than a hundred HOA projects with slopes



in California, it is well known that monitoring can be an effective tool for both the Niguel Summit homes and the Project relative to their maintenance and irrigation procedures to minimize creep influence.

Mechanically-Stabilized Earth (MSE) Walls

The proposed Project incorporates elements to protect the existing remedial measures, such as a type of retaining wall called mechanically stabilized earth (“MSE”) walls, near the toe of the buttress in order to accommodate the City’s required setback from Crown Valley Parkway and to provide for an essentially flat development area, including backyards. This type of wall derives its strength by reinforcing and strengthening the soil behind the wall. In this case, the installation of the MSE walls does not compromise the stability of the landslide area and has the effect of strengthening the soil at the toe of the existing soil buttress. It should be noted that the Project is located on up to 70 feet of previously compacted fill from the previously existing project that was never part of the landslide and has never been considered unstable.

In addition to designing the MSE walls to be stable locally, AMGT also evaluated the potential global influence of putting a notch in the toe of the existing buttress. Numerous models and calculations confirm the MSE walls, including their location and putting a notch in the toe of the existing buttress, will have no negative impact on the existing stability of the slope.

Expansive Soil Considerations

The greatest actual long-term influence of soil on the proposed Project is the expansive nature of the existing soil, like most projects occurring in south Orange County. Expansive soil directly affects slab and foundation behavior and aggravates the tendency for slope creep. While testing has revealed the Project site soil to be generally *low to moderately expansive* (using ASTM method of testing for the Expansion Index), AMGT conservatively recommends that the Project homes and foundations be designed assuming the *upper level* of expansion. AMGT will remain engaged with other architectural and structural consultants to provide proper foundation design criteria as the Project moves to the construction phase.

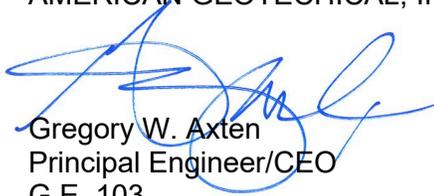


Closure

The undersigned and AMGT trust that the discussions presented above sufficiently clarify any questions. Should you have any further questions regarding the supplemental clarifications presented herein, please do not hesitate to contact the undersigned directly.

Respectfully submitted,

AMERICAN GEOTECHNICAL, INC.



Gregory W. Axten
Principal Engineer/CEO
G.E. 103



Enclosure: Appendix A – References

SP/33348-08 Response to Questions GWA 2-3-22 DL



American Geotechnical, Inc.
GEOTECHNICAL/CIVIL ENGINEERING, TESTING & INSPECTION

APPENDIX A

References



REFERENCES

1. American Geotechnical, Inc. 2021, "Geotechnical Review of Tentative Tract Map – Tentative Tract No. 17721, The Cove at El Niguel," prepared for The Cove at El Niguel c/o Laguna Niguel Properties, Inc., dated January 8, 2021; File No. 33348-08.
2. American Geotechnical, Inc. 2021, "Response to City of Laguna Niguel Geotechnical Review Sheet Dated February 15, 2021 and Notice of incompleteness Dated February 23, 2021," prepared for The Cove at El Niguel c/o Laguna Niguel Properties, Inc., dated April 2, 2021; File No. 33348-08.
3. American Geotechnical, Inc. 2021, "Addendum Report – Adding Geology to Current Site Plan, The Cove at El Niguel – Tentative Tract No. 17721, 30667 Crown Valley Parkway, Laguna Niguel, California," prepared for The Cove at El Niguel c/o Laguna Niguel Properties, Inc., dated May 28, 2021; File No. 33348-08.