ENGINEERING GEOLOGIC RECONNAISSANCE

PROPOSED INN AT NEWPORT RANCH
31502 NORTH HIGHWAY ONE
WESTPORT, MENDOCINO COUNTY, CALIFORNIA

12106.1

prepared for

Jackson-Grube Family
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prepared by

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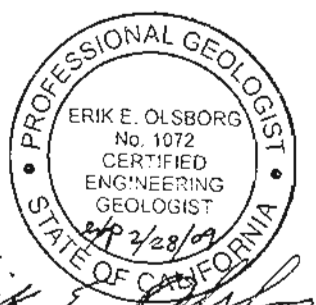

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and/or incipient, larger-scale failure, and they are shown in Site Photographs C and E on Plates 7 and 9, respectively. A large sea cave was observed in the base of the cliffs below these scarps, though haze and shadows obscure this area in the photographs

No evidence of active faulting was observed on the property and none of the published references we reviewed show any faults on, or trending towards, the property. Several old faults were observed within the Franciscan bedrock on the bluffs (Plates 3 and 7). The faults do not appear to propagate into the Pleistocene terrace deposits. As is common among faults in ocean bluffs, sea caves have developed along these zones of relative weakness within the rock. Two ancient faults and an associated sea cave near the end of the northern peninsula, are shown on Plate 3.

5.0 DISCUSSION AND CONCLUSIONS

5.1 General

Based on the results of our reconnaissance, we conclude that the site is geologically suitable for the proposed development, provided that a suitable area for leach fields can be found and adequate water supply can be obtained. The main geotechnical considerations affecting the proposed development are bluff erosion/retreat rate, slope stability, and strong seismic shaking from future earthquakes. These considerations and their possible mitigation measures are discussed below.

BACE was also asked to address the potential impact of the proposed development on the stability of the site and adjacent area for the economic life of the project (75 years). In essence, this involves evaluating the same factors listed above from the opposite standpoint, or estimating how the increased human activity brought on by the proposed development will influence the existing site conditions. Our discussions and recommendations below are directed toward creating a sound development that will neither be impacted by existing natural conditions nor create additional instability.

5.2 Bluff Retreat

Our analysis of aerial photographs indicates an *average* bluff edge retreat rate of approximately 3.7 inches per year along the bluff top nearest to the proposed development envelope (northwest of the northwest corner, currently shown at a proposed 150-foot setback). This erosion rate is the average for the 36-year period between 1964 and 2000, for an area clearly notched by erosion.

The worst-case retreat rate on the bluffs in the proposed development area is the landslide on the northwest bluff. A former house and outbuilding were previously located in this area; only a dilapidated remnant of the house exists today. We assume that the house was built a few feet back of the bluff edge in the 1940's or 1950's. To be conservative, we estimate that the bluff has retreated in this area 45 feet (back to the present landslide scarp) in the last 50 years. This results in a local retreat rate of 0.9 feet per year. The

new bluff edge is defined by the fresh scarp shown on Plates 14 and 15. This can be considered a "worst-case scenario" retreat rate under present conditions.

In general, the erosion/bluff retreat rates due to "grain by grain" erosion along the northwest property bluffs are relatively low. The peninsulas are comprised of hard rock beds that are generally erosion-resistant. Most of the retreat occurring along the cliff edges appears to be due to intermittent, larger scale landslides and slumps rather than ongoing shallow loss of the upper terrace deposits. It should be noted that the retreat rates given are considered averages over the period of time covered by the aerial photos and up to our 2007 study. Localized, larger scale slumps or slides could occur in the future anywhere along the bluff edge.

5.3 Landslides

The large landslides we observed on the property appear to be due to saturation of the terrace deposits and upper, weathered bedrock. These conditions are occurring where concentrated surface runoff flows to the bluff edge. Because the terrace is nearly level in many areas adjacent to the bluff edge, conditions exist in which there is more time for the water to seep through the bluff-edge soils and penetrate into the underlying rock. Where this has been allowed to occur over time, larger-scale slumping has been the result.

Shallow sloughing of terrace deposits along the bluff edges is occurring in many places, as shown on Plate 2. These smaller-scale slumps will continue to occur but should not affect the integrity of the development as it is currently sited.

5.4 Seismic Hazards

As is typical of the Mendocino County area, the site will be subject to strong ground shaking during future, nearby, large magnitude earthquakes. The intensity of ground shaking at the site will depend on the distance to the causative earthquake epicenter, the magnitude of the shock, and the response characteristics of the underlying earth materials. Generally, wood-frame structures founded in supporting soils/bedrock and designed in accordance with current building codes are well suited to resist the effects of ground shaking.

5.5 Site Drainage

In general, the areas of the bluffs that receive concentrated flow of surface runoff are experiencing the greatest erosion and associated weakening of terrace deposits and even the underlying, weathered bedrock. The drainage mouths are sites of deep incision through the terrace deposits and into the upper rock, as well as large landslides due to a combination of saturation along the bluff edge and erosion at the bluff toe. The areas of the bluffs that receive sheet-flow of surface water generally have fewer and smaller sites of accelerated erosion and the bluffs below appear in more stable condition. However, the distance between the drainage mouths and the proposed development is sufficiently great that alterations to the existing drainage patterns do not appear warranted.

6.0 RECOMMENDATIONS

6.1 Bluff Edge Setback

The retreat rates calculated for this report are considered averages - some areas of the bluff may have localized failures, involving a few feet or more of lost material, during an occasional, severe storm season. Using the worst-case scenario (the active landslide) with a retreat rate of (rounded up to) one foot per year, the bluff northwest of the proposed development (closest as currently sited) could erode back approximately 75 feet over a 75-year period (assumed by the California Coastal Commission to be the economic lifespan of a development). Since the erosion may not be uniform (some areas of erosion would be greater and some less) and considering the possible effects of sea level rise, a safety factor of 1.33 should be used in determining a minimum bluff setback of 100 feet.

6.2 Bluff Stability and Landslides

The bedding orientation observed at the tip of the southern peninsula (moderately steep dip into the bluff) although not evident in all areas of property, represents a favorable condition for stability. The proposed development is sited far enough away from the bluff edge and the identified incipient, active and older slide blocks that it should not be threatened by landslide-related instability. In order for the proposed development not to increase the occurrence of sloughing or larger-scale slides, care should be taken not to increase the amount of concentrated surface runoff currently reaching the bluff edges.

6.3 Sea Caves

Several sea caves were identified within the bluff toes along the property, as shown on Plate 2. Additional caves may be present that are not visible from the blufftops, however, the conditions we observed in the areas most pertinent to the proposed development did not warrant marine reconnaissance of the bluff toes. We did not observe any sea caves trending towards the proposed development. Rather, the caves we observed are within the peninsulas. Therefore, no additional setbacks or recommendations regarding the sea caves are warranted at this time.

6.4 Seismic Hazards

Our observations indicate that the property is underlain by widely varying thicknesses of topsoil and terrace deposits over the sandstone bedrock. The possible presence of shallow bedrock in the area of the existing/proposed building area is a favorable condition for building foundations. Structures founded in bedrock or in firm, relatively shallow terrace soils over bedrock are more likely to experience short, jolting motions, rather than the prolonged, oscillatory shaking brought on by perpetuation of seismic waves in thickened, unconsolidated sediment deposits. However, subsurface

investigation of the soils and bedrock underlying the site will be necessary to characterize the thickness and engineering properties of the terrace deposits and bedrock.

6.5 Site Drainage

Because surface and/or subsurface water is often the cause of foundation or slope stability problems, care should be taken to intercept and divert concentrated surface flows and subsurface seepage away from the building foundations and the bluff edge. Roof runoff water should be directed away from the structures and dispersed, as much as practical, across the property. Drainage across the property should be by sheet-flow directed, as much as practical, to the east and south of the buildings. Surface grades should maintain a recommended two percent gradient away from building foundations.

Irrigation near the bluff edge should be kept to an absolute minimum. Saturation of these weak soils, or excess seepage along their base, could cause sloughing and accelerated bluff edge retreat. Care should be taken to avoid concentrated surface flow of runoff along the bluff edge.

7.0 ADDITIONAL SERVICES

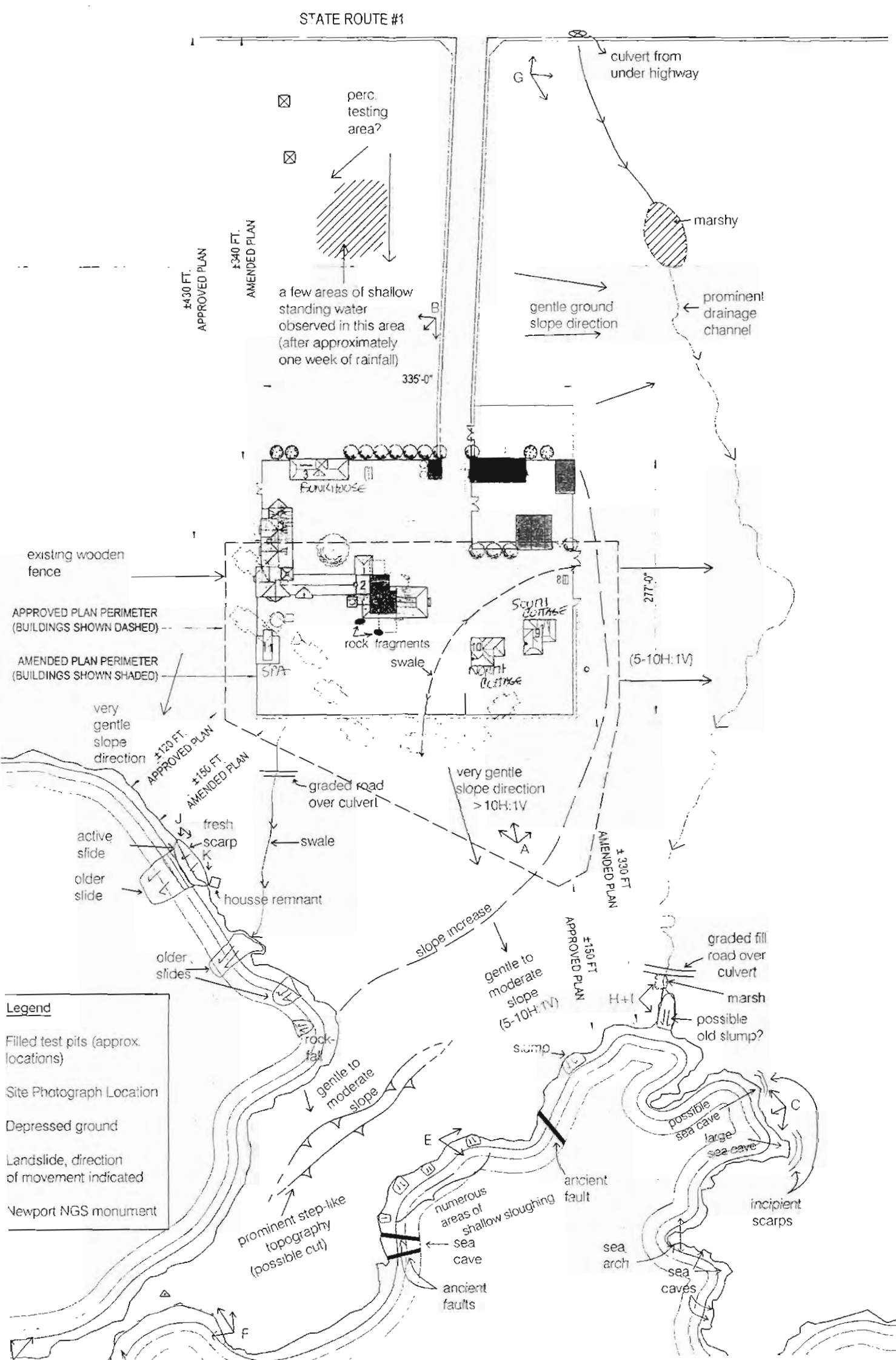
BACE should review and provide consultation during preparation of final development plans. Depending on the structure type, location, and site conditions, additional investigation will be required to provide specific foundation design parameters and, as appropriate, detailed recommendations for site grading, access road construction and surface and/or subsurface drainage.

BACE should be retained to inspect and investigate, as appropriate, any major changes in the condition of the bluffs, such as movement on the active landslide or incipient landslide areas. Our observations of bluff edge changes would allow us to review and modify our recommendations, if necessary.

8.0 LIMITATIONS

This engineering geologic reconnaissance of the ocean bluff property was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report. Our conclusions are based upon reasonable geological and engineering interpretation of available data.

Changes in the condition of a site can occur with the passage of time, whether they are due to natural events or to human activities on this, or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and revision as changed conditions are identified.


STATE ROUTE #1
culvert from under highway
G
perc. testing area?
marshy
±430 FT. APPROVED PLAN
±340 FT. AMENDED PLAN
a few areas of shallow standing water observed in this area (after approximately one week of rainfall)
B
gentle ground slope direction
prominent drainage channel
335'-0"
277'-0"
existing wooden fence
APPROVED PLAN PERIMETER (BUILDINGS SHOWN DASHED)
AMENDED PLAN PERIMETER (BUILDINGS SHOWN SHADED)
rock fragments
swale
(5-10H:1V)
very gentle slope direction
±120 FT. APPROVED PLAN
±150 FT. AMENDED PLAN
graded road over culvert
very gentle slope direction >10H:1V
A
±330 FT AMENDED PLAN
active slide
older slide
fresh scarp
J
K
swale
housse remnant
older slides
slope increase
gentle to moderate slope (5-10H:1V)
±150 FT APPROVED PLAN
graded fill road over culvert
marsh
H+I
possible old slump?
slump
rock-fall
gentle to moderate slope
E
C
possible sea cave
large sea cave
ancient fault
incipient scarps
prominent step-like topography (possible cut)
numerous areas of shallow sloughing
sea cave
ancient faults
sea arch
sea caves
F
Legend
Filled test pits (approx. locations)
Site Photograph Location
Depressed ground
Landslide, direction of movement indicated
Newport NGS monument