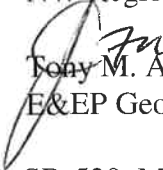




December 3, 2007

TO: Hung Huynh
NW Region, MS NB82-117

FROM:  Tony M. Allen/Donald A. Williams
E&EP Geotechnical Division, MS 47365

SUBJECT: SR-520, MP 11.4 to MP 12.9, XL-2028
West Lake Sammamish Parkway to SR-202
Revised Liquefaction Study – Existing Bridges

As requested, we re-evaluated the potential of liquefaction for the existing structures on the subject project. On April 13, 2006, we evaluated the project with a seismic design return time of 475 years. The new seismic design return time is 975 years. The amplification peak ground acceleration (PGA) increased from 0.35 g to 0.45 g. In 2006, we concluded the existing bridge foundation may experience some additional settlement during a major earthquake event. Due to the depth of the liquefiable soil layers and the amount of expected settlement, from a geotechnical standpoint, we did not see a need to mitigate for liquefaction at this site. Our conclusion has not changed based on the recent evaluation. However, the amount of expected settlement did increase. Bridge and Structures should be contacted concerning possible damage to the structures, which may require bridge replacement.

The results of the revised analysis are as follow at each bridge site:

West Lake Sammamish Parkway Bridge 520/ 42 N & S

We do not expect liquefaction to occur in the surface soils. There are some relatively thin (less than 5 ft thick) discontinuous layers of liquefiable soils below elevation - 9 ft or greater than 50 ft below the ground surface. We expect negligible settlement under Piers 1, 2 and 5. Under Piers 3 and 4, we expect between 2 inches to 3 inches of settlement may occur. The differential settlement between piers could be as much as 3 inches. It is likely that the structure can tolerate this amount of settlement. If it can, foundations or soil mitigation may not be required.

SR 202 / ABAN BNRR Bridge 520/46

Liquefiable soils vary across the site. At Pier 1, there is a zone of potential liquefiable soil between approximate elevations 29 ft and 24 ft or 26 ft below the bottom of the existing spread footing. We expect approximately one inch of settlement in this layer and pier. At Pier 3, the liquefiable soils are deeper, greater than 35 ft below the ground surface. We expect up to 3 inches of settlement will occur at this pier with the majority of the settlement occurring below 50 ft from the ground surface. At Piers 5 and 6, we expect negligible settlement. The

differential settlement between piers could be as much as 3 inches. As with the first bridge, if the structure can tolerate the settlement of the foundations, soil mitigation may not be required.

NE 76th Bridge 520/48A

The majority of the liquefiable soils at this site are at depths greater than 50 ft. We expect up to 3 inches of settlement may occur during an extreme event. The differential settlement between piers should be 2 inches or less.

Conclusion

Based on our assessment the likelihood of complete bridge replacement is low. As settlements are relatively low, we believe that the widenings can be design to handle the expected settlements and downdrag loads. Where possible, similar foundations should be used, (i.e. match existing foundations). This may necessitate additional shoring. Bridge and Structures should evaluate our results, and determine if widenings can be successfully designed.



Donald A Williams

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