



August 3, 2006

TO: Rosario Revilla/Sara Schmitt  
Northwest Region, MS NB 82-75

FROM: T. M. Allen/M. A. Frye  
E&EP Geotechnical Division, 47365

SUBJECT: SR-90, MP 6.22 to 7.24, XL2862  
Two Way Transit & HOV Operations, Stage 1  
Sign Foundations  
Geotechnical Recommendations

### Introduction

This memorandum presents geotechnical recommendations for the design of sign foundations associated with the subject project. This project will provide Two-Way Transit and HOV lanes between Seattle and Bellevue. HOV lanes will be added to the left of the general purpose lanes on the eastbound and westbound mainline roadways. Where existing reversible lanes exist, they will be maintained in their current configuration.

### Sign Descriptions

New signs will be located at stations 76<sup>th</sup>-W 240+55 Lt., LL 240+50 Lt. and Rt., LL 255+80 Lt. and Rt., LL 270+55 Rt., LL 270+60 Lt., and LL 301+45 Lt. New sign bridges will be constructed at stations EN-HOV 360+29 and SW 386+50.

### Subsurface Conditions

A report titled *Geotechnical and Geologic Type, Size, and Location Report, I-90 Two-Way Transit and High-Occupancy Vehicle Operations, I-5 to Bellevue Way, King County, Washington*, July 2, 2004, prepared by Shannon & Wilson, Inc. provides a detailed description of site geology and soil conditions. This report also contains site maps and copies of boring logs from previous geotechnical studies throughout the project corridor.

Soils at the sign locations generally consist of dense to very dense silty sand, sandy silt, and clayey silt. Fill and roadway surfacing materials will likely be encountered near the surface.

### Geotechnical Recommendations

The subsurface conditions at each of the proposed sign locations meet the requirements for Standard Plan Foundations. If special design foundations are necessary, we recommend using an allowable lateral bearing pressure of 2500 psf. The top elevation of the foundations should be at or below the adjacent roadway elevation.

We understand several of these signs will be constructed next to existing sign foundations. If the existing foundations are to be removed, the hole should be backfilled with gravel borrow compacted to 95% (Method C compaction) or Controlled Density Fill. If the existing foundations are to be abandoned in place, the new foundations can be constructed adjacent to the abandoned foundation.

### **Construction Considerations**

Groundwater may be encountered during shaft construction. In the event that excavations extend below the water table, stabilization measures such as temporary casing or slurry will be required during excavation and the concrete should be placed by the tremie method. These stabilization measures may be required for every foundation constructed for this project. The base of the excavations should be cleaned from any loose soil before concrete placement. Excessive loose material left in the bottom of the shaft borings may increase the amount of settlement that occurs, affecting the performance of the signals, and sign structures.

### **Recommended Additional Services**

Because the future performance and integrity of the geotechnical elements of this project will depend largely on proper PS&E preparation and diligent construction procedures, we recommend that the Geotechnical Division (GD) in conjunction with the Regional Materials Engineer (RME) provide the following post-report services:

The GD should prepare the Summary of Geotechnical Conditions to be included in the PS&E as an appendix. The summary should be prepared as part of the PS&E review process.

The GD/RME should review all construction plans and specifications to verify that the design criteria presented in this report have been interpreted correctly and properly integrated into the design.

The GD/RME should attend pre-construction conferences with the Construction Project Engineer and Contractor to discuss important geotechnical related construction issues.

The GD/RME should review Contractor submittals for all shoring walls and other geotechnical elements of this project.

The RME should observe all exposed subgrades after completion of stripping and excavation to contract elevations. The RME should confirm that suitable soil conditions have been reached and determine appropriate subgrade compaction methods.

In addition to the aforementioned services, the Geotechnical Division can provide inspector training for construction personnel, assist in change of condition claims, and review cost reduction incentive proposals (CRIPs).

### **Intended Report Use and Limitations**

This report has been prepared to assist the Washington State Department of Transportation in the engineering design and construction of the subject project. It should not be used, in part or in whole for other purposes without contacting the EEP

Geotechnical Division for a review of the applicability of such reuse. This report should be made available to prospective contractors for their information or factual data only and not as a warranty of ground conditions.

The conclusions and recommendations contained in this report are based on the Geotechnical Division's understanding of the project at the time that the report was written and on site conditions that existed at the time of the field exploration. If significant changes to the nature, configuration, or scope of the project occur during the design process, the Geotechnical Division should be consulted to determine the impact of such changes on the recommendations and conclusions presented in this report.

Site exploration and testing describes subsurface conditions only at the sites of subsurface exploration and at the intervals where samples are collected. These data are interpreted by members of the Geotechnical Division who then render an opinion regarding the general subsurface conditions. The distribution, continuity, thickness, and characteristics of identified (and unidentified) subsurface materials may vary considerably from that indicated by the subsurface data. While nothing can be done to prevent such variability, the Geotechnical Division is prepared to work with the Design Team to reduce the impacts of variability on project design, construction, and performance. Periodic geotechnical observation during construction may be beneficial in this respect. This ongoing involvement of the Geotechnical Division throughout the design and project development process will also help to avoid costly mistakes associated with misinterpretation of the contents of this report and resulting shortcomings of project design or contract documents.

The conclusions and recommendations presented in this report assume that surface and subsurface conditions, as observed during field exploration activities are representative of the site conditions throughout the project area. Because of this assumption, these recommendations should be considered subject to change depending on the actual subsurface conditions encountered. Actual subsurface conditions can be discovered only during earthwork and construction operations. Accordingly, the Geotechnical Division should be involved in the construction of the project in order to make appropriate observations and recommendations for alteration in design, as appropriate.

Rosario Revilla/Sara Schmitt  
August 3, 2006  
Page 4

If you have questions or require further information, please contact Tony Allen at (360) 709-5450 or Mark Frye at (360) 709-5469.



EXPIRES 03-13-08

Prepared By:  
Mark A. Frye  
Geotechnical Designer

Reviewed By:  
James G. Cuthbertson  
Chief Foundation Engineer

Agency Approval Authority:  
Tony M. Allen  
State Geotechnical Engineer

TMA/maf

cc: Chris Johnson, Northwest Region Materials Engineer, MS NB 82-29  
Gary Bedi, Bridge and Structures Office, MS 47340