

VandenBerghe, Alissa (Consultant)

From: Clark, Gordon T. (Consultant)
Sent: Monday, April 13, 2009 4:13 PM
To: Williamson, Alec
Subject: FW: AWW: CE Seismic White Paper -- Extra Scope Item
Follow Up Flag: Follow up
Flag Status: Red
Attachments: EstEngHr_SeismicWhitePaper-001a.pdf

Alec,

I would like to discuss this note from George with you tomorrow at our regularly scheduled meeting and get your direction.

Gordon

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From: Inverso, George (Consultant)
Sent: Thursday, April 09, 2009 5:45 PM
To: Clark, Gordon T. (Consultant)
Cc: Conte, Rick (Consultant); Conner, Bill (Consultant); Rigsby, Mike (Consultant)
Subject: AWW: CE Seismic White Paper -- Extra Scope Item

Gordon:

This follows up the meeting we had with J. Kapur regarding dual level seismic criteria for the SR99 Tunnel on 1 April 2009 as well as the Lead Agency Review Comments received from WSDOT on the Supplemental Structural Design Criteria for bored tunnels received the same day. WSDOT has requested additional information so they can weight the cost and the risk for using a dual level seismic design with an upper level seismic event of 2,500-year as proposed in the criteria versus the single level 1,000-year event used in current guidelines for seismic bridge design.

The most straightforward way to provide the requested information may be in a Seismic Criteria White Paper. The paper can explain why dual level criteria with a lower level operation earthquake are useful for the region immediately after an expected earthquake. The paper can explain the recommendations for the 2,500-year upper level event to tune the risk of tunnel collapse so they do not exceed that for the building being built above. We can present the documentation WSDOT requested in their review comments as to what other jurisdiction have used for their seismic criteria for large tunnel projects. We can more rigorously develop the design and cost difference for 1,000-year and 2,500-year upper level events that Kapur requested in the meeting.

As we pointed out in the meeting, we expect construction loading not seismic loading to control the design for most of the structure, including the bore tunnel and the cut-and-cover segments of the portals. The anticipated design and cost differences will be in the retained cut areas of the portals. In terms of project

cost, we anticipate the differences at the portals will be minor. Our expectation that construction loading governs over seismic loading is based on engineering judgment backed by limited calculations at this point. To develop the information to a point our client can reliably make a decision will take additional effort.

Although we are currently tasked to develop conceptual level structural design for the portals with the accompanying quantities for cost estimate, it is implicit we are evaluating only one set of criteria. Developing a comparison study will require additional effort. A Seismic Criteria White paper would be an additional scope items. I estimate approximately 250 hours to develop the white paper. Attached is detailed break down of the hours and underlying assumptions.

Please let me know your questions and comments.

Take care,

gali

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