APPENDIX THREE

Practical Design Considerations

Certainly we would like to follow convention and use a mechanistic mathematical procedure that predicts behavior of a generic GRS/GCS®/GeoMonolith. I have come to believe this is neither needed nor possible. Yet how do we gain the confidence of the engineering community in adopting this obviously safe, powerful technology?

When Al and I were in discovery modes, our most effective analytical approach was to design a failure scenario. You learn so much with this exercise. We did it repeatedly in our internal experiments, repeatedly with Dr. Wu and his progression of top scholars at UC/D (and with practically unlimited funding from CDOT and others), and with Mike Adams and the research branch of FHWA. What we found, in a nutshell, is that there is no practical way to fail a properly constructed GCS® GeoMonolith. Try it. Twenty tons of bearing capacity….. and practically earthquake proof.

And a GCS®/GeoMonolith would not come close to sustaining eccentric behavior. We can safely build it negatively! So we use practical shortcuts that represent reality….we model it as an unbounded surcharge for bearing and an infinitely stiff, strong shape in stability analyses.

We determine length of confining elements with external stability programs. Where there is no horizontal load, there is not practical requirement for a base to height ratio for determining the depth of embedment for the inclusions. You can build them 3 feet wide and 30 feet high and the GeoMonolith will be stable internally. There is no need for embedment, except for site specific considerations. I have placed the first sheet of silt fence **on** cattails. Think about it. GCS®/GeoMonoliths are just amazing. Now we can do some real engineering.

And you can take solace in the shortcomings in accepted design protocols with MSE. If you can brook them, you certainly can work backwards from impossible failure to design GCS! For example, look at the MSE protocols we developed in which we multiply reduction factors. Multiply reduction factors? How much engineering sense is that? And we check overturning. I don't how scientific "silly" is but it is descriptive of trying to overturn a pile of dirt. Even MSE is beautifully flexible to the extent it will not transmit much of load through it to the front toe. And a drainage medium at the face? Mandatory embedment?

New Zealand's first negative batter GeoMonolith structure, built by local roads personnel directed by Bob Barrett and Highway Stabilizers.

Note that the back wall is stabilized with Launched Soil Nails (ShotRods), thus no minimum fabric width.

Whereas, if the engineer (supertech) panics without the crutch of canned, peer approved, AASHTO/FHWA mindless modeling procedures, I can't offer any help. Products from that desk are without engineering judgment. Where the engineer is on top of the game and wants to provide the latest and greatest….and the quickest, most durable, safest and cheapest…these design suggestions will lend to that end result.

So if you cannot design a failure scenario, just exactly what is the design issue here for an engineer? What would keep you from using this wonderful, generic technology? Wait, did I say generic? There is the heart of the matter…you would have to do some real engineering. Independent thought. Responsibility.

What a great and exciting frontier! Welcome.

Robert K. Barrett, July 2010