

Materials Laboratory Strategic Directions 05-07

7/30/2007

Geotechnical

Steve Lowell		2005						2006						2007														
Task	Description	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			5th Quarter			6th Quarter			7th Quarter			8th Quarter					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
1	Unstable Slopes Program Folio										100%																	
2	GIS Platform																			90%								
3	New Rock Slope Photo Analysis Technique										100%																	
4	State Owned Pits and Quarries																			90%								

Jim Cuthbertson		2005						2006						2007														
Task	Description	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			5th Quarter			6th Quarter			7th Quarter			8th Quarter					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
5	Electronic Preservation of Geotechnical Files													100%														
6	Foundation Construction Submittals																			60%								
7	Seismic Foundation Retrofit Strategy																			40%								
8	Geogrid Subgrade and base course stabilization																			33%								

Tony Allen		2005						2006						2007														
Task	Description	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			5th Quarter			6th Quarter			7th Quarter			8th Quarter					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
9	Geotechnical Design Manual																			95%								
10	LRFD design spec's development																			50%								
11	MSE Wall Research																			50%								

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7/30/2007

Geotechnical

Task	Description
1	<p>Develop 4 page legislative/press folio, in cooperation with HQ Program Management Office, that briefly describes current unstable slopes program, current limitations of the program with regard to funding and the ability of the program to reduce risk to the public (i.e., risks associated with lack of funding), program needs, and what improved funding for the program “buys” the state of Washington.</p> <p>a. Develop folio by February 2006. b. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: Final draft completed March 2006. Final publication occurred April 26, 2006.</p>
2	<p>Develop strategy and implementation plan (including estimated cost, time, and FTE’s required) to develop GIS platform useful for geotechnical purposes, and develop plan to include new and existing geotechnical borings statewide in a GIS database.</p> <p>a. Develop strategy and implementation white paper by February 2006. b. Develop funding strategies by March 2006 (discretionary funds, cost recovery, other WSDOT offices such as UCO, WSF, etc.). c. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: A GIS specialist has been hired as of Oct. 2006. The implementation strategy is being developed in conjunction with Strategic Direction #5 (Electronic Preservation of Geotech Division files). A detailed implementation strategy white paper is underway, but is yet to be completed.</p>
3	<p>Implement new technology to remotely assess rock slopes using photographic techniques for stability analysis and design purposes.</p> <p>a. Implement by March 2006 b. Assigned to: Steve Lowell/Tom Badger</p> <p>Status: The equipment for the technology (SIROVISION) has been obtained, and the technology has been tried on the SR-90 MP 66 Rockslide for its design (March 2006). The trial was very successful. Field measurements were used to verify the accuracy of the measurements obtained from SIRIVISION - it was found that strike and dip measurements were accurate to within 5 degrees, and the technology enabled the field mapping to be much more complete and done much more quickly. Staff training on SIROVISION completed 7/18/06. Implementation is now complete.</p>

Materials Laboratory Strategic Directions 05-07

7/30/2007

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4	<p>Engineering geologists to work with regions that have state owned pits and quarries to identify marginal materials and to identify new sources of better materials. Begin with NE corner of the state and aggregates for HMA.</p> <p>a. Develop plan by June 2007. b. Assigned to: Steve Lowell/Lynn Moses</p> <p>Status: Issues and implementation of this strategic objective were discussed at the statewide RME meeting in March 2006 as a first step in developing a strategy to deal with this issue. Possible strategies were developed, which include: allow lower quality standards to be used in that local region for applications where the property is not as critical (by special provision), or could plan on replacing the material sooner. Must also look carefully at the cause of the poorer test results. The cause may not be important to the application being considered. The next step will be to flesh out and formalize these concepts to develop the final strategy. Have been working with Program Management to secure funding for pit and quarry work in Pend Orielle County. \$70,000 has been requested for the 2007-2009 biennium. Working with the Olympic Region (Bryan Dias) to develop a pit and quarry program for Clallam County. Currently developing a scope of work and cost estimate for the Region. Work is anticipated to start late summer of 2006. This will be the prototype program for this strategic objective. The methodology developed for this county can be utilized for other counties in the state.</p>
5	<p>Develop plan for electronic preservation of the Division's geotechnical files, including how to do it and development of funding strategies.</p> <p>a. Develop plan by April 2006. b. Assigned to: Jim Cuthbertson/Russell Steele</p> <p>Status: Basic plan has been developed (March 2006). Database has already been created, and 2500 records have been entered. These records have already been imported to the database that will be used for recording the data, and detailed procedures for file organization and the scanning/recording process have been developed. The staff who will do this work have been hired, and the scanning equipment has been obtained. Preparation of the files for scanning and the actual scanning of the project files has begun as of January 2007.</p>
6	<p>Reduce/streamline foundation construction submittals, working with industry groups (e.g., ADSC) and the HQ Construction Office.</p> <p>a. Identify and develop specification changes by June 2006. b. Assigned to: Jim Cuthbertson/Mark Frye</p> <p>Status: A task group met in 2005 to begin assessing what could be done. Little work has been done on this since due to heavy workload. However, the Geotechnical Division has hired a full time geotechnical engineer to oversee construction submittals, construction support, and specification development for the Division.</p>

Materials Laboratory Strategic Directions 05-07

7/30/2007

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7	<p>Develop strategy with the Bridge Office, and implementation plan, to include assessment of seismic foundation stability problems (primarily liquefaction) as part of Bridge Office seismic retrofit program. This effort, once put into motion, would identify specific bridges that are vulnerable to foundation stability problems, an assessment of the potential risk to the bridge and impact to the public, and an estimate of cost to address the instability so that these needs can be prioritized for programming purposes.</p> <p>a. Develop strategy and implementation white paper by December 2006. b. Assigned to: Jim Cuthbertson</p> <p>Status: A meeting was held on April 3, 2006 with the Design Office, Program Management, and the Bridge Office to discuss this issue. The need to strategically plan for and address this issue was recognized by all. A conceptual level strategy was developed to begin addressing this need. This strategy includes a first cut identification of bridges located in areas mapped as having liquefiable soils (Program Management has already made a first cut at this). A more detailed evaluation and estimate will be performed for bridges within currently funded Nickel and TPA projects. A more detailed statewide action strategy will be developed as part of the next highway system plan update - Program management, with help from the Bridge and Structures Office and the Geotechnical Division, will take the lead. Key in this strategy is the development of lifeline corridors, which may be a way out is being accomplished.</p>
8	<p>Develop investigation and implementation plan for use of geogrids in pavement base coarse reinforcement and as subgrade reinforcement for pavements.</p> <p>a. Summarize results from nationwide survey by December 2005. b. Review research results obtained to date by others, and in consideration of nationwide survey results, determine what is known, and what is not known that needs to be known, developing preliminary design and use policies for geogrids for this application. Do by December 2006. c. Identify potential test sites where this trial design policy could be tested. Do by March 2007. d. Assigned to: Jim Cuthbertson</p> <p>Status: The survey has been completed, but the final report on the survey is yet to be completed due to the heavy workload that has occurred during the last several months.</p>

Materials Laboratory Strategic Directions 05-07

7/30/2007

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9	<p>Develop more detailed chapter for the GDM on foundation design for marine structures, addressing the specific needs of WSF.</p> <p>a. Complete final draft by June 2006 b. Assigned to: Tony Allen/Jim Cuthbertson</p> <p>Status: Work to update the GDM has been essentially completed. the update includes major revisions to Chapter 15 on requirements for shoring design. This has been a problem area for WSDOT in the recent past. Chapter 8 on foundations was streamlined, taking advantage of the new AASHTO LRFD foundation design specifications recently published. The development of new guidance on design of marine structure foundations has been part of this effort but there is still much to do to complete that particular chapter. The chapter on marine structure foundations has also been updated to include objectives for marine structure foundations.</p>
10	<p>Continue to develop geotechnical design procedures in LRFD format for aspects of foundation and wall design that are not currently in LRFD format (soil nail walls, micropiles, noise walls, reinforced slopes, etc.), primarily through continued participation in the AASHTO Bridge Subcommittee and various NCHRP panels, and possibly other research.</p> <p>a. This will be on-going; soil nail walls and micropiles to be implemented by 2007. b. Assigned to: Tony Allen</p> <p>Status: An agenda item on tieback wall design, and the LRFD calibration work needed to develop that agenda item, has been completed and submitted to the AASHTO Subcommittee for approval at the national meeting in May, and has been approved. The current AASHTO specifications are more conservative than WSDOT's past practice, and the new agenda item will make the level of safety more consistent with our past practice. We are also working on the development of an LRFD specification for micropile design. The draft specifications have been put together by the industry, and the AASHTO T-15 committee is in review mode on this. An agenda item to move the new micropile specifications into the AASHTO specifications is planned for July 2007.</p>

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11	<p>Develop long range plan to fully implement MSE wall research (K-Stiffness Method).</p> <ul style="list-style-type: none"> a. Complete research reports and publish full design method in well respected journals – submit journal papers by October 2006 b. Work with other states/agencies to identify potential instrumented test walls, including those with lower quality backfill materials to establish accuracy of method c. Complete RMC research and coordinate with NCHRP study to broaden applicability of research to lower quality backfill materials and also to seismic conditions d. Prepare agenda item for AASHTO to include new design method in the AASHTO LRFD specifications e. Assigned to: Tony Allen <p>Status: Four journal papers on the K-Stiffness Method have just been sent for publication, two on the previous work for walls with high quality backfill, and one of those two is on LRFD calibration using the database developed from this research. Two other papers have been sent to an international journal. The most recent work has been done with the assistance of a visiting scholar from Japan, in which the K-Stiffness method was shown to be valid for a series of Japanese walls, broadening the applicability and acceptance of this research. The method has now also been expanded to lower quality backfill materials through the evaluation of Japanese and other full scale wall case histories, and the K-Stiffness method now has a proposed modification to accommodate the cohesion that is usually present in lower quality backfill materials. A lower quality backfill source for use in the RMC full scale walls is now being sought, so that this adaptation of the K-Stiffness method can be refined. A fifth paper summarizing the results of the instrumented walls on SR-18, the first walls purposely designed using the new method, has been accepted in an international conference. The paper was very well received.</p>