

Materials Laboratory Strategic Directions 11-13

5/21/2013

Pavements

Jeff Uhlmeyer		2011			2012						2013															
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	WSDOT Pavement Preservation Folio																								90%	
2	Quieter Pavement Web Page																									100%
3	Pavement Preservation Proviso																									90%
4	Permeable Pavement Revisions to HRM				100%																					
5	Quieter Pavement Award - QP website and Intranet				100%																					
6	Pavement Policy - HMA overlays on PCCP				100%																					
7	CA4PRS Implementation in Washington State																									5%
8	Integration of Pavement Maintenance with Asset. Mgmt.																									50%
9	Construction Data Collection - Pvmt Life																									5%

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Mark Russell (Design)		2011			2012						2013														
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
10	Monitoring of Quieter Pavement Test Sections	On going data collection and evaluation																							
11	Experimental Features	On going data collection and evaluation																							
12	Pavement Forensics	On going data collection and evaluation																							
13	PCCP Smoothness Specification																			60%					
14	Update Pavement Web Page				100%																				
15	Safety Edge Evaluation																			80%					
16	Pave-IR Evaluation																			50%					
17	Warm Mix Evaluation																			40%					

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David Luhr (Mgmt)		2011			2012						2013															
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	
18	WSPMS Documentation																								75%	
19	Evaluation of Pavement Life																									30%
20	Economic Performance Measures																									
21	WSPMS Data Base Audit																									20%
22	Evaluation of INO, texture and Skid Data																									90%
23	Develop WSPMS Notebook											100%														
24	Tracking P1 Preventive Maintenance																									90%

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Task	Description
1	WSDOT Pavement Preservation Folio - Develop folio for internal and external customers to fully communicate preservation needs. Status: Plan is being developed.
2	Quieter Pavement Web Page - Update and maintain quieter pavements web page Status: Update webpage on a quarterly basis or as new information becomes available.
3	Pavement Preservation Proviso - Develop Proviso based on 2011 Legislature request, detail WSDOT preservation needs. Status: Begin work December 2011. Due to WSDOT July 2012.
4	Permeable Pavement Revisions to HRM - Update content and design procedures of permeable pavements Status: Revisions are under development
5	Quieter Pavement Award on Web Page Status: Complete
6	Overlay Pavement Policy Strategy Status: Complete
7	CA4PRS Implementation - Work with WSDOT Design to Implement CA4PRS Status: Evaluation is beginning
8	Integration of Pavement Maintenance with Asset Management - Continue to expand use of BST's, crack sealing and pavement repair to rehab pavements Status: Evaluation is underway.
9	Construction Data Collection - Pvmt Life: Investigate ways to collect contract construction information and incorporate into WSPMS for historical pavement needs. Obtaining this data will be used for forensic and performance evaluations. Status: Evaluation is ongoing.

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Task	Description
10	Monitoring of Quieter Pavement Test Sections Status: Noise and pavement data updated through August.
11	Experimental Features Status: Being worked on as time is available.
12	Pavement Forensics Status: Currently up to date.
13	PCCP Smoothness Specification Status: Evaluation of new PCC section will begin after new equipment is purchased.
14	Update Pavement Web Page Status: Complete
15	Pave-IR Evaluation Status: First two demonstration projects constructed summer 2011. Four additional projects to be constructed in 2012. Analyzing data.
16	Safety Edge Evaluation Status: Draft evaluation (report) is complete.
17	Warm Mix Evaluation Status: 2008 and 2009 projects are being tracked. Working with Construction Materials to get data on 2010 and 2011 WMA projects.

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Pavements

Task	Description
18	<p>WSPMS Documentation - The WSPMS has been successfully functioning for over 40 years. A comprehensive User's Guide has been implemented, however, no overall documentation of the new webWSPMS exists. This documentation will describe PMS concepts incorporated into the webWSPMS, and the user functions.</p> <p>Status: WSPMS file processes have been documented, and Profilometer calibration has been documented. An outline for the summary documentation will be developed, followed by the creation of the summary document.</p>
19	<p>Evaluation of Pavement Life - The life of each pavement resurfacing is stored in the WSPMS database. This data needs to be studied in order to evaluate what factors are causing either long-length or short-length resurfacing life. Different statistics related to Remaining Service Life performance also need to be analyzed.</p> <p>Status: Initial calculations have been performed, but an analysis plan needs to be developed.</p>
20	<p>Economic Performance Measures - The initial version of economic performance measures (i.e., \$/lane-mile/year or \$/lane-mile/ESAL) has been implemented in WSPMS. This work needs to be continued to evaluate Economic Performance trends and the development of performance targets.</p> <p>Status: Economic Performance measures are available on WSPMS. Further data clean-up (data spikes at intersections, etc.) needs to be completed. A plan for evaluating results needs to be developed.</p>
21	<p>WSPMS Data Base Audit - Some fields in the database are blank, for certain years. Other data is not consistent. An audit needs to be done to identify problems with the data base and develop remedies.</p> <p>Status: Work has begun on evaluation of data issues, but no recent progress has been made.</p>
22	<p>Evaluation of texture and Skid Data - A new macro-texture laser has been deployed on the 2009 Pathway condition survey van. This data needs to be analyzed and understood in how it can be used, especially in relationship to skid data and BST performance.</p> <p>Status: The data collection of the macro-texture data has begun. Initial study of the texture data is under way.</p>

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Task	Description
23	<p>Develop WSPMS Notebook - Similar concept to the "Grey Notebook", the WSPMS Notebook can be a standard repository of statistics, graphs, and other performance indicators that any one can retrieve off of the internal web site. Items to include: WSPMS lane miles by type, fair or better condition plots, IRI data, construction lane miles by season, project costs, chip seal annual costs and more . . .</p> <p>Status: Requirements document was completed some time ago, but needs to be updated in light of new functions in WSPMS. This Pavement Notebook capability can probably be incorporated into WSPMS, so a development plan needs to be created to complete the work.</p>
24	<p>Interfacing WSPMS with Maintenance -An initial capability has been implemented in WSPMS to receive data from the Highway Activity Tracking System (HATS). This needs to be interfaced with the tracking of P1 Maintenance plans. Olympic Region is a key development partner in this effort.</p> <p>Status: Initial capabilities are in WSPMS, but a development plan needs to be created for new features and continued integration with Maintenance data.</p>

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Construction Materials

Joe DeVol		2011						2012						2013												
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	Examination of HMA N-design							100%																		
2	Multiple Stress Creep Recovery Asphalt Binder Specifications							100%																		
3	HMA Rutting and Moisture Susceptibility Research Study																									70%
4	HMA Density Study																									91%
5	Roadway Core Density Study																									25%
6	Elastic Recovery Specification for Emulsified Asphalt																									5%

Bob Briggs		2011						2012						2013												
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	
7	HMA Mix Design Submittal Program																									25%
8	Concrete Mix Design Submittal Program																									10%
9	Document Storage for MTP																									99%
10	Finish the Materials Testing Program																									94%
11	NTPEP Review Related to HDPE Plastic Pipe																			100%						

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Construction Materials

Rob Molohon		2011			2012						2013														
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
12	ASA Quality Control Plans																								0%
13	Revision to Division 3 of the Standard Specs										100%														
14	Requirements for a RAM Program																								5%
15	Re-Evaluation of QPL products																								15%
16	Americans with Disabilities Act (ADA) Warning System																								95%

Linda Hughes		2011			2012						2013														
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
17	Develop Basic Statistical Class							100%																	
18	Develop and Implement a Plan for New Products Process																								20%

Randy Mawdsley		2011			2012						2013														
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
19	Materials Documentation Guide for Design Build				100%																				
20	Materials Section for Design Build Manual																								92%
21	Desk Manual for the CATS Software																								55%

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Construction Materials

Marilyn Olson		2011			2012						2013															
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	
22	Paint - Pig Sealer Specifications																100%									
23	Replacement Schedule for ICP to X-Ray Florescence																									95%
24	IR Scans for Epoxies																									85%
25	Method studies and set-up for new Ion Chromatograph																									95%
26	Standard specification for silicone joint sealants																									90%
27	Fly Ash / Metals Data							100%																		
28	Review of all current test procedures AASHTO/ASTM/WSDOT - Write New Procedures				100%																					
29	Re-write Specification 9-21 for Raised Pavement Markers incorporating NTPEP performance testing																			100%						
30	Re-write Bridge Paint 9-08 Specification incorporating NTPEP performance testing																									95%

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Construction Materials

Dwight Carlson		2011			2012						2013															
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	
31	NTPEP Acceptance for Traffic Devices																								85%	
32	Update Std Spec Section 9-29																									95%
33	Solar Energy Project																									3%
34	Non- Slip Junction Box covers																									90%
35	Performance Specification for UPS																									40%

Kyle Caufman		2011			2012						2013															
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	
36	Develop QSM Standard Practice Procedures for Plan Approvals																									86%

Mike Polodna		2011			2012						2013																
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		
37	Low Degradation Aggregates in Concrete																									100%	
38	Update Construction Manual for Concrete Mix Design																										100%

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Construction Materials

Task	Description
1	<p>Examination of N-design: Nationwide research is underway to validate the Superpave HMA design levels (compaction tables) for volumetric mix designs. The question is: are current standards giving us the best possible pavement performance? This study to include: Review of WSDOT Equivalent Single Axel Loads (ESAL) and HMA design levels; Collect production data for comparison to mix design data; Identify candidate projects to evaluate pavement performance; Provide recommendations for future Superpave HMA design levels.</p> <p>Status: Since implementation of the Superpave volumetric mix design process in 2004 the Bituminous Materials Section has been collecting test data using both the Hveem stability and Superpave HMA mix design processes on every project paved in the state. This review started in January 2005 and will continue until national standards are changed and/or WSDOT identifies an alternative. The recommendation from National Cooperative Highway Research Program (NCHRP) project 9-9(1) was a reduction in gyratory compaction levels based on studies of densification in the field. Although this study was quite extensive, the relationship between gyratory compaction levels and densification in the field was not strong. As a result the Federal Highway Administration's (FHWA) Asphalt Mixture & Construction Expert Task Group (Mix ETG) concluded after extensive evaluations that no general recommendation could be established for reductions of the gyratory levels. Based on the research and recommendation from the FHWA and the solid performance of Superpave HMA in Washington State this task is terminated.</p>
2	<p>Multiple Stress Creep Recovery (MSCR) Asphalt Binder Specification. Collect informational test data from production samples of performance graded (PG) asphalt binders in 2010 using the provisional MSCR protocol, use this data and previously gathered information to develop and implement a new WSDOT specification for acceptance of PG binders.</p> <p>Status: Results from a national inter-laboratory study (ILS) provided precision and bias statements for the MSCR test protocol that show additional developments in this technology are needed before it could be considered for implementation in Washington State. The Construction Materials Division has implemented an Elastic Recovery (ER) asphalt binder test requirement in the 2012 Standard Specifications until the MSCR test can be refined to improve precision and bias. This task is completed.</p>
3	<p>HMA Rutting and Moisture Susceptibility Research Study. What can the Hamburg Wheel Tracking Device (HWTD) tell us about the HMA mixes used in Washington State? Can this device predict premature failure of HMA from rutting and/or moisture induced damage? Can the HWTD be used for acceptance of Paving Contractor's HMA mix designs and production material?</p> <p>This study to include: Test mix design verification samples with and without antistripping additive, test production mix design conformation samples and roadway cores from select projects; write specifications and provide recommendations for implementation if warranted.</p> <p>Status: Currently analyzing 2010, 2011 data and testing 2012 mix design and production samples. Test data will be used to evaluate material quality and develop specification. Roadway core sample testing will only be conducted if needed for investigative purposes. Specification implementation scheduled for January 2014, planned use on select projects in 2013. Project on schedule 70% complete.</p>

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Construction Materials

Task	Description
4	<p>HMA Density Study. WSDOT is one of only two states in the nation that using the direct transmission method for testing in-place density of HMA when using the nuclear density gauge. There is actually three different methods that can be used to test in-place density with the nuclear gauge; however, it is unclear which method would provide the most accurate and consistent results.</p> <p>This study to include: Perform testing using all three methods on select projects, compare results with roadway cores, analyze data to determine accuracy and reproducibility, provide recommendations for changes to current methods if warranted.</p> <p>Status: Testing on nine paving projects completed, data has been compiled and analyzed, report pending. Based on the findings of the study, the Construction Materials Division has updated the testing procedures to allow in-place density testing to be conducted using both direct transmission and thin layer mode. As each nuclear density gauge is scheduled for replacement through the transportation replacement fund (TEF) they will be replaced with the multi-mode gauge. Once all gauges have been replaced, direct transmission testing will be discontinued. Full implementation will take several years, approximately 91% complete. No Change since last reporting.</p>
5	<p>Roadway Core Density Study. Due to recent concerns regarding accuracy of the bulk specific gravity determination of roadway cores used to correlate the nuclear density gauge for measuring in-place density of asphalt concrete pavements a roadway core density study is to be conducted.</p> <p>This study to include: Perform comparative testing on roadway cores using AASHTO T 331 Bulk Specific Gravity (Gmb) and Density of Compacted Hot Mix Asphalt (HMA) Using Automatic Vacuum Sealing Method and AASHTO T 166 Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens. Provide recommendations for changes to current methods if warranted.</p> <p>Status: (New Project, Sept. 2012), Study to be performed by the Bituminous Materials Section in conjunction with the Northwest and Olympic Region laboratories. Study will take place during the 2013 Construction season on approximately 10 projects in the two regions. Data will be compiled, analyzed, and findings reported in late fall 2013. Project on schedule 25% complete.</p>
6	<p>"Elastic Recovery Specification for Emulsified Asphalt. Researcher have recognized AASHTO T 301 "Standard Method of Test for Elastic Recovery of Asphalt Materials by Means of a Ductilometer" as a more reliable method of identifying the presence of active polymer in Polymer Modified Cationic Emulsion (CRS-2P) than the Torsional Recovery Test (CA 332) or the Benson Toughness/Tenacity test. A comparison testing study will be conducted by the Bituminous Materials Section during the 2013 construction season using both methods. On completion of the study, recommendations will be provided to continue using CA 332 or to implement a change to use T 301.</p> <p>Status: (New Project, January 2013), Comparison testing will be conducted during the 2013 construction season and the test data will be analyzed. Project 5% complete. No change since last reporting.</p>

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Task	Description
7	<p>Development requirements for a concrete mix design submittal program.</p> <p>Status: As part of the MATS program, we will have a way for the concrete mix designs to be electronically filled out and requested by the contractor. These mix designs will be sent to the project office for approval. This strategic direction will be to develop the requirements for programming the concrete mix design submittal process. When we get the HMA submittal program, it will be easy to make it work for concrete mix designs. No work on this strategic direction this quarter. This is on hold for the MATS program at this time.</p>
8	<p>Development requirements for a concrete mix design submittal program</p> <p>Status: As part of the MATS program, we will have a way for the HMA mix designs to be electronically filled out and requested by the contractor. These mix designs will be sent through the project office to the State Materials Laboratory for verification. This strategic direction will be to develop the requirements for programming the HMA mix design submittal process. The initial layout is complete. We discussed this with industry as to the requirements that they would like. We will be developing the requirements based on this discussion. No work on this strategic direction this quarter. This is on hold for the MATS program at this time.</p>
9	<p>Development requirements for MTP to allow for document storage.</p> <p>Status: As part of the ongoing improvements to the Materials Tracking Program, and with the completion of MATS, we need to have an electronic way to store approval documents, acceptance documents, test reports, and other materials documentation in a logical, meaningful location with easy access. This strategic direction will be to develop the requirements for programming the document storage process in MTP. Materials test reports from MATS are now automatically filed in MTP. Still working on miscellaneous document storage in MTP. This quarter we have put the process into testing. It needs a few more things and it will be put into production next quarter. January 2012, this has been finished and is in the QA MTP program for training and testing. This has not been deployed at this time. 8/29/2012</p>
10	<p>Finish the Materials Testing Program</p> <p>Status: The materials testing program, MATS, is about 95% programmed. Working with the chem lab for the last few tests to be programmed. The program will not be completely finished by June 2011. The remaining work, 10 chemical tests will be finished under maintenance. We are working on maintenance of the existing parts of MATS, and finishing the electrical tests.</p>

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Construction Materials

Task	Description
11	<p>Review and incorporate into the standard specification the BTPEP HDPE Plastic pipe audit program as a requirement.</p> <p>Status: Currently preparing specification update and contacting NTPEP and pipe manufacturers to determine how long it will take to get through NTPEP testing process. Specification requirements for NTPEP compliance have been written and will go into effect in the Aug 2012 amendments. The manufacturers have been notified of the new specifications and change. This is on hold until August 2012 when the new specifications go into effect January 2012. These revisions did not make it in the August amendments and will be put in the January amendments. This item is complete.</p>
12	<p>Quality Control Plans for Aggregate Materials Producers & Suppliers, to include recycled materials (glass, rap, pcc rubble, blast furnace slag, foundry slag, foundry sand, and so on.)</p> <p>Status: The development of this standard will be to establish and set protocols for evaluating all aggregate materials to determine their approval status. It will capture all aggregate types of materials and develop methodologies and processes to allow expanded use of recycled materials that are not identified in our specifications such as: foundry sand and roofing tiles. This strategic direction is currently on hold due to current work load.</p>
13	<p>Revision to Division 3 of the Standard Specs.</p> <p>Status: Division 3 of the Standard Specification currently deals with production aggregate sites and does not reflect today's and tomorrow's way of mining and producing aggregate materials. This section will be revised to include current technology, statistical acceptance of aggregates, and requirements for getting on the ASA database. There will be requirements for recycled materials, and blending facilities included in this section. The statistical specifications have been written. Have started pencil drafting the specification. Will address approval of aggregate materials (recycled included) and inclusion of the statistical specification. The statistical acceptance of aggregate was published in the 2012 spec book. Other revisions were also made to chapter 3. 100% complete and no more revisions are planned.</p>
14	<p>Development of the requirements for a materials approval (RAM) process program.</p> <p>Status: The development of a materials approval computer program will be another step to achieving the fully electronic Project Engineer's Office. The goal is to develop requirements to have the RAM process fully electronic (no paper) and tie into MTP. This strategic direction is one of the lean suggestions. It is currently on hold do to current work load.</p>

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Task	Description
15	<p>Develop and implement a plan for the re-evaluation of QPL products.</p> <p>Status: One of the recommendations from the FHWA national audit of other State Highway Agencies was to implement re-evaluation of materials, systems, and processes listed on the Qualified Products Lists. In an effort to address this recommendation the Materials Documentation section will develop a plan and process for re-evaluating materials, systems, and processes identified in WSDOT's QPL. Have not started yet as of 12/31/10. No change this quarter. Have drafted the process for re-evaluation of Bituminous Materials (PG, Cationic Emulsions), and Cement. Currently classifying the process for geosynthetics (NTPEP, Temporary, and other). 6/14/11 Have developed the phone application process and the QPL submittal process (internal). These processes are currently being utilized. 1/10/12 QPL Engineer has developed some revisions, will review this fall. 1/22/13 Soliciting other state DOT's for their re-evaluation process.</p>
16	<p>Americans with Disability Act (ADA) Warning systems</p> <p>Status: The ADA warning systems have the following challenges; #1 No material specifications, this has lead to bias evaluations of these materials. This issue had been brought to Paula Hammond's attention from a ADA warning system supplier. #2 An environmental group has determined that the WSDOT is wasting 1/2 billion dollars in ten years by the use of plastic ADA warning systems. This issue had gotten the attention of the House of Representatives and the WSDOT has been directed to address it. #3 WSDOT has documented plastic ADA warning systems losing color contrast in two years. Report is almost done. Estimated to complete 7/1/11. Completed field investigation of catalyst-hardened panel used in the City of Tacoma. 1/22/13 - Have drafted field investigation into the material specification.</p>
17	<p>Develop a basic statistical class that teaches our specification and calculations.</p> <p>Status: This course is intended to be a brief synopsis of the specifications and calculations used to determine pay factors for statistical acceptance of materials. This course will aid in reducing phone calls to the Materials Laboratory concerning why pay factors are low. All updates have been made and the course is in review.</p>
18	<p>Develop and implement a plan for New Products process.</p> <p>Status: Met with Bob Briggs to discuss a new idea for the New Products Listing looking at what the benefits are to the person requesting new products and what the benefit is to the State vs cost incurred. Working on a new presentation of the issue.</p>

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Task	Description
19	<p>Write a materials documentation guide for design build offices.</p> <p>Status: This guide is being developed to aid the Design-Builder's QA personnel and the DOT's Quality Verification personnel in Materials approval, acceptance and verification. The shift of these Materials approval, acceptance and verification responsibilities from WSDOT to the Design-Builder has had word of mouth guidance up to this time. The guide goal is to clarify roles and responsibilities to both owner and design-builder. Product is nearly ready for initial review by Bob Briggs.</p>
20	<p>Develop Materials section for the Design Build Manual.</p> <p>Status: In a Design Build project, Sections 1-06, 2.25 and 2.28 of the RFP's deal with the quality assessment, methods of acceptance and the quality process. The goal of the materials section of the WSDOT Design-Build manual is to give the DOT Quality Verification organization a path for start up to project closure within the RFP time frames. Lessons learned are being used to facilitate this guidance. The most recent Design-Build projects have moved section 1-06 in to section 2.25. The materials portion of the manual will facilitate that transition. A tactical/logistics conversation with Derek Case has lead me to revise my percentage complete due to several aspects we discussed that weren't part of the scope I originally started with. This process is ongoing but, five public disclosure requests on the pontoon project have taken up quite a bit of time.</p>
21	<p>Write a Desk Manual for CATS Software.</p> <p>Status: This software needs a desk reference for when the incumbent Design Build QV Oversight Engineer retires and a successor has to update the checklists. Continuing to note the idiosyncrasies in the software that are worked around now but, should be modified in a newer version of the software. I'm continuing to capture my lessons learned facilitating this software in field use and for more widespread field use. I'm also formulating a priority list for functional revision. This process is ongoing but, five public disclosure requests on the pontoon project have taken up quite a bit of time.</p>
22	<p>Review and modify Standard Specifications, Section 9-08 started in January 2008. Additional review to consider modifications to Pigmented Sealer specifications to incorporate gloss requirement, Section 9-08.3.</p> <p>Status: 9-08 specifications updated in 2010 printing of standard specifications. Specification 9-08.3 has been reviewed and no changes recommended to include gloss number system, semi opaque is adequate. Task is 100% complete.</p>
23	<p>Consider replacing the Inductively Coupling Plasma (ICP) with X-ray fluorescence (XRF).</p> <p>Status: The X-ray fluorescence instrument, Chiller, M4 Fluxer, gas and ventilation system have been installed and are currently in use. Comparative testing is being conducted aswell as data from April CCRL ICP results compared to XRF cement results. At conclusion of comparative testing, final plans for full implementation of XRF will be completed. Task is 95% complete.</p>

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Construction Materials

Task	Description
24	<p>The technique of Infrared Spectroscopy (IR) is being employed to analyze the uniformity of a specific company's epoxy coating system formula over time. Our objective is to test and evaluate the uniformity of these epoxy systems and determine whether we can correlate spectrum differences (chemical formula variations) samples with failing physical testing and whether there was a change to the formulation of the same product.</p> <p>Status: Epoxy samples are being analyzed resulting in no correlation between failing samples and formulation changes. Samples are continuing to be scanned as they come in creating an epoxy library. The new IR is installed, a new library is being established for pigmented sealer vehicle comparisons. Task is 85% complete.</p>
25	<p>The new instrument Ion Chromatograph (IC) is being set up to test Chlorides and Sulfate in liquids as well as concrete and soil slurries. This will replace the outdated titration methods.</p> <p>Status: Comparison studies titration/IC are being conducted. The methods for extraction are being worked through and samples are being tested. Additional comparison samples are needed. Task is 95% complete.</p>
26	<p>Develop a new standard specification for joint sealant used to span joint openings in road and bridge construction that will supplement Section 9-04.2(2) Poured Rubber Joint Sealer.</p> <p>Status: Test methods established and need to be formatted for inclusion to Section 9-04.2(2) Task is 90% complete.</p>
27	<p>Establish Fly Ash Metals allowances and write QC Plan</p> <p>Status: The QC plan and modifications to the Construction and Materials Manuals have been completed. Task is 100% complete.</p>
28	<p>Starting date August 2010. Review all current test procedures for compliance with AASHTO/ASTM/WSDOT methods and write procedures as needed.</p> <p>Status: Task is 100% completed.</p>
29	<p>Re-write Specification 9-21 for Raised Pavement Markers incorporating NTPEP performance testing</p> <p>Status: We are up to date for methods being used in the chemical laboratory at this time. Task is 100% complete.</p>
30	<p>Re-write Bridge Paint Specification 9-08 including performance testing requirements as defined in ASTM and SSPC standards.</p> <p>Status: Specification is written and under review. Working with Bridge Office to define field performance testing specification. Task is 95% complete.</p>

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Construction Materials

Task	Description
31	<p>This task includes looking at the NTPEP testing for traffic devices such as flexible guide posts and raised pavement markers (RPM) and a re-write of Specification 9-21. Where possible, consider modifying WSDOT specifications and allow for ASTM specification and use of NTPEP acceptance testing if benefit is realized.</p> <p>Status: Specifications identified and drafted for majority of items, wording for NTPEP performance testing drafted as well. NTPEP testing available for Type II and Type III RPM's, but not for Type I RPM's will need to draft alternate requirements for acceptance. Task is 85% complete. No change since last reporting.</p>
32	<p>Update Standard Specifications Section 9-29 Illumination, Signal, Electrical. This section in the Standard Specifications has not been updated in a number of years and needs to be updated to remove outdated requirements and updated to include the latest standards. Need to identify and assemble Expert Task Group to review specifications (ETG Members identified). 17 of 25 section completed at the end of this reporting period.</p> <p>Status: Specification is written and submitted for amendment, task is 95% complete.</p>
33	<p>The purpose of this strategy is to investigate how WSDOT can contribute to the use of renewable energy in the daily operation of the highway system. The investigation will include research into how the use of solar energy can reduce the amount of and/or the cost of commercial electrical energy WSDOT consumes, through the use of existing resources or developing resources, in partnership with industry, which would have a predictable pay back. The title of this item was changed to Energy Project and includes other forms of energy production such as wind generation, as well as other efficiencies that can be achieved.</p> <p>Status: Task in beginning stages, will continue to monitor national research and developments that would contribute to advances in this technology, task is 3% complete.</p>
34	<p>Prepare a performance specification for a non-slip cover for Junction Boxes</p> <p>Status: Research into available test instruments is continuing for this task. There are several approaches to testing for non-slip surfaces NFPA 1901 has a specification for fire truck running boards which may apply, in addition Regan Scientific has a test instrument that may apply. Research into this issue has shown that there are no instruments commercially available to test for the COF. Currently there is a GSP requiring non-slip j-box covers accompanied by a Special Provision listing two proprietary products. Task is 90% complete, no change since last reporting.</p>

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Construction Materials

Task	Description
35	<p>Prepare a performance specification for Uninterruptable Power Supplies to be used for battery back-up systems for traffic signalized intersections, changeable traffic lane gates and miscellaneous ITS equipment.</p> <p>Status: The standard cabinet requirements have been defined need to complete the performance specification for the batteries and charger system. Task is 40% complete, no change since last reporting.</p>
36	<p>Develop Quality Systems Manual Standard Practice Procedures for approval of fabrication plants. Standard Practice Procedures will be separated into standard plant approvals and annual plant approvals. Development will include incorporating Standard Practice Procedures into the WSDOT Standard Specifications.</p> <p>Status: Materials Manual Standard Practice QC 6, QC 7, and QC 8 have been written and sent to Kurt Williams for review. QC 6 is Annual Plant Approval process for Prestress Plants, QC 7 is Annual Plant Approval process for Precast Plants, and QC 8 is the process for approval of manufacturing plant fabrication and coatings facilities. Proposed revisions to Standard Specification Section 6-02.3(25), and 6-02.3(28) to incorporate QC 6, and QC 7 have been written and sent to Kurt Williams for review. Proposed new Standard Specification 1-06.1(5) to incorporate QC 8 has been written and sent to Kurt Williams for review. Rob Molohon has reviewed and revised Kyle's proposed Standard Specification 1-06.1(5) and QC 8. Rob Molohon's version was sent to Kurt Williams who has returned the documents to Kyle with revisions and questions. Kyle Cauffman discussed QC 7 with precast fabricators during the annual plant approval trip in June. Feedback was positive. Kyle has sent QC 6 out to key prestress plants for review and comment. 86% Complete.</p>
37	<p>WSU study on the use of low degradation aggregates in concrete.</p> <p>Status: Report has been finalized. Based on the report, no changes will be made to the WSDOT Standard Specifications.</p>
38	<p>The WSDOT Construction Manual needs to be updated on how to check concrete mix designs. The construction manual needs to be updated with specific information on what needs to be checked on concrete mix designs so WSDOT Project Offices can independently check concrete mix designs.</p> <p>Status: Complete. Checklists are on the Mats Lab web page instead of in the CM. Training was conducted at the 2013 construction conferences.</p>

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Administration

Colleen Reynolds		2011			2012						2013														
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	MatsLab Software Audits														100%										

Ed Bellinger		2011			2012						2013														
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
2	Disaster Recovery																						100%		
3	Disaster Recovery Implementation																						100%		
4	Development Self Help Web																								60%
5	Sharepoint Consolidation																								45%

Kathy Brascher		2011			2012						2013														
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
6	Smartware Application Replacement																								75%
7	Replace Regional Technical System, Work Order Grabbers and Report Generator with MATS																								95%

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Administration

Task	Description
1	Internal/External Software Audit Status: Adobe compliance review is complete, we will continue with other software manufacturers until all software has been identified and purchasing records are attached. This task is complete, but will be ongoing for new technology.
2	Disaster Recovery Status: OIT and DOT Server administrators group have made a decision on an enterprise backup/DR solution. FalconStor software backed by XioTech hardware. The Materials Laboratory has integrated it's disaster recovery plan with OIT.
3	Disaster Recovery / Business Continuity Implementation Status: Data center consolidation to OIT is complete. DR/BC is directed and managed from OIT. The DOT COOP plan has been submitted to the governors office .
4	Development Self help Web for users Status: We continue to add content as specific topics are encountered. We are also adding help files for devices, "Printers, Wifi".
5	Move Group data onto SharePoint document server, create standards, procedures and searchable structure for project data. Status: A committee has been formed to develop the standards, procedures and searchable structure. Testing continues at a very slow pace due to current workload of testers. Testing has all but stopped due to Shaerpoints slow response times. Takes too long for users to complete tasks.
6	Replace Smartware with MATS and continue to develop the remainder of MATS. Status: No progress due to maintenance backlog.
7	Replace Regional Technical System, Work Order Grabbers and Report Generator with MATS Status: No progress due to maintenance backlog.

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Geotechnical

Tony Allen		2011			2012						2013														
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	Update Geotechnical Design Manual																						80%		
10	LRFD design spec's development																						60%		
11	MSE Wall Research																						85%		

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5/21/2013

Geotechnical

Task	Description
1	<p>Complete draft plan to develop GIS database of new and existing geotechnical borings statewide, and begin implementation, which includes populating the database with borings. Assigned to: Tom Badger/Marc Fish</p> <p>Status: Estimate 60% complete. A prototype database has been developed that can access historic boring logs in pdf format from Stellant (now Oracle) and has been placed on the GIS Workbench referencing SRMP. This database does not contain the data/information associated with the test boring logs. Full implementation of a GIS/SQL server database for all existing and future test boring data/information is waiting on the development of gINT rules for gINT Professional Plus (our test boring/SQL server database). In conjunction with the manufacturer of gINT and OIT, we are looking into either having the manufacturer, OIT, or both develop these rules and to provide routine maintenance on the database so we can finish and implement this strategic objective.</p>
2	<p>Improve horizontal drain effectiveness through development of improved design procedures.</p> <p>a. Complete pooled fund research study, which includes assessment of several fully instrumented field horizontal drain installations to validate the methods developed. b. Develop research implementation plan to incorporate results into WSDOT design and construction practice. Assigned to: Tom Badger</p> <p>Status: Pooled fund study is essentially complete; waiting on copyright permissions for some figures; should be finalized in mid-February. Will be proposing TRB-hosted webinars for T2 activities scheduled for April-May 2013. Need to employ design procedure for WSDOT project to evaluate how we're going to implement it into our design. This will be an ongoing activity as projects arise to implement research.</p>

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Geotechnical

Task	Description
3	<p>Develop an Unstable Slopes Management System (USMS) utilizing Geographical Information System (GIS) technology. a. The system needs to contain viewing, querying, and analysis applications. b. The system needs to be accessible to all WSDOT users. c. A user's manual needs to be developed. d. A training program needs to be implemented to train users on how to use the GIS. Assigned to: Tom Badger/Marc Fish</p> <p>Status: Estimate 75% complete. An in-house GIS application has been created. The system is slower on less robust computers and needs to be improved upon. This improvement will require additional storage space on network computers. We have constructed a new Internet-based mapping application of our USMS, which is available through our USMS website. This is a very basic application. We recently received training and access to a DOT GIS mapping license and we will be using our new knowledge and available license to improve upon this application and to create new ones. We are also approximately 75% complete in bringing our new USMS website into a current programming language (to ".Net" from "Cold Fusion"). It is currently in quality control status as checks are being made and bugs fixed. As part of the new USMS website programming, we have made some modifications/additions to the USMS SQL server database that stores our USMS information. These modifications/additions will help us track risk reduction scaling slopes (RRS) and partially mitigated slopes in addition to our normal unstable slope within the USMSs. We will be offering training once the USMS website and GIS are finalized and help manuals have been written.</p>
4	<p>Develop residual strength database to improve design parameter selection for landslide analyses. a. Get detailed test procedures developed and obtain a baseline of experience with the test to get off the learning curve. b. Develop database of ring shear (residual strength) test results and correlate with other soil properties such as PI or LL, gradation, residual strength from back analysis of landslide, and also correlate with geologic unit. Assigned to: Tom Badger/Doug Anderson</p> <p>Status: Test method has finally been developed after much difficulty replicating Dr. Stark's test results. Currently doing one final set of tests in which split samples were obtained for a WSDOT project so that a direct comparison between WSDOT and Dr. Stark's tests results can be made. Assuming the comparison is favorable, procedure is ready to use in production work. Need to start building database of test results as projects become available.</p>

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Geotechnical

Task	Description
5	<p>1. Qualify testers on the operation of the SSH-100 equipment for the following test procedures.</p> <p>1.1. D7181 - Triaxial Compression CD Soil</p> <p>1.2. T297/D4767 - Triaxial Compression CU Soil</p> <p>1.3. T296/D2850 - Triaxial Compression UU</p> <p>1.4. D5084 - Hydraulic Conductivity (Flexible Wall)</p> <p>1.5. D3999 - Cyclic Triaxial (Modulus & Damping)</p> <p>1.6. D5311 - Cyclic Triaxial (Liquefaction Potential)</p> <p>1.7. D6528 - Direct Simple Shear CU</p> <p>1.8. Cyclic Simple Shear (with PP)</p> <p>2. Develop a WSDOT test procedures for Cyclic Simple Shear Testing (1.8 above) as AASHTO and ASTM do not have test procedures for this test. Note that the primary focus of this testing is for liquefaction evaluation, though other types of cyclic properties can also be determined.</p> <p>3. Train Staff in the selection of test parameters and interpretation of the test results for all cyclic tests performed on the machine.</p> <p>4. Incorporate test results into a database</p> <p>5. Develop WA specific soil correlations for use on all WSDOT projects</p> <p>Assigned to: Jim Cuthbertson/Pete Palmerson</p> <p>Status: 78% Complete Overall</p> <p>Item 5-1, 100% Complete. Items 1.1. through 1.6 are infrequent tests. In accordance with our AMRL certification, we do not need to be qualified for infrequent tests. Accordingly, we are currently compliant with tester qualification for these infrequent tests. Items 1.7 and 1.8 are more frequent tests and we have qualified two testers for these tests.</p> <p>Item 5-2, 90% Complete. Item 5-2 is essentially complete. We have a test procedure developed and just need to write it up as a final paper procedure.</p> <p>Item 5-3, 90% Complete. The Office has contacted several individuals familiar with this type of testing and negotiated with them to develop training for our engineering staff, but we have not been able to get final approval for funds to hold the training. Training of the engineering staff is on hold until funds become available. We did successfully develop and hold training for the Technicians performing the testing. There was a fair amount of time invested in setting up training for the testing,</p> <p>Item 5-4, 30% Complete. We have hired a project person to begin developing data tables in gINT for us to store laboratory test results. He is working on that and making progress. We expect to have most of the data tables required constructed by the end of the Biennium.</p> <p>Item 5-5, 0% Complete. This Strategic direction needs to be deferred to the next Biennium. We need to get the database in Item 5-4 constructed and populated with data before we can begin to develop correlations. We have been doing database testing to get soil properties and have been storing that data until we can populate the database and do data analysis.</p>

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Geotechnical

Task	Description
6	<p>1. Train core staff to more fully develop their expertise in this area, including attendance at conferences as they become available and are determined to be beneficial to achieving this strategic direction.</p> <p>2. Obtain or update the necessary computer software to conduct the seismic analyses needed – especially important is obtaining/augmenting non-linear effective stress analysis software.</p> <p>3. Have core seismic staff consult with other staff that are faced with doing this type of design on their projects, and as they do so, train these other staff on how to do the analysis.</p> <p>4. Continue development/revision of the GDM, especially chapter 6 on seismic design to document the design procedures needed, how to obtain the design parameters needed, etc.</p> <p>Assigned to: Jim Cuthbertson/Jim Struthers</p> <p>Status: 85% Complete Overall</p> <p>Item 6-1, 80% Complete. Item 6-1 is still hampered by budgetary issues and travel restrictions. There are insufficient funds for training, and travel restrictions prevent us from sending staff outside State to attend FHWA, NHI, and other training opportunities. We have had a couple of informal training sessions developed by our own staff, but our work load is high and devoting the necessary time to developing the training has been virtually impossible.</p> <p>Item 6-2, 100% Complete. Basic training regarding the use of DMOD has been completed for some core staff. WsLiq a liquefaction analysis tool developed by the University of WA is complete and fully implemented. In addition, the University of WA has developed a ground motion modeling and analysis tool through funded research. The tool is currently available for use by the core seismic team.</p> <p>Item 6-3, 100% Complete. Two projects North River and Smith Ck were identified to implement this training, and have been completed.</p> <p>Item 6-4, 60% Complete. Tony Allen has been working updates to the GDM including the seismic chapter. Edits are currently in progress on the chapter. It is hoped that the edits will be complete and FHWA will be finalized so revised manual can be published before the end of the biennium.</p>

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Geotechnical

Task	Description
7	<p>gINT Professional Plus offers centralized data storage for boring log information and laboratory test results. It is a SQL Server based product which will enable the Geotechnical Division to store and query geotechnical data. Data can be made available to other WSDOT programs like Microstation or GIS platforms such as ARC-GIS. Tasks to be accomplished for this strategic direction are as follows:</p> <ol style="list-style-type: none"> 1. Set up GIS accessible database so that as test results are obtained, they can be recorded/stored in an easily retrievable system. 2. Develop soil/rock property database and correlate those properties to geologic units commonly encountered in WA. 3. Search the Division's records for lab data to help populate the database. 4. As time allows (during less busy times in lab), conduct tests for key properties (shear strength, compressibility, etc.) on existing stored undisturbed samples. 5. Summarize results in Chapter 5 of the GDM to provide design parameter selection guidance based on these results. <p>Assigned to: Jim Cuthbertson/Pete Palmerson</p> <p>Status: 20% Complete Overall</p> <p>Item 7-1, 90% Complete. Item 7-1 was advanced from 75% to 85% complete this last quarter. gINT professional plus has been purchased. We have completed the data template for the boring logs as well as the new DIRT program. We are continuing to add data tables and create reports for the lab data we generate. Before we are able to really implement the new system however, we need to get some issues resolved. We are currently working with the MATSLAB IT group as well as gINT technical support.</p> <p>Item 7-2, 30% Complete. We have hired a project person to begin developing data tables in gINT for us to store laboratory test results. He is working on that and making progress. We expect to have most of the data tables required constructed by the end of the Biennium.</p> <p>Item 7-3, 0% Complete. This Strategic direction needs to be deferred to the next Biennium. Our current work load has prevented us from having the staff available to accomplish this direction.</p> <p>Item 7-4, 100% Complete. Database testing has been occurring during periods of low lab work. We have met the intent of this element, even though we are continuing to perform the work.</p> <p>Item 7-5, 50% Complete. We have reviewed the current information in the GDM and revised the chapter accordingly. Next we need to develop soil specific correlations and then re-review the GDM to ensure that the material properties are consistent with our Database data. Like all tasks database related, we must finish the database prior to being able to complete this task.</p>

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Geotechnical

Task	Description
8	<p>Develop investigation and implementation plan for use of geogrids in pavement base coarse reinforcement and as subgrade reinforcement for pavements. a. Summarize results from nationwide survey. b. Review research results obtained to date by others, and in consideration of nationwide survey results, and work with the Materials Lab Pavements Division to help develop design and use policies for geogrids for this application. c. Identify potential test sites where this trial design policy could be tested.</p> <p>Assigned to: Jim Cuthbertson</p> <p>Status: This effort is on hold until research efforts by others (NCHRP) is completed that will develop the analysis tools needed by pavement designers to accommodate geosynthetic base reinforcement.</p>
9	<p>Continue development of the GDM, especially focusing on updates to Chapter 15 to reflect new AASHTO seismic design specifications for walls, Chapter 6 on seismic design (see also Strategic Direction No. 6), especially with regard to lateral spreading and flow failure impacts to foundation design, updated drilled shaft design specifications (Chapter 8), and filling any gaps in the recommended design practice to insure clarity for design-build contracts.</p> <p>a. Complete updates by the end of 2012 or sooner. b. Assigned to: Tony Allen/Jim Cuthbertson</p> <p>Status: Several updates to GDM chapters have just been completed, including Chapters 15 (walls) and 22 (Geotechnical Design-Build). Work is partially complete on developing updates to Chapters 6 (esp. regarding lateral spreading and flow failure design), chapter 15 (esp. regarding implementation of the new AASHTO wall seismic design provisions, and clean up of the shoring/temporary cut and fill design sections), chapter 5 (soil and rock property determination), appendices to chapter 15 to update/add proprietary wall system preapproved procedures and details, Chapter 9 (temporary fill design requirements), chapter 1, and chapter 23. Note that work on the GDM is an on-going process, so this strategic direction is anticipated to be on-going.</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. Develop updated procedures to submit to AASHTO regarding drilled shaft foundation design procedures, spread footing design, and MSE wall design. Assigned to: Tony Allen</p> <p>Status: New drilled shaft design specifications have been completed and are now in full subcommittee review - a subcommittee vote is anticipated in June. Changes to Section 11 to update/improve the MSE wall design specifications are being developed.</p>

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Geotechnical

Task	Description
11	<p>Develop long range plan to fully implement MSE wall research (K-Stiffness Method).</p> <p>a. Complete research reports and publish updated design method in well respected journals. This includes development of load and resistance factors using reliability theory, application of method to seismic design and to establish link between working stress design (K-Stiffness method) and limit equilibrium design (compound stability analysis)</p> <p>b. Work with other states/agencies to identify potential instrumented test walls, including those with lower quality backfill materials to establish accuracy of method and improve user confidence</p> <p>c. Complete RMC research - scheduled completion date is July 2012.</p> <p>d. Work with the FHWA and AASHTO T-15 so that they have what they need to consider how improved MSE design methods such as the K-Stiffness Method should be addressed in the AASHTO LRFD specifications and FHWA manuals. Assigned to: Tony Allen</p> <p>Status: The K-Stiffness Method has been well established in the literature. The database of walls was expanded significantly prior to 2008 by including a number of walls from Japan, the methodology was updated and published in 2008, and LRFD calibration of this and other available methods for internal stability design of MSE walls (including resistance statistics and analysis using data from AASHTO NTPEP and other sources) has been partially accomplished. The work has won several international awards. However, there are some within the profession who have raised concerns as to how the proposed methodology assures equilibrium of the system is maintained (i.e., working stress vs. limit equilibrium design). Therefore, efforts are underway, including journal papers that are completed or in the journal review process, using available results from testing of full scale walls to near failure at RMC to assess the relationship between working stress and limit equilibrium design, especially considering how to address compound stability of MSE walls designed using working stress methods. Other key implementation issues in the method development that are actively being researched include how to incorporate seismic design with the K-Stiffness Method, prediction of wall lateral and vertical deformation, procedures to handle surcharge loads in working stress conditions using the K-Stiffness Method, and refinements to better handle the effect of wall height, improve the facing stiffness model, and the steel reinforcement stiffness model. A paper series to address these issues is well underway. Discussions with the FHWA and T-15 regarding potential future design specification revisions to address current short-comings in the MSE wall design procedures for internal stability have begun. Getting through the journal review process takes time, but we anticipate acceptance late this year (2013).</p>