



Illinois Department of Transportation

Memorandum

To: ALL GEOTECHNICAL MANUAL USERS (AGMU) 07.1
From: Ralph E. Anderson *Ralph E. Anderson*
Subject: Bureau of Materials and Physical Research
Date: November 26, 2007

Please find attached the updated operating procedures for the Bureau of Materials and Physical Research Soils Laboratory. The previously issued handout (January 19, 2006) that was provided at the Annual Geotechnical Engineers Meeting is to be discarded. Also, the "Introduction" for Appendix II of [AGMU 05.3](#) shall no longer apply.

In regards to the Field Soil Compaction (Nuclear) MISTIC document known as [BMPR MI701N](#) and the related instructions, this information is now available via the intranet under Topics/Forms Management. This information is also available on the internet at the following link:
<http://www.dot.il.gov/materials/materialforms.html>

The Bureau of Materials Soils Laboratory now has an e-mail address BMPR.Soilslab@dot.il.gov that may be used to request testing.

The Bureau of Materials Soils Laboratory has also developed a bi-annual schedule for the calibration of rimacs. An inventory and schedule is attached.

DAD/LRC/kkt07.1AGMU-20071126

Soils Lab Operating Procedures

- All requests for Materials and Physical Research (M&PR) testing by a Region/District shall go directly to the Soils Laboratory. Please use form [BMPR SL19](#) for all testing requests except acceptance samples. Form [BMPR LM6](#)* shall be used for all acceptance sample testing requests (i.e. MSE wall backfill, lime, fly ash, cement, etc.). The forms may be sent electronically to the Soils Laboratory at BMPR.Soilslab@dot.il.gov.

**The LM6 form has been revised. Please use the current version BMPR LM6 for your future requests.*

- For testing performed by M&PR that requires no geotechnical analysis by B&S, M&PR will provide the test results to the Region/District and will copy B&S. However, some types of test results (usually test results for acceptance samples) will not be provided by M&PR, unless requested by the District or B&S. Instead, these test results will be entered directly into MISTIC for retrieval by the Region/District and B&S.

For testing performed by M&PR that requires geotechnical analysis by B&S, B&S will issue a response to the Region/District and provide the test results.

- M&PR will consult with a Region/District or B&S as necessary for establishing test priorities. Based on this information, M&PR will be responsible for scheduling the laboratory work. M&PR will take into consideration the obligations to another Lab within the Bureau, Region/District requests, B&S requests, and obligations to other entities.
- M&PR will maintain a current list of test methods performed in the Soils Laboratory. Illinois AASHTO / ASTM test modifications or Illinois test methods will be written and approved by B&S.

Services Provided by BMPR Soils Laboratory

Tests performed in Soils Laboratory:

AASHTO T 87 Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T 88 Particle Size Analysis of Soils

AASHTO T 89 Determining the Liquid Limit of Soils

AASHTO T 90 Determining the Plastic Limit and Plasticity Index of Soils

AASHTO T 99 Moisture-Density Relations of Soils (standard effort)

AASHTO T 100 Specific Gravity of Soils

AASHTO T 134 Moisture-Density Relations of Soil-Cement Mixtures

AASHTO T 135 Wetting-and-Drying Test of Compacted Soil-Cement Mixtures

AASHTO T 136 Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures

AASHTO T 146 Wet Preparation of Disturbed Soil Samples for Test

AASHTO T 180 Moisture-Density Relations of Soils (modified effort)

AASHTO T 208 Unconfined Compressive Strength of Cohesive Soil

AASHTO T 215 Permeability of Granular Soils (constant head)

AASHTO T 216 One-Dimensional Consolidation Properties of Soils

AASHTO T 265 Laboratory Determination of Moisture Content of Soils

AASHTO T 288 Determining Minimum Laboratory Soil Resistivity

AASHTO T 296 Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression

AASHTO T 297 Consolidated, Undrained Triaxial Compression Test on Cohesive Soils

Illinois Bearing Ratio (IBR)

Immediate Bearing Value (IBV)

Erosion Function Apparatus (Pier Scour Testing & Analysis)

ASTM D 2938 Unconfined Compressive Strength of Intact Rock Core Specimens

Services Provided by BMPR Soils Laboratory (continued)

Tests coordinated by Soils Laboratory, but performed in Analytical Laboratory:

- Topsoils:
 - AASHTO T 194 Determination of Organic Matter in Soils by Wet Combustion
 - ASTM D 4972 pH of Soils
- Peat Materials:
 - AASHTO T 267 Determination of Organic Content in Soils by Loss on Ignition
 - ASTM D 2976 pH of Peat Materials
- Hydrated Lime, Quicklime, By-Product Limes:
 - ASTM C 25 Chemical Analysis of Limestone, Quicklime, and Hydrated Lime
- MSE Wall Materials:
 - AASHTO T 267 Determination of Organic Content in Soils by Loss on Ignition
 - AASHTO T 289 Determining pH of Soil for Use in Corrosion Testing
 - AASHTO T 290 Determining Water-Soluble Sulfate Ion Content in Soil
 - AASHTO T 291 Determining Water-Soluble Chloride Ion Content in Soil
- Fly Ash (used in soil modification):
 - ASTM C 311 Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
- Cement (used in soil modification and stabilization):
 - ASTM C 114 Chemical Analysis of Hydraulic Cement
- Concrete Subjected to Sulfate Attack in Soil or Groundwater:
 - AASHTO T 290 Determining Water-Soluble Sulfate Ion Content in Soil
 - Illinois Modified ASTM D 516-82 Test Method for Sulfate Ion in Water

Tests coordinated by Soils Laboratory, but performed in Aggregate Laboratory:

- Fly Ash (used in pozzolanic mixtures):
 - Illinois Modified AASHTO T 27
- Hydrated Lime, Quicklime, By-Product Limes:
 - Illinois Modified AASHTO T 27
- Topsoils:
 - Illinois Modified AASHTO T 27

Repair Services coordinated by Soils Laboratory:

- Rimac

Services Provided by BMPR Nuclear Laboratory

Calibration Services:

- AASHTO T 287 Asphalt Cement Content of Asphalt Concrete Mixtures by the Nuclear Method
- AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Repair Services:

- Asphalt Content Gauge
- Nuclear Gauge
- Slope Inclinator
- Earth Resistivity

Equipment Available for Loan:

- Slope Inclinator Equipment (SINCO Company – 1973)
 - AASHTO T 254 Installing, Monitoring, & Processing Data of the Traveling Type Slope Inclinator
 - ASTM D 6230 Monitoring Ground Movement using Probe-Type Inclinator
- Earth Resistivity Equipment (Bison Instruments Incorporated – 1970)
 - ASTM D 6431 Using the Direct Current Resistivity Method for Subsurface Investigation
- Soil Stiffness / Modulus Using Geogauge (Humboldt Mfg. Co. – 2005)

Material Codes for BMPR LM6

Aggregate Material Codes

The 7 character material code for the aggregate product is determined as follows:

- The first space is a "0" to indicate the material is an aggregate.
- The second space indicates the "Quality Level" of the aggregate (see below).
- The third space indicates the "Type of Material" (see below).
- The fourth space indicates the "Aggregate Type" (see below).
- The fifth space indicates the "Specification" of the aggregate (see below).
- The sixth and seventh spaces are the "Gradation Number" of the aggregate. See Articles 1003.01(c) and 1004.01(c) of the Standard Specifications.

<u>Quality Level</u>	<u>Type of Material</u>	<u>Aggregate Type</u>	<u>Specification</u>
0 & 1 Have No Quality	0 = Gravel	C = Coarse Aggregate	A = Standard Specification
2 = A Quality	1 = Crushed Gravel	F = Fine Aggregate	M = Modified or QC/QA Specification
3 = B Quality	2 = Crushed Stone		
4 = C Quality	3 = ACBF Slag		
5 = D Quality	5 = Recycled		
6 = D Quality Stabilized	7 = Natural Sand		
	8 = Stone Sand		
	9 = Special Aggregate		

Lime Material Codes

003FA00 Lime, Hydrated
003FA05 Lime, Quick
003FA06 Lime, By-Product Hydrated
003FA07 Lime, By-Product Non-Hydrated

Cement Material Codes

37601 Portland Cement, Type I
37706 Portland Cement, Slag Modified, Type I (SM)

Fly Ash Material Codes

37800 Fly Ash Class C Conditioned (Pozzolanic Mixtures)
37801 Fly Ash Class C (Soil Modification Mixtures)

General Comment: Do not use material code "005MF01 Fly Ash" for soils related work. This material code is used for Hot Mix Asphalt Mixtures.

Rimac Calibration Schedule

Odd years (2009, 2011...)		Even years (2008, 2010...)	
Inventory #	Condition	Inventory #	Condition
<u>District 1</u> <i>January & March</i>		<u>District 2</u> <i>January & March</i>	
097566	Good	SS5008	Very good
097567 (blue)	Good	SS5007	Very good
E24695	Good	04-1118	Fair
E	Good	07-1117	Poor
E34776 (tall blue)	Good	D24211	Fair
JJ7102	Good		
L01321 (grey)	Save for parts		
None	Good		
None (yellow)	Save for parts		
<u>District 3</u> <i>December & January</i>		<u>District 4</u> <i>September & October</i>	
KK3504	New 2006	EE5368	Good
KK3505	New 2006	E33463	Good
E15627	Operational	B6803	Bad
L2053	Parts only	B4469	Bad
E15626	Operational		
<u>District 5</u> <i>November & December</i>		<u>District 6</u> <i>June & August</i>	
EE7153	Working	CC9853	Motorized
E30411	Working	BB6343	Standard
L2055	Non-working	L10477	Unmodified
<u>District 7</u> <i>January & February</i>		<u>District 8</u> <i>January & February</i>	
E02056	Working	None	Scrap
E02057	Working	L1032	Working
		K05040	Working
<u>District 9</u> <i>December & February</i>			
E16851	Working		
E16985	Working		

Emergency maintenance at any time.