PAVEMENT MANAGEMENT SERVICES, INC.

435 South Washington Square
Lansing, Michigan 48933

(517) 485-5291 off
(517) 485-5665 fax

June 3, 2009

Mr. Robert Brown
Assistant Director of Facilities Planning
Grand Valley State University
1008 Service Building
1 Campus Drive
Allendale, Michigan 49401-9403

Dear Mr. Brown:

Pavement Management Services, Inc. (PMSI) was retained to evaluate the porous asphalt pavement and aggregate base removed from Lot Q on campus. We removed 15 six-inch cores from the existing porous pavement. PMSI retained cores 1, 5, 7, 8 and 14, as marked on the enclosed site plan. Two cores were retained by Grand Valley State University personnel; the remaining cores were taken by Fishbeck, Thompson, Carr and Huber.

The surface of the asphalt showed moderate loss of the asphalt cement; however, only a slight amount of raveling existed. There were two small areas that exhibited cracking at paving joints. These joints were not raveling and were not causing any structural problems. At all of the core locations, the ability to drain water from the core equipment was excellent to very good.

The enclosed test data indicate that all mixture parameters still meet original mixture specification, with the exception of percent of asphalt cement in the mixture. I believe the main reason for the loss of asphalt cement on the surface aggregate was snow plowing.

The aggregate base showed no signs of deterioration and will still meet Michigan Department of Transportation gradation specifications for a 2G and 3G.

I believe the pavement has been through five winters and, in my judgment, is still performing at nearly 100 percent of capacity, with many more years of service life remaining. This project would indicate that this water handling system and pavement structure is a very viable process.

If you have any further questions, please contact me.

Sincerely yours,

Jeff Click
President

JCC:dnc
encl.

811 W. STAIE ST.
ST. JOHNS, MI 48879

OFFICE: 989-224-2642
FAX: 989-224-3455

ASPHALT SOILS ANDREWS Material Testing Services AGGREGATE CONCRETE

ROBERT L. ANDREWS, JR.
PRESIDENT

MIM 108 & MIM 109

SIEVE ANALYSIS REPORT

AMIS JOB # 2658 PROJECT: Grand Valley State University

DATE: 5-7-09 CLIENT/CONTRACTOR: PMSI

SAMPLE IDENTIFICATION: 21AA modified

SIEVE SIZE	WEIGHT RETAINED (grams)	% RETAINED	CUMULATIVE % PASSING	SPECIFICATIONS/ TARGET
1 1/2"				
1"	0	0	100	
3/4"	290.6	11.3	88.7	
1/2"	952.3	37.2	51.5	
3/8"	530.9	20.7	30.8	
No. 4	578.9	22.6	8.2	
No. 8	86.6	3.4	4.8	
No. 16	23.6	0.9	3.9	
No. 30	10.6	0.4	3.5	
No. 50	9.3	0.4	3.1	
No. 100	8.9	0.3	2.8	
No. 200	8.8	0.3	2.5	
Pan/LBW	2.2/62.4	2.5		
Total Wt	2565.1			

CRUSH SPEC.: _____ %

CRUSH CONTENT 100 %

WEIGHT OF OVEN DRY SAMPLE BEFORE WASHING: 2565.1 gr.
WEIGHT OF OVEN DRY SAMPLE AFTER WASHING: 2502.7 gr.
WEIGHT LOSS BY WASH (LBW): 62.4 gr. 2.4%

CLAY IRON STONE: _____ %
TOTAL SOFT PARTICLE: _____ %
CHERT: _____ %
TOTAL: _____ %

1 FACE CRUSH: _____ %
2 FACE CRUSH: _____ %
FLAT & ELONG: _____ %

REMARKS: The sample tested meets MDOT 2G & 3G gradation specifications.

TEST PERFORMED BY: [signature]
AA/ma

ANDREWS Material Testing Services
ASPHALT SOILS AGGREGATE CONCRETE

EXTRACTION/GRADATION REPORT MIM 325 & MIM 311

AMTS JOB # 2658 DATE: 5-6-09 PROJECT: Grand Valley State University
CLIENT: PMSI CONTRACTOR:
SAMPLED BY: DATE SAMPLED: PLANT LOCATION:
TYPE OF MIXTURE: Open graded

		SIEVE SIZE	WEIGHT RETAINED (grams)	% RETAINED	CUMULATIVE % PASSING	SPECIFICATIONS
WEIGHT OF SAMPLE	2414.6					
WEIGHT OF DRY EXTRACTED SAMPLE	2342.9	1 1/2"	0	0	100	
		1"	33.2	1.4	98.6	
LOSS IN WEIGHT	71.7	3/4"	113.5	4.8	93.8	
DUST CORRECTION	7.2	1/2"	647.5	27.6	66.2	
WEIGHT OF EXTRACTED BIT.	64.5	3/8"	634.8	27.0	39.2	
		No. 4	549.4	23.4	15.8	
PERCENT BITUMEN	2.7	No. 8	87.0	3.7	12.1	
WEIGHT OF DRY EXTRACTED AGG.	2350.1	No. 16	39.3	1.7	10.4	
WEIGHT OF DRY AGG. AFTER WASH	2245.7	No. 30	24.4	1.0	9.4	
WEIGHT LOSS BY WASHING	104.4	No. 50	32.2	1.4	8.0	
		No. 100	40.9	1.7	6.3	
WEIGHT PASSING #200 BY SHAKING	9.7	No. 200	33.8	1.4	4.9	
TOTAL WEIGHT PASSING #200	114.1	P. #200	114.1	4.9		
PERCENT P.#200	4.9	TOTAL WEIGHT	2350.1			

MIM - 117
CRUSH CONTENT: 93.8 %

REMARKS:

RECOVERED PENEIRAIION =

BY:

AA/ma

ASIM 3203

REPORT OF RESULTS OF MARSHALL TEST

PROJECT: Grand Valley State University JOB # 2658

ARCHITECT/ENGINEER: PMSI DATE: 5-4-09

CONTRACTOR: _____ GRADATION SPECIFICATION: OG

LOCATION/STATION: _____ SAMPLE CONDITION: freshly mixed/ reheated

COMPACTION EFFORT: Cores PERCENT ASPHALT CEMEMT: _____

Specimen Number	1	5	7	
A. Weight in Air (grams)	2169.0	2100.6	2636.8	
B. Weight in Water (grams)				
C. S.S.D. Weight (grams)				
D. Specimen Volume (cc) C-B	1066.8	1018.3	1277.8	
E. Bulk Specific Gravity of Specimen A/(C-B)	2.033	2.063	2.064	
F Specimen Density Ex62.4 (pcf)	126.9	128.7	128.8	
Gmm	2.616	2.616	2.616	
% Air	22.3	21.1	21.1	
Back washed fines	1.0 gr.	12.1 gr.		

TESTED BY: R.L. Andrews, Jr.

St. Johns, MI 48879 • (517) 224-2642

ASIM 3203

REPORT OF RESULTS OF MARSHALL TEST

PROJECT: Grand Valley State University JOB # 2658

ARCHITECT/ENGINEER: PMSI DATE: 5-4-09

CONTRACTOR: _____ GRADATION SPECIFICATION: OG

LOCATION/STATION: _____ SAMPLE CONDITION: freshly mixed/ reheated

COMPACTION EFFORT: Cores PERCENT ASPHALT CEMEMT: _____

Specimen Number	8	14		
A. Weight in Air (grams)	2655.4	2686.7		
B. Weight in Water (grams)				
C. S.S.D. Weight (grams)				
D. Specimen Volume (cc) C-B	1287.4	1320.8		
E. Bulk Specific Gravity of Specimen A/(C-B)	2.063	2.034		
F. Specimen Density Ex62.4 (pcf)	128.7	126.9		
Gmm	2.616	2.616		
% Air	21.1	22.2		

TESTED BY: R.L. Andrews, Jr.

St. Johns, MI 48879 • (517) 224-2642

ANDREWS Material Testing Services
ASPHALT SOILS AGGREGATE CONCRETE

ASIM 3203

REPORT OF RESULTS OF MARSHALL TEST

PROJECT: Grand Valley State University JOB # 2658

ARCHITECT/ENGINEER: PMSI DATE: 5-7-09

CONTRACTOR: _____ GRADATION SPECIFICATION: _____

LOCATION/STATION: _____ SAMPLE CONDITION: freshly mixed/ reheated

COMPACTION EFFORT: 50/50 PERCENT ASPHALT CEMEMT: _____

Specimen Number	1	2	3	4
A. Weight in Air (grams)	1037.2	1037.8	1032.4	1035.3
B. Weight in Water (grams)				
C. S.S.D. Weight (grams)				
D. Specimen Volume (cc) C-B	511.7	512.3	508.9	511.8
E. Bulk Specific Gravity of Specimen A/(C-B)	2.027	2.026	2.029	2.023
F Specimen Density Ex62.4 (pcf)	126.5	126.4	126.6	126.2
Gmm	2.616	2.616	2.616	2.616
% Air	22.5	22.6	22.4	22.7

TESTED BY: R.L. Andrews, Jr.

St. Johns, MI 48879 • (517) 224-2642

Michigan Department of Transportation (1506 (7-01))

THEORETICAL MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES MODIFIED ASTM D 2041 (RICE METHOD)

FILE 208

PROJECT NUMBER	MIX DESIGN NUMBER
Grand Valley State University	MIM - 314

CONTRACTOR

Pavement Management Services, Inc.

% ASPHALT BINDER		2.7	
ASPHALT SPECIFIC GRAVITY			
SAMPLE and BOWL WEIGHT in AIR, g	A	4382.5	
BOWL WEIGHT in AIR, g	B	2066.1	
SAMPLE WEIGHT in AIR, g	C=A-B	2316.4	
SAMPLE and BOWL in WATER, g	D	2753.4	
BOWL in WATER, g	E	1322.6	
SAMPLE in WATER, g	F=D-E	1430.8	
VOLUME, cc	G=C-F	885.6	
G_{mm}	C/G	2.616	
G_{se}			

% ASPHALT BINDER			
ASPHALT SPECIFIC GRAVITY			
SAMPLE and BOWL WEIGHT in AIR, g	A		
BOWL WEIGHT in AIR, g	B		
SAMPLE WEIGHT in AIR, g	C=A-B		
SAMPLE and BOWL in WATER, g	D		
BOWL in WATER, g	E		
SAMPLE in WATER, g	F=D-E		
VOLUME, cc	G=C-F		
G_{mm}	C/G		
G_{se}			
AVERAGE G_{se}			

SOURCE AND GRADE OF ASPHALT CEMENT USED	DATE TESTED
	5-5-09
TESTER	CHECKED BY
R.L. Andrews, Jr.	