ASPHALT TECHNOLOGIES, INC.

To: Federal Lands Highway Division February 19,2009

From: Laurand Lewandowski
PRI Asphalt Technologies, Inc.

Subject: Test & Evaluation Report: Strawman Testing, Ralumac LMCQS-1H

PROPERTY			TEST METHOD	SPECIFICATION	RESULT
Asphalt Emulsion as Received					
TBD					
Evaporative Method Residue (24 hours @ 25°C, 24 hours @ 60°C, Forced Draft Oven)					
Residue by Evaporation, %			Draft Method	Report	64.8
Water Content, %			ASTM D 95		0.0
Frequency Sweep (25 mm, 0.1 – 100 rad/sec, 12% Strain)		70°C	AASHTO T 315		See Graph 1, Table 1
MSCR	% Rec (100 Pa)		TP 70-08		31.46
	J_{nr} (100 Pa) kPa^{-1}				2.70
	% Rec (1,000 Pa)				16.17
	J_{nr} (1,000 Pa) kPa^{-1}				3.53
	% Rec (3,200 Pa)				11.12
	J_{nr} (3,200 Pa) kPa^{-1}				4.09
	% Rec (10,000 Pa)				7.07
	J_{nr} (10,000 Pa) kPa^{-1}				4.71
Frequency Sweep (25 mm, 0.1 – 100 rad/sec, 12% Strain)		64°C	AASHTO T 315		See Graph 1, Table 2
MSCR	% Rec (100 Pa)		TP 70-08		34.75
	J_{nr} (100 Pa) kPa^{-1}				1.34
	% Rec (1,000 Pa)				24.59
	J_{nr} (1,000 Pa) kPa^{-1}				1.59
	% Rec (3,200 Pa)				17.25
	J_{nr} (3,200 Pa) kPa^{-1}				1.92
	% Rec (10,000 Pa)				13.86
	J_{nr} (10,000 Pa) kPa^{-1}				2.20
Frequency Sweep (25 mm, 0.1 – 100 rad/sec, 12% Strain)		58°C	AASHTO T 315		See Graph 1, Table 3
MSCR	% Rec (100 Pa)		TP 70-08		38.05
	J_{nr} (100 Pa) kPa^{-1}				0.63
	% Rec (1,000 Pa)				33.30
	J_{nr} (1,000 Pa) kPa^{-1}				0.68
	% Rec (3,200 Pa)				25.88
	J_{nr} (3,200 Pa) kPa^{-1}				0.81
	% Rec (10,000 Pa)				18.86
	J_{nr} (10,000 Pa) kPa^{-1}				0.99

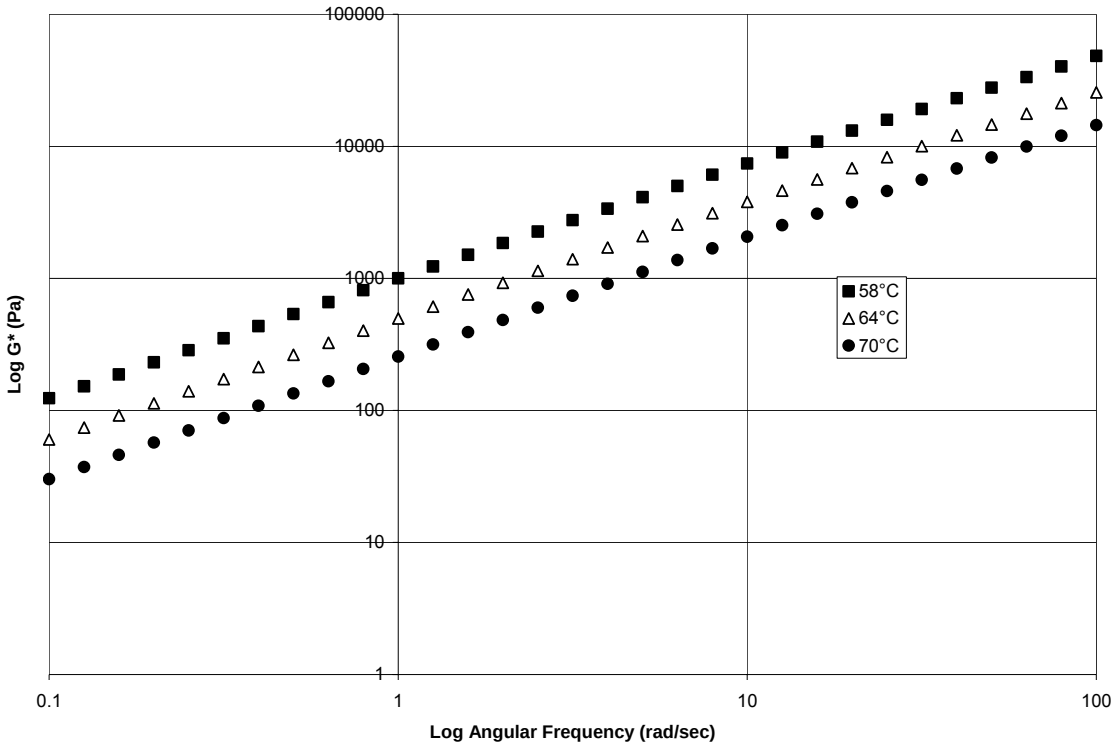
PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

RESULTS: (Continued)

PRESSURE AGING RESIDUE (100°C, 300 psi, 20 hr.)					
Frequency Sweep (8 mm, 0.1 – 100 rad/sec, 5% Strain)		70°C	AASHTO T 315	Report	See Graph 2, Table 4
MSCR	% Rec (100 Pa)		TP 70-08		N/A
	J_{nr} (100 Pa) kPa^{-1}				
	% Rec (1000 Pa)				36.16
	J_{nr} (1000 Pa) kPa^{-1}				0.54
	% Rec (3,200 Pa)				23.36
	J_{nr} (3,200 Pa) kPa^{-1}				0.72
	% Rec (10,000 Pa)				12.98
	J_{nr} (10,000 Pa) kPa^{-1}				1.01
Frequency Sweep (8 mm, 0.1 – 100 rad/sec, 5% Strain)		64°C	AASHTO T 315		See Graph 2, Table 5
MSCR	% Rec (100 Pa)		TP 70-08		N/A
	J_{nr} (100 Pa) kPa^{-1}				
	% Rec (1000 Pa)				33.90
	J_{nr} (1000 Pa) kPa^{-1}				0.24
	% Rec (3,200 Pa)				32.97
	J_{nr} (3,200 Pa) kPa^{-1}				0.25
	% Rec (10,000 Pa)				19.89
	J_{nr} (10,000 Pa) kPa^{-1}				0.36
Frequency Sweep (8 mm, 0.1 – 100 rad/sec, 5% Strain)		58°C	AASHTO T 315		See Graph 2, Table 6
MSCR	% Rec (100 Pa)		TP 70-08		N/A
	J_{nr} (100 Pa) kPa^{-1}				
	% Rec (1000 Pa)				43.33
	J_{nr} (1000 Pa) kPa^{-1}				0.099
	% Rec (3,200 Pa)				42.54
	J_{nr} (3,200 Pa) kPa^{-1}				0.10
	% Rec (10,000 Pa)				33.26
	J_{nr} (10,000 Pa) kPa^{-1}				0.12
Frequency Sweep (8 mm, 0.1 – 100 rad/sec, 1% Strain)		10°C	AASHTO T 315		See Graph 3, Table 7
Frequency Sweep (8 mm, 0.1 – 100 rad/sec, 1% Strain)		20°C			See Graph 3, Table 8
Strain Sweep (8 mm, 1 – 50 % Strain, 10 rad/sec		25°C	New Method		See Graph 4, Table 9
Creep Stiffness	Stiffness, MPA (60 sec.)	-18°C	AASHTO T 313	300 max.	272
	m- Value			0.300 min.	0.308
	Stiffness, MPA (60 sec.)	-12°C		300 max.	120
	m- Value			300 min.	0.371

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Graph 1: Frequency Sweep on Residue (58°C, 64°C & 70°C)



PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 1. **Frequency Sweep on Residue (25 mm plates, 2 mm gap, 10% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	82.61	3.879	29.89	30.14	9.9515	70
0.1259	82.88	4.619	36.99	37.28	9.9922	70
0.1585	83.07	5.557	45.74	46.07	9.9903	70
0.1995	83.22	6.739	56.68	57.08	9.9878	70
0.2512	83.27	8.263	70.05	70.53	9.9847	70
0.3162	83.3	10.21	86.94	87.53	9.9843	70
0.3981	83.33	12.59	107.7	108.4	9.9817	70
0.5012	83.25	15.77	133.3	134.2	9.9809	70
0.631	83.19	19.72	165.2	166.4	9.9758	70
0.7943	83.08	24.81	204.5	206	9.975	70
1	82.91	31.49	253.1	255.1	9.9682	70
1.259	82.72	40.04	313.6	316.1	9.9666	70
1.585	82.49	51.18	388.4	391.8	9.9581	70
1.995	82.2	65.77	480	484.5	9.9563	70
2.512	81.89	84.42	592.6	598.6	9.9479	70
3.162	81.53	108.8	730.2	738.3	9.9454	70
3.981	81.13	140.2	898.4	909.3	9.9352	70
5.012	80.71	180.6	1104	1119	9.9335	70
6.31	80.28	232.1	1355	1375	9.9237	70
7.943	79.81	298.2	1660	1686	9.9219	70
10	79.32	382.9	2031	2067	9.9138	70
12.59	78.87	488	2479	2527	9.917	70
15.85	78.4	620.8	3023	3086	9.9162	70
19.95	77.94	786.7	3683	3766	9.9173	70
25.12	77.5	993.2	4479	4588	9.9268	70
31.62	77.1	1246	5441	5582	9.9318	70
39.81	76.76	1554	6601	6782	9.9526	70
50.12	76.45	1927	7991	8220	9.9657	70
63.1	76.21	2372	9667	9953	9.9959	70
79.43	76.05	2898	11670	12020	10.015	70
100	75.98	3512	14060	14490	10.057	70

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 2. **Frequency Sweep on Residue (25 mm plates, 2 mm gap, 10% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	82.18	8.181	59.53	60.09	9.8887	64
0.1259	82.37	9.849	73.47	74.13	9.9832	64
0.1585	82.41	12.1	90.77	91.57	9.9828	64
0.1995	82.44	14.89	112.2	113.2	9.979	64
0.2512	82.42	18.43	138.5	139.8	9.9785	64
0.3162	82.35	22.98	171.2	172.7	9.973	64
0.3981	82.27	28.72	211.5	213.5	9.9717	64
0.5012	82.11	36.16	261.1	263.6	9.9652	64
0.631	81.95	45.56	322.3	325.5	9.9643	64
0.7943	81.72	57.98	398.3	402.5	9.9539	64
1	81.44	73.98	491.4	496.9	9.9528	64
1.259	81.12	94.53	605	612.3	9.9425	64
1.585	80.78	120.8	744.6	754.3	9.9401	64
1.995	80.4	154.7	914.4	927.3	9.9292	64
2.512	80	197.7	1121	1139	9.9274	64
3.162	79.56	253.1	1374	1397	9.9147	64
3.981	79.12	322.8	1680	1710	9.9141	64
5.012	78.67	411	2052	2092	9.9051	64
6.31	78.21	522.6	2504	2558	9.9018	64
7.943	77.77	661.3	3050	3121	9.8993	64
10	77.32	834.3	3709	3802	9.8998	64
12.59	76.89	1049	4504	4624	9.9035	64
15.85	76.49	1313	5464	5620	9.9045	64
19.95	76.11	1639	6628	6827	9.913	64
25.12	75.77	2034	8022	8276	9.9201	64
31.62	75.44	2520	9700	10020	9.9402	64
39.81	75.15	3102	11700	12110	9.9539	64
50.12	74.92	3806	14120	14620	9.9773	64
63.1	74.71	4657	17030	17650	10.009	64
79.43	74.55	5665	20500	21270	10.012	64
100	74.46	6856	24660	25600	10.048	64

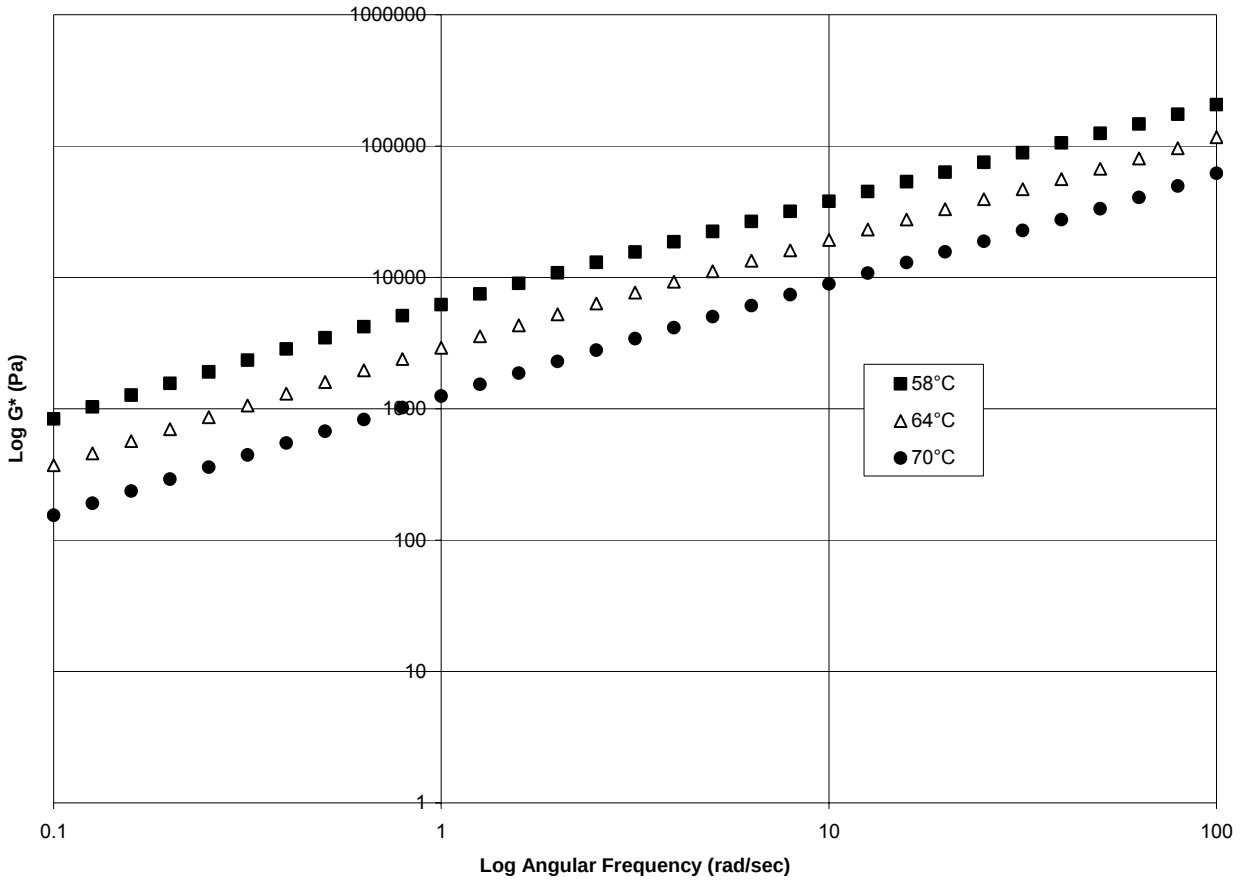
PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 3. **Frequency Sweep on Residue (25 mm plates, 2 mm gap, 10% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	81.06	19.17	121.9	123.4	9.708	58
0.1259	81.28	23.04	150.2	152	9.9777	58
0.1585	81.37	28.12	185.2	187.3	9.9712	58
0.1995	81.4	34.53	228.3	230.9	9.9706	58
0.2512	81.37	42.75	281.8	285.1	9.963	58
0.3162	81.28	53.35	348	352	9.9614	58
0.3981	81.15	66.79	428.8	434	9.9533	58
0.5012	80.95	84.33	529.5	536.1	9.9493	58
0.631	80.7	106.8	652.2	660.9	9.9392	58
0.7943	80.43	135.3	802.3	813.7	9.9376	58
1	80.09	172.3	986.4	1001	9.9244	58
1.259	79.73	219.3	1211	1231	9.9219	58
1.585	79.35	278.9	1483	1509	9.9111	58
1.995	78.96	353.7	1813	1847	9.9108	58
2.512	78.54	448.7	2214	2259	9.9	58
3.162	78.12	568.2	2702	2761	9.896	58
3.981	77.69	718.3	3293	3370	9.8897	58
5.012	77.27	905.4	4007	4108	9.8889	58
6.31	76.84	1140	4875	5006	9.8856	58
7.943	76.43	1430	5922	6092	9.8852	58
10	76.03	1785	7177	7396	9.8975	58
12.59	75.64	2224	8688	8968	9.8971	58
15.85	75.28	2760	10500	10860	9.9144	58
19.95	74.93	3415	12690	13140	9.9159	58
25.12	74.61	4211	15300	15870	9.9398	58
31.62	74.31	5183	18450	19160	9.9662	58
39.81	74.03	6354	22200	23090	9.9595	58
50.12	73.79	7762	26700	27810	9.9895	58
63.1	73.56	9475	32120	33490	10.013	58
79.43	73.37	11520	38580	40260	10.005	58
100	73.22	13960	46300	48350	10.038	58

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Graph 1: Frequency Sweep on PAV Residue (58°C, 64°C & 70°C)



PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 4. **Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 5% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	82.44	20.35	153.3	154.6	4.9994	70
0.1259	82.29	25.57	188.9	190.6	4.9994	70
0.1585	82.13	32.32	233.9	236.2	4.9992	70
0.1995	81.97	40.71	288.5	291.4	4.999	70
0.2512	81.71	51.85	355.9	359.7	4.9987	70
0.3162	81.45	66.11	439.8	444.7	4.9983	70
0.3981	81.18	84.29	543	549.5	4.9979	70
0.5012	80.83	107.3	664.8	673.4	4.9973	70
0.631	80.5	136.8	817.2	828.6	4.9963	70
0.7943	80.05	176.2	1004	1020	4.9964	70
1	79.48	227.9	1227	1248	4.9955	70
1.259	78.97	293	1504	1532	4.9953	70
1.585	78.32	378.9	1833	1872	4.9941	70
1.995	77.76	485.8	2240	2292	4.9939	70
2.512	77.1	624.8	2728	2798	4.9922	70
3.162	76.38	803.3	3316	3412	4.9919	70
3.981	75.67	1028	4023	4152	4.9904	70
5.012	74.89	1311	4857	5031	4.9901	70
6.31	74.12	1669	5868	6101	4.9885	70
7.943	73.24	2128	7069	7383	4.9882	70
10	72.35	2705	8501	8921	4.9866	70
12.59	71.33	3450	10210	10780	4.9845	70
15.85	70.34	4369	12230	12990	4.9864	70
19.95	69.25	5542	14630	15640	4.986	70
25.12	67.99	7073	17490	18870	4.9856	70
31.62	66.45	9097	20880	22770	4.9876	70
39.81	64.65	11780	24850	27500	4.9922	70
50.12	62.33	15490	29550	33360	5.0009	70
63.1	59.71	20510	35110	40660	5.0035	70
79.43	56.8	27220	41590	49710	5.0218	70
100	52.4	37880	49180	62080	5.0309	70

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 5. **Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 5% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	82.52	48.4	368.5	371.6	4.9985	64
0.1259	82.17	62.43	453.8	458.1	4.9984	64
0.1585	81.69	82.12	562.3	568.3	4.9977	64
0.1995	81.23	106.6	691.1	699.3	4.9971	64
0.2512	80.65	139.9	850.3	861.7	4.9962	64
0.3162	80.12	182.2	1046	1062	4.9963	64
0.3981	79.59	235.3	1281	1303	4.9954	64
0.5012	79.01	305.1	1571	1600	4.995	64
0.631	78.37	395.2	1921	1961	4.9937	64
0.7943	77.75	508.1	2340	2395	4.9938	64
1	77.14	649.5	2846	2919	4.9922	64
1.259	76.47	833.8	3464	3563	4.9914	64
1.585	75.81	1060	4191	4323	4.9898	64
1.995	75.15	1341	5060	5234	4.9897	64
2.512	74.44	1700	6105	6337	4.9872	64
3.162	73.77	2147	7374	7680	4.9867	64
3.981	73.07	2702	8877	9279	4.9844	64
5.012	72.38	3379	10640	11160	4.9845	64
6.31	71.68	4207	12710	13390	4.9826	64
7.943	71.01	5235	15210	16090	4.9798	64
10	70.34	6510	18220	19340	4.9798	64
12.59	69.59	8072	21690	23150	4.9797	64
15.85	68.87	9944	25730	27580	4.9805	64
19.95	68.1	12300	30610	32990	4.9807	64
25.12	67.28	15230	36360	39420	4.9817	64
31.62	66.38	18820	43050	46980	4.9867	64
39.81	65.32	23440	51000	56130	4.9874	64
50.12	64.06	29380	60400	67170	4.9946	64
63.1	62.57	37120	71510	80570	5.0087	64
79.43	60.81	47060	84220	96470	5.0141	64
100	58.26	61380	99250	1.17E+05	5.0338	64

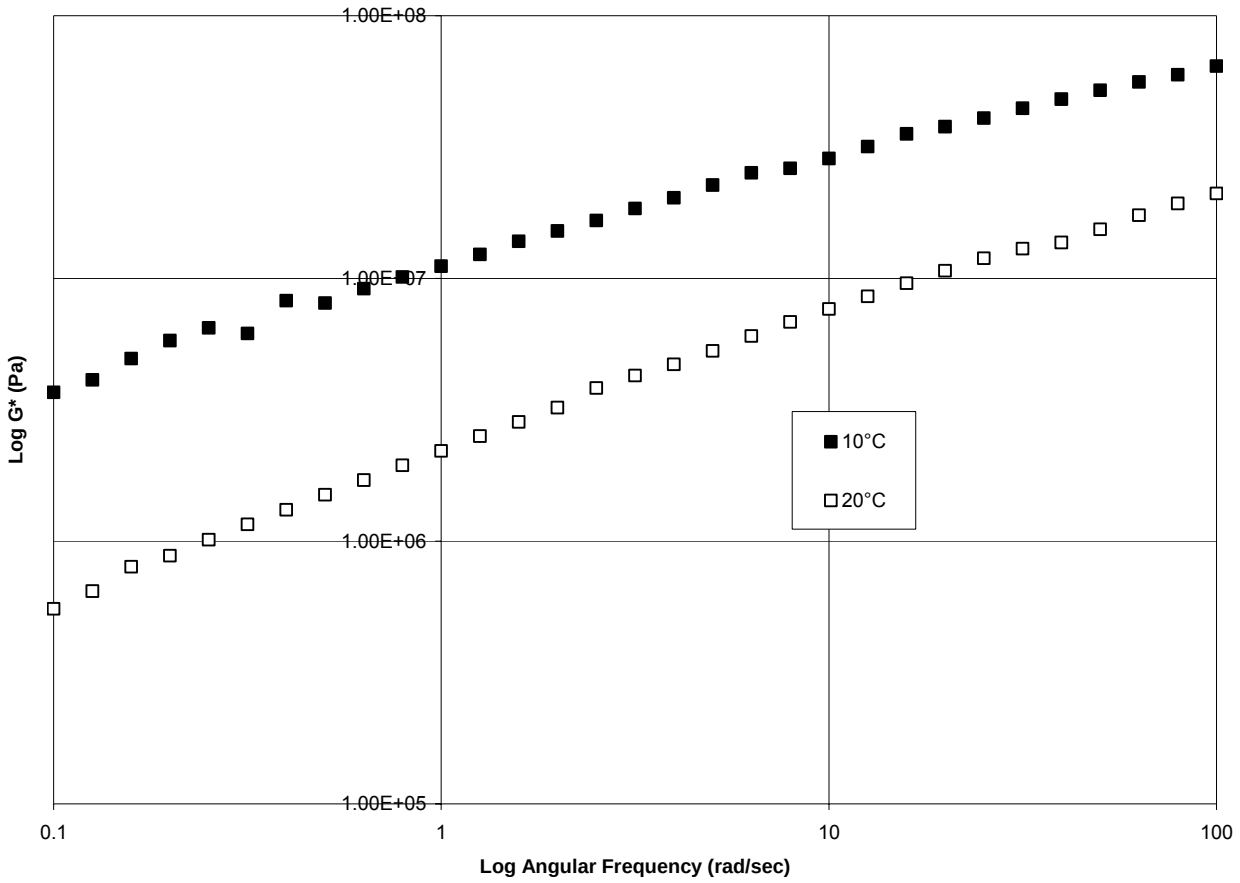
PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 6. **Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 5% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	80.01	145.6	826.9	839.6	4.9955	58
0.1259	79.55	187.3	1016	1033	4.9963	58
0.1585	79.08	240.8	1248	1271	4.9952	58
0.1995	78.55	310.5	1532	1563	4.9949	58
0.2512	78.02	396.7	1869	1910	4.9938	58
0.3162	77.39	510.9	2284	2341	4.9933	58
0.3981	76.81	650.8	2776	2851	4.9916	58
0.5012	76.21	826.7	3370	3469	4.9916	58
0.631	75.58	1048	4075	4208	4.9898	58
0.7943	74.92	1328	4931	5107	4.9892	58
1	74.26	1682	5965	6198	4.9867	58
1.259	73.57	2120	7186	7492	4.9863	58
1.585	72.93	2643	8609	9006	4.9842	58
1.995	72.28	3300	10330	10840	4.9806	58
2.512	71.65	4100	12360	13020	4.9822	58
3.162	70.99	5081	14750	15600	4.9788	58
3.981	70.36	6281	17600	18690	4.9767	58
5.012	69.77	7736	20990	22370	4.977	58
6.31	69.16	9503	24960	26710	4.9743	58
7.943	68.57	11640	29660	31870	4.9712	58
10	67.99	14220	35180	37940	4.974	58
12.59	67.42	17300	41620	45070	4.9725	58
15.85	66.85	21040	49220	53530	4.9715	58
19.95	66.27	25520	58050	63410	4.9748	58
25.12	65.66	31020	68560	75250	4.9748	58
31.62	65.01	37640	80740	89080	4.9806	58
39.81	64.27	45770	94950	1.05E+05	4.9838	58
50.12	63.44	55740	1.12E+05	1.25E+05	4.9932	58
63.1	62.48	68080	1.31E+05	1.47E+05	5.0095	58
79.43	61.41	83540	1.53E+05	1.75E+05	5.0119	58
100	59.82	1.04E+05	1.79E+05	2.07E+05	5.0373	58

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Graph 3. **Intermediate Temperature Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 5% strain (0. 1 to 100 rad/sec))**



PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 7. **Intermediate Temperature Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 1% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	50.09	2.37E+06	2.83E+06	3.69E+06	1.001	10
0.1259	48.42	2.73E+06	3.08E+06	4.11E+06	0.98475	10
0.1585	48.6	3.28E+06	3.72E+06	4.96E+06	0.94571	10
0.1995	47.18	3.94E+06	4.25E+06	5.80E+06	0.95774	10
0.2512	45.65	4.53E+06	4.63E+06	6.48E+06	0.98109	10
0.3162	45.54	4.32E+06	4.41E+06	6.17E+06	1.0846	10
0.3981	43.13	6.00E+06	5.62E+06	8.22E+06	0.87086	10
0.5012	44.39	5.76E+06	5.64E+06	8.06E+06	1.0749	10
0.631	43.31	6.65E+06	6.27E+06	9.14E+06	0.96981	10
0.7943	42.82	7.42E+06	6.88E+06	1.01E+07	0.98294	10
1	42.21	8.25E+06	7.48E+06	1.11E+07	0.98626	10
1.259	41.38	9.26E+06	8.16E+06	1.23E+07	0.98005	10
1.585	40.9	1.05E+07	9.07E+06	1.39E+07	0.97025	10
1.995	40.25	1.16E+07	9.79E+06	1.52E+07	0.98519	10
2.512	39.69	1.28E+07	1.06E+07	1.66E+07	0.98143	10
3.162	38.98	1.43E+07	1.16E+07	1.84E+07	0.97218	10
3.981	38.46	1.59E+07	1.26E+07	2.03E+07	0.97675	10
5.012	37.76	1.79E+07	1.39E+07	2.27E+07	0.96224	10
6.31	36.98	2.01E+07	1.52E+07	2.52E+07	0.96288	10
7.943	36.83	2.10E+07	1.57E+07	2.63E+07	1.01	10
10	36.34	2.30E+07	1.69E+07	2.86E+07	0.97579	10
12.59	35.65	2.58E+07	1.85E+07	3.18E+07	0.95686	10
15.85	34.93	2.91E+07	2.03E+07	3.55E+07	0.94909	10
19.95	34.57	3.11E+07	2.14E+07	3.78E+07	0.98359	10
25.12	34.13	3.37E+07	2.29E+07	4.08E+07	0.97106	10
31.62	33.58	3.70E+07	2.46E+07	4.44E+07	0.96045	10
39.81	33.09	4.03E+07	2.63E+07	4.81E+07	0.96301	10
50.12	32.59	4.38E+07	2.80E+07	5.19E+07	0.96191	10
63.1	32.12	4.73E+07	2.97E+07	5.59E+07	0.96235	10
79.43	31.75	5.07E+07	3.14E+07	5.96E+07	0.96549	10
100	31.24	5.50E+07	3.34E+07	6.43E+07	0.95418	10

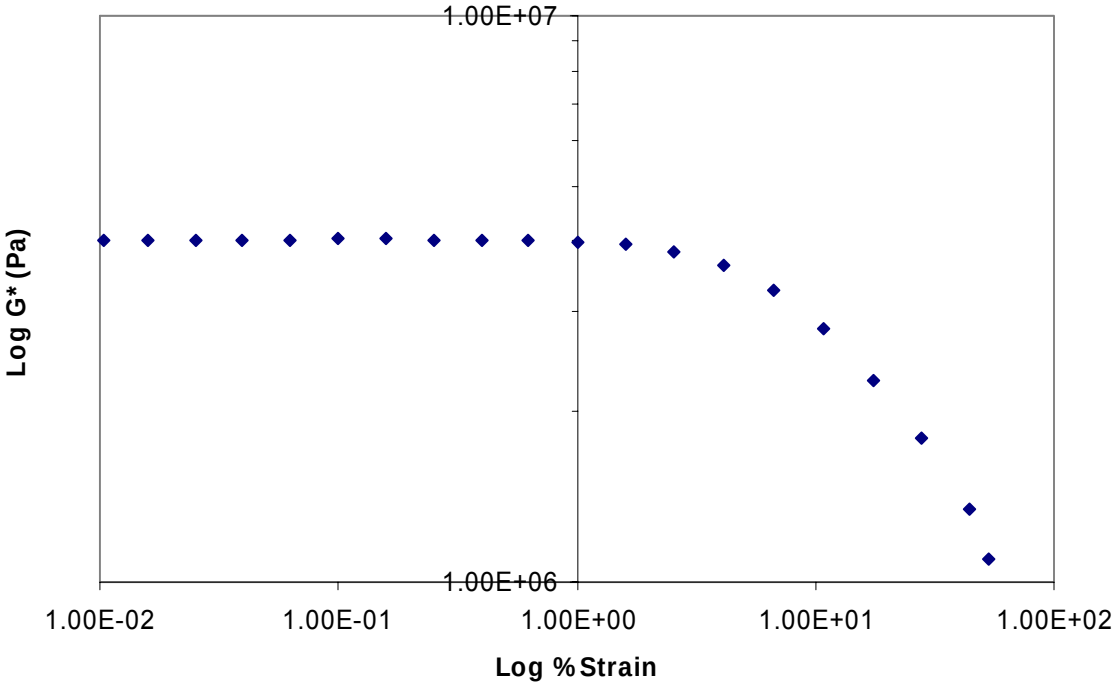
PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 8. **Intermediate Temperature Frequency Sweep on PAV Residue (8 mm plates, 2 mm gap, 5% strain (0. 1 to 100 rad/sec))**

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
0.1	59.07	2.84E+05	4.74E+05	5.52E+05	1.0035	20
0.1259	56.49	3.56E+05	5.38E+05	6.45E+05	0.97252	20
0.1585	56.21	4.45E+05	6.65E+05	8.00E+05	0.95942	20
0.1995	55.13	5.03E+05	7.22E+05	8.80E+05	0.99456	20
0.2512	54.65	5.86E+05	8.27E+05	1.01E+06	0.97989	20
0.3162	53.88	6.82E+05	9.35E+05	1.16E+06	0.98087	20
0.3981	53.44	7.85E+05	1.06E+06	1.32E+06	0.98303	20
0.5012	52.86	9.07E+05	1.20E+06	1.50E+06	0.98083	20
0.631	52.19	1.05E+06	1.35E+06	1.71E+06	0.98118	20
0.7943	51.66	1.21E+06	1.53E+06	1.95E+06	0.98084	20
1	51.14	1.39E+06	1.72E+06	2.21E+06	0.98137	20
1.259	50.49	1.60E+06	1.94E+06	2.51E+06	0.97956	20
1.585	49.92	1.83E+06	2.17E+06	2.84E+06	0.98241	20
1.995	49.25	2.10E+06	2.44E+06	3.22E+06	0.98084	20
2.512	48.39	2.54E+06	2.86E+06	3.83E+06	0.95402	20
3.162	47.79	2.87E+06	3.16E+06	4.27E+06	0.98788	20
3.981	47.33	3.19E+06	3.47E+06	4.71E+06	0.99412	20
5.012	46.75	3.63E+06	3.86E+06	5.30E+06	0.98358	20
6.31	46.08	4.18E+06	4.35E+06	6.03E+06	0.97287	20
7.943	45.43	4.79E+06	4.86E+06	6.82E+06	0.97631	20
10	44.85	5.42E+06	5.39E+06	7.65E+06	0.9822	20
12.59	44.25	6.13E+06	5.97E+06	8.55E+06	0.98333	20
15.85	43.66	6.93E+06	6.61E+06	9.58E+06	0.97908	20
19.95	43.08	7.81E+06	7.30E+06	1.07E+07	0.98129	20
25.12	42.51	8.78E+06	8.05E+06	1.19E+07	0.98213	20
31.62	42.09	9.63E+06	8.70E+06	1.30E+07	0.99872	20
39.81	41.9	1.02E+07	9.15E+06	1.37E+07	1.0174	20
50.12	41.26	1.15E+07	1.01E+07	1.54E+07	0.97578	20
63.1	40.56	1.32E+07	1.13E+07	1.74E+07	0.9675	20
79.43	40.02	1.48E+07	1.24E+07	1.93E+07	0.98286	20
100	39.58	1.62E+07	1.34E+07	2.11E+07	0.99249	20

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Graph 4. **Strain Sweep on PAV Residue**
(8 mm plates, 2 mm gap, 0.01-50 % strain (10 rad/sec))



PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com

Table 9. **Strain Sweep on PAV Residue**
(8 mm plates, 2 mm gap, 0.01% -50% strain, 10 rad/sec)

ang. frequency	delta	G'	G''	|G*|	% strain	temperature
rad/sec	degrees	Pa	Pa	Pa		°C
10	49.75	2.59E+06	3.06E+06	4.00E+06	0.010	25
10	48.42	2.66E+06	3.00E+06	4.01E+06	0.016	25
10	48.4	2.66E+06	3.00E+06	4.01E+06	0.025	25
10	48.39	2.67E+06	3.01E+06	4.03E+06	0.040	25
10	48.39	2.67E+06	3.01E+06	4.03E+06	0.063	25
10	48.39	2.68E+06	3.01E+06	4.03E+06	0.100	25
10	48.4	2.68E+06	3.02E+06	4.03E+06	0.158	25
10	48.41	2.67E+06	3.01E+06	4.02E+06	0.252	25
10	48.43	2.67E+06	3.01E+06	4.02E+06	0.397	25
10	48.46	2.66E+06	3.00E+06	4.01E+06	0.629	25
10	48.61	2.64E+06	2.99E+06	3.99E+06	1.001	25
10	48.87	2.59E+06	2.96E+06	3.94E+06	1.592	25
10	49.47	2.49E+06	2.91E+06	3.83E+06	2.553	25
10	50.62	2.30E+06	2.81E+06	3.63E+06	4.097	25
10	52.62	1.99E+06	2.61E+06	3.28E+06	6.644	25
10	55.28	1.60E+06	2.30E+06	2.80E+06	10.792	25
10	58.07	1.20E+06	1.93E+06	2.28E+06	17.523	25
10	60.56	8.81E+05	1.56E+06	1.79E+06	27.693	25
10	62.75	6.15E+05	1.20E+06	1.34E+06	44.449	25
10	64.06	4.79E+05	9.84E+05	1.10E+06	53.220	25

PRI Asphalt Technologies, Inc. 6408 Badger Drive Tampa, FL 33610 ● Tel: 813-621-5777 ● Fax: 813-621-5840 ● e-mail: llewandowski@priasphalt.com ● Website: http://www.priasphalt.com