Resilient Modulus Testing - US Customary Units

Date: March 22, 2010

Project: BL-10-00425

Client:
Mr. Harkanwal Brar
SRA
1201 New Road Suite 242
Linwood, NJ 08221

Project Description:
Resilient Modulus Test
AASHTO T307
Client ID: NAPTF Subgrade Soils
Station:

Sample Information

Braun Sample ID./ File Name:	N	Sample Diameter, in.:	2.86	Sample M.C., % before, after:	32.4, 32.4
Sample Type:	Type 2	Sample Height, in.:	5.60	Sample Dry Density, pcf:	86.9
Test Date:	19-Mar-2010	Desired M.C., %:	32.4	Failed in Shear?:	YES
Comments:		Desired Dry Density, pcf:	86.9	Triaxial Shear Strength, psi:	25.7

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Cycle No.	Actual Applied Maximum Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Maximum Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Recov Def. LVDT 1 Reading	Recov Def. LVDT 2 Reading	Average Recov Def. LVDT 1 and LVDT 2	Resilient Strain	Resilient Modulus
DESIGNATION	S3	Scyclic	c1	Pmax	Pcyclic	Pcontact	Smax	Scyclic	Scontact	H1	H2	H average		Mr
UNIT	psi	psi	---	lbs.	lbs.	lbs.	psi	psi	psi	inches	inches	inches	in/in	psi
PRECISION	- - -.-	- - -.-	-	- - - -.-	- - - -.-	- - -.-	- - -.-	- - -.-	- - -.-	-.- - - - -	-.- - - - -	-.- - - - -	-.- - - - -	- - -
SEQUENCE 1	6.0	2.0	1	12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00080	0.00080	0.00014	12,559
			2	12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00080	0.00080	0.00014	12,553
			3	12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00079	0.00080	0.00014	12,584
			4	12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00080	0.00080	0.00014	12,572
			5	12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00080	0.00080	0.00014	12,509
	COLUMN AVERAGE			12.7	11.5	1.2	2.0	1.8	0.2	0.00081	0.00080	0.00080	0.00014	12,555
	STANDARD DEV.			0.02	0.02	0.01	0.00	0.00	0.00	0.00000	0.00000	0.00000	0.00000	29

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 2	6.0	4.0	1	25.4	23.0	2.4	4.0	3.6	0.4	0.00157	0.00159	0.00158	0.00028	12,700
			2	25.5	23.0	2.4	4.0	3.6	0.4	0.00157	0.00159	0.00158	0.00028	12,718
			3	25.5	23.1	2.5	4.0	3.6	0.4	0.00158	0.00160	0.00158	0.00028	12,734
			4	25.5	23.1	2.4	4.0	3.6	0.4	0.00157	0.00159	0.00158	0.00028	12,762
			5	25.5	23.1	2.4	4.0	3.6	0.4	0.00157	0.00159	0.00158	0.00028	12,747
	COLUMN AVERAGE			25.5	23.1	2.4	4.0	3.6	0.4	0.00158	0.00159	0.00158	0.00028	12,732
	STANDARD DEV.			0.06	0.06	0.01	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	24
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 3	6.0	6.0	1	38.4	34.7	3.8	6.0	5.4	0.6	0.00243	0.00247	0.00245	0.00044	12,368
			2	38.4	34.7	3.8	6.0	5.4	0.6	0.00243	0.00246	0.00244	0.00044	12,410
			3	38.5	34.7	3.8	6.0	5.4	0.6	0.00244	0.00247	0.00245	0.00044	12,378
			4	38.5	34.7	3.7	6.0	5.4	0.6	0.00243	0.00246	0.00244	0.00044	12,414
			5	38.5	34.7	3.8	6.0	5.4	0.6	0.00242	0.00246	0.00244	0.00044	12,423
	COLUMN AVERAGE			38.5	34.7	3.8	6.0	5.4	0.6	0.00243	0.00246	0.00245	0.00044	12,398
	STANDARD DEV.			0.03	0.03	0.02	0.00	0.01	0.00	0.00001	0.00001	0.00001	0.00000	24
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 4	6.0	8.0	1	51.5	46.4	5.0	8.0	7.2	0.8	0.00336	0.00344	0.00340	0.00061	11,947
			2	51.5	46.4	5.1	8.0	7.2	0.8	0.00336	0.00344	0.00340	0.00061	11,935
			3	51.4	46.4	5.0	8.0	7.2	0.8	0.00336	0.00344	0.00340	0.00061	11,935
			4	51.5	46.5	5.0	8.0	7.3	0.8	0.00336	0.00344	0.00339	0.00061	11,962
			5	51.4	46.4	5.0	8.0	7.2	0.8	0.00335	0.00342	0.00339	0.00061	11,975
	COLUMN AVERAGE			51.4	46.4	5.0	8.0	7.2	0.8	0.00336	0.00344	0.00339	0.00061	11,951
	STANDARD DEV.			0.05	0.03	0.05	0.01	0.00	0.01	0.00000	0.00001	0.00000	0.00000	17

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Sheet No. 2 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 5	6.0	10.1	1	64.4	58.3	6.2	10.1	9.1	1.0	0.00440	0.00453	0.00446	0.00080	11,401
			2	64.3	58.1	6.2	10.0	9.1	1.0	0.00440	0.00452	0.00446	0.00080	11,390
			3	64.3	58.2	6.2	10.0	9.1	1.0	0.00439	0.00453	0.00446	0.00080	11,391
			4	64.4	58.2	6.2	10.1	9.1	1.0	0.00440	0.00453	0.00446	0.00080	11,398
			5	64.4	58.3	6.1	10.1	9.1	1.0	0.00440	0.00453	0.00446	0.00080	11,412
	COLUMN AVERAGE			64.4	58.2	6.2	10.1	9.1	1.0	0.00440	0.00453	0.00446	0.00080	11,399
	STANDARD DEV.			0.05	0.08	0.03	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	9
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 6	4.0	2.0	1	13.0	11.5	1.5	2.0	1.8	0.2	0.00083	0.00084	0.00084	0.00015	11,965
			2	13.0	11.5	1.6	2.0	1.8	0.2	0.00083	0.00085	0.00084	0.00015	11,964
			3	13.0	11.5	1.5	2.0	1.8	0.2	0.00083	0.00085	0.00084	0.00015	12,003
			4	13.0	11.5	1.5	2.0	1.8	0.2	0.00083	0.00084	0.00083	0.00015	12,030
			5	13.0	11.5	1.5	2.0	1.8	0.2	0.00083	0.00084	0.00083	0.00015	12,027
	COLUMN AVERAGE			13.0	11.5	1.5	2.0	1.8	0.2	0.00083	0.00084	0.00083	0.00015	11,998
	STANDARD DEV.			0.02	0.02	0.01	0.00	0.00	0.00	0.00000	0.00000	0.00000	0.00000	32
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 7	4.0	4.0	1	25.6	23.1	2.5	4.0	3.6	0.4	0.00163	0.00167	0.00165	0.00029	12,249
			2	25.6	23.1	2.4	4.0	3.6	0.4	0.00163	0.00166	0.00164	0.00029	12,276
			3	25.5	23.1	2.5	4.0	3.6	0.4	0.00163	0.00166	0.00164	0.00029	12,265
			4	25.5	23.1	2.5	4.0	3.6	0.4	0.00163	0.00166	0.00165	0.00029	12,246
			5	25.6	23.2	2.5	4.0	3.6	0.4	0.00163	0.00166	0.00165	0.00029	12,284
	COLUMN AVERAGE			25.6	23.1	2.5	4.0	3.6	0.4	0.00163	0.00166	0.00165	0.00029	12,264
	STANDARD DEV.			0.04	0.04	0.01	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	17

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Sheet No. 3 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 8	4.0	6.0	1	38.3	34.6	3.8	6.0	5.4	0.6	0.00248	0.00253	0.00250	0.00045	12,078
			2	38.3	34.5	3.7	6.0	5.4	0.6	0.00247	0.00252	0.00249	0.00045	12,102
			3	38.3	34.6	3.7	6.0	5.4	0.6	0.00248	0.00252	0.00250	0.00045	12,085
			4	38.4	34.6	3.7	6.0	5.4	0.6	0.00248	0.00253	0.00250	0.00045	12,094
			5	38.4	34.6	3.8	6.0	5.4	0.6	0.00248	0.00252	0.00250	0.00045	12,096
	COLUMN AVERAGE			38.3	34.6	3.7	6.0	5.4	0.6	0.00248	0.00252	0.00250	0.00045	12,091
	STANDARD DEV.			0.03	0.03	0.01	0.01	0.00	0.00	0.00000	0.00000	0.00000	0.00000	10
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 9	4.0	8.0	1	51.1	46.1	5.0	8.0	7.2	0.8	0.00343	0.00351	0.00347	0.00062	11,607
			2	51.1	46.1	5.0	8.0	7.2	0.8	0.00343	0.00351	0.00347	0.00062	11,612
			3	51.1	46.1	5.0	8.0	7.2	0.8	0.00343	0.00352	0.00347	0.00062	11,616
			4	51.1	46.1	5.0	8.0	7.2	0.8	0.00343	0.00351	0.00347	0.00062	11,618
			5	51.2	46.1	5.1	8.0	7.2	0.8	0.00343	0.00351	0.00347	0.00062	11,619
	COLUMN AVERAGE			51.1	46.1	5.0	8.0	7.2	0.8	0.00343	0.00351	0.00347	0.00062	11,614
	STANDARD DEV.			0.03	0.03	0.02	0.00	0.00	0.00	0.00000	0.00000	0.00000	0.00000	5
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 10	4.0	10.0	1	64.1	57.8	6.3	10.0	9.0	1.0	0.00450	0.00462	0.00456	0.00081	11,066
			2	64.0	57.7	6.3	10.0	9.0	1.0	0.00450	0.00462	0.00456	0.00081	11,060
			3	64.1	57.8	6.3	10.0	9.0	1.0	0.00450	0.00461	0.00455	0.00081	11,079
			4	64.1	57.8	6.3	10.0	9.0	1.0	0.00451	0.00462	0.00456	0.00082	11,062
			5	64.1	57.8	6.3	10.0	9.0	1.0	0.00450	0.00462	0.00456	0.00082	11,068
	COLUMN AVERAGE			64.1	57.8	6.3	10.0	9.0	1.0	0.00450	0.00462	0.00456	0.00081	11,067
	STANDARD DEV.			0.05	0.04	0.02	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	8

Sample ID: N

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COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 11	2.0	2.1	1	13.4	11.5	1.9	2.1	1.8	0.3	0.00090	0.00090	0.00090	0.00016	11,141
			2	13.3	11.4	1.9	2.1	1.8	0.3	0.00089	0.00089	0.00089	0.00016	11,155
			3	13.4	11.4	1.9	2.1	1.8	0.3	0.00090	0.00089	0.00089	0.00016	11,181
			4	13.4	11.4	1.9	2.1	1.8	0.3	0.00090	0.00089	0.00089	0.00016	11,200
			5	13.4	11.4	1.9	2.1	1.8	0.3	0.00089	0.00089	0.00089	0.00016	11,239
	COLUMN AVERAGE			13.4	11.4	1.9	2.1	1.8	0.3	0.00090	0.00089	0.00089	0.00016	11,183
	STANDARD DEV.			0.02	0.03	0.01	0.00	0.00	0.00	0.00000	0.00000	0.00000	0.00000	38
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 12	2.0	4.0	1	25.5	23.1	2.4	4.0	3.6	0.4	0.00178	0.00179	0.00178	0.00032	11,345
			2	25.4	23.0	2.4	4.0	3.6	0.4	0.00177	0.00178	0.00177	0.00032	11,335
			3	25.5	23.0	2.4	4.0	3.6	0.4	0.00177	0.00179	0.00177	0.00032	11,343
			4	25.5	23.0	2.4	4.0	3.6	0.4	0.00177	0.00179	0.00178	0.00032	11,333
			5	25.5	23.1	2.4	4.0	3.6	0.4	0.00177	0.00179	0.00178	0.00032	11,342
	COLUMN AVERAGE			25.5	23.1	2.4	4.0	3.6	0.4	0.00177	0.00179	0.00178	0.00032	11,340
	STANDARD DEV.			0.03	0.04	0.01	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	5
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 13	2.0	6.0	1	38.3	34.5	3.8	6.0	5.4	0.6	0.00268	0.00272	0.00269	0.00048	11,186
			2	38.3	34.6	3.8	6.0	5.4	0.6	0.00268	0.00272	0.00270	0.00048	11,184
			3	38.3	34.6	3.7	6.0	5.4	0.6	0.00268	0.00272	0.00270	0.00048	11,182
			4	38.3	34.6	3.8	6.0	5.4	0.6	0.00268	0.00271	0.00269	0.00048	11,209
			5	38.4	34.6	3.8	6.0	5.4	0.6	0.00268	0.00271	0.00269	0.00048	11,228
	COLUMN AVERAGE			38.3	34.6	3.8	6.0	5.4	0.6	0.00268	0.00272	0.00270	0.00048	11,198
	STANDARD DEV.			0.04	0.04	0.01	0.01	0.01	0.00	0.00000	0.00000	0.00000	0.00000	20

Sample ID: N

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COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 14	2.0	8.0	1	51.1	46.1	5.0	8.0	7.2	0.8	0.00368	0.00376	0.00372	0.00067	10,818
			2	51.1	46.1	5.0	8.0	7.2	0.8	0.00368	0.00376	0.00372	0.00067	10,818
			3	51.1	46.1	5.0	8.0	7.2	0.8	0.00369	0.00376	0.00372	0.00066	10,813
			4	51.2	46.1	5.0	8.0	7.2	0.8	0.00368	0.00376	0.00372	0.00066	10,833
			5	51.2	46.1	5.1	8.0	7.2	0.8	0.00368	0.00376	0.00372	0.00066	10,837
	COLUMN AVERAGE			51.1	46.1	5.0	8.0	7.2	0.8	0.00368	0.00376	0.00372	0.00066	10,824
	STANDARD DEV.			0.04	0.03	0.02	0.01	0.00	0.00	0.00000	0.00000	0.00000	0.00000	11
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 15	2.0	10.0	1	64.1	57.8	6.4	10.0	9.0	1.0	0.00480	0.00491	0.00486	0.00087	10,395
			2	64.1	57.8	6.3	10.0	9.0	1.0	0.00480	0.00492	0.00486	0.00087	10,390
			3	64.1	57.8	6.3	10.0	9.0	1.0	0.00480	0.00492	0.00486	0.00087	10,387
			4	64.1	57.7	6.3	10.0	9.0	1.0	0.00480	0.00491	0.00486	0.00087	10,385
			5	64.1	57.7	6.3	10.0	9.0	1.0	0.00480	0.00492	0.00486	0.00087	10,372
	COLUMN AVERAGE			64.1	57.8	6.3	10.0	9.0	1.0	0.00480	0.00492	0.00486	0.00087	10,386
	STANDARD DEV.			0.03	0.03	0.01	0.01	0.00	0.00	0.00000	0.00000	0.00000	0.00000	9

Sample ID: N

Project: BL-10-00425

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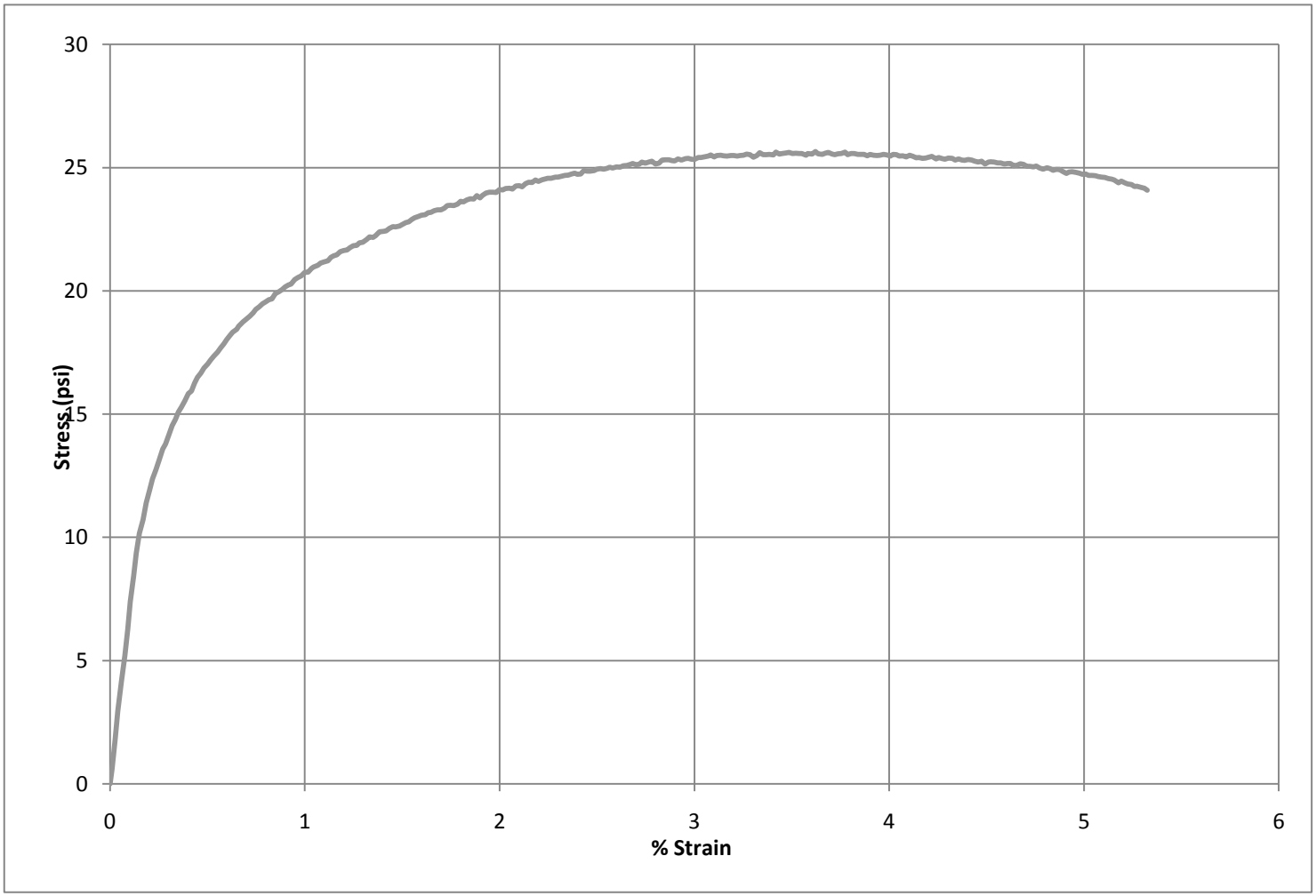
EJK

Laboratory Technician

Quick Shear

Confining Pressure 4 PSI

Peak Shear Stress (psi) = 25.66



Sample ID: N

Project: BL-10-00425

Sheet No. of

Resilient Modulus Testing - S. I. Units

Date: March 22, 2010

Project: BL-10-00425

Client:
Mr. Harkanwal Brar
SRA
1201 New Road Suite 242
Linwood, NJ 08221

Project Description:
Resilient Modulus Test
AASHTO T307
Client ID: NAPTF Subgrade Soils
Station:

Sample Information

Braun Sample ID./ File Name:	N	Sample Diameter, mm:	72.5	Sample M.C., % before, after:	32.4, 32.4
Sample Type:	Type 2	Sample Height, mm:	142.1	Sample Dry Density, Kg/cu.m:	1392.1
Test Date:	19-Mar-2010	Desired M.C., %:	32.4	Failed in Shear?:	YES
Comments:		Desired Dry Den., Kg/cu.ı	1392.0	Triaxial Shear Strength, kPa:	176.9

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Cycle No.	Actual Applied Maximum Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Maximum Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Recov Def. LVDT 1 Reading	Recov Def. LVDT 2 Reading	Average Recov Def. LVDT 1 and LVDT 2	Resilient Strain	Resilient Modulus
DESIGNATION	S3	Scyclic	c1	Pmax	Pcyclic	Pcontact	Smax	Scyclic	Scontact	H1	H2	H average		Mr
UNIT	kPa	kPa	---	N	N	N	kPa	kPa	kPa	mm	mm	mm	mm/mm	MPa
PRECISION	- - -.-	- - -.-	-	- - - -.-	- - - -.-	- - -.-	- - -.-	- - -.-	- - -.-	-.- - - - -	-.- - - - -	-.- - - - -	-.- - - - -	- - -
SEQUENCE 1	41.4	13.7	1	56.5	51.2	5.3	13.7	12.4	1.3	0.02046	0.02031	0.02035	0.00014	87
			2	56.4	51.1	5.2	13.6	12.4	1.3	0.02054	0.02023	0.02031	0.00014	87
			3	56.6	51.2	5.3	13.7	12.4	1.3	0.02062	0.02015	0.02031	0.00014	87
			4	56.5	51.2	5.3	13.7	12.4	1.3	0.02046	0.02031	0.02031	0.00014	87
			5	56.3	51.0	5.3	13.6	12.3	1.3	0.02046	0.02031	0.02035	0.00014	86
	COLUMN AVERAGE			56.4	51.2	5.3	13.7	12.4	1.3	0.02051	0.02026	0.02032	0.00014	87
	STANDARD DEV.			0.11	0.09	0.03	0.03	0.02	0.01	0.00007	0.00007	0.00002	0.00000	0

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 2	41.4	27.4	1	113.0	102.1	10.9	27.3	24.7	2.6	0.04000	0.04031	0.04012	0.00028	88
			2	113.2	102.4	10.9	27.4	24.8	2.6	0.04000	0.04031	0.04015	0.00028	88
			3	113.6	102.7	10.9	27.5	24.9	2.6	0.04008	0.04054	0.04023	0.00028	88
			4	113.6	102.8	10.7	27.5	24.9	2.6	0.04000	0.04046	0.04019	0.00028	88
			5	113.6	102.7	10.9	27.5	24.9	2.6	0.04000	0.04046	0.04019	0.00028	88
	COLUMN AVERAGE			113.4	102.6	10.9	27.4	24.8	2.6	0.04001	0.04042	0.04018	0.00028	88
	STANDARD DEV.			0.27	0.29	0.06	0.06	0.07	0.01	0.00004	0.00010	0.00004	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 3	41.3	41.4	1	171.0	154.1	16.8	41.4	37.3	4.1	0.06170	0.06263	0.06217	0.00044	85
			2	171.0	154.2	16.8	41.4	37.3	4.1	0.06170	0.06240	0.06197	0.00044	86
			3	171.2	154.5	16.8	41.4	37.4	4.1	0.06194	0.06263	0.06224	0.00044	85
			4	171.0	154.4	16.6	41.4	37.4	4.0	0.06170	0.06248	0.06205	0.00044	86
			5	171.2	154.3	16.8	41.4	37.3	4.1	0.06155	0.06240	0.06197	0.00044	86
	COLUMN AVERAGE			171.1	154.3	16.8	41.4	37.3	4.1	0.06172	0.06251	0.06208	0.00044	85
	STANDARD DEV.			0.13	0.15	0.08	0.03	0.04	0.02	0.00014	0.00012	0.00012	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 4	41.4	55.4	1	229.0	206.6	22.4	55.4	50.0	5.4	0.08527	0.08728	0.08623	0.00061	82
			2	229.0	206.4	22.6	55.4	49.9	5.5	0.08527	0.08736	0.08627	0.00061	82
			3	228.7	206.4	22.3	55.3	49.9	5.4	0.08527	0.08743	0.08627	0.00061	82
			4	228.9	206.7	22.2	55.4	50.0	5.4	0.08527	0.08728	0.08620	0.00061	82
			5	228.5	206.5	22.0	55.3	50.0	5.3	0.08503	0.08697	0.08600	0.00061	83
	COLUMN AVERAGE			228.8	206.5	22.3	55.4	50.0	5.4	0.08522	0.08727	0.08620	0.00061	82
	STANDARD DEV.			0.22	0.12	0.22	0.05	0.03	0.05	0.00010	0.00018	0.00011	0.00000	0

Sample ID: N

Project: BL-10-00425

Sheet No. 2 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 5	41.4	69.3	1	286.6	259.2	27.4	69.3	62.7	6.6	0.11185	0.11495	0.11340	0.00080	79
			2	286.2	258.6	27.6	69.2	62.6	6.7	0.11170	0.11480	0.11325	0.00080	79
			3	286.2	258.7	27.5	69.3	62.6	6.7	0.11162	0.11495	0.11329	0.00080	79
			4	286.4	259.0	27.4	69.3	62.7	6.6	0.11170	0.11503	0.11332	0.00080	79
			5	286.7	259.5	27.2	69.4	62.8	6.6	0.11170	0.11511	0.11340	0.00080	79
	COLUMN AVERAGE			286.4	259.0	27.4	69.3	62.7	6.6	0.11171	0.11497	0.11333	0.00080	79
	STANDARD DEV.			0.22	0.35	0.14	0.05	0.08	0.03	0.00009	0.00012	0.00007	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 6	27.6	14.0	1	57.7	50.9	6.8	14.0	12.3	1.6	0.02116	0.02139	0.02124	0.00015	82
			2	57.9	50.9	6.9	14.0	12.3	1.7	0.02108	0.02147	0.02124	0.00015	82
			3	57.9	51.1	6.8	14.0	12.4	1.7	0.02108	0.02147	0.02124	0.00015	83
			4	57.7	50.9	6.8	14.0	12.3	1.6	0.02101	0.02139	0.02112	0.00015	83
			5	57.8	51.0	6.8	14.0	12.3	1.6	0.02101	0.02139	0.02116	0.00015	83
	COLUMN AVERAGE			57.8	51.0	6.8	14.0	12.3	1.6	0.02107	0.02143	0.02120	0.00015	83
	STANDARD DEV.			0.09	0.07	0.05	0.02	0.02	0.01	0.00006	0.00004	0.00005	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 7	27.6	27.5	1	113.7	102.8	10.9	27.5	24.9	2.6	0.04147	0.04232	0.04186	0.00029	84
			2	113.7	102.8	10.9	27.5	24.9	2.6	0.04139	0.04225	0.04178	0.00029	85
			3	113.4	102.5	10.9	27.4	24.8	2.6	0.04131	0.04225	0.04170	0.00029	85
			4	113.6	102.7	10.9	27.5	24.8	2.6	0.04147	0.04225	0.04182	0.00029	84
			5	113.9	103.0	10.9	27.6	24.9	2.6	0.04139	0.04225	0.04182	0.00029	85
	COLUMN AVERAGE			113.7	102.8	10.9	27.5	24.9	2.6	0.04141	0.04226	0.04180	0.00029	85
	STANDARD DEV.			0.16	0.17	0.03	0.04	0.04	0.01	0.00007	0.00004	0.00006	0.00000	0

Sample ID: N

Project: BL-10-00425

Sheet No. 3 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 8	27.5	41.3	1	170.5	153.8	16.7	41.3	37.2	4.0	0.06294	0.06418	0.06352	0.00045	83
			2	170.3	153.7	16.6	41.2	37.2	4.0	0.06279	0.06395	0.06333	0.00045	83
			3	170.5	153.8	16.7	41.2	37.2	4.0	0.06287	0.06410	0.06348	0.00045	83
			4	170.6	154.0	16.6	41.3	37.3	4.0	0.06294	0.06418	0.06352	0.00045	83
			5	170.6	153.9	16.7	41.3	37.2	4.0	0.06294	0.06403	0.06345	0.00045	83
	COLUMN AVERAGE			170.5	153.8	16.7	41.3	37.2	4.0	0.06289	0.06409	0.06346	0.00045	83
	STANDARD DEV.			0.14	0.13	0.05	0.03	0.03	0.01	0.00007	0.00010	0.00008	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 9	27.6	55.0	1	227.4	205.0	22.4	55.0	49.6	5.4	0.08720	0.08922	0.08810	0.00062	80
			2	227.4	205.1	22.3	55.0	49.6	5.4	0.08712	0.08914	0.08809	0.00062	80
			3	227.5	205.3	22.3	55.0	49.7	5.4	0.08712	0.08930	0.08813	0.00062	80
			4	227.4	205.0	22.4	55.0	49.6	5.4	0.08705	0.08907	0.08802	0.00062	80
			5	227.7	205.2	22.5	55.1	49.7	5.4	0.08705	0.08922	0.08810	0.00062	80
	COLUMN AVERAGE			227.5	205.1	22.4	55.0	49.6	5.4	0.08711	0.08919	0.08809	0.00062	80
	STANDARD DEV.			0.12	0.11	0.08	0.03	0.03	0.02	0.00006	0.00009	0.00004	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 10	27.6	69.0	1	284.9	256.9	28.0	68.9	62.2	6.8	0.11441	0.11736	0.11581	0.00081	76
			2	284.7	256.7	28.1	68.9	62.1	6.8	0.11425	0.11728	0.11577	0.00081	76
			3	284.9	257.0	28.0	68.9	62.2	6.8	0.11433	0.11720	0.11569	0.00081	76
			4	285.2	257.1	28.1	69.0	62.2	6.8	0.11449	0.11736	0.11592	0.00082	76
			5	285.2	257.1	28.1	69.0	62.2	6.8	0.11441	0.11736	0.11584	0.00082	76
	COLUMN AVERAGE			285.0	256.9	28.1	69.0	62.2	6.8	0.11438	0.11731	0.11581	0.00081	76
	STANDARD DEV.			0.20	0.16	0.07	0.05	0.04	0.02	0.00009	0.00007	0.00009	0.00000	0

Sample ID: N

Project: BL-10-00425

Sheet No. 4 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 11	13.8	14.4	1	59.5	51.0	8.5	14.4	12.3	2.1	0.02287	0.02287	0.02283	0.00016	77
			2	59.2	50.6	8.6	14.3	12.2	2.1	0.02271	0.02271	0.02263	0.00016	77
			3	59.4	50.8	8.6	14.4	12.3	2.1	0.02279	0.02263	0.02267	0.00016	77
			4	59.4	50.8	8.6	14.4	12.3	2.1	0.02279	0.02263	0.02263	0.00016	77
			5	59.5	50.8	8.7	14.4	12.3	2.1	0.02263	0.02256	0.02256	0.00016	77
	COLUMN AVERAGE			59.4	50.8	8.6	14.4	12.3	2.1	0.02276	0.02268	0.02266	0.00016	77
	STANDARD DEV.			0.11	0.13	0.05	0.03	0.03	0.01	0.00009	0.00012	0.00010	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 12	13.8	27.4	1	113.5	102.8	10.7	27.5	24.9	2.6	0.04511	0.04550	0.04519	0.00032	78
			2	113.1	102.3	10.8	27.4	24.8	2.6	0.04488	0.04527	0.04504	0.00032	78
			3	113.4	102.5	10.9	27.4	24.8	2.6	0.04488	0.04535	0.04507	0.00032	78
			4	113.4	102.5	10.9	27.4	24.8	2.6	0.04496	0.04535	0.04511	0.00032	78
			5	113.4	102.6	10.8	27.4	24.8	2.6	0.04496	0.04543	0.04511	0.00032	78
	COLUMN AVERAGE			113.3	102.5	10.8	27.4	24.8	2.6	0.04496	0.04538	0.04511	0.00032	78
	STANDARD DEV.			0.15	0.16	0.05	0.04	0.04	0.01	0.00010	0.00009	0.00006	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 13	13.7	41.2	1	170.2	153.5	16.7	41.2	37.1	4.0	0.06806	0.06899	0.06845	0.00048	77
			2	170.5	153.7	16.7	41.2	37.2	4.0	0.06814	0.06907	0.06856	0.00048	77
			3	170.3	153.7	16.6	41.2	37.2	4.0	0.06806	0.06914	0.06856	0.00048	77
			4	170.5	153.8	16.7	41.3	37.2	4.0	0.06814	0.06891	0.06845	0.00048	77
			5	170.7	154.0	16.7	41.3	37.3	4.0	0.06798	0.06883	0.06841	0.00048	77
	COLUMN AVERAGE			170.4	153.7	16.7	41.2	37.2	4.0	0.06807	0.06899	0.06848	0.00048	77
	STANDARD DEV.			0.18	0.18	0.04	0.04	0.04	0.01	0.00007	0.00012	0.00007	0.00000	0

Sample ID: N

Project: BL-10-00425

Sheet No. 5 of

COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 14	13.8	55.0	1	227.3	205.0	22.3	55.0	49.6	5.4	0.09348	0.09558	0.09453	0.00067	75
			2	227.3	205.0	22.3	55.0	49.6	5.4	0.09356	0.09558	0.09453	0.00067	75
			3	227.3	204.8	22.4	55.0	49.6	5.4	0.09364	0.09550	0.09449	0.00066	75
			4	227.6	205.2	22.4	55.1	49.7	5.4	0.09356	0.09558	0.09449	0.00066	75
			5	227.6	205.1	22.5	55.1	49.6	5.4	0.09340	0.09550	0.09441	0.00066	75
	COLUMN AVERAGE			227.4	205.0	22.4	55.0	49.6	5.4	0.09353	0.09554	0.09449	0.00066	75
	STANDARD DEV.			0.18	0.14	0.09	0.04	0.03	0.02	0.00009	0.00004	0.00005	0.00000	0
COLUMN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SEQUENCE 15	13.8	69.0	1	285.3	257.0	28.2	69.0	62.2	6.8	0.12201	0.12480	0.12333	0.00087	72
			2	285.2	257.1	28.2	69.0	62.2	6.8	0.12201	0.12488	0.12340	0.00087	72
			3	285.1	256.9	28.2	69.0	62.2	6.8	0.12201	0.12487	0.12336	0.00087	72
			4	284.9	256.8	28.2	68.9	62.1	6.8	0.12201	0.12472	0.12333	0.00087	72
			5	284.9	256.8	28.2	68.9	62.1	6.8	0.12201	0.12495	0.12348	0.00087	72
	COLUMN AVERAGE			285.1	256.9	28.2	69.0	62.2	6.8	0.12201	0.12484	0.12338	0.00087	72
	STANDARD DEV.			0.15	0.13	0.04	0.04	0.03	0.01	0.00000	0.00009	0.00006	0.00000	0

Sample ID: N

Project: BL-10-00425

Sheet No. 6 of

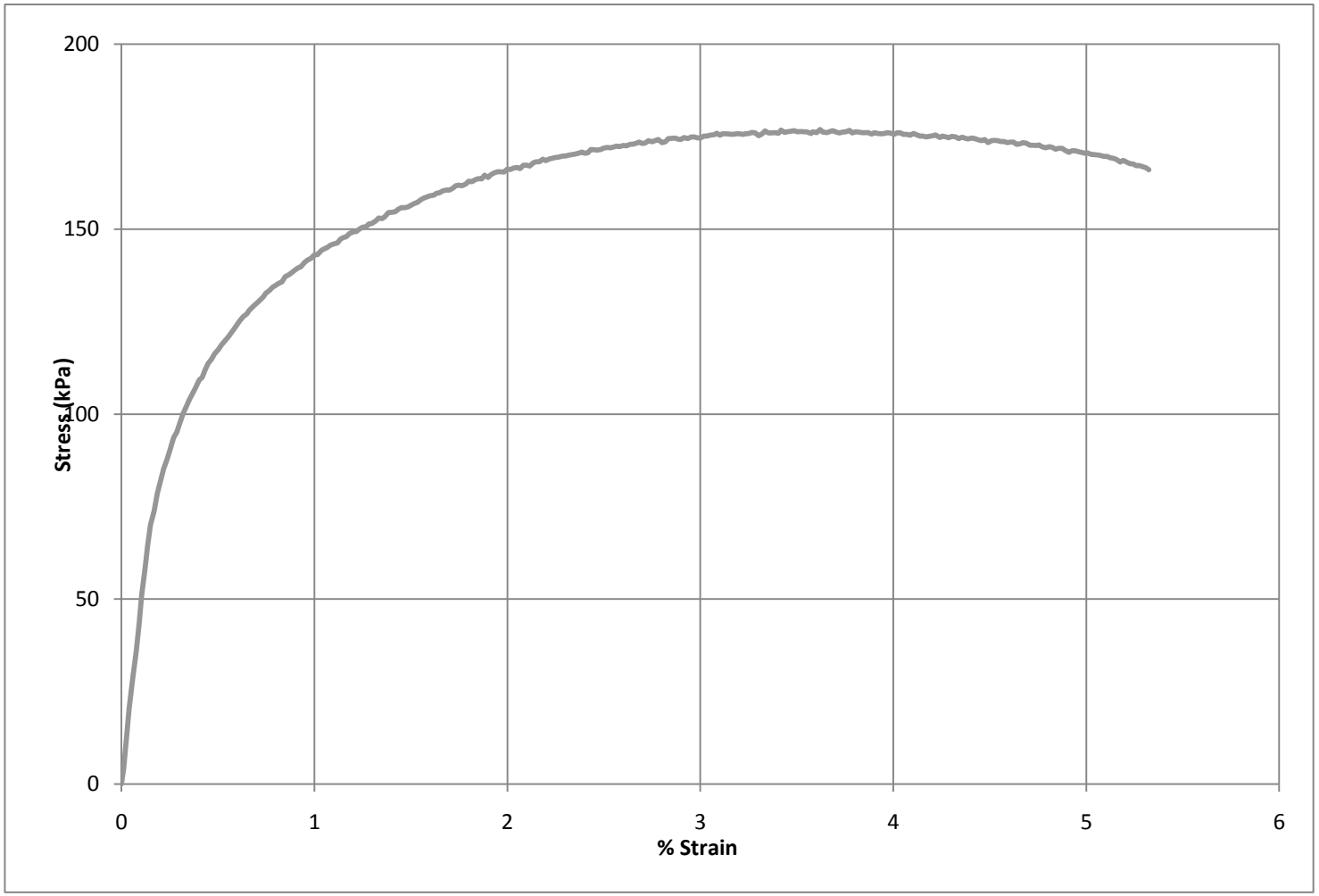
EJK

Laboratory Technician

Quick Shear

Confining Pressure 27.6 kPa

Peak Shear Stress (kPa) = 176.90



Sample ID: N

Project: BL-10-00425

Sheet No. of

Universal Model Calculations - US Customary Units

Braun Sample ID: N

Project: BL-10-00425

Station:

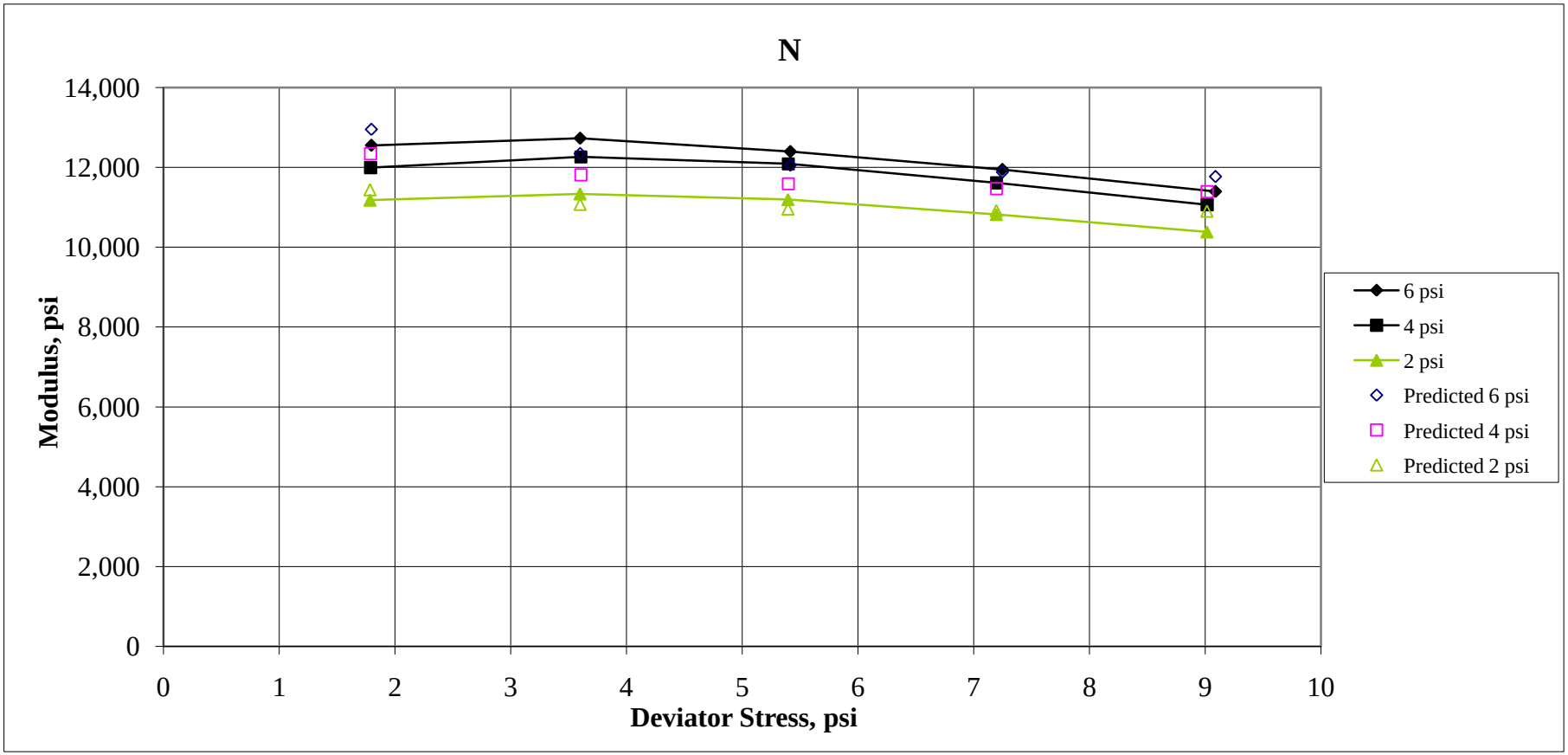
Seq.	Conf. psi	Axial Stress psi	Bulk psi	Deviator psi	M_r psi	Pred. Mr psi	Ln(Mr)	Ln(Bulk)	Ln(Dev)
1	6.0	2.0	20.0	1.8	12,555	12,954	9.438	2.995	0.585
2	6.0	4.0	22.0	3.6	12,732	12,347	9.452	3.090	1.281
3	6.0	6.0	24.0	5.4	12,398	12,057	9.425	3.178	1.689
4	6.0	8.0	26.0	7.2	11,951	11,886	9.389	3.259	1.981
5	6.0	10.1	28.1	9.1	11,399	11,774	9.341	3.335	2.207
6	4.0	2.0	14.0	1.8	11,998	12,343	9.392	2.642	0.582
7	4.0	4.0	16.0	3.6	12,264	11,816	9.414	2.772	1.283
8	4.0	6.0	18.0	5.4	12,091	11,590	9.400	2.888	1.686
9	4.0	8.0	20.0	7.2	11,614	11,469	9.360	2.996	1.974
10	4.0	10.0	22.0	9.0	11,067	11,393	9.312	3.091	2.199
11	2.0	2.1	8.1	1.8	11,183	11,442	9.322	2.089	0.578
12	2.0	4.0	10.0	3.6	11,340	11,075	9.336	2.300	1.281
13	2.0	6.0	12.0	5.4	11,198	10,959	9.323	2.481	1.686
14	2.0	8.0	14.0	7.2	10,824	10,918	9.289	2.638	1.973
15	2.0	10.0	16.0	9.0	10,386	10,905	9.248	2.772	2.199

Universal Model Graph - US Customary Units

Braun Sample ID: N

Station:

Project: BL-10-00425



Universal Model Calculations - US Customary Units

Braun Sample ID: N

Project: BL-10-00425

Station:

SUMMARY OUTPUT

	k1	k2	k3
Value	9,029	0.138	-0.088
t-Stat	128.18	4.88	-5.16
R-sqr Adj.	0.69367		
Std Err	0.03261	or 3.31%	

Regression Statistics	
Multiple R	0.858737902
R Square	0.737430784
Adjusted R Square	0.693669248
Standard Error	0.03260855
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.035836177	0.0179181	16.851117	0.00032769
Residual	12	0.01275981	0.0010633		
Total	14	0.048595988			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	9.10819389	0.071058194	128.17936	3.41E-20	8.953371385	9.263016396	8.953371385	9.263016396
X Variable 1	0.137640355	0.028185976	4.8832922	0.0003764	0.076228389	0.199052321	0.076228389	0.199052321
X Variable 2	-0.08769907	0.016999324	-5.158974	0.0002374	-0.124737419	-0.050660726	-0.124737419	-0.050660726

Universal Model Calculations - S.I. Units

Braun Sample ID: N

Project: BL-10-00425

Station:

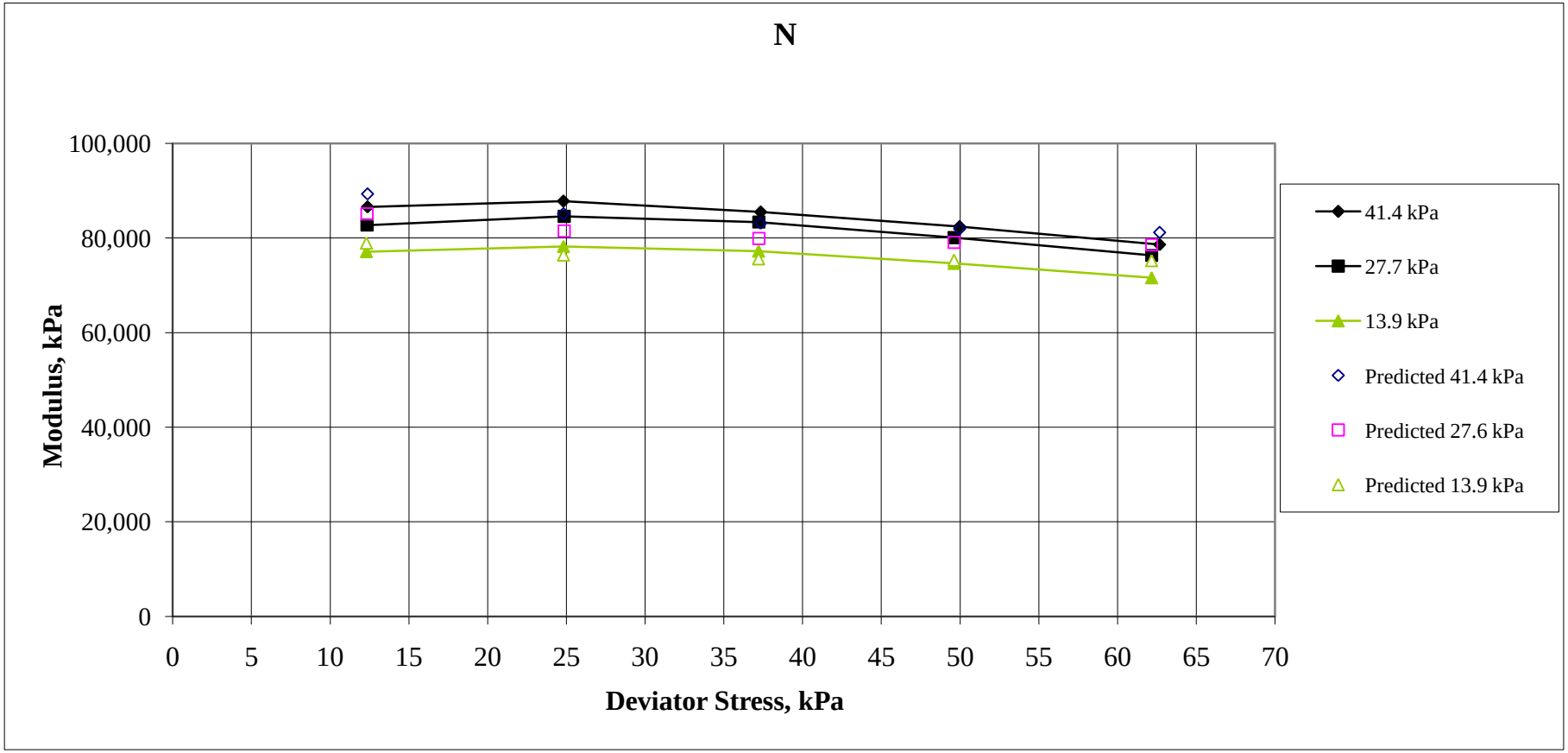
Seq.	Conf. kPa	Axial Stress kPa	Bulk kPa	Deviator kPa	M_r kPa	Pred. Mr kPa	Ln(Mr)	Ln(Bulk)	Ln(Dev)
1	41.4	13.7	137.8	12.4	86,565	89,313	11.369	4.926	2.516
2	41.4	27.4	151.5	24.8	87,784	85,132	11.383	5.021	3.211
3	41.3	41.4	165.4	37.3	85,484	83,132	11.356	5.108	3.620
4	41.4	55.4	179.5	50.0	82,399	81,951	11.319	5.190	3.911
5	41.4	69.3	193.6	62.7	78,590	81,181	11.272	5.266	4.138
6	27.6	14.0	96.8	12.3	82,722	85,100	11.323	4.573	2.513
7	27.6	27.5	110.2	24.9	84,558	81,467	11.345	4.702	3.213
8	27.5	41.3	123.8	37.2	83,364	79,907	11.331	4.819	3.617
9	27.6	55.0	137.9	49.6	80,079	79,076	11.291	4.926	3.905
10	27.6	69.0	151.6	62.2	76,304	78,552	11.242	5.022	4.130
11	13.8	14.4	55.7	12.3	77,107	78,891	11.253	4.020	2.509
12	13.8	27.4	68.8	24.8	78,185	76,359	11.267	4.231	3.211
13	13.7	41.2	82.5	37.2	77,205	75,560	11.254	4.412	3.616
14	13.8	55.0	96.4	49.6	74,626	75,278	11.220	4.568	3.904
15	13.8	69.0	110.3	62.2	71,607	75,185	11.179	4.703	4.130

Universal Model Graph - S.I. Units

Braun Sample ID: N

Station:

Project: BL-10-00425



Universal Model Calculations - S.I. Units

Braun Sample ID: N

Project: BL-10-00425

Station:

SUMMARY OUTPUT

	k1	k2	k3
Value	56,530	0.138	-0.088
t-Stat	93.57	4.88	-5.16
R-sqr Adj.	0.69367		
Std Err	0.03261	or 3.31%	

Regression Statistics	
Multiple R	0.858737902
R Square	0.737430784
Adjusted R Square	0.693669248
Standard Error	0.03260855
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.035836177	0.0179181	16.851117	0.00032769
Residual	12	0.01275981	0.0010633		
Total	14	0.048595988			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	10.94253046	0.116948724	93.566908	1.485E-18	10.68772108	11.19733984	10.68772108	11.19733984
X Variable 1	0.137640355	0.028185976	4.8832922	0.0003764	0.076228389	0.199052321	0.076228389	0.199052321
X Variable 2	-0.08769907	0.016999324	-5.158974	0.0002374	-0.124737419	-0.050660726	-0.124737419	-0.050660726