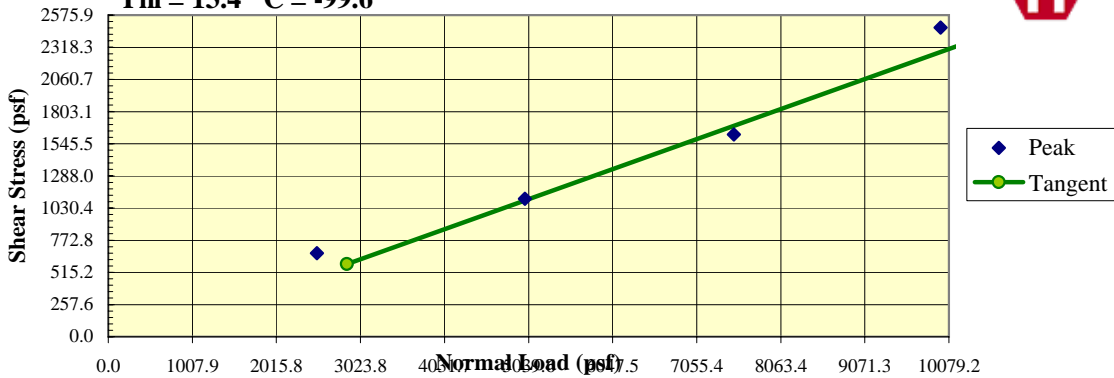


Humboldt Scientific, Inc.  
Direct Shear Test (ASTM D3080)

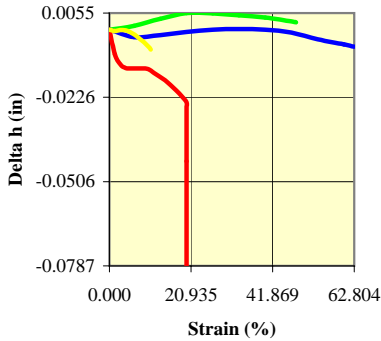


Phi = 13.4 C = -99.6

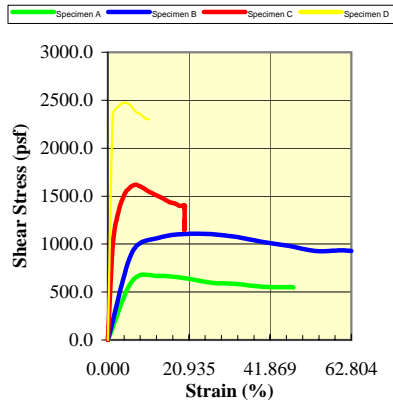


Date

Checked By



Date



Date

Specimen				
Initial	A	B	C	D
Moisture (%)	50.40	50.40	50.40	50.40
Density (pcf)	72.53	72.53	72.53	72.53
Void Ratio	1.281	1.281	1.281	1.281
Saturation (%)	104.27	104.27	104.27	104.27
Diameter (in)	2.500	2.500	2.500	2.500
Height (in)	1.070	1.070	1.070	1.070

Final	A	B	C	D
Moisture (%)	0.00	0.00	0.00	0.00
Density (pcf)	109.08	109.08	109.08	109.08
Void Ratio	0.517	0.517	0.517	0.517
Saturation (%)	0.00	0.00	0.00	0.00
Diameter (in)	2.500	2.500	2.500	2.500
Height (in)	1.070	1.070	1.070	1.070
Normal Stress (psi)	17.4	34.7	52.1	69.3
Peak Stress (psf)	668.8	1105.9	1619.3	2475.9
Deformation (in)	47.850	0.000	0.000	0.000
Rate (in/min)	0.0120	0.0120	0.0120	0.0120

Project Date	
Date	07/26/06

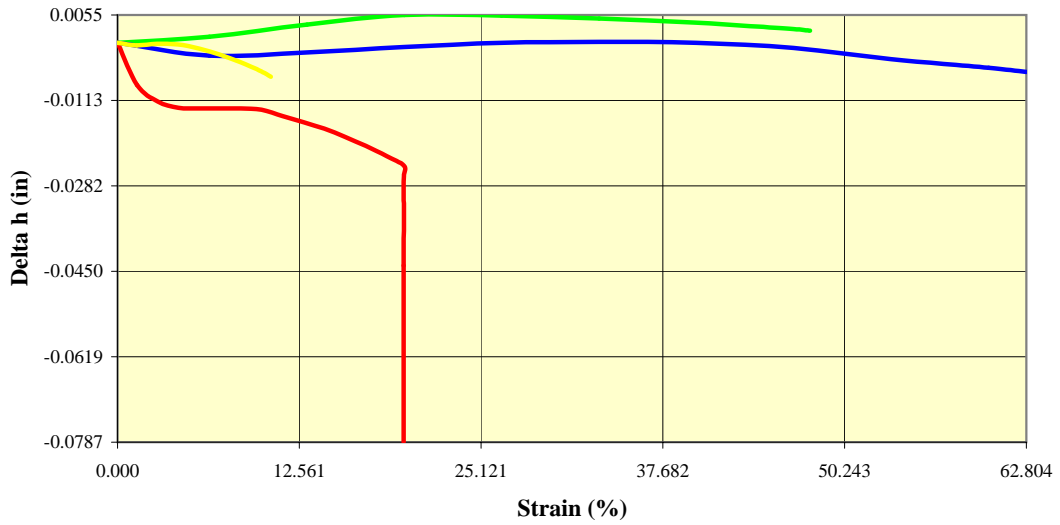
Project:	Testing	N/A	N/A	N/A	N/A
Location:	Bridge 5B				
Project Number:	5B				
Boring Number:	7				
Sample Number:	23				
Depth:	5'	Failure Photographs			
Sample Type:	Remolded				
Description:	Sand				
Test Type:	Direct Shear				
Remarks:					

Tested By



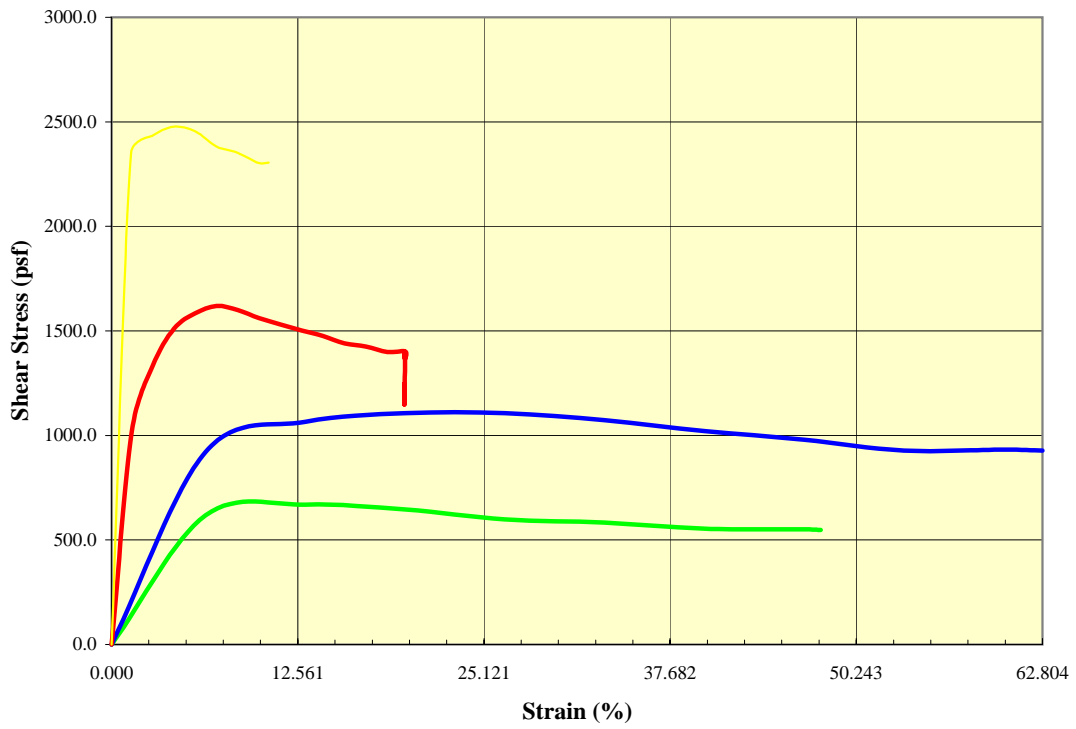
Date  
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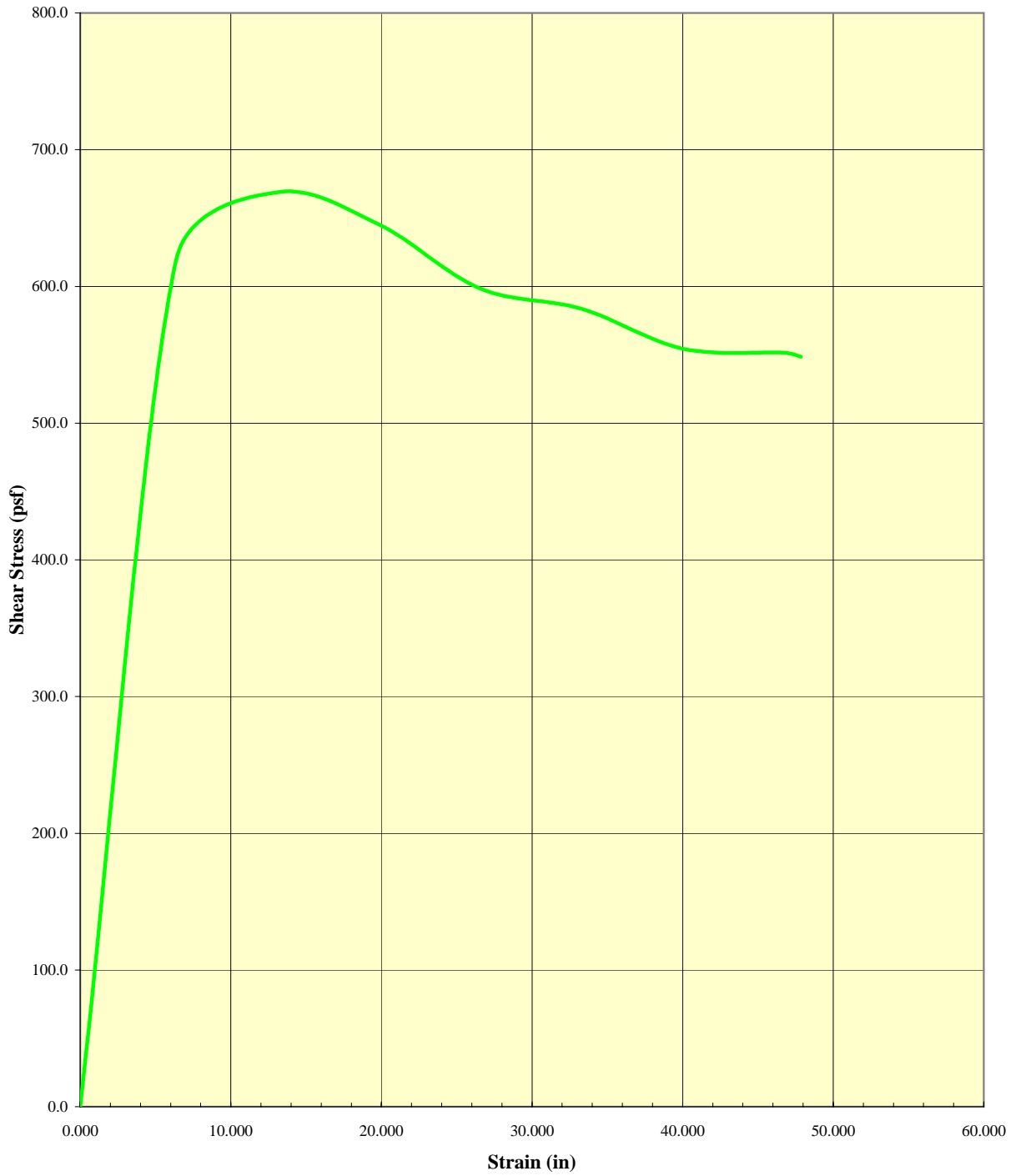
— Specimen A — Specimen B — Specimen C — Specimen D

Stress Strain





Specimen A Stress Strain



Date

Checked By

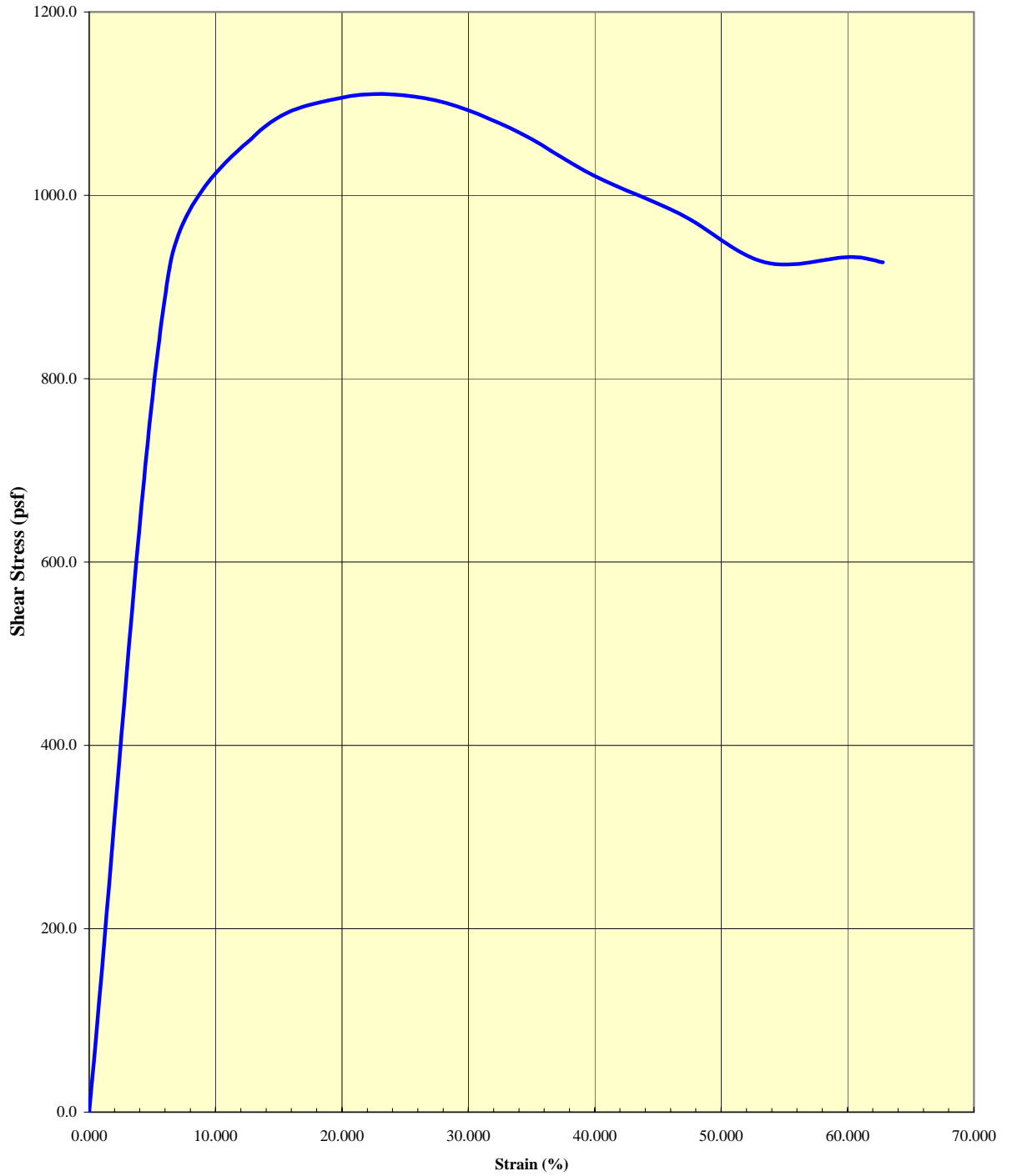
Date

Date

Tested By



Specimen B Stress Strain



Date

Checked By

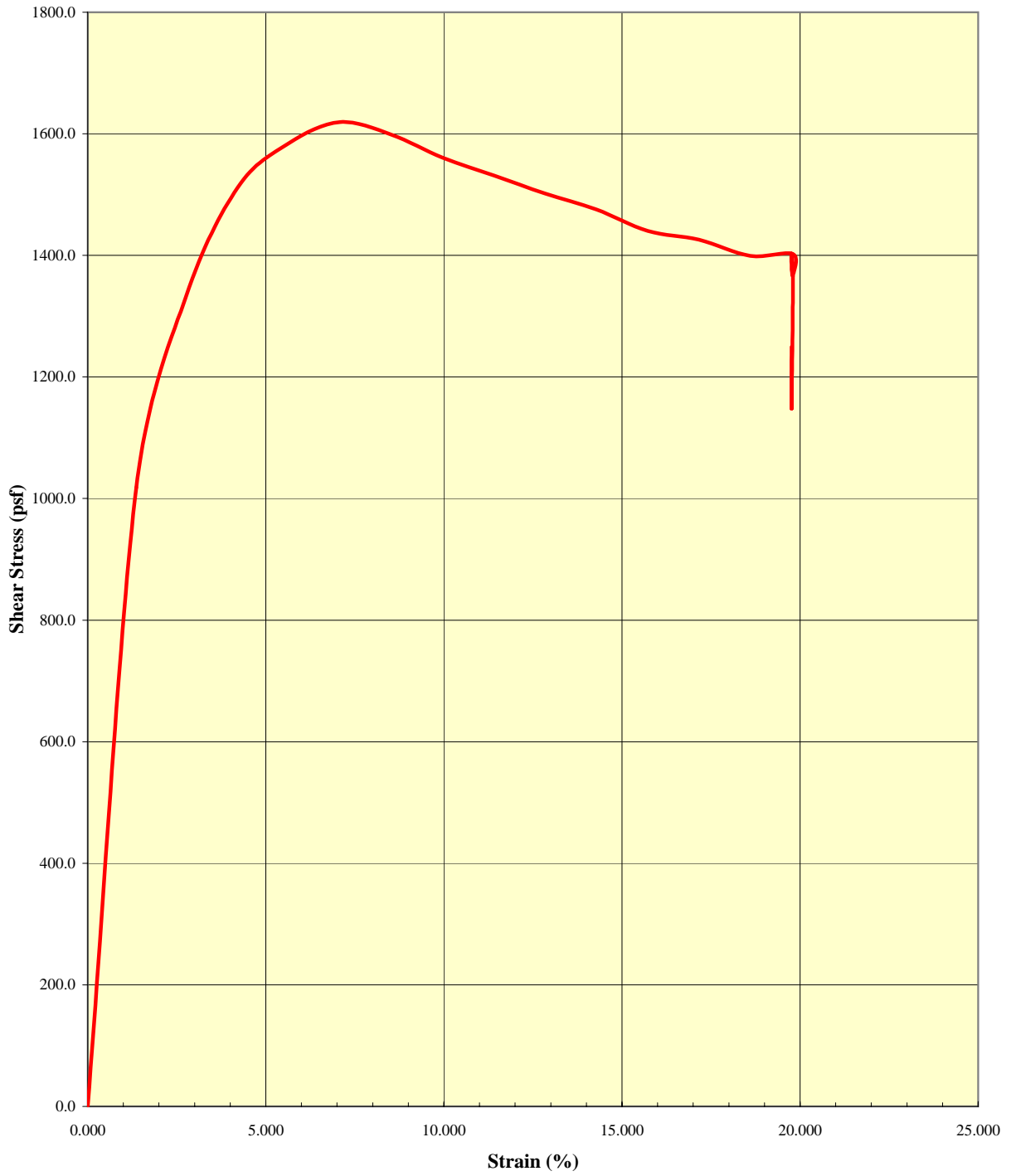
Date

Date

Tested By



Specimen C Stress Strain



Date

Checked By

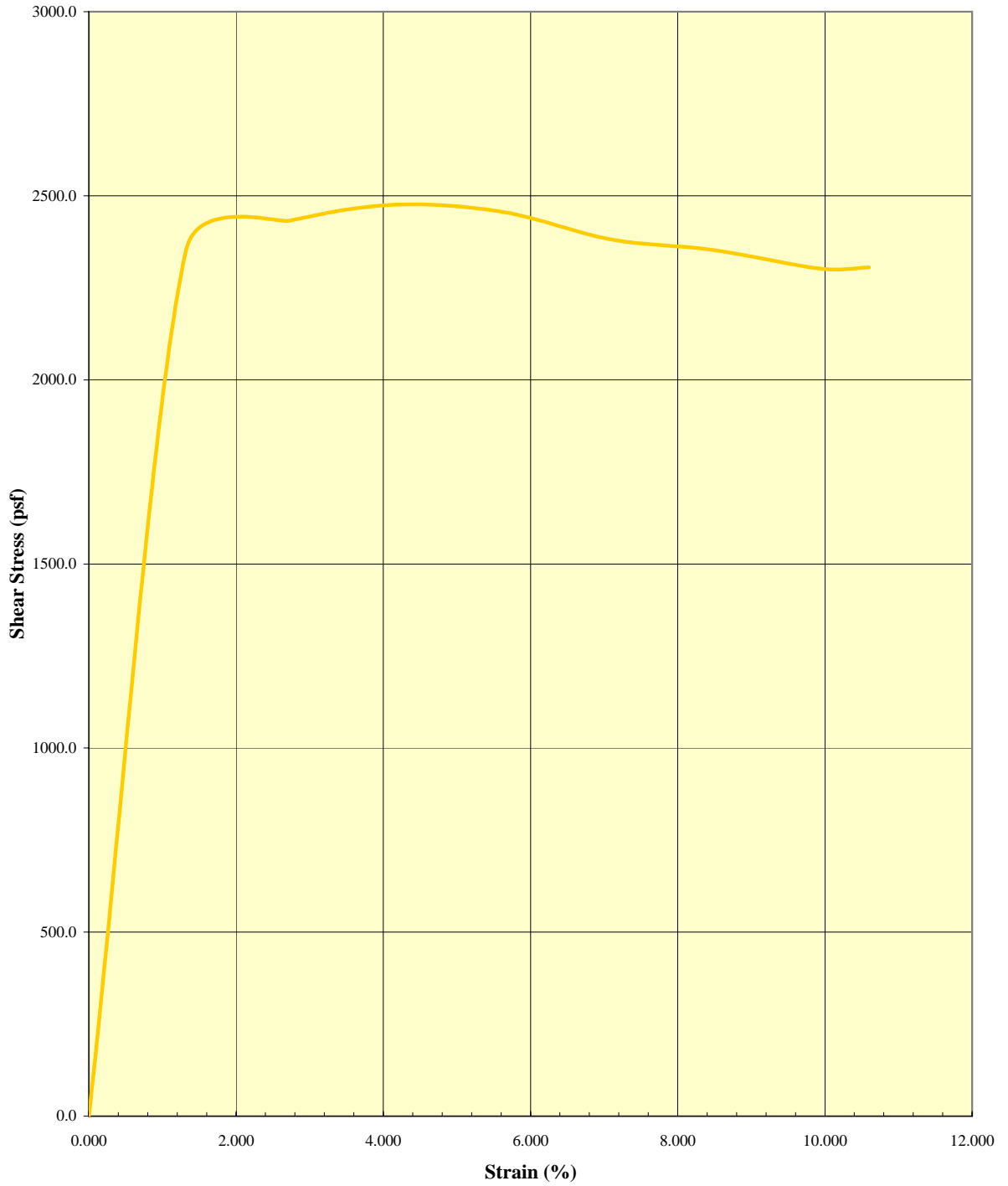
Date

Date

Tested By



Specimen D Stress Deformation



Date

Checked By

Date

Date

Tested By

**Specimen Information**

Direct Shear Test

Humboldt Scientific, Inc.

**Project Information**

Project: Testing  
 Location: Bridge 5B  
 Project Number: 5B  
 Client: Bridge Builder Company X  
 Sample Location: Bridge 5B  
 Sample Number: 23  
 Boring Number: 7

Tested By:  
 Reduced By:  
 Checked By:

Sample Description/Remarks	
<b>Specimen A Description</b>	Sand
<b>Remarks</b>	
<b>Specimen B Description</b>	Sand
<b>Remarks</b>	
<b>Specimen C Description</b>	Sand
<b>Remarks</b>	
<b>Specimen D Description</b>	Sand
<b>Remarks</b>	

**Moisture Density Data**

	Specimen A		Specimen B		Specimen C		Specimen D	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
<b>Height (in)</b>	1.070	1.070	1.070	1.070	1.070	1.070	1.070	1.070
<b>Diameter (in)</b>	2.500	2.500	2.500	2.500	2.500	2.500	2.500	2.500
<b>Total Wet Weight of Ring &amp; Soil (g)</b>	1060.10	1060.10	1060.10	1060.10	1060.10	1060.10	1060.10	1060.10
<b>Weight of Ring (g)</b>	909.70	909.70	909.70	909.70	909.70	909.70	909.70	909.70
<b>Wet Weight of Soil (g)</b>	150.40	150.40	150.40	150.40	150.40	150.40	150.40	150.40
<b>Wt of Wet Soil &amp; Dish (g)</b>	-	100.00	-	100.00	-	100.00	-	100.00
<b>Wt of Dry Soil &amp; Dish (g)</b>	-	100.00	-	100.00	-	100.00	-	100.00
<b>Wt. Of Dish (g)</b>	-	0.00	-	0.00	-	0.00	-	0.00

**Consolidation Calculations**

	Specimen A	Specimen B	Specimen C	Specimen D
<b>Initial Ref. Height (in)</b>	0.000	0.000	0.000	0.000
<b>Final Ref. Height (in)</b>	0.000	0.000	0.000	0.000
<b>Height after Consol (in)</b>	1.070	1.070	1.070	1.070

**Calculations**

	Specimen A		Specimen B		Specimen C		Specimen D	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
<b>Specific Gravity</b>	2.650	2.650	2.650	2.650	2.650	2.650	2.650	2.650
<b>Area (in<sup>2</sup>)</b>	4.909	4.909	4.909	4.909	4.909	4.909	4.909	4.909
<b>Volume (in<sup>3</sup>)</b>	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
<b>Moisture Content (%)</b>	50.400	0.000	50.400	0.000	50.400	0.000	50.400	0.000
<b>Wet Density (pcf)</b>	109.085	109.085	109.085	109.085	109.085	109.085	109.085	109.085
<b>Dry Density (pcf)</b>	72.530	109.085	72.530	109.085	72.530	109.085	72.530	109.085
<b>Saturation (%)</b>	104.272	0.000	104.272	0.000	104.272	0.000	104.272	0.000
<b>Void Ratio</b>	1.281	0.517	1.281	0.517	1.281	0.517	1.281	0.517
<b>Porosity (%)</b>	56.157	34.060	56.157	34.060	56.157	34.060	56.157	34.060

<b>Specimen A Shear Data</b>	<b>Humboldt Scientific, Inc.</b>
<b>Direct Shear Test</b>	

File Location  
DS\_test.HSD

**Last Shear Pass**

<b>Reading Number</b>	<b>Time</b>	<b>Shear Force (lbs)</b>	<b>Horizontal Deformation (in)</b>	<b>Vertical Deformation (in)</b>	<b>Axial Strain (%)</b>	<b>Stress (psf)</b>
0	00:00:00	0.0	0.000	0.0000	0.000	0.0
1	00:03:00	21.1	-0.034	0.0012	6.355	619.0
2	00:06:01	22.8	-0.070	0.0036	13.084	668.8
3	00:09:01	22.0	-0.106	0.0055	19.813	645.4
4	00:12:01	20.4	-0.142	0.0054	26.542	598.4
5	00:15:01	19.9	-0.178	0.0048	33.271	583.8
6	00:18:01	18.9	-0.214	0.0040	40.000	554.4
7	00:21:01	18.8	-0.250	0.0027	46.729	551.5
8	00:21:33	18.7	-0.256	0.0024	47.850	548.6

<b>Specimen B Shear Data</b>	<b>Humboldt Scientific, Inc.</b>
<b>Direct Shear Test</b>	

File Location  
DS\_test.HSD

**Last Shear Pass**

<b>Reading Number</b>	<b>Time</b>	<b>Shear Force (lbs)</b>	<b>Horizontal Deformation (in)</b>	<b>Vertical Deformation (in)</b>	<b>Axial Strain (%)</b>	<b>Stress (psf)</b>
0	00:00:00	0.0	0.000	0.0000	0.000	0.0
1	00:03:00	31.4	-0.034	-0.0025	6.355	921.1
2	00:06:00	36.3	-0.070	-0.0019	13.084	1064.9
3	00:09:00	37.7	-0.106	-0.0008	19.813	1105.9
4	00:12:00	37.7	-0.142	0.0000	26.542	1105.9
5	00:15:01	36.6	-0.178	0.0002	33.271	1073.7
6	00:18:01	34.8	-0.214	0.0000	40.000	1020.9
7	00:21:01	33.4	-0.250	-0.0010	46.729	979.8
8	00:24:01	31.6	-0.286	-0.0032	53.458	927.0
9	00:27:01	31.8	-0.322	-0.0049	60.187	932.9
10	00:28:14	31.6	-0.336	-0.0057	62.804	927.0

<b>Specimen C Shear Data</b>	<b>Humboldt Scientific, Inc.</b>
<b>Direct Shear Test</b>	

File Location  
DS\_test.HSD

**Last Shear Pass**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	0.0	0.000	0.0000	0.000	0.0
1	00:03:01	34.7	0.034	-0.0083	1.360	1017.9
2	00:06:01	45.4	0.069	-0.0115	2.760	1331.8
3	00:09:01	51.5	0.105	-0.0128	4.200	1510.8
4	00:12:01	54.0	0.141	-0.0129	5.640	1584.1
5	00:15:01	55.2	0.177	-0.0129	7.080	1619.3
6	00:18:01	54.5	0.213	-0.0129	8.520	1598.8
7	00:21:02	53.2	0.249	-0.0132	9.960	1560.6
8	00:24:02	52.2	0.285	-0.0144	11.400	1531.3
9	00:27:02	51.2	0.321	-0.0156	12.840	1502.0
10	00:30:02	50.3	0.357	-0.0169	14.280	1475.6
11	00:33:02	49.1	0.393	-0.0185	15.720	1440.4
12	00:36:02	48.6	0.429	-0.0203	17.160	1425.7
13	00:39:02	47.7	0.465	-0.0223	18.600	1399.3
14	00:42:03	47.8	0.495	-0.0242	19.800	1402.2
15	00:45:03	46.6	0.495	-0.0262	19.800	1367.0
16	00:48:03	47.0	0.494	-0.0285	19.760	1378.8
17	00:51:03	47.8	0.494	-0.0307	19.760	1402.2
18	00:54:03	46.2	0.495	-0.0331	19.800	1355.3
19	00:57:03	39.2	0.494	-0.0439	19.760	1149.9
20	00:58:49	42.6	0.494	-0.0787	19.760	1249.7

<b>Specimen D Shear Data</b>	<b>Humboldt Scientific, Inc.</b>
<b>Direct Shear Test</b>	

File Location  
DS\_test.HSD

**Last Shear Pass**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	1.8	0.000	0.0000	0.000	0.0
1	00:03:00	82.0	0.033	-0.0005	1.320	2352.7
2	00:06:00	84.7	0.068	-0.0002	2.720	2431.9
3	00:09:00	86.2	0.104	-0.0003	4.160	2475.9
4	00:12:00	85.5	0.141	-0.0011	5.640	2455.4
5	00:15:00	83.0	0.177	-0.0023	7.080	2382.0
6	00:18:00	82.0	0.212	-0.0038	8.480	2352.7
7	00:21:01	80.3	0.248	-0.0056	9.920	2302.8
8	00:22:26	80.4	0.265	-0.0067	10.600	2305.8

<b>Specimen A All Shear Pass Data</b>	<b>Humboldt Scientific, Inc.</b>
<b>Direct Shear Test</b>	

File Location  
DS\_test.HSD

**PASS 1**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	1.8	0.506	0.3594	0.0	0.000	0.0000	0.000	0.000
1	00:03:00	22.9	0.472	0.3606	21.1	-0.034	0.0012	6.355	618.978
2	00:06:01	24.6	0.436	0.3630	22.8	-0.070	0.0036	13.084	668.848
3	00:09:01	23.8	0.400	0.3649	22.0	-0.106	0.0055	19.813	645.380
4	00:12:01	22.2	0.364	0.3648	20.4	-0.142	0.0054	26.542	598.443
5	00:15:01	21.7	0.328	0.3642	19.9	-0.178	0.0048	33.271	583.775
6	00:18:01	20.7	0.292	0.3634	18.9	-0.214	0.0040	40.000	554.440
7	00:21:01	20.6	0.256	0.3621	18.8	-0.250	0.0027	46.729	551.506
8	00:21:33	20.5	0.250	0.3618	18.7	-0.256	0.0024	47.850	548.573

**Specimen B All Shear Pass Data**

Humboldt Scientific, Inc.

**Direct Shear Test**

File Location

DS\_test.HSD

**PASS 1**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	1.6	0.498	0.3345	0.0	0.000	0.0000	0.000	0.000
1	00:03:00	33.0	0.464	0.3320	31.4	-0.034	-0.0025	6.355	921.133
2	00:06:00	37.9	0.428	0.3326	36.3	-0.070	-0.0019	13.084	1064.876
3	00:09:00	39.3	0.392	0.3337	37.7	-0.106	-0.0008	19.813	1105.946
4	00:12:00	39.3	0.356	0.3345	37.7	-0.142	0.0000	26.542	1105.946
5	00:15:01	38.2	0.320	0.3347	36.6	-0.178	0.0002	33.271	1073.677
6	00:18:01	36.4	0.284	0.3345	34.8	-0.214	0.0000	40.000	1020.873
7	00:21:01	35.0	0.248	0.3335	33.4	-0.250	-0.0010	46.729	979.804
8	00:24:01	33.2	0.212	0.3313	31.6	-0.286	-0.0032	53.458	927.000
9	00:27:01	33.4	0.176	0.3296	31.8	-0.322	-0.0049	60.187	932.867
10	00:28:14	33.2	0.162	0.3288	31.6	-0.336	-0.0057	62.804	927.000

**Specimen C All Shear Pass Data**

Humboldt Scientific, Inc.

**Direct Shear Test**

File Location

DS\_test.HSD

**PASS 1**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	1.7	0.494	0.3187	0.0	0.000	0.0000	0.000	0.000
1	00:03:01	36.4	0.460	0.3104	34.7	0.034	-0.0083	1.360	1017.940
2	00:06:01	47.1	0.425	0.3072	45.4	0.069	-0.0115	2.760	1331.829
3	00:09:01	53.2	0.389	0.3059	51.5	0.105	-0.0128	4.200	1510.775
4	00:12:01	55.7	0.353	0.3058	54.0	0.141	-0.0129	5.640	1584.114
5	00:15:01	56.9	0.317	0.3058	55.2	0.177	-0.0129	7.080	1619.316
6	00:18:01	56.2	0.281	0.3058	54.5	0.213	-0.0129	8.520	1598.781
7	00:21:02	54.9	0.245	0.3055	53.2	0.249	-0.0132	9.960	1560.645
8	00:24:02	53.9	0.209	0.3043	52.2	0.285	-0.0144	11.400	1531.310
9	00:27:02	52.9	0.173	0.3031	51.2	0.321	-0.0156	12.840	1501.974
10	00:30:02	52.0	0.137	0.3018	50.3	0.357	-0.0169	14.280	1475.572
11	00:33:02	50.8	0.101	0.3002	49.1	0.393	-0.0185	15.720	1440.370
12	00:36:02	50.3	0.065	0.2984	48.6	0.429	-0.0203	17.160	1425.702
13	00:39:02	49.4	0.029	0.2964	47.7	0.465	-0.0223	18.600	1399.300
14	00:42:03	49.5	-0.001	0.2945	47.8	0.495	-0.0242	19.800	1402.234
15	00:45:03	48.3	-0.001	0.2925	46.6	0.495	-0.0262	19.800	1367.031
16	00:48:03	48.7	0.000	0.2902	47.0	0.494	-0.0285	19.760	1378.766
17	00:51:03	49.5	0.000	0.2880	47.8	0.494	-0.0307	19.760	1402.234
18	00:54:03	47.9	-0.001	0.2856	46.2	0.495	-0.0331	19.800	1355.297
19	00:57:03	40.9	0.000	0.2748	39.2	0.494	-0.0439	19.760	1149.949
20	00:58:49	44.3	0.000	0.2400	42.6	0.494	-0.0787	19.760	1249.689

**Specimen D All Shear Pass Data**

Humboldt Scientific, Inc.

**Direct Shear Test**

File Location

DS\_test.HSD

**PASS 1**

Reading Number	Time	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Shear Force (lbs)	Horizontal Deformation (in)	Vertical Deformation (in)	Axial Strain (%)	Stress (psf)
0	00:00:00	1.8	0.498	0.1338	0.0	0.000	0.0000	0.000	0.000
1	00:03:00	82.0	0.465	0.1333	80.2	0.033	-0.0005	1.320	2352.702
2	00:06:00	84.7	0.430	0.1336	82.9	0.068	-0.0002	2.720	2431.907
3	00:09:00	86.2	0.394	0.1335	84.4	0.104	-0.0003	4.160	2475.910
4	00:12:00	85.5	0.357	0.1327	83.7	0.141	-0.0011	5.640	2455.376
5	00:15:00	83.0	0.321	0.1315	81.2	0.177	-0.0023	7.080	2382.037
6	00:18:00	82.0	0.286	0.1300	80.2	0.212	-0.0038	8.480	2352.702
7	00:21:01	80.3	0.250	0.1282	78.5	0.248	-0.0056	9.920	2302.832
8	00:22:26	80.4	0.233	0.1271	78.6	0.265	-0.0067	10.600	2305.765