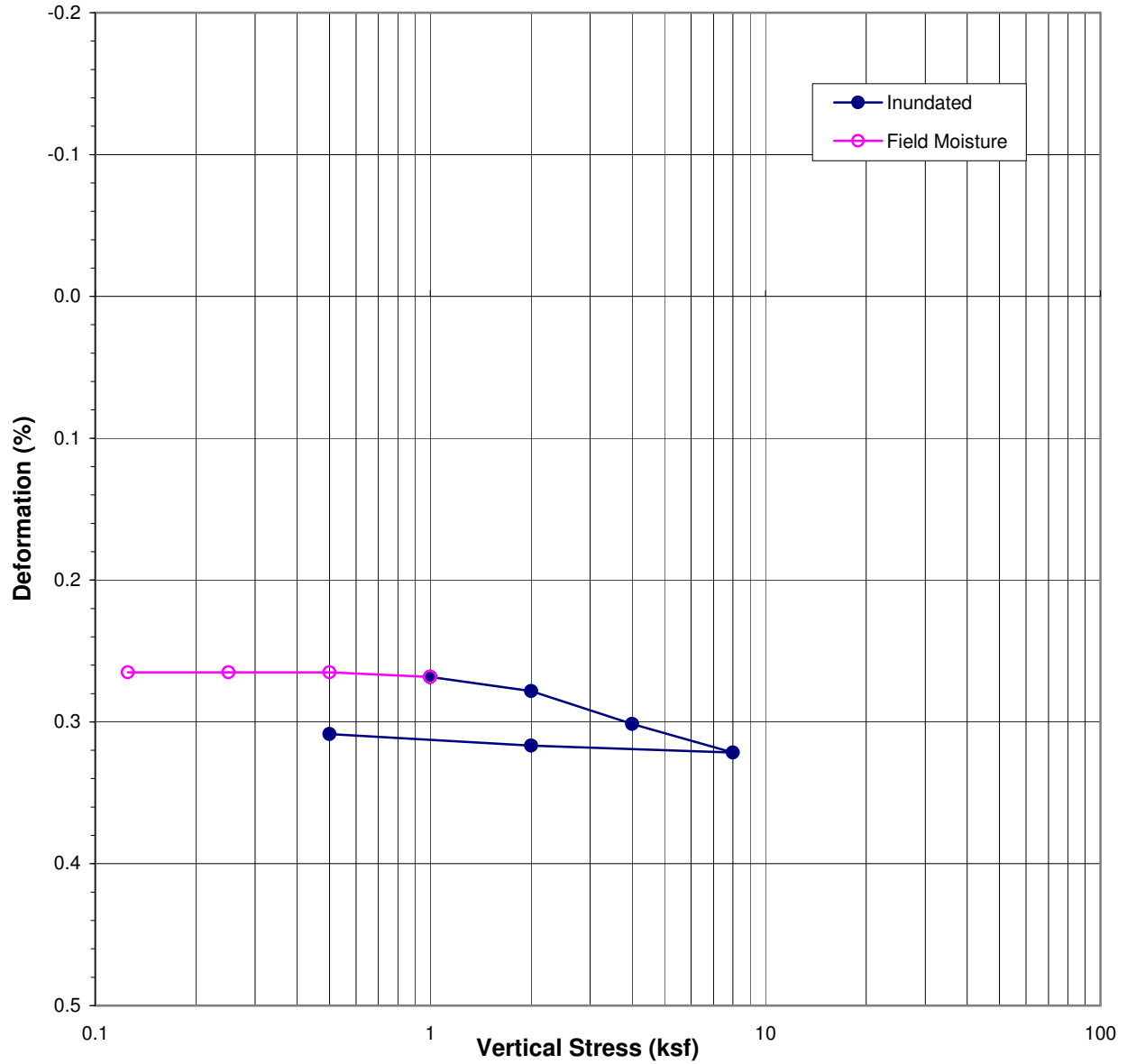


Appendix C
Laboratory Data



| Location: | Sample No.: | Depth (ft) | Dry Density (pcf) | Initial Moisture Content (%) | Final Moisture Content (%) |
|--------------|-------------|------------|-------------------|------------------------------|----------------------------|
| LGC-2 | R-2 | 5 | 116.2 | 12.2 | 14.6 |

Sample Description: Clayey Sand

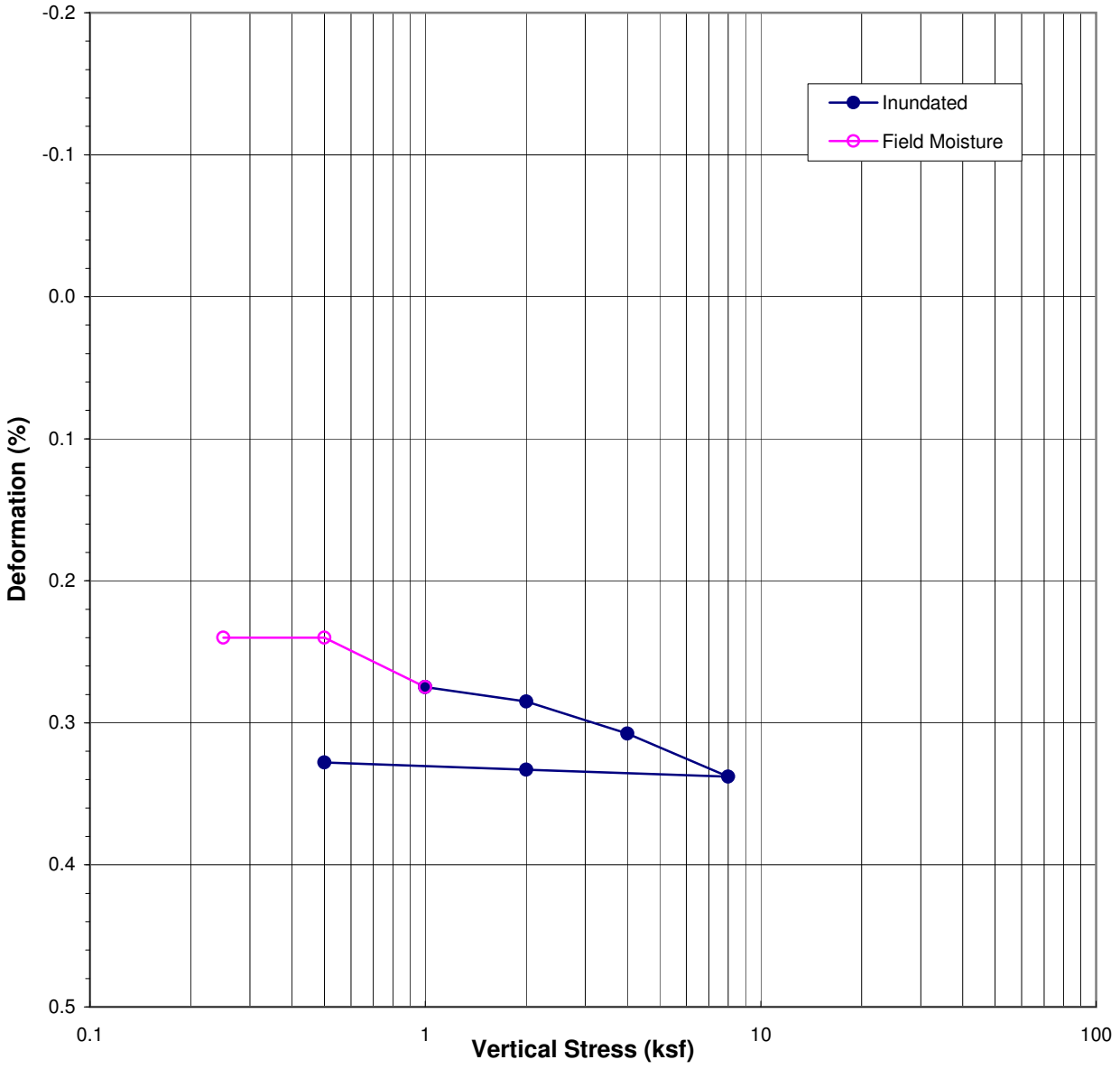


ONE-DIMENSIONAL CONSOLIDATION

Project Number: 10132-01

Date: May-12

South Shores Church



| Location: | Sample No.: | Depth (ft) | Dry Density (pcf) | Initial Moisture Content (%) | Final Moisture Content (%) |
|--------------|-------------|------------|-------------------|------------------------------|----------------------------|
| LGC-2 | R-4 | 10 | 110.5 | 13.8 | 12.8 |

Sample Description: Clayey Sand

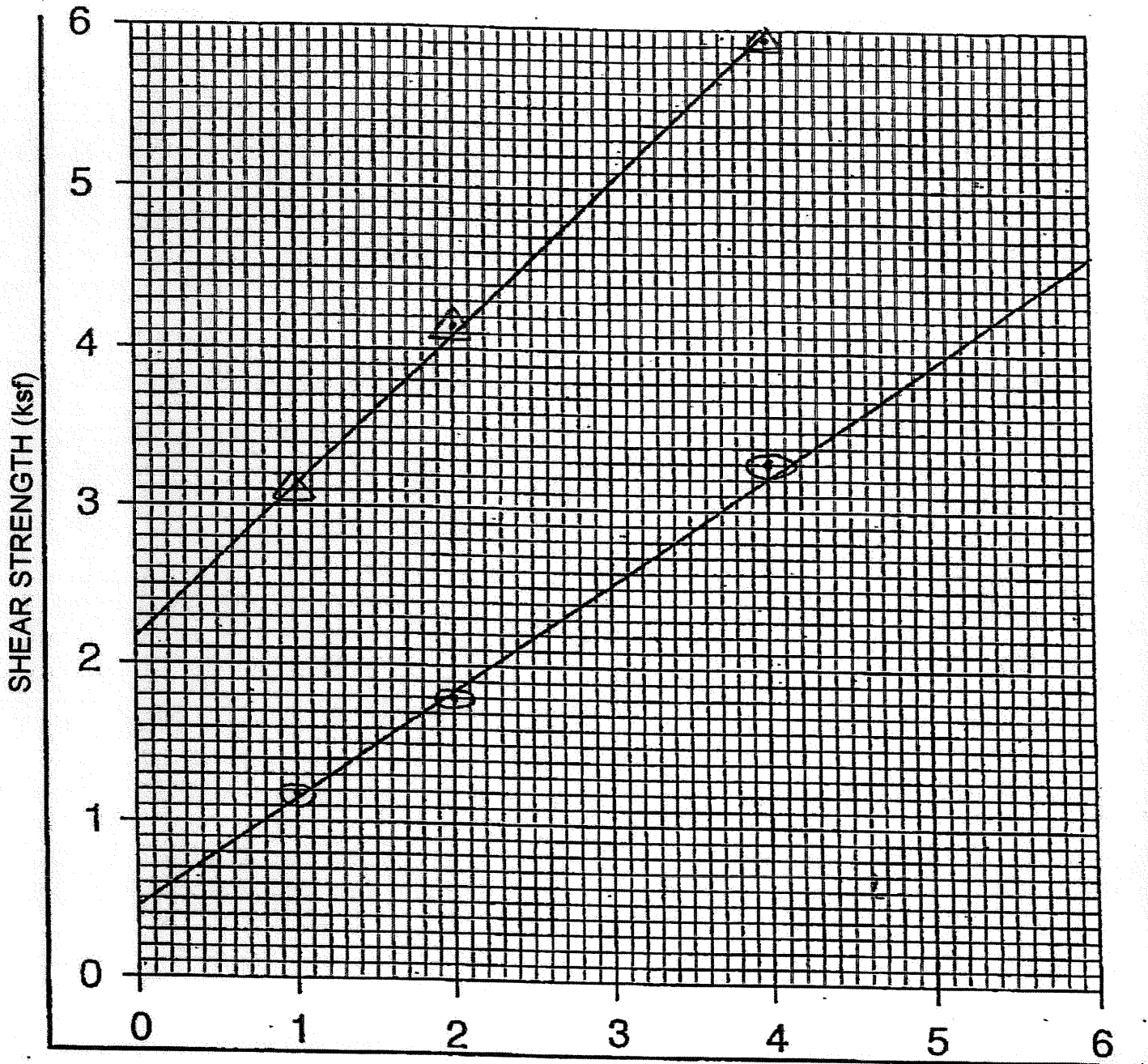


ONE-DIMENSIONAL CONSOLIDATION

Project Number: 10132-01
Date: May-12

South Shores Church

DIRECT SHEAR TEST DIAGRAM



Boring No. BN-3 Depth 20-21 feet NORMAL STRESS (ksf)

Soil Description Silty SAND w/tr. of clay + 5% cement by wt.

Undisturbed/Remolded Remolded to 90%

Moisture Content, % 15.9% after test

Dry Density, pcf 122.2% after test

Saturation, % 113.4% after test

Shearing Rate .023"/min.

Cohesion (ksf)

Friction Angle

Remarks:

| | | |
|--------|------------|-----------|
| ▲ Peak | ● Ultimate | ■ Reshear |
| 2190 | 480 | _____ |
| 43 | 34 | _____ |



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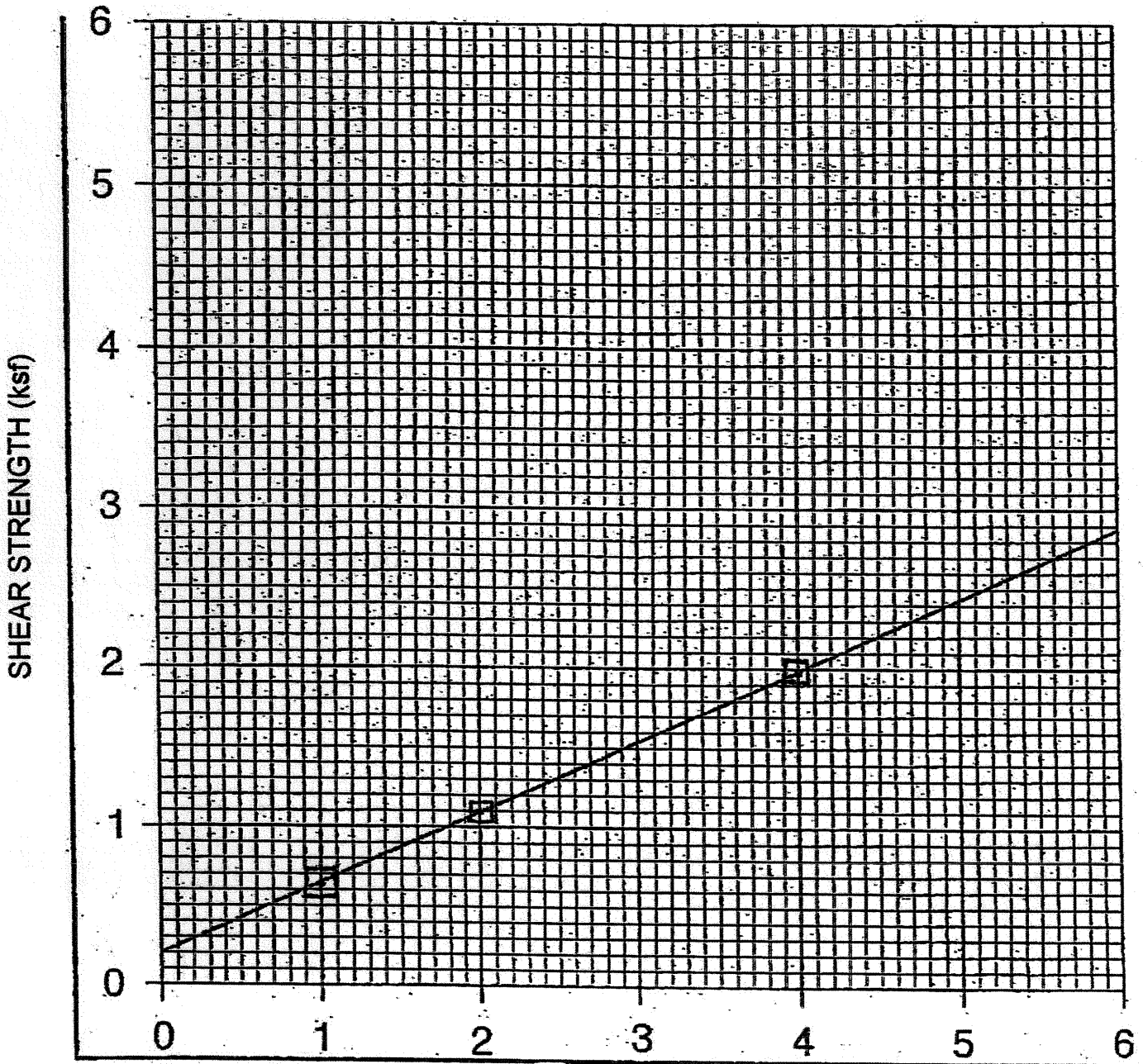
Project Name: **SOUTH SHORES CHURCH**

Date: **May 2007**

Project No: **6375-04.1**

Figure No: **C-1**

DIRECT SHEAR TEST DIAGRAM



Boring No. BA-4 Depth 32.5' NORMAL STRESS (ksf)

Soil Description Sandy Silt with Clay
 Undisturbed/Remolded Remolded to 105.5 D.D.

Moisture Content, % _____
 Dry Density, pcf _____
 Saturation, % _____
 Shearing Rate _____

▲ Peak ● Ultimate ■ Reshear

Cohesion (ksf) _____
 Friction Angle _____
 Remarks: _____

0.20
24



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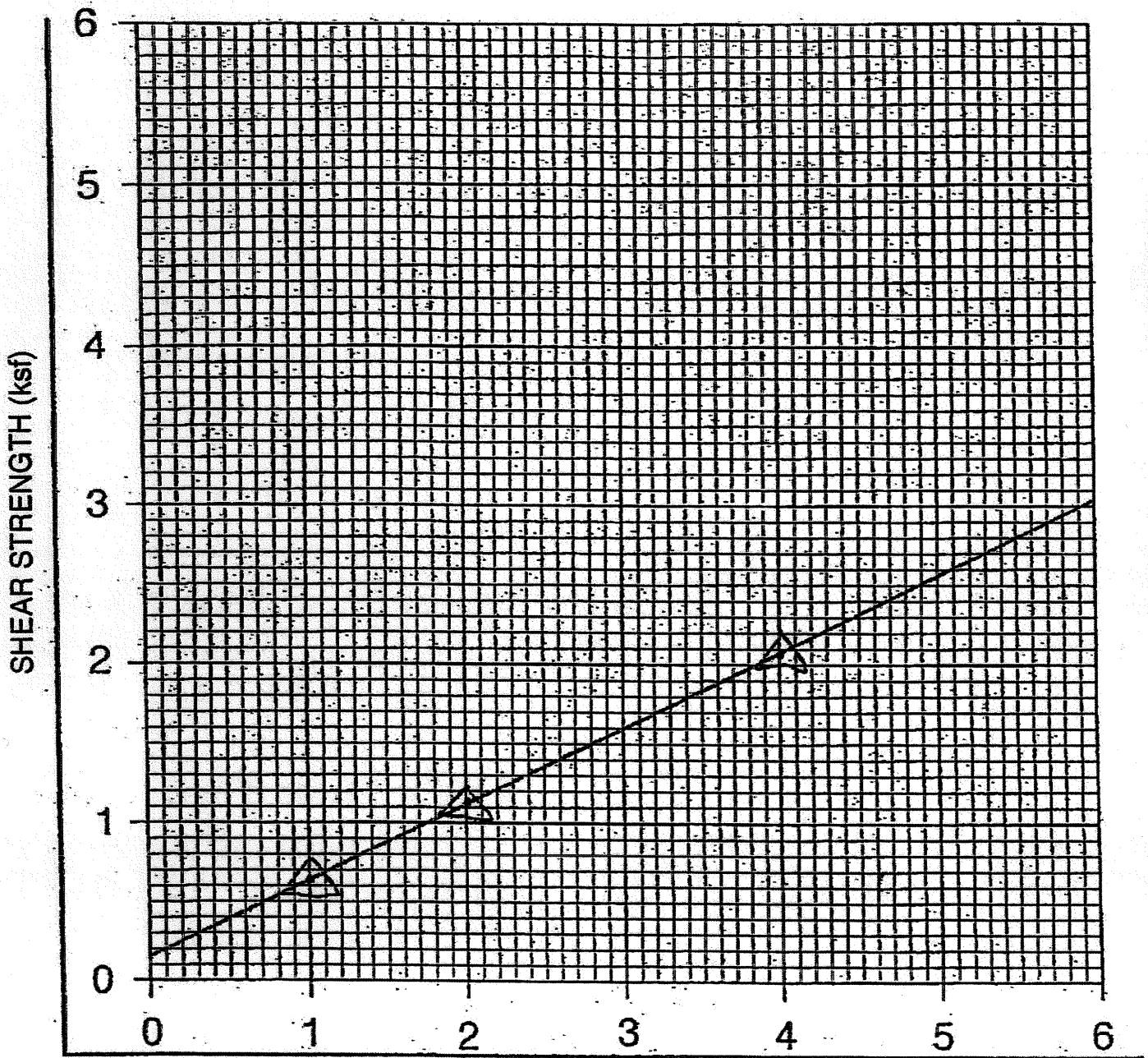
Project Name: **South Shores Church**

Date: **June 2007**

Project No: **6375-04.1**

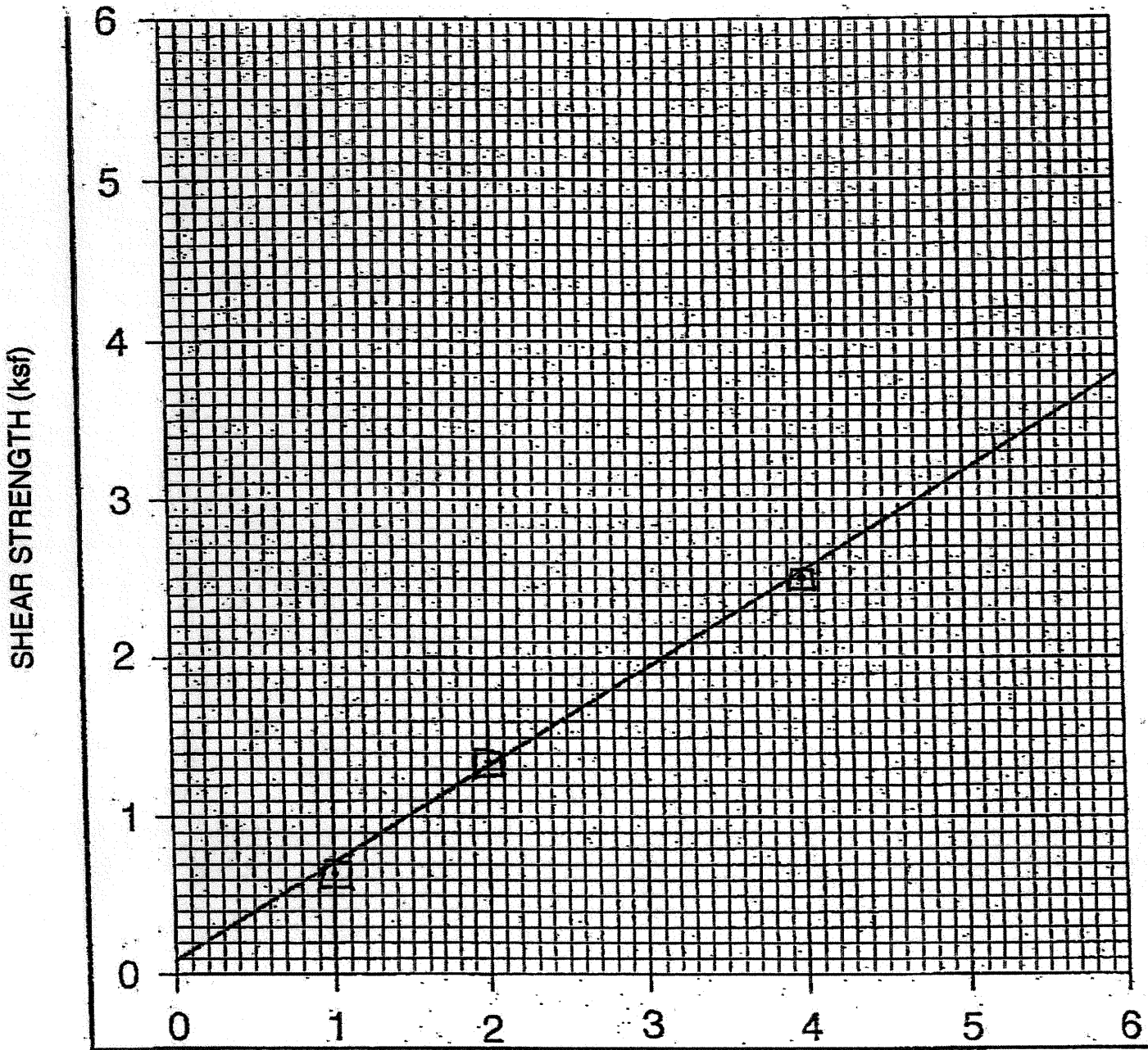
Figure No: **1**

DIRECT SHEAR TEST DIAGRAM



| | | | | | | | | | |
|------------------------|-------------------------------|---------------------|--|--------|------------|-----------|------|------|--|
| Boring No. BA-4 | Depth 32.5' | NORMAL STRESS (ksf) | | | | | | | |
| Soil Description | Sandy Silt with Clay | | | | | | | | |
| Undisturbed/Remolded | Remolded to 105.5 D.D. | | | | | | | | |
| Moisture Content, % | 19.9% after test | Cohesion (ksf) | <table border="0" style="font-size: small;"> <tr> <td>▲ Peak</td> <td>● Ultimate</td> <td>■ Reshear</td> </tr> <tr> <td style="border-bottom: 1px solid black; text-align: center;">0.15</td> <td style="border-bottom: 1px solid black; text-align: center;">0.15</td> <td style="border-bottom: 1px solid black;"></td> </tr> </table> | ▲ Peak | ● Ultimate | ■ Reshear | 0.15 | 0.15 | |
| ▲ Peak | ● Ultimate | ■ Reshear | | | | | | | |
| 0.15 | 0.15 | | | | | | | | |
| Dry Density, pcf | 105.7% after test | Friction Angle | <table border="0" style="font-size: small;"> <tr> <td style="border-bottom: 1px solid black; text-align: center;">26</td> <td style="border-bottom: 1px solid black; text-align: center;">26</td> <td style="border-bottom: 1px solid black;"></td> </tr> </table> | 26 | 26 | | | | |
| 26 | 26 | | | | | | | | |
| Saturation, % | 90.5% after test | Remarks: | _____ | | | | | | |
| Shearing Rate | .028"/min. | | | | | | | | |

DIRECT SHEAR TEST DIAGRAM



Boring No. BA-4 Depth 72.5' - 73.5
 Soil Description Silty SAND
 Undisturbed/Remolded Remolded to 90% reshear

NORMAL STRESS (ksf)

Moisture Content, % _____
 Dry Density, pcf _____
 Saturation, % _____
 Shearing Rate _____

▲ Peak ● Ultimate ◼ Reshear

Cohesion (ksf) _____ **0.10**
 Friction Angle _____ **31**

Remarks: _____



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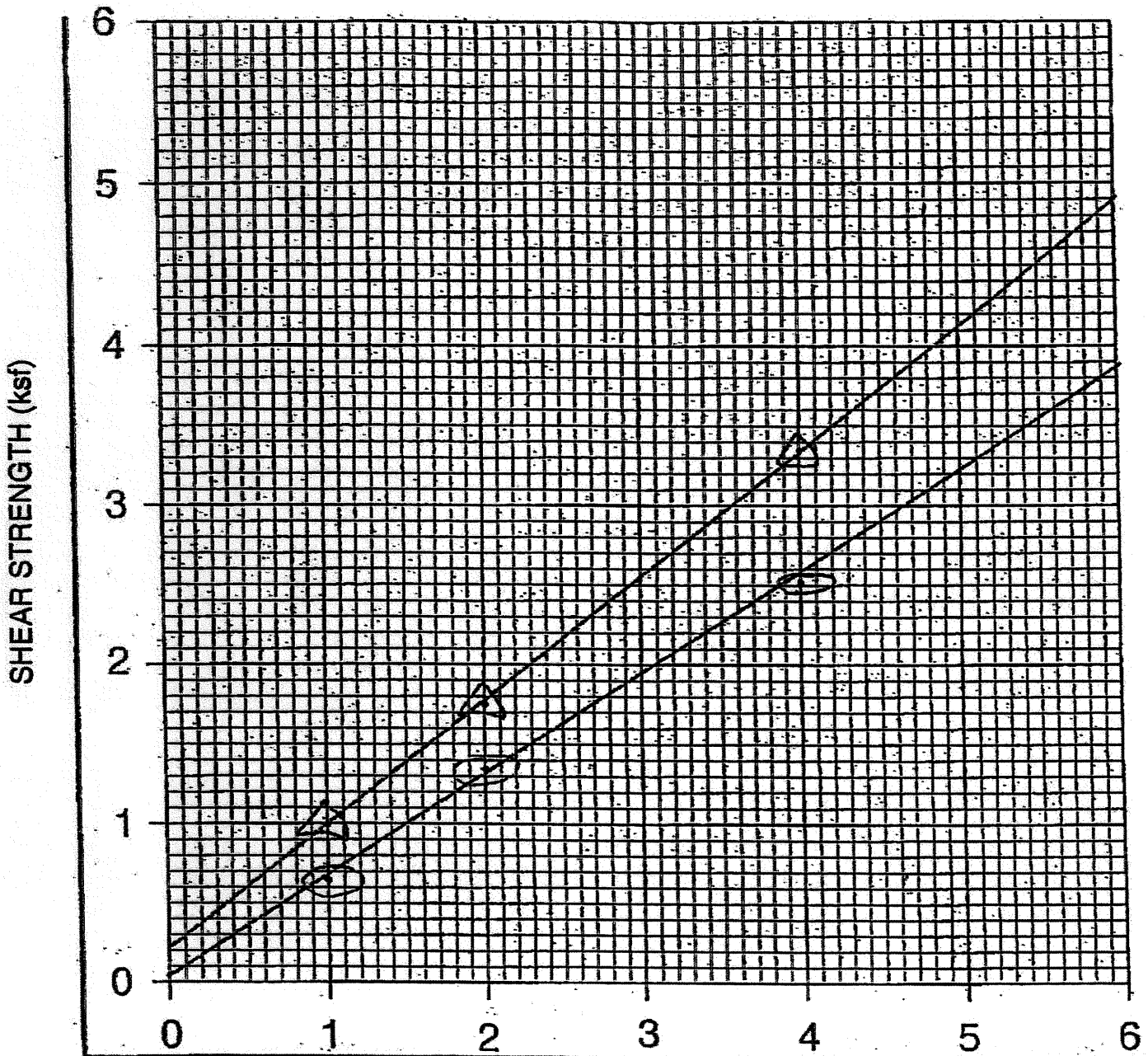
Project Name: **South Shores Church**

Date: **June 2007**

Project No: **6375-04.1**

Figure No: **3**

DIRECT SHEAR TEST DIAGRAM



Boring No. BA-4 Depth 72.5' - 73.5'
 Soil Description Silty SAND
 Undisturbed/Remolded Remolded to 90%
 Moisture Content, % 18.5% after test
 Dry Density, pcf 108.2% after test
 Saturation, % 89.7% after test
 Shearing Rate .028"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) _____
 Friction Angle _____
 Remarks: _____

| | | |
|------------|-------------|-----------|
| ▲ Peak | ● Ultimate | ■ Reshear |
| <u>210</u> | <u>0.05</u> | _____ |
| <u>38</u> | <u>32</u> | _____ |



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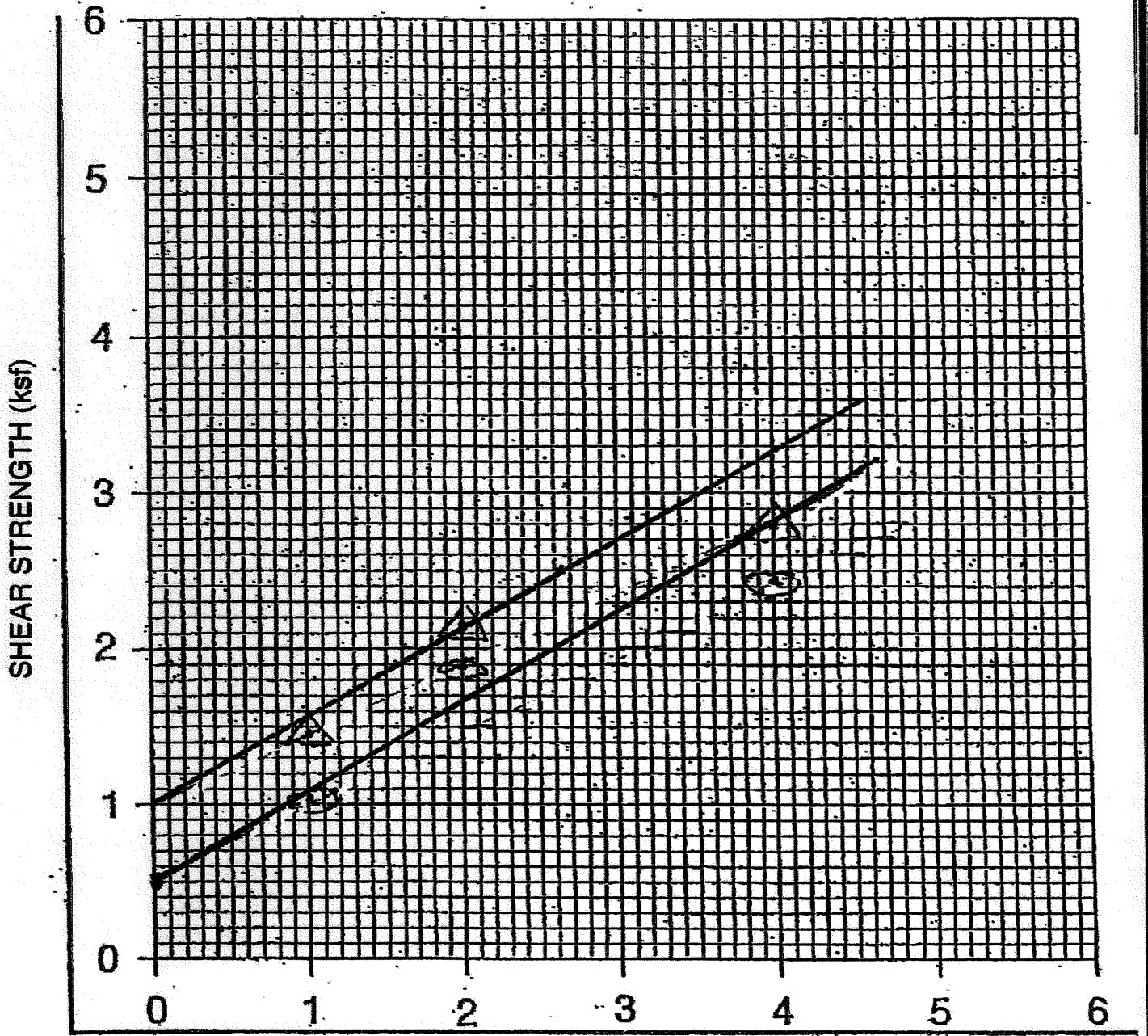
Project Name: **South Shores Church**

Date: **June 2007**

Project No: **6375-04.1**

Figure No: **4**

DIRECT SHEAR TEST DIAGRAM



Boring No. BN-1 Depth 30 feet
 Soil Description Breccia
 Undisturbed/Remolded Undisturbed
 Moisture Content, % 14.2% after test
 Dry Density, pcf 122.1% after test
 Saturation, % 100.9% after test
 Shearing Rate .022"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) _____
 Friction Angle _____
 Remarks: _____

▲ Peak ● Ultimate ■ Reshear
 1.0 0.5 _____
 30 30 _____



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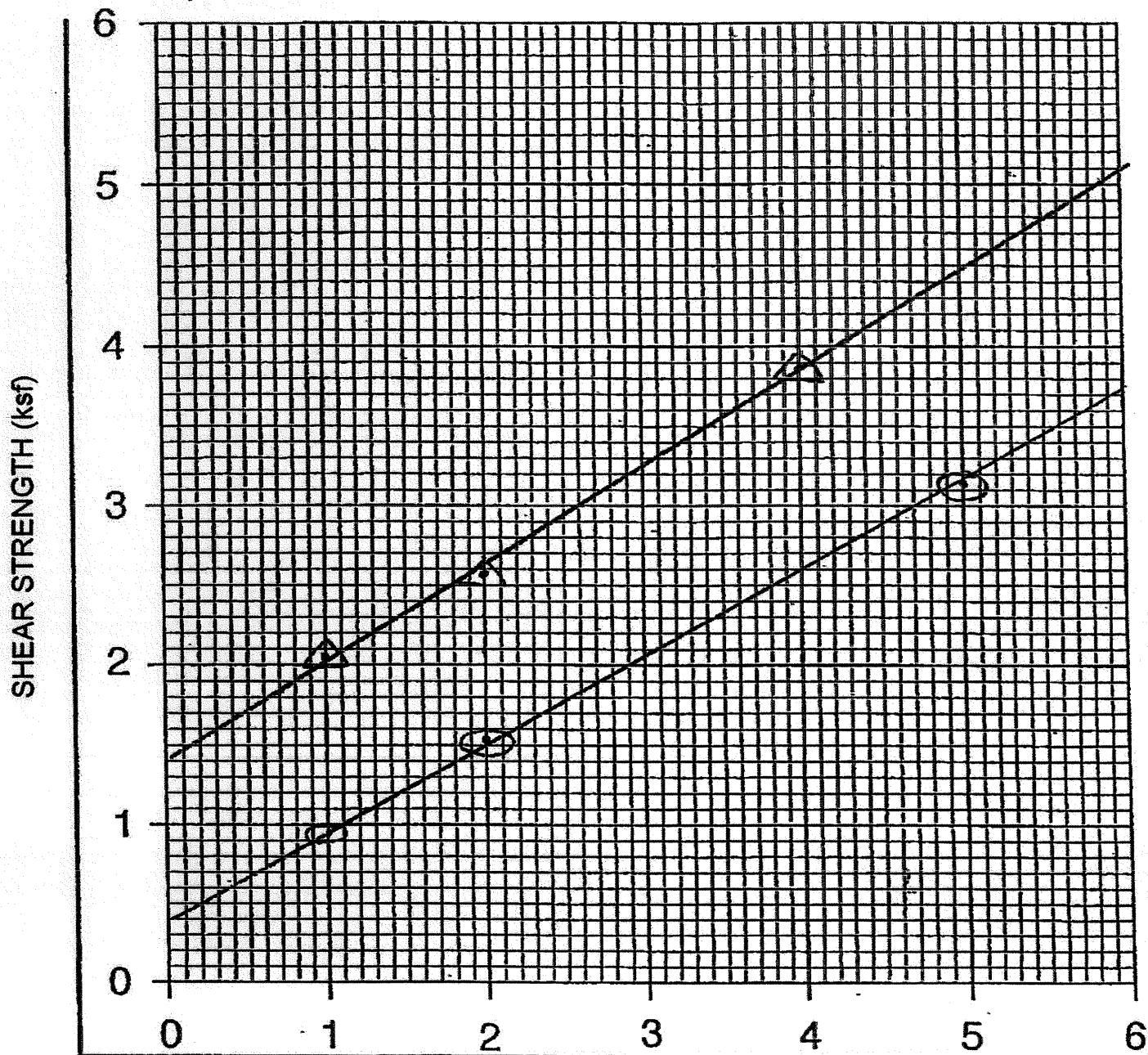
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-1

DIRECT SHEAR TEST DIAGRAM



Boring No. BN-2 **Depth** 10 feet
Soil Description Breccia
Undisturbed/Remolded Undisturbed
Moisture Content, % 15.8% after test
Dry Density, pcf 126.9% after test
Saturation, % 130.2% after test
Shearing Rate .023"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) _____
Friction Angle _____
Remarks: _____

▲ Peak ● Ultimate ■ Reshear
 _____ 0.40 _____
 _____ 29 _____



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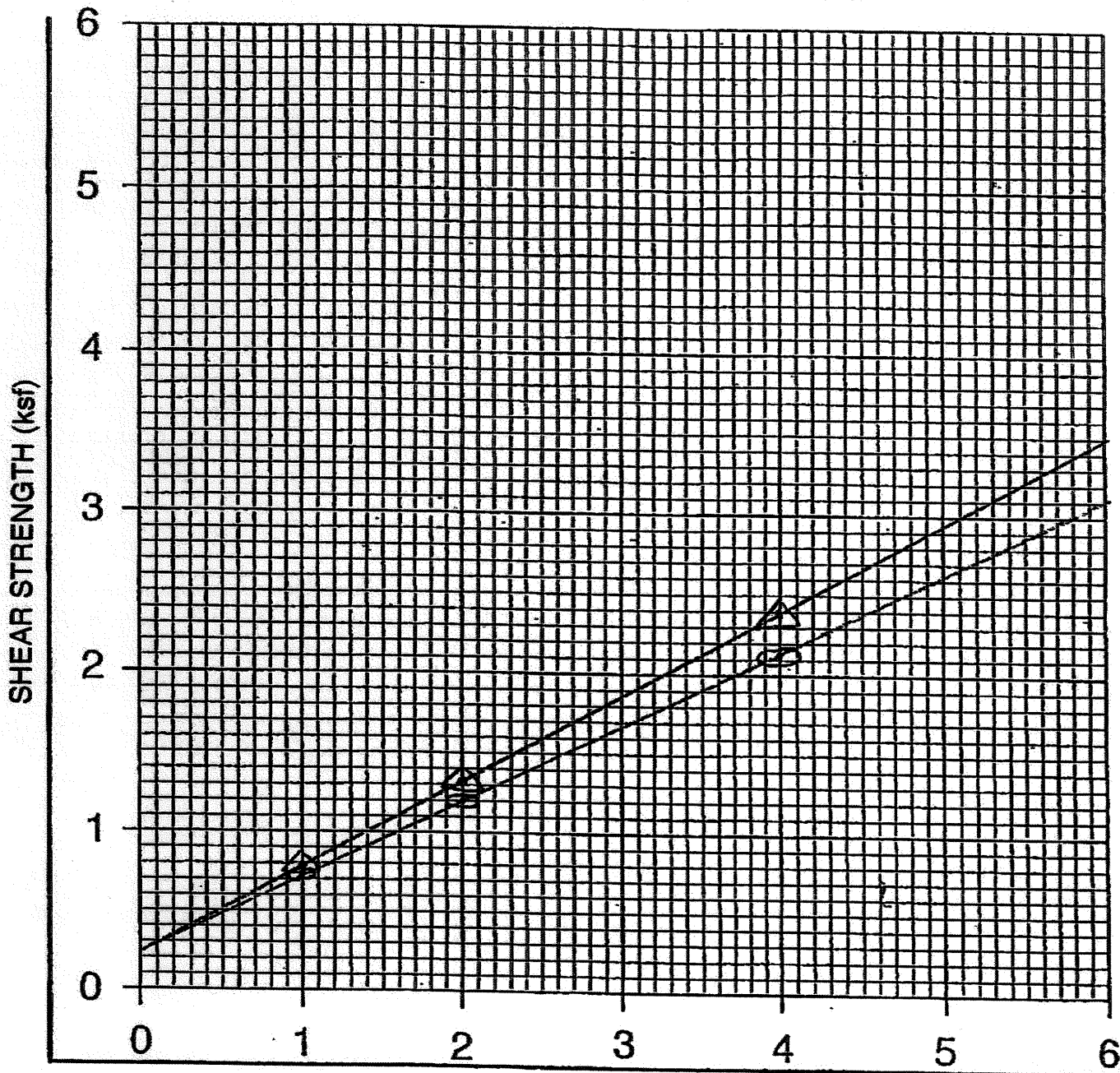
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-2

DIRECT SHEAR TEST DIAGRAM



Boring No. BN-3 Depth 20 and 21 feet
 Soil Description Silty Sand w/Gravel and tr. of Clay
 Undisturbed/Remolded Remolded
 Moisture Content, % 15.8% after test
 Dry Density, pcf 122.2% after test
 Saturation, % 112.6% after test
 Shearing Rate .023"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) _____
 Friction Angle _____
 Remarks: _____

| | | |
|--------|------------|-----------|
| ▲ Peak | ● Ultimate | ■ Reshear |
| 1.0 | 0.5 | _____ |
| 30 | 30 | _____ |



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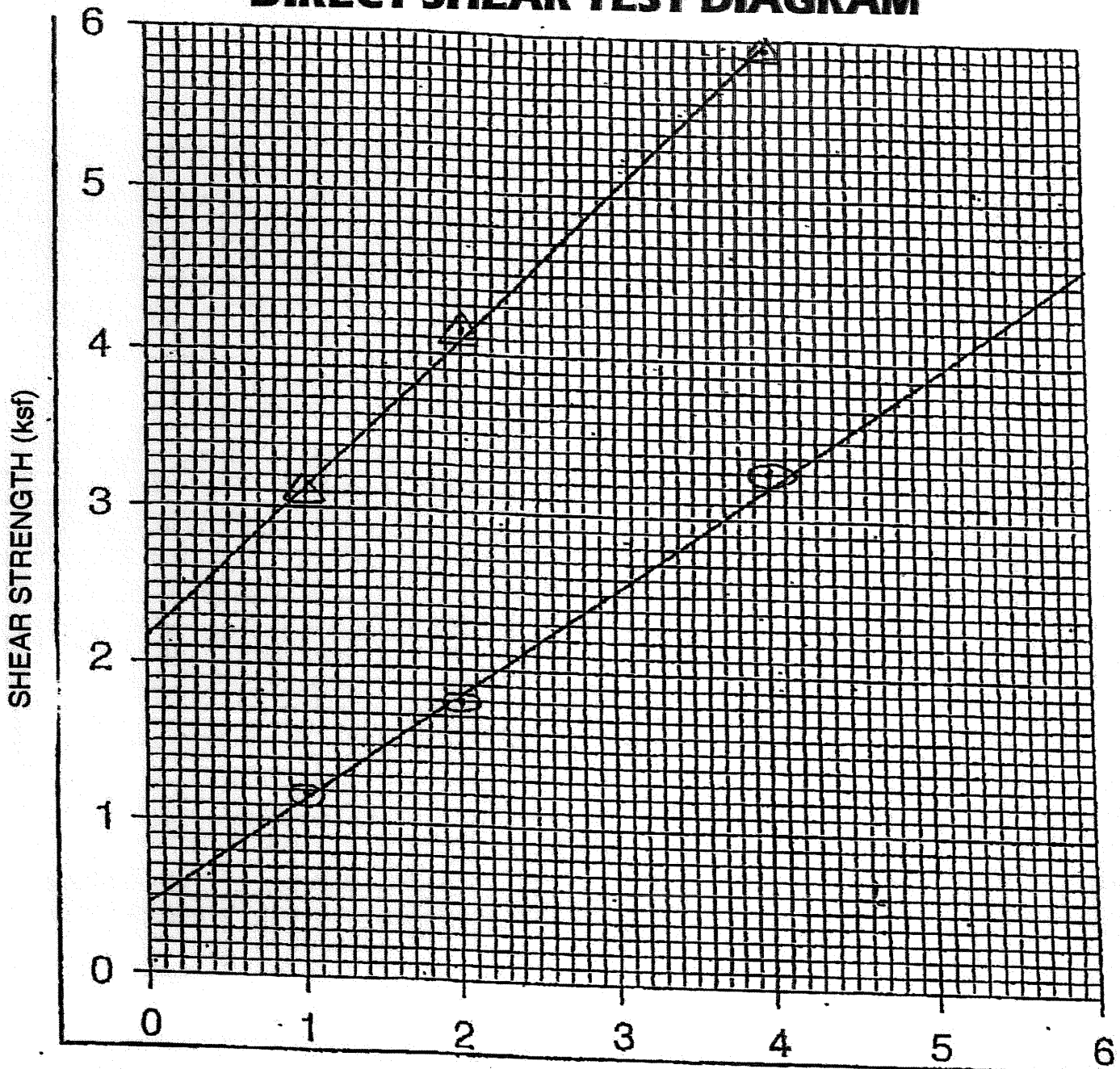
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-3

DIRECT SHEAR TEST DIAGRAM



| | | | | |
|----------------------|---|-------|----------------|----------------------------|
| Boring No. | BN-3 | Depth | 20 and 21 feet | NORMAL STRESS (ksf) |
| Soil Description | Silty Sand w/tr. of Clay + 5% cement by wt. | | | |
| Undisturbed/Remolded | Remolded | | | |
| Moisture Content, % | 15.9% after test | | | |
| Dry Density, pcf | 122.2% after test | | | |
| Saturation, % | 113.4% after test | | | |
| Shearing Rate | .023"/min. | | | |

| | | | | |
|----------------|--------|------------|-----------|--|
| | ▲ Peak | ● Ultimate | ■ Reshear | |
| Cohesion (ksf) | 2190 | 480 | _____ | |
| Friction Angle | 43 | 34 | _____ | |
| Remarks: | _____ | | | |



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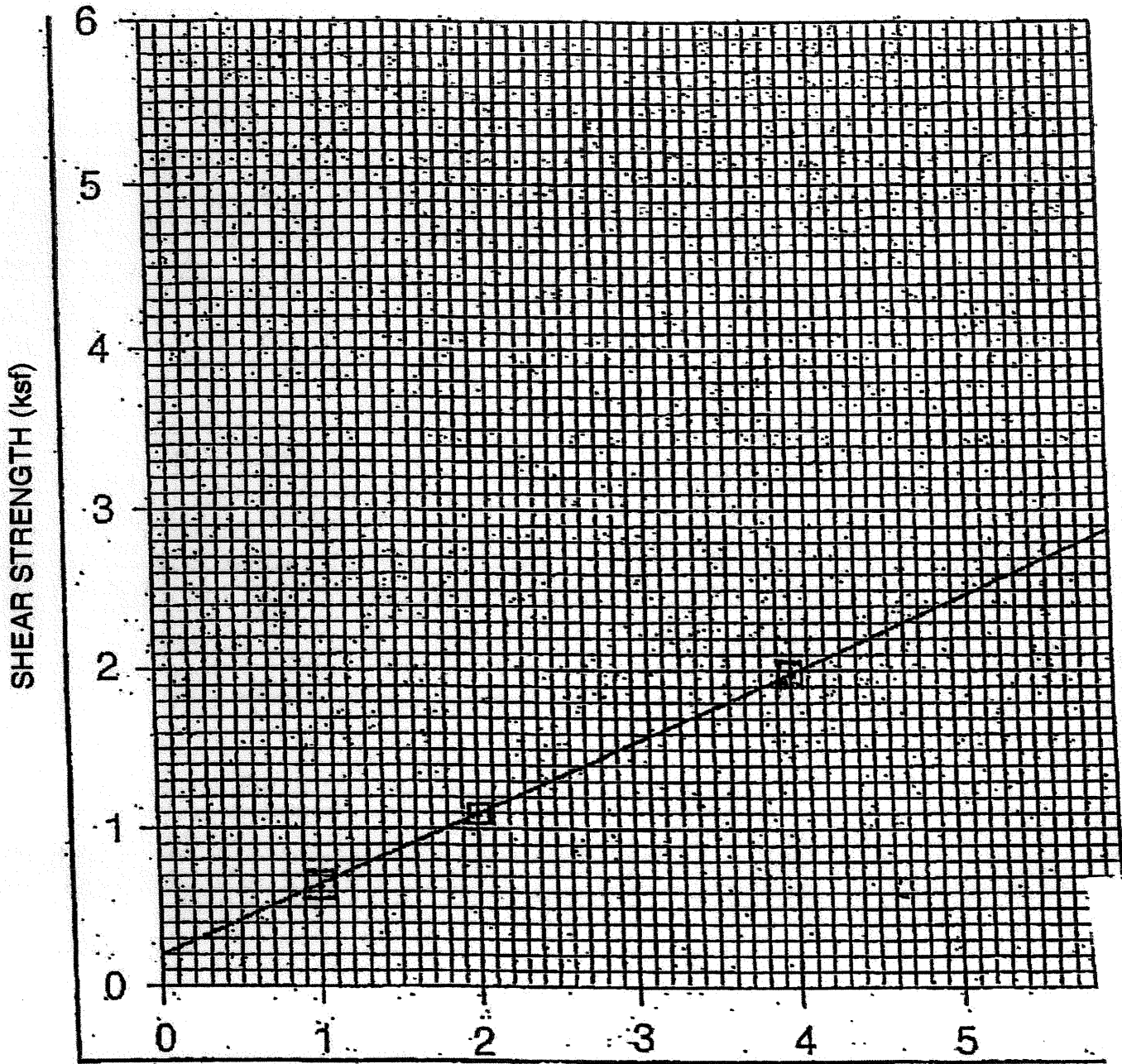
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-4

DIRECT SHEAR TEST DIAGRAM



Boring No. BA-4 Depth 32.5 feet
 Soil Description Sandy Silt with Clay
 Undisturbed/Remolded Remolded to 105.5 D.D.
 Moisture Content, % 19.9% after test
 Dry Density, pcf 105.7% after test
 Saturation, % 99.5% after test
 Shearing Rate .022"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) _____
 Friction Angle _____
 Remarks: _____

▲ Peak ● Ultimate ■ Reshear
 _____ _____ _____
 0.20
 24



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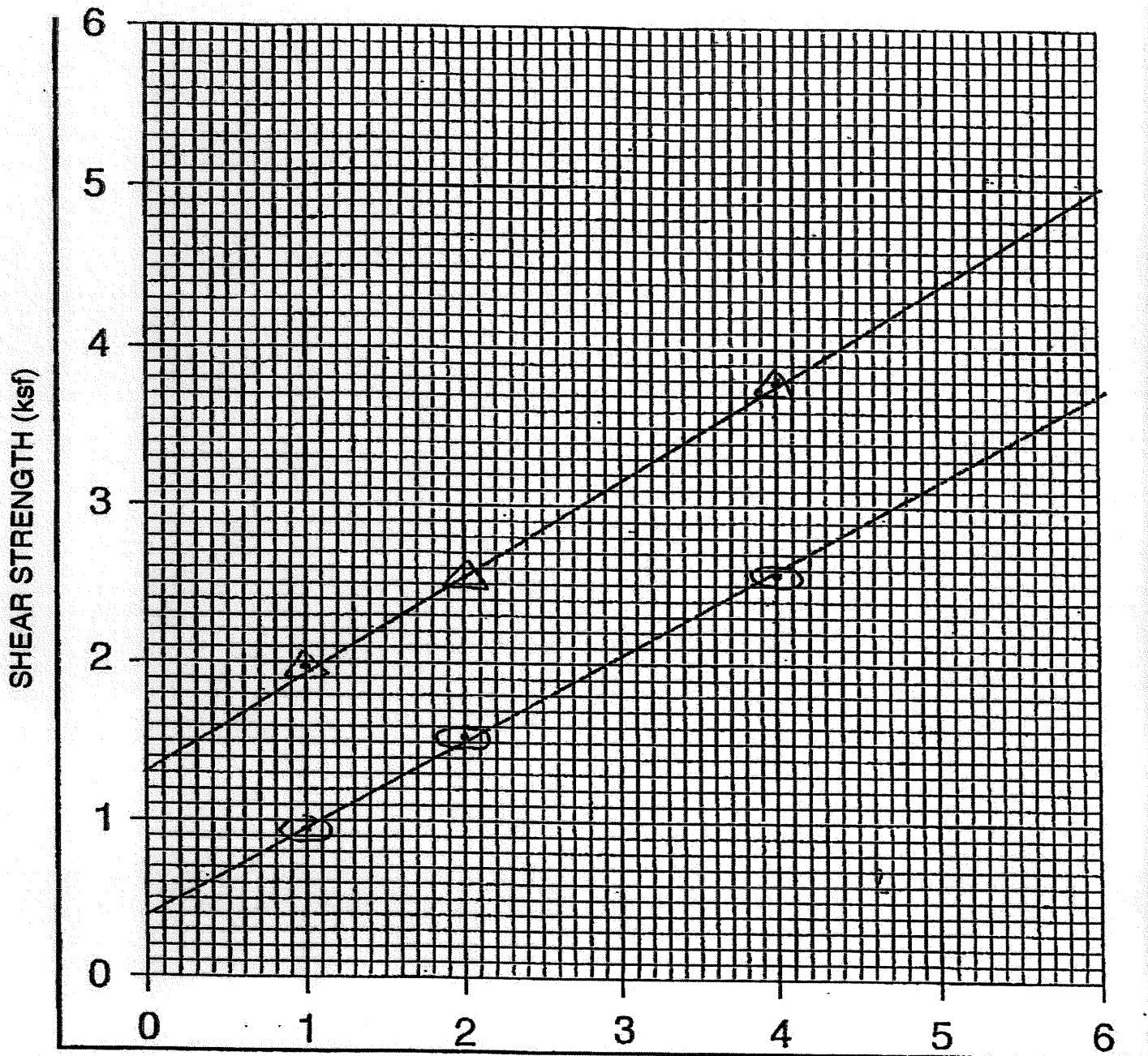
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-5

DIRECT SHEAR TEST DIAGRAM



Boring No. BN-4 **Depth** 35 feet
Soil Description Breccia
Undisturbed/Remolded Undisturbed
Moisture Content, % 14.1% after test
Dry Density, pcf 125.2% after test
Saturation, % 110.1% after test
Shearing Rate .023"/min.

NORMAL STRESS (ksf)

Cohesion (ksf) 390
Friction Angle 29

▲ Peak ● Ultimate ■ Reshear

Remarks: _____



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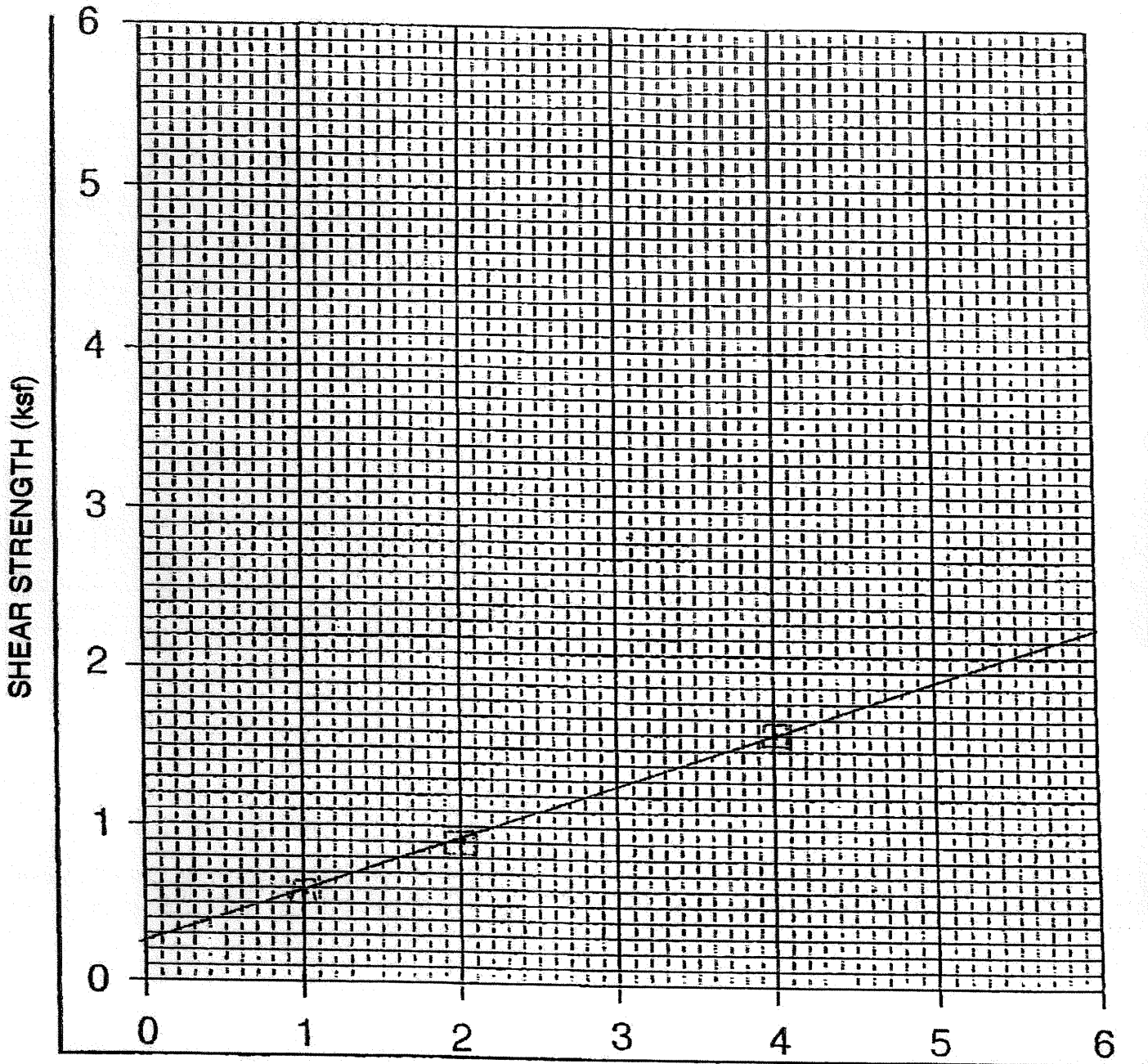
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-6

DIRECT SHEAR TEST DIAGRAM



| | | | |
|----------------------|-----------------------------|-------|----------------|
| Boring No. | <u>BN-6</u> | Depth | <u>31 feet</u> |
| Soil Description | <u>Clayey Siltstone bed</u> | | |
| Undisturbed/Remolded | <u>Undisturbed</u> | | |
| Moisture Content, % | <u>16.9% after test</u> | | |
| Dry Density, pcf | <u>115.4% after test</u> | | |
| Saturation, % | <u>99.2 after test</u> | | |
| Shearing Rate | <u>.022"/min.</u> | | |

NORMAL STRESS (ksf)

| | | |
|----------------|-----------------------------|------|
| Cohesion (ksf) | ▲ Peak ● Ultimate ■ Reshear | |
| Friction Angle | | 270c |
| Remarks: | | 19 |



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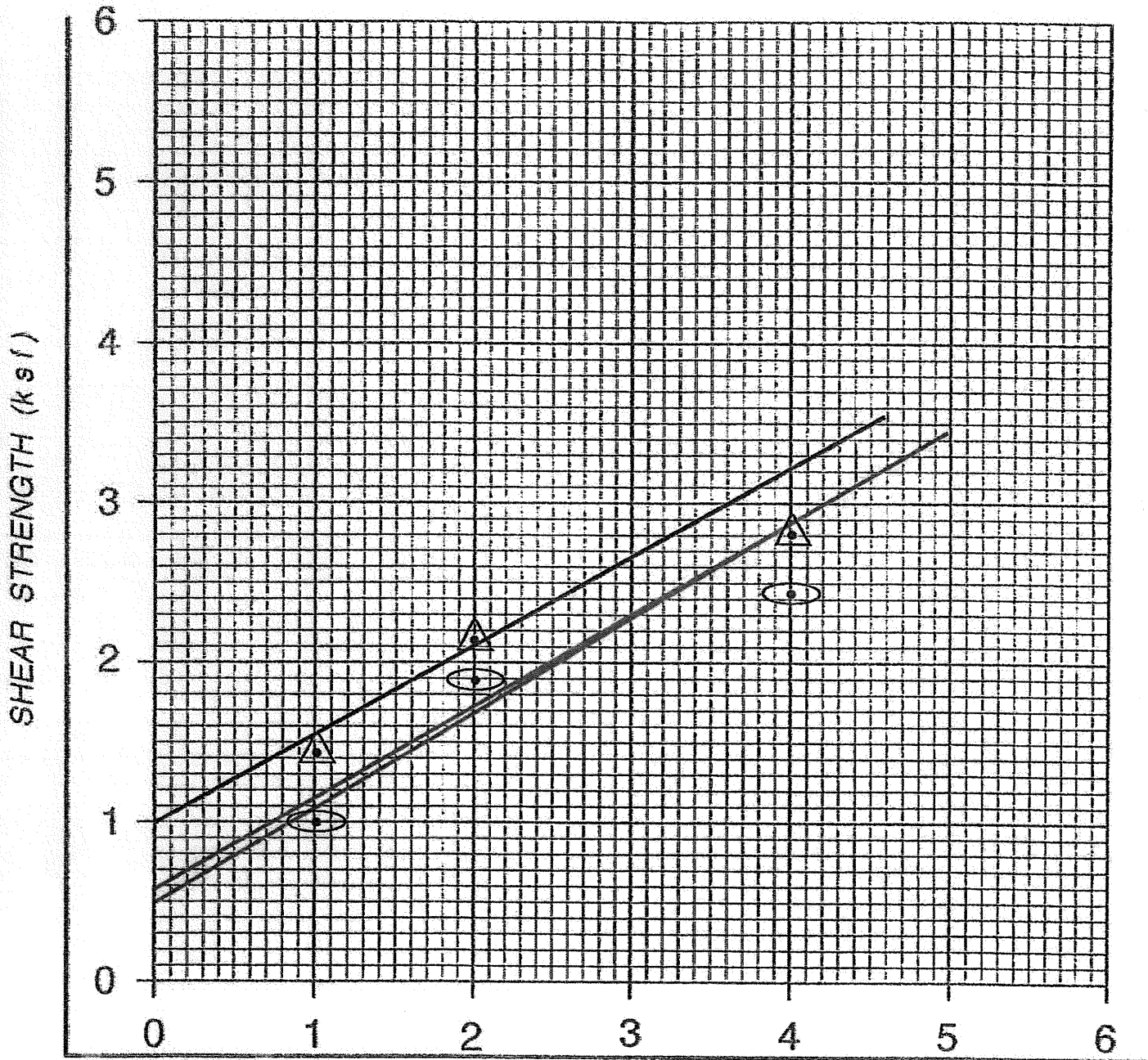
Project Name: South Shores Church

Date: February 2008

Project No: 6375-04.1

Figure No: A-7

DIRECT SHEAR TEST DIAGRAM

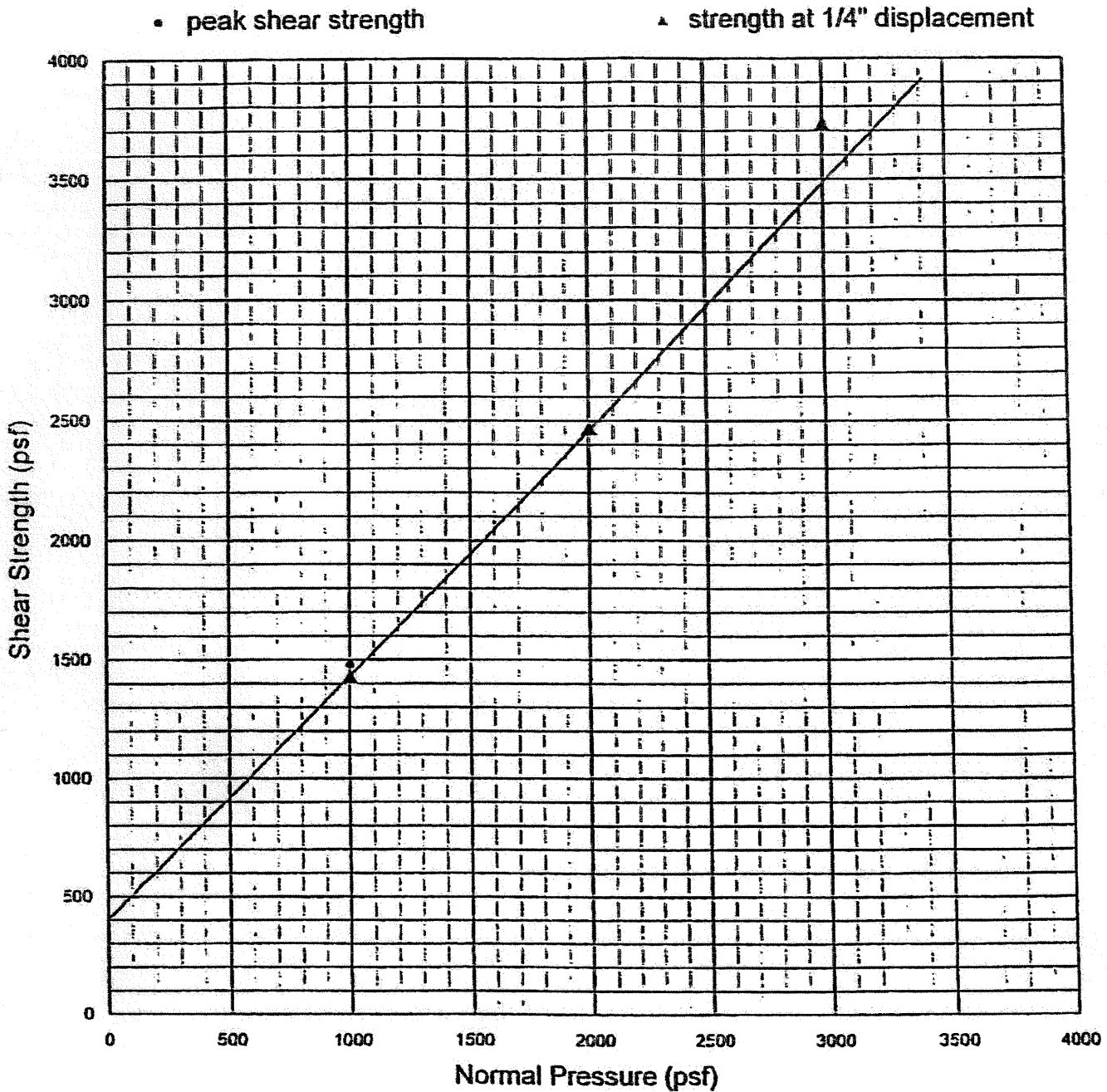


| | | | | |
|-----------------------------|--------------------------|-----------------------|-----------------------|----------------------------|
| Boring No. | <u>BN-1</u> | Depth | <u>30 feet</u> | NORMAL STRESS (ksf) |
| Soil Description | <u>Breccia</u> | | | |
| Undisturbed/Remolded | <u>Undisturbed</u> | | | |
| Moisture Content, % | <u>14.2% after test</u> | | | |
| Dry Density, pcf | <u>122.1% after test</u> | | | |
| Saturation, % | <u>100.9% after test</u> | | | |
| Shearing Rate | <u>.022"/min.</u> | | | |
| | | Cohesion (ksf) | Friction Angle | |
| | | <u>1.0</u> | <u>30</u> | |
| | | Peak | Ultimate | Reshear |
| | | <u>1.0</u> | <u>0.5 / 0.6</u> | <u> </u> |
| | | 30 | 31 / 30 | <u> </u> |
| | | Remarks: | <u> </u> | |



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| | |
|--|------------|
| Project Name: South Shores Church | |
| Date: | April 2008 |
| Project No: | 6375-04.1 |
| Figure No: | A-1 |

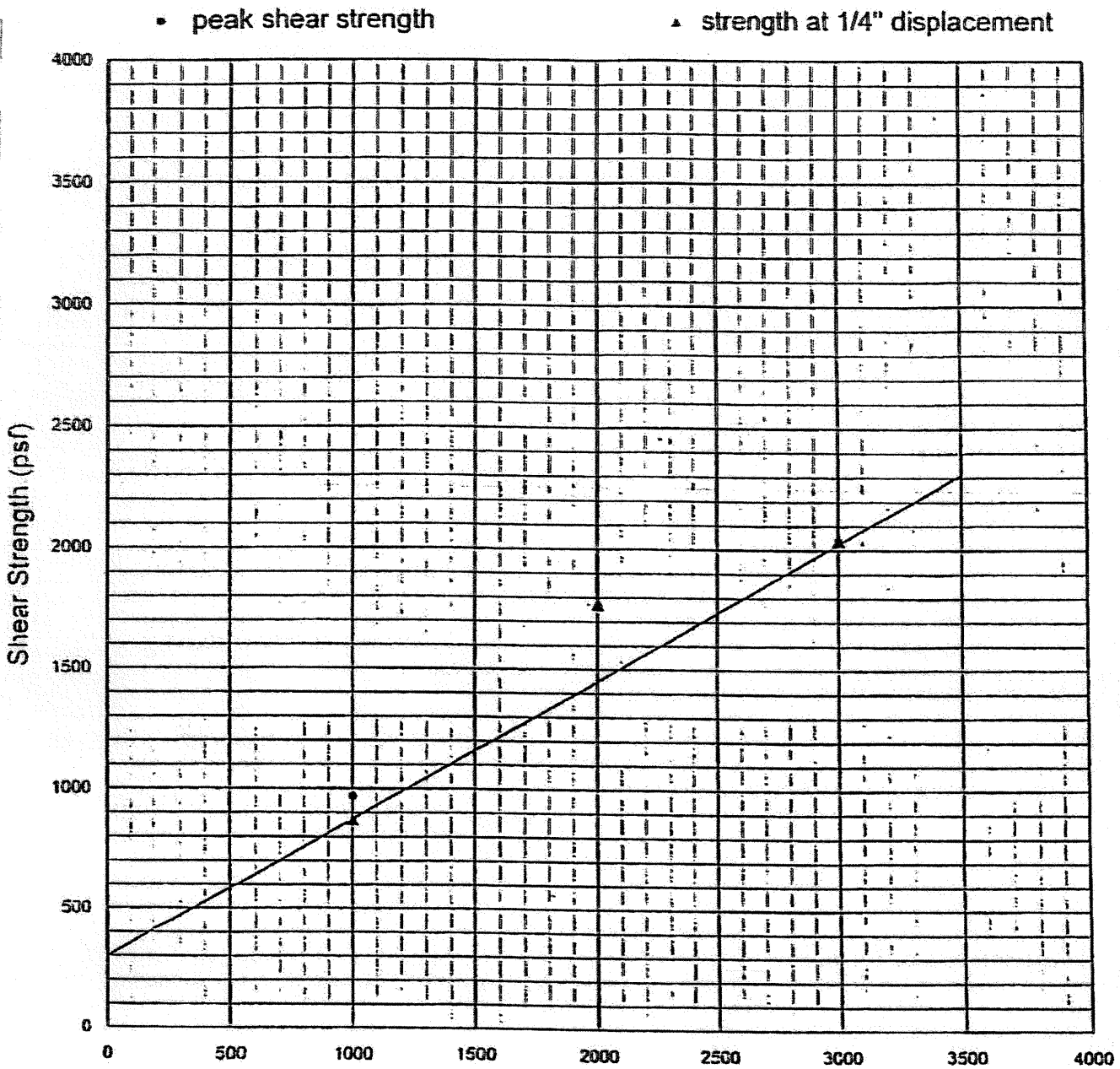


Strain Rate: 0.025 in. / min.

| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|--------|-------------|--|-------------------|-------------------|
| BB-1/4 | Undisturbed | San Onofre Formation: Sandy Siltstone w. Gravel | 125.5 | 7.4 |

| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 1000 | 1480 | 1430 |
| 2000 | 2470 | 2470 |
| 3000 | 3730 | 3730 |
| | C = 400 psf | C = 400 psf |
| | φ = 46 deg. | φ = 46 deg. |

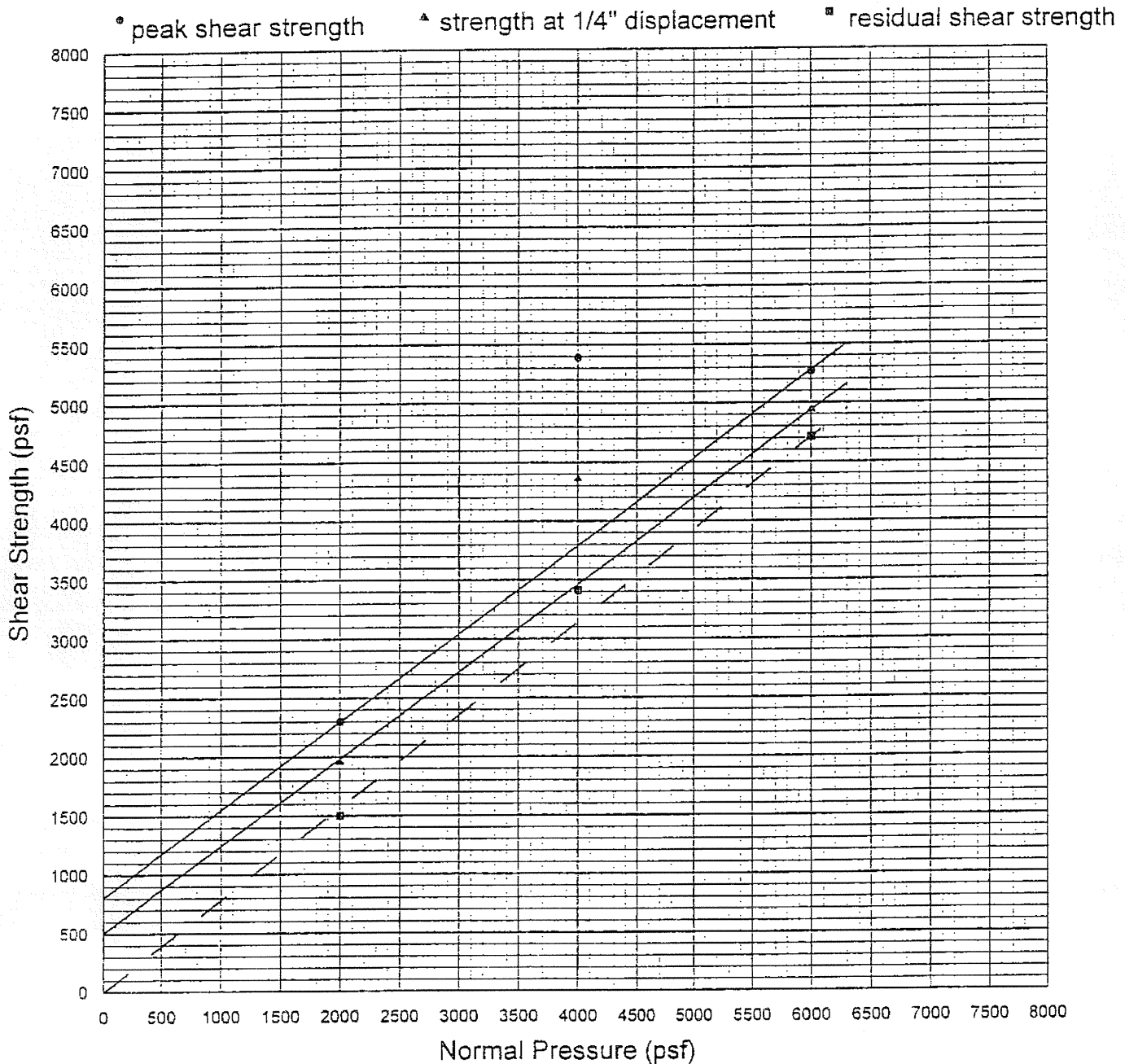
AGRA



Normal Pressure (psf)
Strain Rate: 0.025 in. / min.

| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|--------|-------------|--|-------------------|-------------------|
| S-1/3 | Undisturbed | San Onofre Formation: Sandy Siltstone w. Gravel | 126.7 | 14.5 |

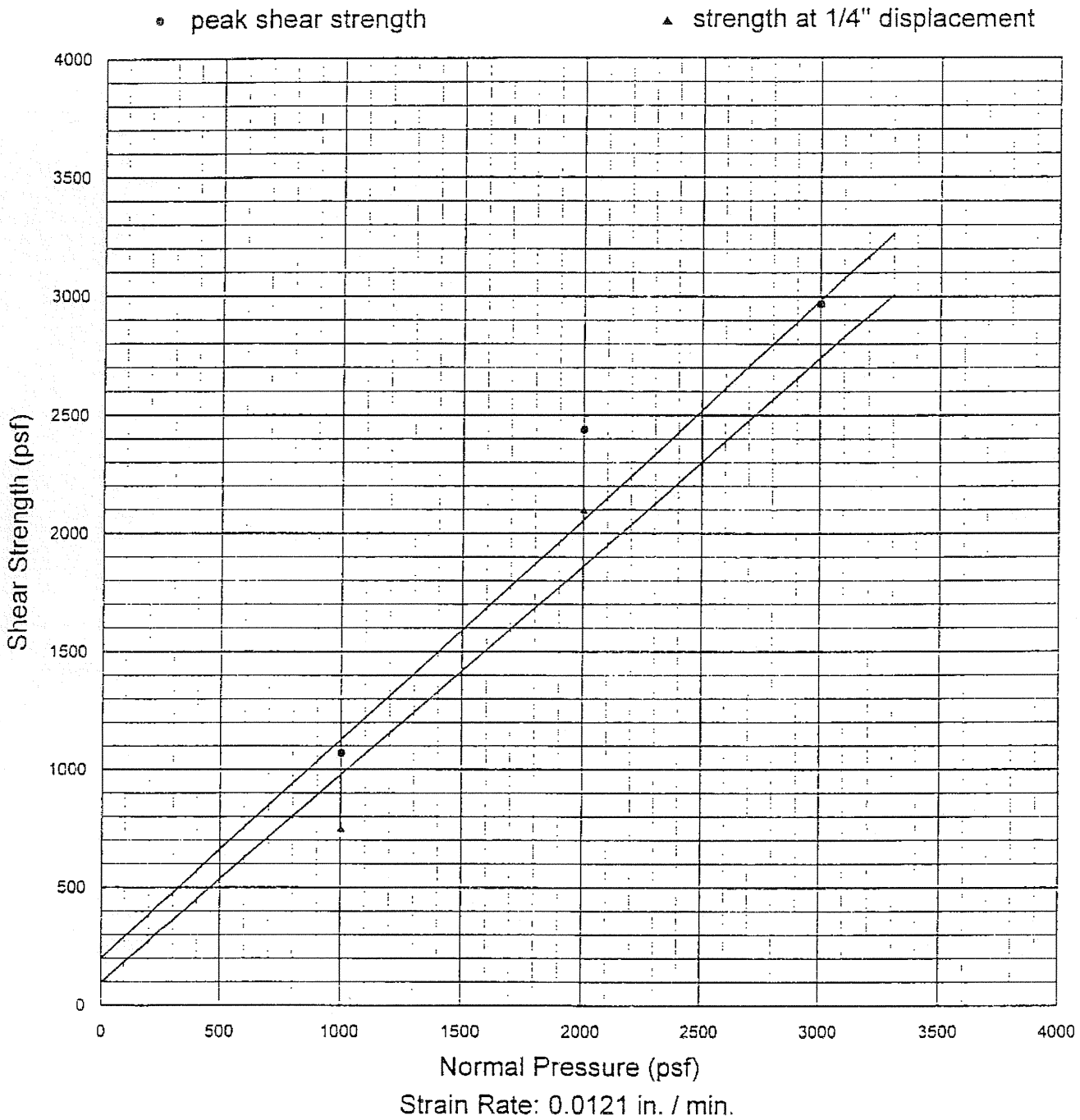
| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 1000 | 970 | 870 |
| 2000 | 1770 | 1770 |
| 3000 | 2040 | 2040 |
| | C = 300 psf | C = 300 psf |
| | φ = 30 deg. | φ = 30 deg. |



Strain Rate: 0.0165 in. / min.

| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|--------|-------------|---|-------------------|-------------------|
| R-2-3A | Undisturbed | Landslide Material: Diatomaceous Siltstone | 40.7 | 113.7 |

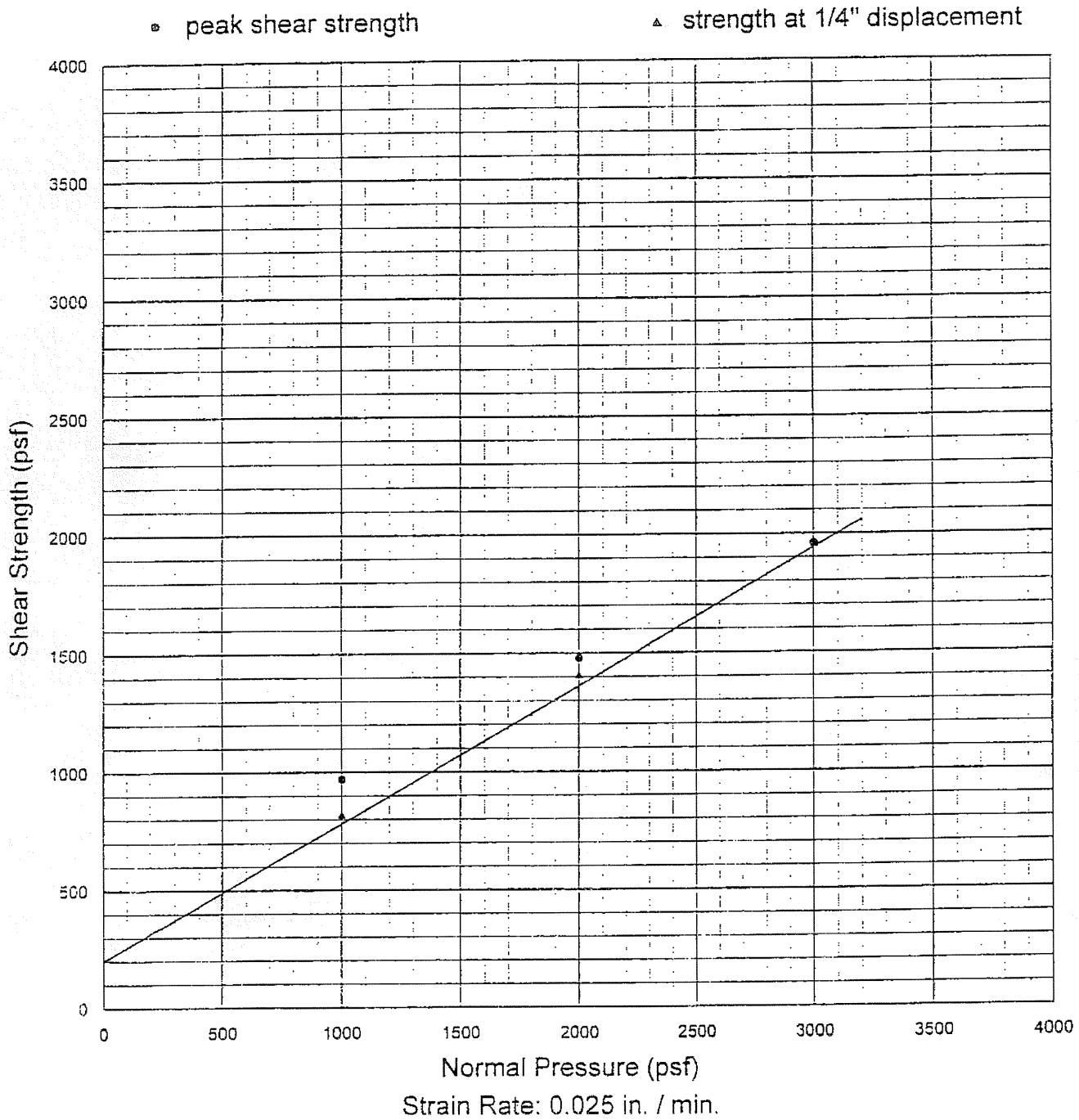
| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) | Residual Shear Strength (psf) |
|-----------------------|-----------------------------------|-----------------------------------|-------------------------------|
| 2000 | 2300 | 1970 | 1500 |
| 4000 | 5390 | 4370 | 3410 |
| 6000 | 5270 | 4950 | 4710 |
| | C = 800 psf $\phi = 36.5$ deg. | C = 500 psf $\phi = 36.5$ deg. | C = 0 psf $\phi = 38$ deg. |



| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|---------|-------------|---|-------------------|-------------------|
| R-2/13A | Undisturbed | Monterey Formation: Fine sandy Siltstone | 105.6 | 23.3 |

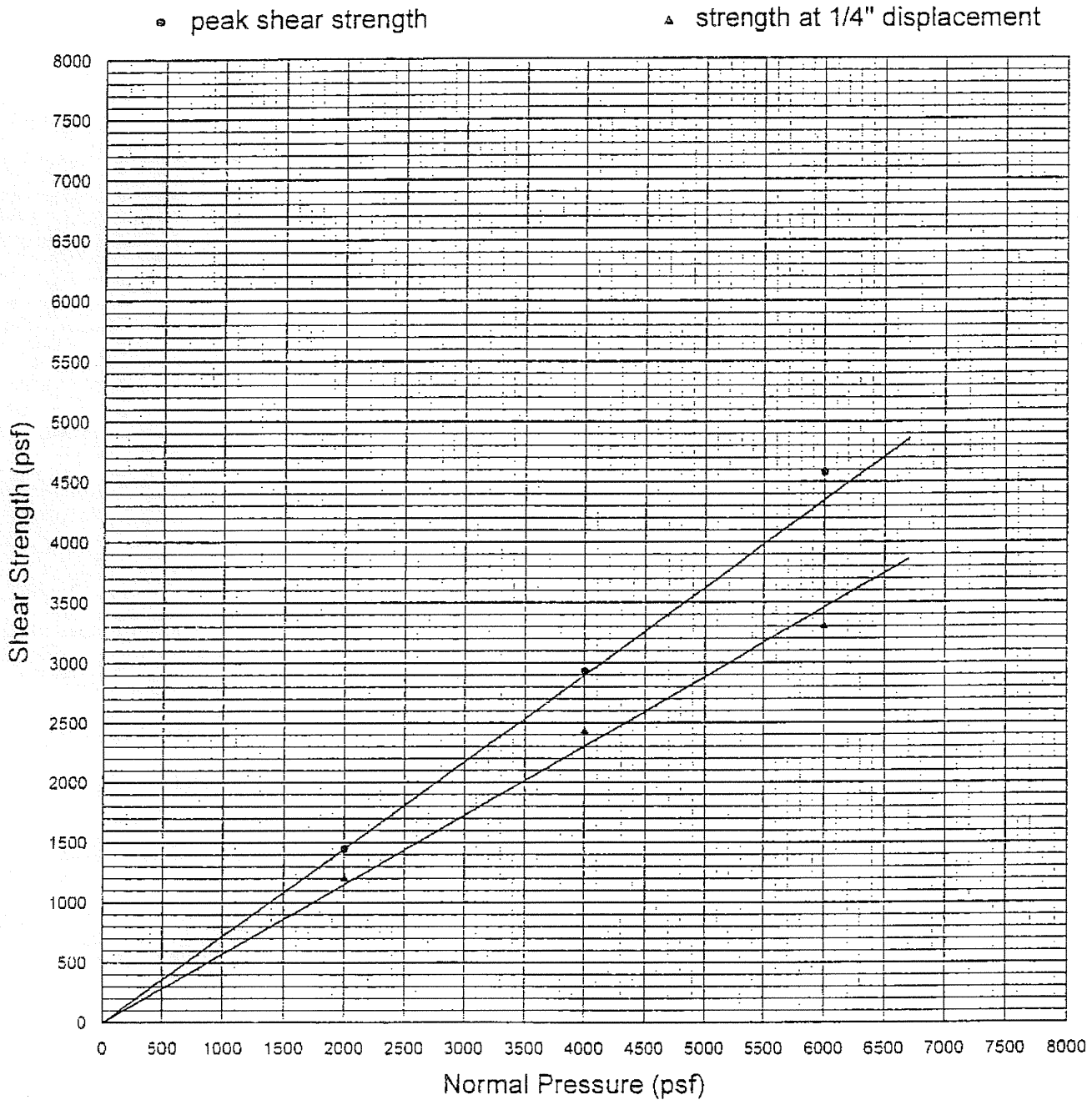
| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 1000 | 1070 | 750 |
| 2000 | 2440 | 2100 |
| 3000 | 2970 | 2970 |

$C = 200 \text{ psf}$ $C = 100 \text{ psf}$
 $\phi = 43 \text{ deg.}$ $\phi = 41 \text{ deg.}$



| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|--------|-------------|------------------------------|-------------------|-------------------|
| R-3/1 | Undisturbed | Fill Material: Sandy Silt | 109.7 | 18.1 |

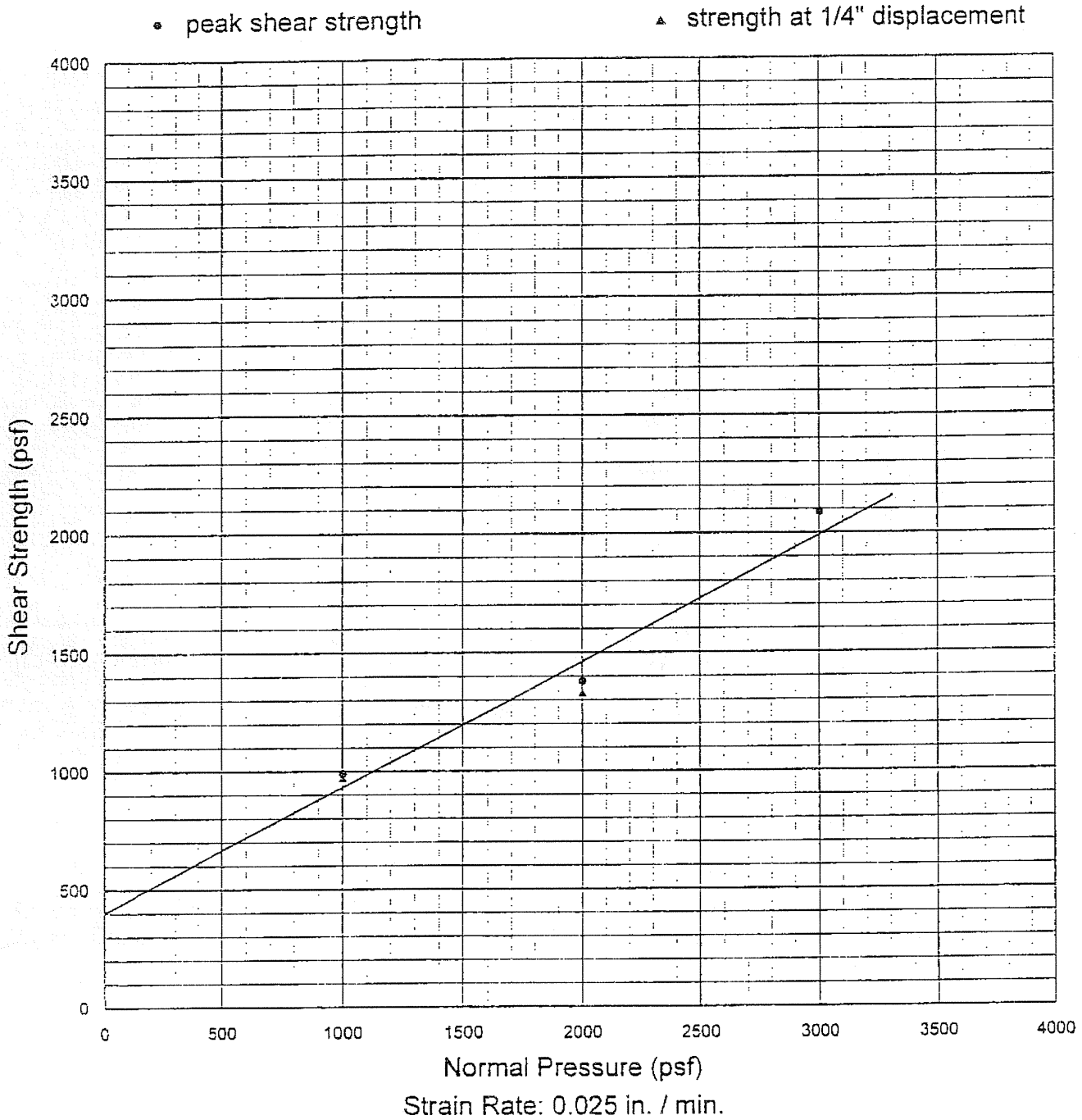
| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 1000 | 970 | 820 |
| 2000 | 1480 | 1410 |
| 3000 | 1960 | 1960 |
| | C = 200 psf | C = 200 psf |
| | $\phi = 30$ deg. | $\phi = 30$ deg. |



Strain Rate: 0.0124 in. / min.

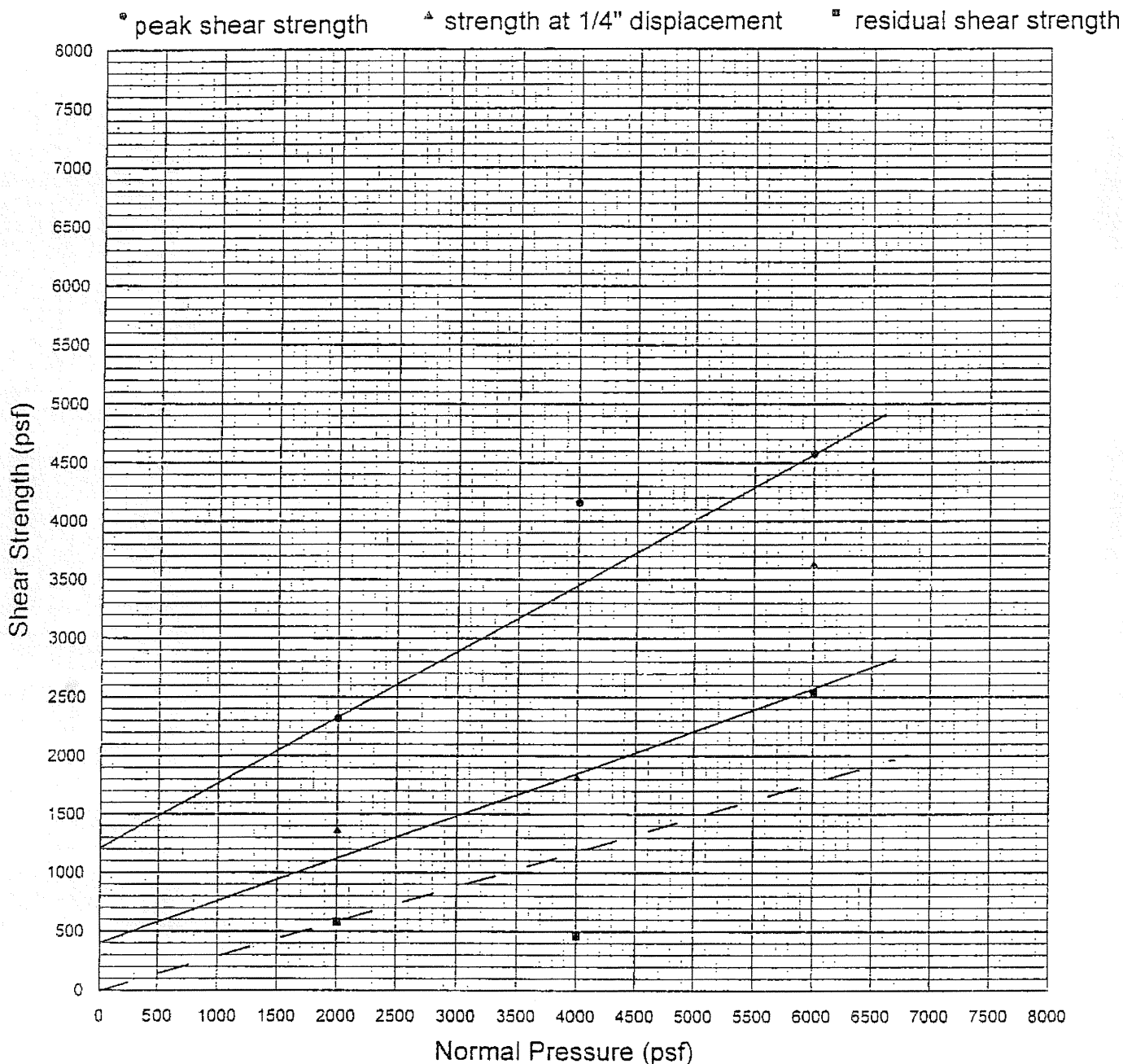
| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|---------|-------------|----------------------------------|-------------------|-------------------|
| R-3/10A | Undisturbed | Monterey Formation: Siltstone | 73.7 | 41.2 |

| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 2000 | 1450 | 1210 |
| 4000 | 2930 | 2440 |
| 6000 | 4580 | 3310 |
| | C = 0 psf | C = 0 psf |
| | $\phi = 36.5$ deg. | $\phi = 30$ deg. |



| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|--------|-------------|--|-------------------|-------------------|
| R-4/1 | Undisturbed | Fill Material: Silty Clay w. Siltstone Frgmts | 82.8 | 56.0 |

| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) |
|-----------------------|---------------------------|-------------------------------|
| 1000 | 990 | 970 |
| 2000 | 1380 | 1330 |
| 3000 | 2090 | 2090 |
| | C = 400 psf | C = 400 psf |
| | φ = 28 deg. | φ = 28 deg. |



Strain Rate: 0.0025 in. / min.

| Sample | Type | Description | Dry Density (pcf) | Water Content (%) |
|---------|-------------|----------------------------------|-------------------|-------------------|
| R-4/11A | Undisturbed | Monterey Formation: Siltstone | 75.5 | 40.3 |

| Normal Pressure (psf) | Peak Shear Strength (psf) | Ultimate Shear Strength (psf) | Residual Shear Strength (psf) |
|-----------------------|-----------------------------|-------------------------------|-------------------------------|
| 2000 | 2320 | 1370 | 580 |
| 4000 | 4160 | 1820 | 460 |
| 6000 | 4580 | 3640 | 2540 |
| | C = 1200 psf φ = 29 deg. | C = 400 psf φ = 20 deg. | C = 0 psf φ = 16 deg. |

***Geotechnical Evaluation and Slope Stabilization
Design for Environmental Impact Report
Purposes, for Proposed New Structures at the
South Shores Church, City of Dana Point,
California***

Volume II

Prepared For:

Mr. GG Kohlhagan

**South Shores Church
32712 Crown Valley Parkway
Dana Point, CA 92629**

Dated: May 22, 2013

Project No. 10132-01

