



# GeoTesting Newsletter

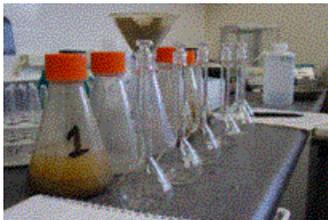
Vol. 6, June 2003

Cooper Testing Labs, Inc.

## Corrosion Lab Complete



Chloridometer



Sulfate



Spectrophotometer



Torsional Ring Shear

The corrosion lab was completed late last year . Peter Jacke is in charge of it. We are offering the typical corrosion packages consisting of pH, resistivity, sulfate and redox. We have been running tests every week since we opened the lab for business. I think that corrosion testing will eventually be a big part of our testing.

### Torsional Ring Shear

We have purchased a second Torsional Ring Shear. Our current machine runs 24/7. The test has become the standard of care for residual strength testing. It is rare that we use the direct shear any more. The direct shear has so many problems. Some of which are: The

area decreases as the strain increases making it impossible to strain far enough to reach a residual condition. The area decreases because the bottom of the sample is held fast while the top is pushed or pulled or visa-versa, as this occurs the top can tilt, which can cause a new shear plane to develop. If the direction of shearing is reversed the clay particles will reverse too, undoing much of what has been accomplished. The shear plane can be precut, which helps to reach a residual state at a much smaller strain, but can still be problematic. If the soil is normally consolidated it will heal and you have gained very little. The torsional shear is virtually problem free. The sample is annular (donut like). The bottom rotates while the top is

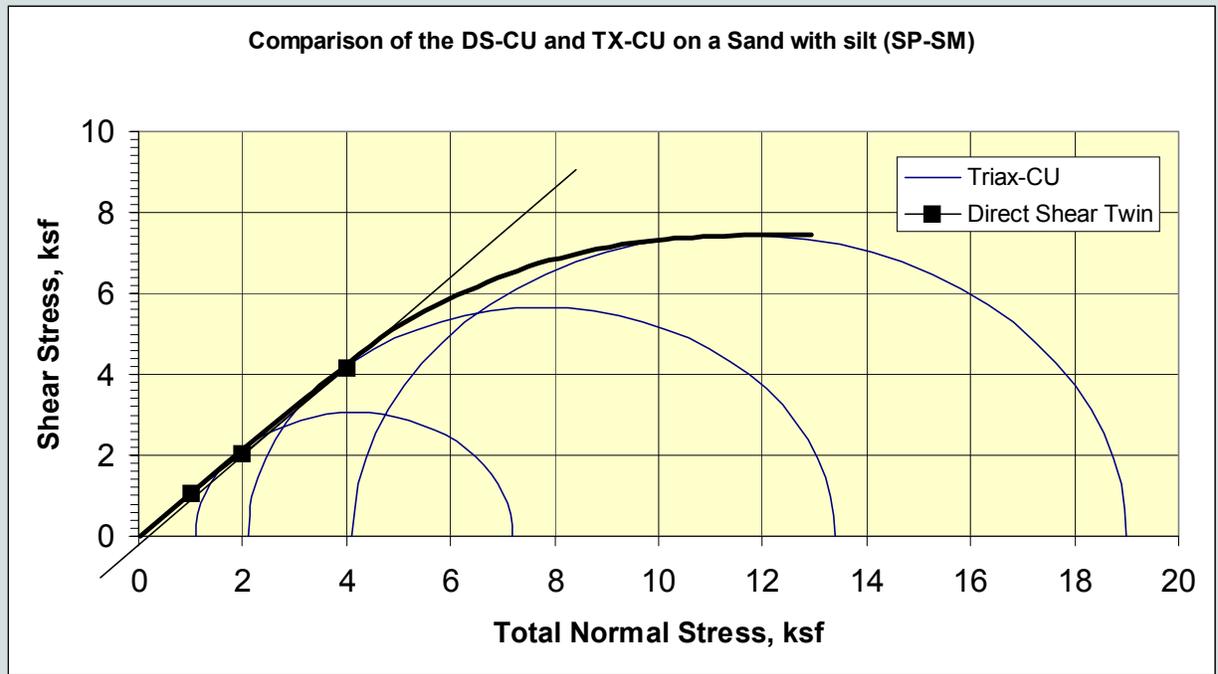
### Comparison of the Triaxial and Direct Shear Tests

We recently had the opportunity to compare the triax test against the direct shear using duplicate samples of clean sand and a clay. I was surprised to see that there was fairly good correlation between the two tests on the sand but not the clay. (See page two for test data). The test results on the sand were almost identical but on the clay were not even close. The direct shear on the clay was about 39 degrees phi vs. 15 phi on the triax test. These were consolidated undrained tests. . It is not too

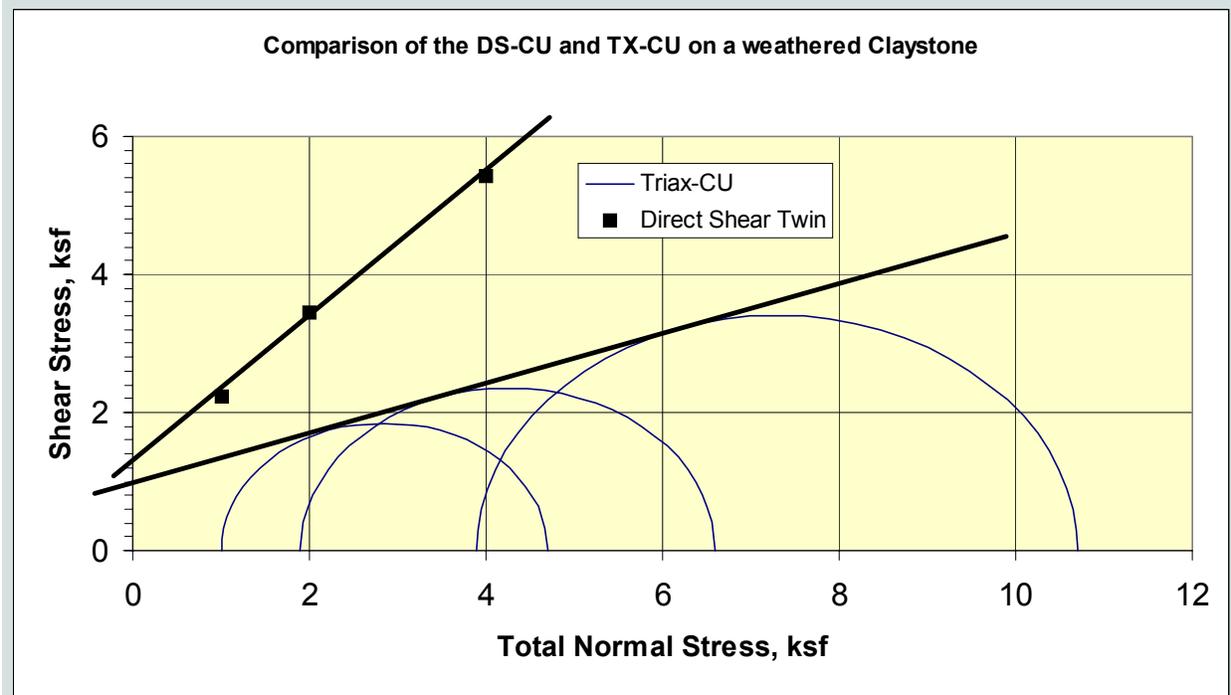
surprising that the results varied so much on the clay since the density and moisture content can change significantly from inch to inch in a clay sample. Micro fishers and variations in structure are common in clay samples and can have profound affects on the results. Since the triax test allows the sample to fail at it's weakest point and the direct shear, which might be forced to fail at the strongest part of the sample, it makes sense that the two tests do not agree with

held fast. The shear plane is a fraction of an inch under the top ridged-porous-stone. The drainage path is so short that full saturation and complete drainage is always achieved as proven by the typical zero cohesion. Another great advantage is you don't have to test an undisturbed sample, although we can. The procedure is to sieve out the coarse sand and mix the sample with water to it's liquid limit. The sample is then over-consolidated and presheared 360 degrees. What you end up with is an overconsolidated, slickensided, shear plane, much the same as is found in most slides. After all this is done the test is ready to start. All three or four loads are run on the same specimen, it is called staged testing. It is better

each other. Our conclusions: use the direct shear on sands to save money and the triax for everything else. Especially if you need drained (effective) values, the direct shear will show too much cohesion because 1) the sample cannot be fully saturated by inundation and 2) the drainage path makes it necessary to shear clay at rates exceeding 24 to 48 hours per point.



Above is a comparison of a triax vs. a direct shear on duplicate samples of (SP) material. The direct shear points are plotted at 1, 2 & 4 ksf. The direct shear tangent is linear and the triax is non linear. The two tangent lines coincide almost perfectly up to 4 ksf, then the triax tangent falls away as it wraps around the third Mohr envelope. It is surprising how good they correlate in the lower than 4 ksf stress range. Higher normal loads were not run using the direct shear, so it is not known whether the tangent would follow the triax in the stress range above 4 ksf. A second comparison was done on duplicate clay samples. The friction angles were not comparable but the apparent cohesion was close. That may be a coincidence. With the limited testing that was done it appears that between the triax and direct shear sand is comparable and clay isn't. This was surprising to me. I have always thought that the direct shear test gave unrealistically higher values than the triax in all materials. These two comparisons are certainly not conclusive but are interesting. Thanks to Joe Raferty of Redwood Geotechnical for having us do this.



## New Online Test Request Form

By now many of you are most likely familiar with our online reporting site. Each client has their own secure page that can only be accessed by the people in that company who have been issued a username and password. All of our test results are posted to the site and an email is automatically sent out to inform the client that a test result has been posted. Sometimes I forget to check the box next to the person to be notified and an email is not sent so check the site before calling. You may have noticed two new buttons at the top of your page: "Request Tests" and "View My Requests". You can fill out an online request sheet by clicking the first button. The tests are arranged in the order of our fee schedule in a drop down menu. There is a nifty trick so you don't have to search for the test that you want to select. Highlight the menu while holding down the shift key, click the first letter of the test name. If you wanted to request a Triax-CU-PP click the "T" key and torsional will pop up. Click it again and triax will pop up. It will scroll through all the

tests that start with "t". This makes filling it out very quick and easy. The program will keep track of the cost of the testing being selected. It will ask important questions like how many points do you want to run and at what pressures, etc. It will require you to give this information, which will save us many phone calls. You can submit the request by the click of a button and print a copy for yourself or to send with the samples. There are 15 lines available for listing samples and tests. When you get to the last line click update and it will add 5 more lines. You can do this indefinitely. We hope that you will use it for several reasons. Quality control is greatly improved, in-that there are fewer questions to be asked and answered because it requires you to enter all the needed information, for us to proceed with out further delay, which will also help reduce the turnaround time. Many times new jobs with questions sit on my desk for a day or two before I get a chance to call for further instructions, in addition to the time that it takes you to

call back. Everything is very clear and easy for the technicians to read and understand. There is an entry screen on each line for additional information if required. When the first 15 lines are full, click "update" and it will add 5 more lines. This can be done indefinitely. This is the first part of a very elaborate sample tracking system, which both you and us will be able to use to determine the status of the testing so it is important to the success of this system that everyone use this request sheet. Of course there will be situations that make it either not possible or inconvenient to use or chain of custody issues. We'll work that out eventually. But if you would try it out and let us know what you think we would be grateful. We especially want to know if you have problems, so we can fix them ASAP. It won't be used unless it's easy and intuitive. I do almost all of my purchasing on the web and it's the easiest I have seen.

**File Explorer for Cooper Testing Labs - Microsoft Internet Explorer**

Address: <http://webdoc.coopertestinglabs.com/explore.asp?ps=ctl>

**Cooper Testing Labs**

home help

**Project Folder**

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- ACRE
- Adco
- Advanced GeoE...
- Advanced Soil ...
- AEI Consultants
- AES Engineering
- AESC
- AGS Inc
- Alan Kropp
- American Soil
- Applied Materia...
- Aquatech
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**Estimated Total: \$193**    Update    Cancel    Next >

**Your Company:** Cooper Testing La    **Requesting user:** dc    **Date in:** 5/20/2003

**Project Name:** Test    **Results to:** Joe Engineer    **Date due:** ASAP

**Project No:** Test    **Your Client:** Mr Money Bags    **P.O.:** DC52003

Boring	Sample	Depth (calc)	Test (rate sheet avail.)	Price
1	1	1 ft	MC, ASTM D2216 - \$13	\$13 del
	1	1 ft	SA, ASTM D 422 - \$90	\$90 del
2	1	1 ft	Total Porosity API RP40 - \$90	\$90 del
		ft	Select	del
		ft	Select	del
		ft	Select	del
		ft	Select	del

Done    Internet

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Fax: 650-968-4228  
Email: cooper@coopertestinglabs.com  
www.coopertestinglabs.com

Address Label Here

### Field Technician for Hire:

Allen Miller has started his own field density testing service. He is also a geologist and has had extensive drilling experience including pile driving, lab testing and much more. Al can be reached at Cell—707-476-5642, pager—510-807-1187, Home—707-836-1912. He works out of Windsor but may travel outside his area. I highly recommend him. Over 25 years experience. He's one of the best. Give him the address and don't worry about the job being done right.

## Torsional Ring Shear (continued from page 1)

than testing separate specimens because it is important to have consistency to develop the nonlinearity in the stress path, that is typical of the torsional ring shear test. Being able to test disturbed samples is particularly useful. Many times a person is lowered down a large boring to the contact of a slide. A hole is carved just above the contact and tubes are driven through the contact. The samples are then taken to the lab and we are asked to try to align the contact at the shear plane of our direct shear machine. This is next to impossible to do since the contact is rarely perfectly horizontal and even if it is the technician is working in the blind by trying to align the contact in the middle of a one inch ring and then pushes it half way into another one inch ring in an effort to get the contact perfectly between the two rings

with a 1/16th inch gap between them. With the torsional all we have to do is put the sample as a paste into the ring shear cell and put the top porous stone on, consolidate it and shear it. It is great if all you have is a chunk of the contact. All we have to do is cut out the soil that is of interest, prepare it and shear it. No problemo! It may even save a person from having to go down a hole. I'm glad I'm in the lab! I believe the theory that Dr. Stark is working from is that the residual strength is dependant upon the plasticity and particle size and the density is assumed overconsolidated. The density doesn't seem to have much affect. It is hard to get away from the idea that the sample has to be undisturbed and therefore representative. It became obvious after having run samples both in a paste and undisturbed

that there was no difference in the results as long as you overconsolidate the sample. Our typical loads are 2,4 & 8 ksf or up to 20 ksf if needed. I enjoy the simplicity of the torsional ring shear and the results that we get from it.

## Bulletin Board in

### Webdoc

A few months ago I sent out a mass email to all the webdoc users. My idea was to have a place within webdoc where our clients could go to view all the members in webdoc and could email each other with questions, info etc. This idea was a huge success but there were a few people concerned about having their email addresses publicized and rightfully so. So what we have done was to connect a full website accessible from within webdoc so people could post questions, answers, papers etc. The orange button is at the top right the top right of your companies page called "help desk" is how you access the bulletin board. Check it out. Let us know what you think, need and want. It is for you.,