N.Z. GEOMECHANICS NEWS

No. 8

JUNE 1974

A NEWSLETTER OF THE N.Z. GEOMECHANICS SOCIETY

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Contents

THIS IS A RESTRICTED PUBLICATION

"N.Z. Geomechanics News" is a newsletter issued to members of the N.Z. Geomechanics Society. It is designed to keep members in touch with recent developments. Authors must be consulted before papers are cited in other publications.

Persons interested in applying for membership of the society are invited to complete the application form at the back of this newsletter. Members are required to affiliate to at least one of the following international societies; Soil Mechanics, Rock Mechanics or Engineering Geology.

EDITOR'S NOTES

1. Geomechanics News

This issue marks a change of editorship. For the last four years Geomechanics News has progressed strongly under the editorship of Mr J.P. Blakeley. Members of the society extend their thanks to Mr Blakeley for the consistently high standard of publication he achieved.

In the editor's notes of Geomechanics News No. 6 the future of this publication was discussed. Should it remain a newsletter or be expanded to become a more technical publication? At that time it was felt that Geomechanics News should continue as an easily readable newsletter on a six monthly basis.

This matter has again been discussed by the management committee. With the Society becoming increasingly involved in technical workshops and symposia should this material be published in Geomechanics News? Again your committee feels that to expand the scope of this publication would severely strain the resources of the Society. While diagrams may be printed to accompany short papers it is felt that more detailed publications and technical papers should be published in the "Transactions" of the N.Z. Institution of Engineers, the first issue of which has just appeared.

Despite pleas by the previous editor no correspondence was ever received by him in four years. This issue contains the first letter received which is essentially discussion generated by articles published in a previous issue. It is hoped the trend will continue, either in the form of letters to the Editor or spontaneous contribution of articles for publication.

2. Geomechanics at the N.Z.I.E. Annual Conference

A Group Technical Session was held at the 1974 N.Z.I.E. Annual Conference in Wellington on 19 February. The session took the form of a Workshop on lateral earth pressures with papers being presented by several speakers. A review of the recently published Issue C of the Ministry of Works and Development "Retaining Wall Design Notes" was given and general discussion ensued. A report of the workshop is presented in this issue.

The management committee feels that the papers presented and the ensuing discussion contain a considerable amount of valuable information which should be available to interested members of the profession. To this end it has been proposed the information be collected together and published, either in an issue of the "Transactions" of the N.Z.I.E. or a separate bound publication. Participants at the workshop have been circularised advising them of this proposal.

Should they wish to enlarge upon (or withdraw) presented discussion they should forward it to the Editor of Geomechanics News. Further discussion from participants, or interested members, will be welcomed.

Following participation at this year's conference, time has been booked at the 1975 Conference to be held in Auckland for a similar Group Technical Session. The theme for the Session has not been fixed at this time. A call for papers is made for presentation of the next conference. Further details are listed on page 26 of this issue.

3. Geomechanics Symposium, Nelson, November 1974

Three Symposia have been organised by the Society in recent years. All symposia have been very successful, and members of the society who have attended in the past will welcome the decision to hold a further Symposium.

The theme for this Symposium will be Stability of Slopes in Natural Ground, and is to be sponsored jointly by the Society and the Nelson branch of the N.Z.I.E., which has a particular interest in slope stability.

A report is presented in this issue of the proposed programme. We are most appreciative of the efforts of the Nelson branch and urge a special effort to attend the Symposium. It may be possible to arrange for charter air flights to Nelson from Wellington and Christchurch to ease travelling problems. It is felt that attending a Symposium away from your home town can add to its value. Participants are forced to "get away from it all" and enjoy the technical papers and discussion.

We hope that many of our members will make the effort in November.

4. Reports from Moscow, 1973

We are most fortunate in this issue to have articles from Drs Pender and Hawley who were in Moscow for the VIII International Conference on Soil Mechanics and Foundation Engineering. Dr Hawley tells of his experiences in Moscow and at the conference, while Dr Pender, who was our representative at the Executive Committee meeting of the ISSMFE, reports on a very important financial matter.

5. Geomechanics Activities in Wellington

A short article is included in this issue concerning the evening meetings it is proposed to hold in the Wellington area. Geomechanics topics of general interest will be discussed. Members in the area are urged to read the article and attend the meeting. Interest, and the feasibility of holding such meetings, will be gauged by attendance at this meeting.

6. Contributions Wanted

Contributions to New Zealand Geomechanics News may be in the form of technical articles, notes of general interest, letters to the Editor, or book reviews, and may cover any subject within the fields of Soil Mechanics, Rock Mechanics and Engineering Geology. Articles on site investigations, construction techniques or design methods which have been successfully used in New Zealand, and which would be of help to other members, would be particularly welcome.

All contributions should be sent to:

The Editor,
New Zealand Geomechanics News,
C/- New Zealand Geomechanics Society,
P.O. Box 12241,
WELLINGTON.

I.M. Parton
EDITOR

INTERNATIONAL SOCIETY FOR ROCK MECHANICS REPORT

G.D. Mansergh

A report on the activities of the International Society for Rock Mechanics for the year October 1972-1973 has been received by the Geomechanics Society as an affiliated Group.

In this report the International Society emphasizes that it must continue its drive for an expanding membership to be able to fulfil its commitments. At present it has 92 supporting member organizations and 4,872 individual members. 166 of these are affiliated directly to the International Society; the rest are affiliated through their respective National Groups.

The International Society continues to publish the Journal 'Rock Mechanics' and this year eleven articles have been published, nine in English and two in German. The 'News' also comes out as a quarterly and should be being received individually by those affiliated to the Society.

A number of commissions have been active within the International Society. The commission on "Terminology, Symbols and Graphic Representation" has completed compilation of a document in English, French and German on the topic, and will have their final meeting at Denver this year.

A commission on "Teaching" is being set up under Professor Edward J. Cording who wishes for comment from the rank and file members on the course of investigation to be followed by this commission.

A commission on "Recommendations on Site Investigation Techniques" has also completed its task and hopes to distribute its findings by the end of this year.

The commission on "Standardization on Laboratory and Field Tests" has been reorganized into two parts, Field and Laboratory. Two final reports have been circulated, one entitled "Suggested methods for determining the uniaxial compressive strength of rock materials and the point load strength index", and the other "Suggested methods for determining water content, porosity, density, absorption and related properties and swelling and slake-durability index properties".

The commission on "Research" met and produced a list of topics for future symposia. The list was divided into three categories, symposia on a large field, on a specific topic, and symposia to be held by correspondence. The lists however were not included in the report.

A commission on "Classification of Rock and Rock Masses" was formed in 1972 to discuss a paper by Dr F. Franciss on 'Geotechnological Classification of Rock Media'. The commission then proceeded to draw up a questionnaire, which it circulated to its members, on classification, and on the results obtained prepared a report on 'Basic Classification of Rock Masses' for discussion at the annual meeting at Katowice in October 1973.

Also at Katowice a commission on "The Behaviour of Tunnels and other permanent openings" was set up but as yet has not reported.

Representatives from the I.S.R.M. met with those of the I.S.S.M.F.E. and I.A.E.G. to discuss the establishment of a permanent co-ordinating secretariat for the three bodies. The meetings were described as very fruitful with close co-operation between the three societies having been reached.

Incoherent ISOlation

A Heretical Metrical Myth

J.H.H. Galloway

We are going metric and this is said to be a good thing.

So far as the man in the street goes swapping the old "twelve inches equals one foot, three feet equals one yard, twenty two yards equals one chain etc.," for the new "one thousand millimetres equals one metre, one thousand metres equals one kilometre" will be a bit of a hassle, but worth it in the end. Said m.i.t.s. thinks to himself "I managed to cope with the change to decimal money, so why not decimal distance, and area and the rest". No doubt he will be bothered to begin with about how much he is getting for 50 g of tobacco or a litre of beer, but within a couple of years he will have got used to the new units and may even have forgotton his dark suspicions that the change was all a plot on the part of the brewers to put up the price of beer!

But the poor technologist, things aren't so easy for him. He can't just "go metric". He's got to choose what type of metric. Which god should he follow? Should it be "c.g.s.", "mks" or "ISO"? A momentous decision which has gone in favour of ISO! ISO is the new international god to whom most nations are being converted, even some who already followed other metric gods! Thus the Kiwi is ISOlating to avoid becoming isolated!

Now ISO is indeed a great god and his myth is truly a sacred mystery. Draw near with due reverence and I will tell it to you.

In the beginning was ISO, the great god of metric truth. And ISO appeared to certain wise men saying:

"Worship me faithfully and I will expound to you the twin mysteries of technology. They will give you great riches and power amongst men. And all the people will bow down before you. And you shall take the name ISOlationists and be my priests, both you and your children and your children's children unto all generations.

But beware lest you explain these great mysteries to other men or they too will perceive their simplicity. They will call your bluff proclaiming that these are no mysteries but simple truths that any school child can understand. And your power will pass from you and you will have to work for a living! Therefore guard you diligently my sacred mysteries!

And this is the first mystery that I show you!

Lo, here is a great map of my land of technology. Marked carefully upon it are the positions of all technical concepts. And to each concept I have given a name for its basic unit, a short name that rolls easily from the tongue, clear and unambiguous, to serve as its identification to all. Mark well these names in your hearts. And behold to the map I have added all the routes by which technologist may proceed from one concept to another. Thus is the whole of technology revealed to you. And the name of this map is "Coherence", and it will give you great power amongst men.

And this is the second mystery that I show you!

As you travel round my land of technology you will find that sometimes it behoves you to travel fast and far with giant strides. At other times you must creep with tiny steps lest you miss your destination. So I give you a set of ratios so that you may travel skillfully and without error throughout my land. And the large ratios shall be:

"Kilo means one thousand fold
and mega means a million
giga is a mega kilo
and tera is one billion"

and the small ratios shall be:

"milli means one tenth per cent
and micro means a millionth
nano is one micro milli
and femto is one billionth"

These ratios I have skillfully chosen to satisfy your every need. Use them wisely and you will travel safely throughout all my land. They are your sure defence against the Decimal Demon who lies in wait for the unwary traveller.

And you shall call this mystery the "Prefix Rule". But reveal not these my mysteries to other men lest your power depart from you".

And straightaway the great god ISO vanished from their sight.

And the wise men were amazed and rejoiced in their good fortune, for surely they were indeed blessed and their future assured! And they bowed down and worshipped ISO and became his priests and took unto themselves the name of ISOlationists.

But they remembered well the warning of the great god ISO so they took the map "Coherence" and hid it in a secret place. But before they did so they made a copy marked with many false shortcuts and with most names missing or replaced by misleading ones. And this copy they falsely called Coherence. Thus was the true mystery hidden from the eyes of other men.

And they took the true Prefix Rule and changed it adding many subtle confusions and using strange names. And the false Prefix Rule they drew up was very long and complex and full of monstrous exceptions. Part of it went thus:

One unit of length shall be <u>one</u> metre
One unit of area shall be <u>one</u> metre squared
One unit of time shall be <u>one</u> second, BUT
One unit of mass shall be one <u>kilo</u> gram!

One thousand units of length shall be one <u>kilo</u>metre
One thousand units of time shall be one <u>kilo</u>second
One thousand units of area shall have no <u>prefix</u> BUT
One thousand units of mass is NOT one <u>kilo</u> kilogram!

One million units of time shall be one <u>mega</u> second
One million units of area shall be one <u>kilo</u>metre squared
* One million units of volume shall have <u>no prefix</u> BUT
One million units of mass is NOT one <u>mega</u>gram!

Thus was the Prefix Rule utterly obfuscated and the prefix names given variable meanings.

Thus did the ISOlations do as the great god ISO bade them and hid the true mysteries from all men. And they rejoiced amongst themselves for they thought their power was assured for ever. They had so obscured the mysteries of ISO that even they couldn't understand them!

* Another version reads:

"One million units of volume shall be <u>one gigalitre</u> BUT."

So the ISOlationists took the false map Coherence and the false Prefix Rule and displayed them to the people, saying:

"Behold, the mysteries of the great god ISO
Lo, they contain all wonders of technology
Let us intercede for you with the great god ISO and interpret them
That your trade may flourish and
Your structural monuments become the wonder of mankind".

And the populace were filled with wonderment and fell down and worshipped the great god ISO. So their leaders heaped honours and riches upon their priests, the ISOlationists, air travel and expense accounts. And the ISOlationists vied with each other in collecting duty free loot and air hostesses and praised the great god ISO loud and long.

But amongst the populace there were heretics, technologists and others who had long worshipped other gods. They looked askance at the mysteries of ISO and saw that the Prefix Rule was no more than confusion and that the map Coherence was but falsehood. So they murmured amongst themselves saying "These ISOlationists are but rogues and charlatans. We will not honour them, nor will we follow their god. How can the map Coherence be a true map when we can see so many false routes marked upon it and so many important destinations without names? And the Prefix Rule is no rule, but just an arbitrary collation of exceptions".

And these murmurings came to the ears of the ISOlationists and they were sore afraid. For they feared for their fat meal tickets and expense accounts. So they took council amongst themselves to overcome the heretics, saying "we must indeed show that the map Coherence can be useful lest we be utterly discredited". And being cunning men they decided to add names to the map Coherence slowly, step by step. With much public protestation about the difficulty of the task, the all night vigils, the exhausting air travel, the awesome tribute exacted by the great god ISO, they worked and after several years produced the name "Pascal" for the unit of stress. And when they had done so they held a great feast day for the great god ISO and sang this triumphal chant:

"There is but one metric god and ISO is his name
Mighty he is and armed with two great Mysteries.
Honour ye his priests, the ISOlationists,
For they have perpetuated his Mysteries for ever!
Praise ye ISO the Incoherent!"

For they could see that at that rate the map of Coherence would never be properly completed and their power would indeed be secure for ever and ever.

In the fullness of time the worship of ISO was brought to Aotearoa. There the ISOlationists praised their god and presented his mysteries to the leaders of the people and the merchants. And straightaway the merchants believed for they saw that if their goods were blessed by ISO they would sell well throughout all the world and they would make fat profits. So they persuaded the leaders of the people to pass laws and ordinances commanding the worship of the great god ISO and obedience to the ISOlationists.

But the technologists of Aotearoa were a stubborn and independent breed who were not easily deceived. And they looked upon the mysteries of the ISOlationists and saw their folly. But they were also shrewd people so they decided to pay lip service to ISO but still to practice the rites of their traditional god F.P.S. And amongst them there was a seer who comprehended the true nature of the mysteries of ISO and realised that they could indeed make plain all technology and provide a sure defence against the Decimal Demon. So this seer preached his creed and gathered round him a band of prophets who called themselves the ISOherents (for surely they believed in the great god ISO and his true Coherence). And they struggled long with the ISOlationists and overthrew them. Thus was the true worship of the great god ISO first established.

And from Aotearoa the ISOherents spread the true worship of ISO throughout the world. Everywhere the merchants waxed fat for their goods were indeed blessed by ISO and the technologists rejoiced for the map Coherence and the Prefix Rule were indeed powerful and simple tools for their use. Thus was the worship of ISO brought to all men and the Decimal Demon finally tamed. And this is the chant that all men sang to ISO:

"There is but one metric god and ISO is his name
Mighty he is and powerful are his Mysteries
He needs no priests for we are all his worshippers
And he to us has made his Mysteries plain
Praise ye ISO the Coherent!"

And such is the sacred myth of ISO, the great god of metric truth.

Praise ye ISO the Coherent."

GEOMECHANICS SYMPOSIUM

NELSON, NOVEMBER 1974

J.P. Blakeley

The Symposium will be sponsored jointly by the N.Z. Geomechanics Society and by the Nelson Branch of the N.Z.I.E.

The title will be -

"SYMPOSIUM ON STABILITY OF SLOPES IN NATURAL GROUND"

Scope

The Symposium will consider the stability of both cut slopes and natural slopes. However, the stability of slopes in filled ground will be specifically excluded. It is hoped that the technical sessions will bring together the disciplines of Soil Mechanics, Rock Mechanics and Engineering Geology in the solving of slope stability problems.

Background

This Symposium will follow on from previous symposia organised by the Society in Hamilton (1965) Christchurch (1969) and Wanganui (1972) to discuss specific technical subjects over a two day period and to enable members of the Society and other people interested in Geomechanics to have informal discussions and hence get to know one another better.

Programme

The Symposium will be held on Friday and Saturday 8th and 9th November. The venue will be the D.B. Rutherford Hotel, Trafalgar Square, Nelson. On the Friday morning there will be registration and the formal opening. On Friday afternoon there will be the opening session for presentation of papers and discussion followed by an evening meal and then a further session of papers and discussion possibly followed by a social hour. There will be further sessions of papers and discussions on the Saturday which will end in time for those who wish to catch planes leaving Nelson in the afternoon. However it is hoped that many will prefer to stay on for a bus tour of points of interest in the Nelson city area in the afternoon and a possible social function in the evening.

Sessions

The technical sessions are planned as follows.

1. Keynote Address
2. Risks Legalities and Insurance of Slope Stability
3. Classification and Mechanism of Slope Failures in Natural Ground
4. Geological Assessment of Slope Stability
5. Soil Slopes, Engineering Assessment of Slope Stability
6. Rock Slopes, Assessment of Slope Stability
7. Stabilisation of Slopes
8. Stability Problems in the Nelson Area.

General

It is hoped that many of the participants will elect to stay at the D.B. Rutherford Hotel and hence, with all the activities under one roof, give the Symposium more of a residential flavour than has been possible in our past symposia.

The Society realises that travelling costs to Nelson will be high for many participants but believes that there are many advantages to be gained from meeting in a suitable city where nearly all participants have to drop their day-to-day concerns. This means that participants can relax and concentrate on the subjects under discussion and also between sessions can meet and talk informally with other people interested in Geomechanics.

The Society would like participants to regard the Symposium as a chance for a brief holiday before the Christmas rush. For that reason it is hoped that many will elect to stay on in Nelson over Saturday night and to take part in any social function which can be arranged.

It is hoped that arrangements can be made within the programme to cater for ladies who wish to accompany participants to Nelson.

Further Information

For further information please tear out and post the attached form.

.....

The Secretary,
P.O. Box 774,
Nelson

Please send me further information on the "Symposium on the Stability of Slopes in Natural Ground"

Signed .....

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.....

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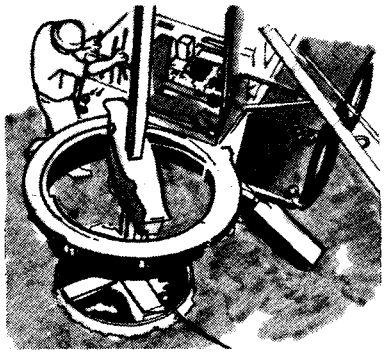

- **Site investigation**
- **Mineral Exploration drilling**
- **Diamond core drilling**
- **Seismic shot-holes**
- **Oil and gas exploration**
- **Locating suitable well sites**
- **Drilling and construction of water wells**
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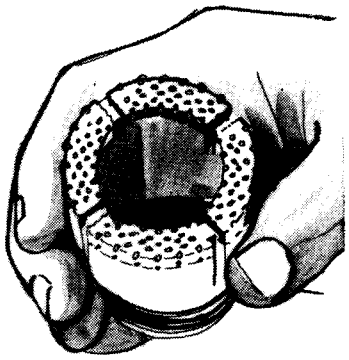

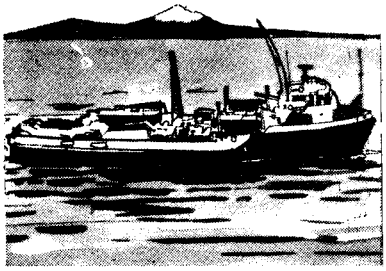

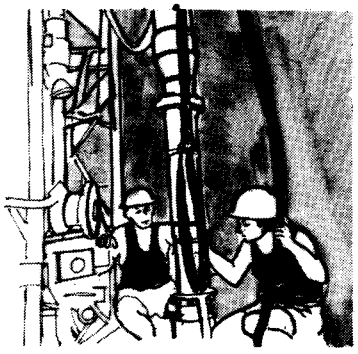

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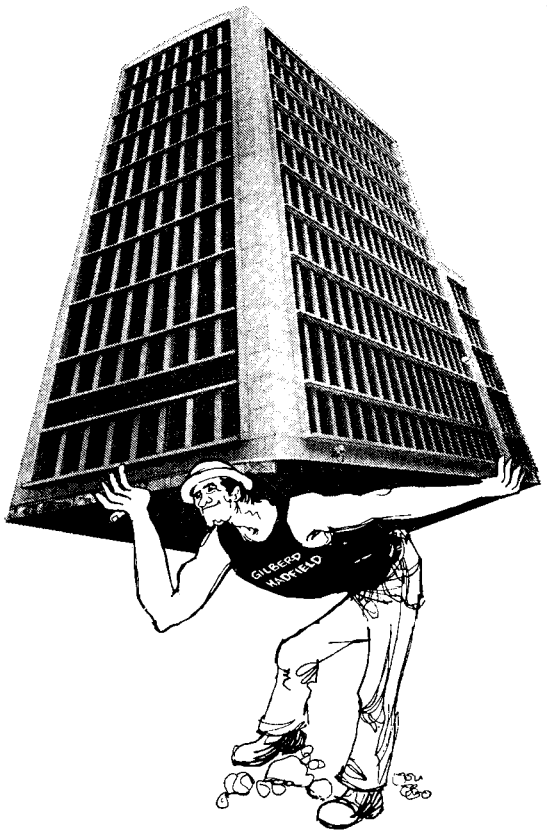

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REPORT ON COURT OF APPEAL DECISION

I.M. Parton

Recently a Court of Appeal decision has been handed down which will be of practical value to architects and engineers throughout New Zealand. The decision reverses a Lower Court finding reported in Geomechanics News No.2 and concerns the standard of care and duties of an engineer to his client.

A second case (also reported in the same issue) is of interest because it concerned the collapse of a building wall and the responsibility of an excavator to structures on neighbouring properties. The Lower Court finding was appealed against and subsequently reversed (see Geomechanics News No.5.).

The facts of the first case were quite simple. H. had purchased a building plot from a firm of housing site developers in 1965 and had employed a builder to erect a brick veneer dwelling on the site shortly afterwards. Some months after they had moved in the owners noticed that the brick veneer was developing cracks at the eastern end of the house which worsened after a while. When inspected it was found that there was some subsidence at this end of the house and, while this was only 18 mm at the maximum, it was sufficient to cause severe problems with a brick veneer house.

The owners brought an action for breach of contract against the builders and site developers, who joined the consulting engineers and the firm of excavators as parties to the action on the grounds that the consulting engineers were in breach of their contract with the developers in that they failed to adequately supervise and test the work of the excavators and that the excavators negligently carried out their earthworks contract.

In the Lower Court it was held:

1. that the builder was not liable,
2. that the site developers were liable to the owners,
3. that as the consulting engineers had issued a completion certificate to the firm of excavators that firm was not liable,
4. that the consulting engineers were liable to contribute to the site developers 75% of the damages awarded to the owners against the site developers. It was against this last point that the consulting engineers appealed.

What is the standard of care required of a firm of consulting engineers in this situation? The Lower Court judge held that it was "to carry out a general supervision of work with particular reference to matters of special importance". Does this mean that they became a guarantor of the proper performance of the contract of the firm of excavators?

To assist in its decision the Court of Appeal followed the decision of an earlier case which involved the consideration of the standard of care which an architect owed in ascertaining whether a particular site was suitable to carry the weight of a building. In the course of his judgement in that case the Judge said "I ... conclude that there was not sufficient proof that the architect failed to exercise the amount of skill expected from skilful and experienced members of his profession.

Since the Court must ultimately determine the question of negligence as a fact in all the circumstances of the case, I do not rest my findings on evidence as to the general practice of the profession alone. The Court may come to the conclusion that the standards deposed to by the witnesses do not reach the standard required by law - namely, a reasonable and prudent architect engaged on a work such as this."

In other words a valuable test is that of the general practice of the profession. If it be found that a professional man (of any profession) does not use the degree of care and skill which the majority of his profession would have used, then that is strong evidence of negligence. However, that is not the definitive test and the Court is quite free to find that the general practice of a profession falls below the standard required by law.

The Court further held that where a professional man's relationship with his client is contractural, the true nature of an action brought against the professional man for damage caused by lack of proper professional skill and care is an action founded upon contract alone.

In this particular case the Court did not find it necessary to decide whether or not there was a breach of contract caused by lack of a proper professional skill because, if there had been, it had occurred more than 6 years before the issue of the notice joining the consulting engineers as a part to the action and was therefore barred by the Limitation Act (1950).

Nevertheless the case is important because it provides a discussion of the duties of a professional man toward his clients and will serve as a valuable guide in future disputes where the skill and care of a professional man are in question.

(Based on an article in Construction No. 217, p.30,February 1974).

THE FIRST N.Z. GEOMECHANICS LECTURE

J.H.H. Galloway

The first N.Z. Geomechanics Lecture was delivered by Mr J.W. Ridley, M.P., B.E., M.N.Z.I.E. in March. Three deliveries, one each at Branch meeting of N.Z.I.E. in Christchurch, Wellington and Auckland were planned and the total attendance at these meetings was nearly 230. Regrettably bad weather prevented Mr Ridley from getting to Christchurch in time to deliver the lecture in person but swift work on the part of the Branch saved the day. At very short notice they rigged up loud speakers in the hall and when the text of Mr Ridley's lecture had been read to the audience he was able to listen to and answer their questions by land line from his home in Rotorua.

The main topic of the Lecture was the impact of Geomechanics on New Zealand's development, and many of the questions put to Mr Ridley were concerned with the development of geothermal energy. Mineral resources were also a subject that roused considerable interest and it was apparent that Mr Ridley considered these to be of greater importance in the development of New Zealand than was generally realised. A third area of concern was the impact of Geomechanics on people, and the growing need for its practitioners to remain aware of and sensitive to the public's legitimate demands for information and consultation.

The Lecture was organised with the enthusiastic co-operation of the three Branches of N.Z.I.E.concerned. Their helpfulness made my task of organising the venues very simple indeed and I hope they found their work on behalf of the Society well repaid by the attendances. I hope that such co-operation between the Branches and the Society continues in the future.

I would also like to thank Messrs G. Mansergh and D.K. Taylor for acting as the Society's representatives at the Lectures in Christchurch and Auckland. Mr Mansergh deserves special mention for the way in which he coped with the emergency situation that developed in Christchurch.

T.P.D. CORE ORIENTATION INSTRUMENT

G.T. Hancox

1. Introduction

In some engineering projects such as damsites and large underground excavations accurate data is often required from diamond drill holes put down to investigate rock defects. It is therefore important to be able to measure the attitude of these defects in the drill core so that maximum information can be obtained.

In angle or inclined holes it is possible to orientate the core so that the dip and strike of specific defects can be measured direct from the drill core.

Various methods of core orientation are known but most are expensive, complex, and apparently of doubtful reliability. The method described below was developed for use on the Tongariro Power Development after achieving only limited success with one of the commercially available methods.

2. Purpose

The TPD core orientation instrument was designed and built by the MOW Drilling and Investigation section of the Tongariro Power Development during the 1968-70 investigation programmes for the Moawhango and Rangipo Power Projects. Much of the credit for the development of this instrument must go to Mr Allan Erskine Snr, Drilling Overseer TPD, now retired.

The device was designed to be used with triple and double tube core barrels, so that, when drilling angle holes the core can be orientated. In this system the "bottom" or lower side of the core is defined, hence if the angle of dip and direction of the holes is accurately known the attitudes of rock defects (joints, crush and shear zones, foliation, bedding etc.) can be measured directly from the core. Ideally the core orientation instrument should be used in conjunction with a Pajari borehole surveying instrument so that the true dip and direction of the entire length of the hole can be plotted, thus allowing the 3 dimensional location of specific defects.

3. Description

The device is basically very simple, and consists of a 2" perspex cylinder with brass end-pieces. When in operation the cylinder is filled with gelatine and a ball bearing. Fig 1 gives the detailed dimensions of the instrument used on the Tongariro Power Development.

This particular instrument was designed for use with an NMS double tube core barrel though it is also readily adapted for use with NMLC barrels by packing cardboard or rubber around the cylinder to ensure a snug fit. Similar core orientation devices for use with BMS, BMLC or A series barrels could easily be machined.

4. Core Orientation Procedure

(a) The cylinder is filled with a hot gelatine solution for which the setting time (under cold running water) is known. A certain amount of experimentation is necessary to find a solution with a setting time that is long enough to allow the Driller time to put down the drilling rods and start coring before the gelatine has solidified. For example, a mixture containing 3 rounded teaspoons (1 small sachet) of DAVIS GRANULATED GELATINE

in 10 oz (280 ml) of hot water has a setting time of 6 - 8 mins, when the cylinder is cooled in cold water. A weaker solution, using 20 oz of hot water (570 ml) sets in 20 - 25 minutes.

(b) A small ballbearing (1 cm dia) and the required gelatine solution is placed in the cylinder and the screw end-piece is replaced and sealed with "thread seal" tape. The assembled device is then positioned inside the split inner tube, at the top end of the core barrel. When the barrel is assembled, the fit inside the inner tube should be tight enough to prevent the device from slipping down inside the barrel.

The assembled barrel and rods are then lowered down the hole and drilling is resumed. The time taken for this procedure should be less than the setting time of the gelatine. As the rods are lowered down the hole the barrel and inner tube can rotate freely, but after drilling is resumed the core enters the core-catcher preventing rotation of the inner tube. The gelatine solidifies, hopefully without further movement, and the ball bearing is positioned at the low point of the cylinder, indicating the "bottom" side of the core.

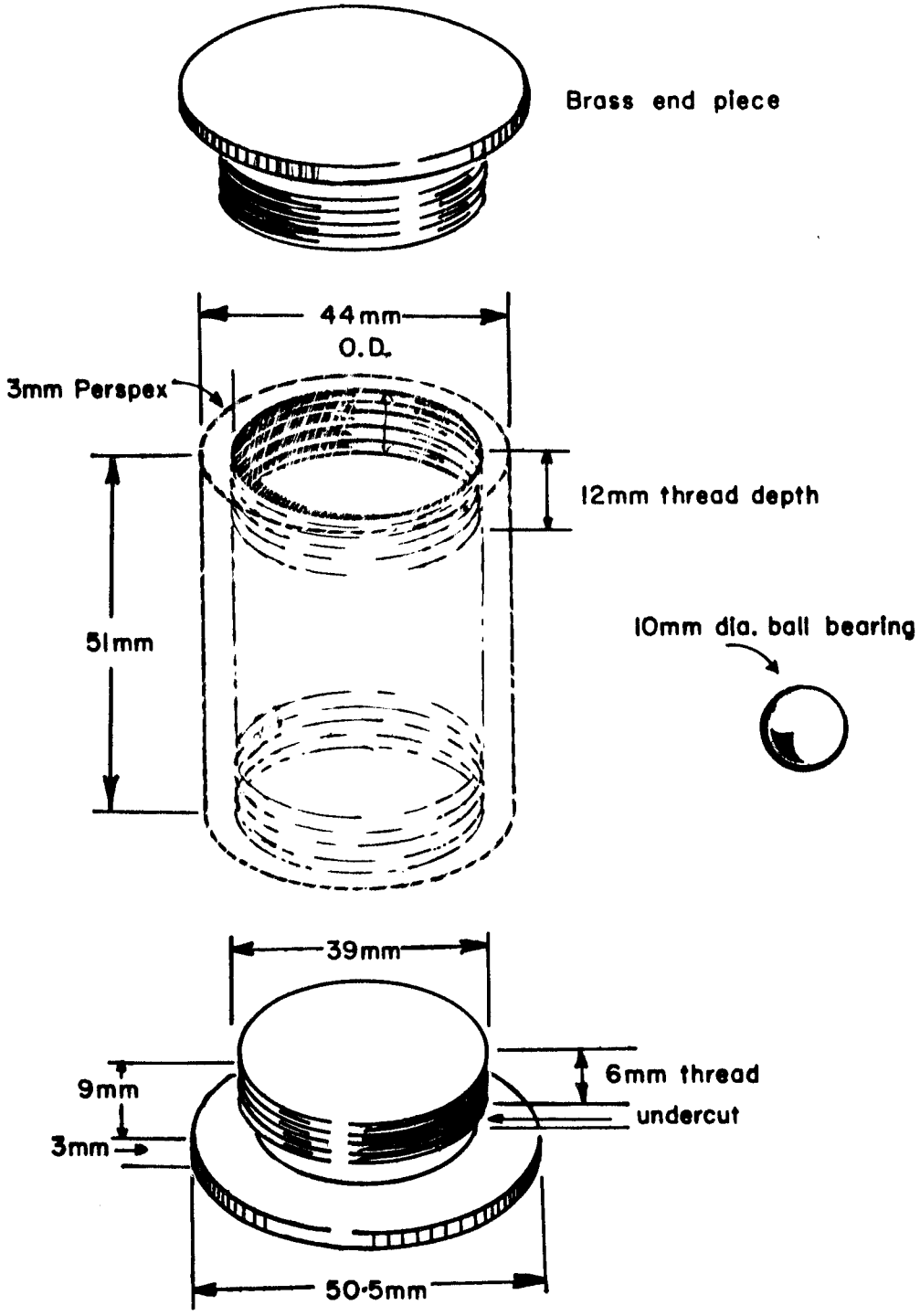
(c) When each run is recovered, the core is laid out in the split inner tube and a line matching the position of the ball bearing is drawn along the core. A waterproof felt pen is most suitable for this purpose. The "bottom" or lower side of the core is therefore identified and the core should then be placed carefully in the core box with this orientation line uppermost.

5. Potential Difficulties

This orientation system is simple, cheap and is generally reliable, though care is required to ensure that the cylinder is firmly positioned in the inner tube.

There is always the possibility that the inner tube might twist after solidification of the gelatine and therefore when logging, the Geologist should always bear this in mind and be watchful for unpredictable or inconsistent orientations of structures in the core. Structures such as bedding, foliation etc, if known to be generally consistent in a particular area, should be used as a check on orientation reliability.

Core orientation using the perspex cylinder should be continued lift by lift and never solely by matching the ends of core, (i.e., fitting joints and fractures from the bottom of one lift to the top of the next lift). Drillers who attempt to adopt this procedure should be informed of the unreliability of this method and persuaded to discontinue this practice. However, matching of core ends should be used as an additional check on the reliability of the orientation.



T.P.D. CORE ORIENTATION INSTRUMENT

EIGHTH INTERNATIONAL CONFERENCE ON SOIL MECHANICS AND FOUNDATION ENGINEERING

MOSCOW - AUGUST 1973

J.G. Hawley

It would appear that Moscow is to be the venue for many conferences. When we arrived a lawyers conference was finishing and when we left a gynaecologists conference was about to begin almost simultaneously with the World University Games. Next August the International Society of Soil Science will meet in Moscow. This alone will give the reader some feeling for the "atmosphere" on arriving at the conference. The Russians are equipped to stage large conferences; they are unhurried and unworried by them. For many of the 'translators' and 'hosts' the conference was routine business.

Dr Penman has given a fairly detailed review of the conference sessions in the January issue of "Ground Engineering" (see reference). Rather than attempt to cover the same ground as Dr Penman I refer readers to his article and to the conference proceedings.

Not until I arrived in Moscow and heard of the experiences of the English delegates did I appreciate how fortunate I had been in the matter of getting a visa. (Dr Penman writes very amusingly of the frustrations the English had). It may be that one of the benefits of belonging to a small isolated country is that lists of undesirables are shorter. I had all of my papers in order within a few days of applying to the U.S.S.R. Legation in Wellington.

Postal delays between Moscow and New Zealand can be very considerable. After I had returned to Wellington from the conference I had a letter from Moscow informing me that my conference fee had been received and that the Organising Committee looked forward to seeing me. This matter of postal delays (or perhaps anticipated postal delays) may explain why the conference proceedings were not sent to participants in advance of the conference. Everyone received seven volumes of proceedings upon arrival for registration at the conference hall. This meant that virtually nobody had read any of the papers and this put a serious limitation on the value of the formal "discussion" or "main" sessions.

After travelling long distances and coping with time changes, food changes, language barriers, currency exchange and so on, few participants had the reserve of mental energy necessary to digest volumes of proceedings. At the main sessions the tendency was therefore for people to talk about work that they had done (or theories which they had) which they had not worked up into publishable form but which they thought could be considered relevant to the theme of the sessions, often only by a considerable stretch of the imagination.

The conference was attended by 1,740 delegates (450 from Russia) and 600 accompanying persons. The main sessions were held in the Central State Concert Hall which has a seating capacity of 2,500, air conditioning, excellent acoustics and comfortable seats each individually wired for simultaneous translations (in this case to anyone of the three conference languages, Russian, English and French). This was impressive enough but what amazed me was that this hall, a smaller cinema and enormous foyer areas were situated within a hotel, - the Rossia Hotel - the largest in the world. I was told that it could sleep six and a half thousand people

which sounded about the right order of magnitude. Its size is made the more confusing by being set out on an almost square plan - four facades deceptively alike; all interior corridors virtually identical. After a few tiring mistakes one learned to look out the windows (fortunately it did have windows) and having memorised some features of the landscape outside, deliberate for a while before choosing a direction in which to walk along a corridor. Self service restaurants were to be found on alternate floors at each of the four corners of the building. Five restaurants at each of four corners meant twenty identical restaurants - and then there were the dining rooms! The Rossia Hotel was a major subject of conversation at the conference. Fortunately I stayed in it so my transport problem to and from sessions was simply that of a long walk. Some participants had been put in hotels a half an hour away by special bus. The fear of missing the bus lay heavily on these people many of whom could have made themselves understood to taxi drivers in French, English, Italian,German and Spanish - but not in Russian. Besides, the taxis didn'd behave like taxis; they functioned by prearrangement and didn't charge fares. They were Public Service vehicles.

I got to know several young Russians who spoke English and wore badges as members of the conference organising committee. They had studied English at the University as their major study. I did not meet a Russian who spoke English and knew something about soil mechanics.

The beginning of the conference (reduced almost to disaster level for most visitors by difficulties over visas, hotel bookings, money exchange and lack of preprints of proceedings) was saved by the opening ceremony. The excellent addresses (which included reference to the sudden and tragically early death of Laurits Bjerrum) were followed by a most interesting film "Soviet Achievements in Foundation Engineering". An attempt is being made to get a copy of this film sent out on loan to New Zealand. The afternoon programme included the terse announcement "Concert". I was intrigued to know what this meant and was not disappointed when it turned out to be just that - a variety concert to end all variety concerts. With the resources of the Bolshoi Ballet and Opera, the Red Guards and the Moscow Circus in the city, one could expect perfection and not be disappointed. Personally I was overwhelmed. Again and again I felt that I had seen the climax of the show, the "piece de resistance" only to have an even more spectacular item take the climax even higher. After that, I and many others forgot that we had had to pay for our rooms in Russian currency before we could be shown to them to change out of our travelling clothes, and that the exchange counter was closed and wouldn't open for hours and that when it did open the queues had been so long, and that having changed money into Russian currency we found that the souvenir shop would take only foreign currency. (How fortunate we New Zealanders were that the exchange rate for New Zealand dollars was within one percent of unity. Russian roubles and kopeks were New Zealand dollars and cents, to within one percent!)

The Russians seem to be going through a stage in their national pride which I associate with the America of a decade or more ago: everything has to be the biggest in the world. I went about half way up their T.V. tower which stands well over five hundred metres high - two and a half times the height of the London Post Office Tower. It stands in an open field on a shallow concrete annular foundation 90 metres in diameter and 4 metres thick.

They have the cleanest, most pleasant and efficient underground railway in the world and very few motor vehicles. This alone gives Moscow a very different character, a more pleasant character, than most major cities I

been in. Together with this peaceful street atmosphere was a feeling of personal safety. More than once as I found myself walking across the heart of the city at about midnight it occurred to me that this was something which I would not do in London or Washington and would hesitate to do in many New Zealand cities. On passing public parks one became aware of courting couples in the shadows and of old people shuffling about, often on their own.

For five of the seven days the weather was (unseasonally I gather) very hot, + 30°C. On the fifth night this broke in the most powerful thunderstorm I have known. I thought a lot about the staff in the T.V. tower that night. When on the following day, rain was falling very heavily as the morning main session ended, all 1,700 or more of us had to walk in the rain from the Concert Hall entrance which was in the middle of one side of the building around to one of the hotel entrances in the middle of anyone of the other three sides. There appeared to be no hotel manager with the authority to open the doors between the concert hall foyer and the hotel corridors. It was then that I realised that my own room was right next to those locked doors and that I had been making a long circular journey at least four times every day.

Those churches with golden 'onions' on their spires are at their most impressive as shown on the postcards i.e. from the outside. Inside they are a collection of rooms all of which are small in plan. The one or two main rooms which have very high ceilings are essentially the insides of towers. Christian worship in Czarist Russia was clearly not something to which the masses were invited. There was room, in the churches I saw, only for a nobleman and his household.

Yes, I could gladly spend some more time in Moscow and I would like to see other parts of Russia - most Russians one sees in Red Square are tourists making their, once in a lifetime perhaps, pilgrimage to Lenin's tomb and the Kremlin. Next time I will try to avoid their airline. Their pilots have a 'non legato' style of flying which elsewhere is to be encountered only in light aircraft. In an airliner the effect on a 'western' passenger is alarming. One could not help but wonder whether there was a connection between this and their poor safety record.

What, after all this, is the value of such a conference. I had been warned, fortunately, that the fact that I was an author of a paper 'presented' at the conference would mean nothing. All of the session time was given to discussion. Getting onto the limited list of speakers was difficult. The value of the conference was nonetheless very high. I had a long talk over lunch with John Lowe III who had given the Terzaghi lecture in America on the very topic of my conference paper. He gave me not only a transcript of his lecture but a cassette tape recording it. Harvey Wahls, whose work on strain rates in consolidation have been of interest to me for many years, was another mealtime acquaintance. This personal contact aspect is I think of the greatest value and will I think be the reason why these conferences will continue to be held. The personal contact aspect is particularly valuable for New Zealanders. For us the likelihood of meeting in New Zealand even once in a lifetime, the authors of the papers which we read and quote from, is remote. Another valuable aspect is the impetus which a forthcoming conference provides for the completion and writing up of work.

Reference

PENMAN A.D.M. (1974). USSR - VIII - ICSMFE, - a review of the recent Moscow soils conference - Ground Engineering, Vol 7, No 1, p. 50.

REPORT ON THE EXECUTIVE COMMITTEE MEETING OF THE ISSMFE MOSCOW, AUGUST 1973

M.J. Pender

One of the main items discussed at the committee meeting, held at the House of Friends, was the matter of membership and budget fees. After some discussion, it had been agreed that $US 26,000 was needed each year to keep the ISSMFE running effectively. The procedure for distributing this burden among the 40 odd member societies was not so easy to settle. Two things had to be decided: how to spread the load on a membership basis and yet allow for the different financial status of each member country. A subcommittee report tabled at the meeting suggested that membership fees should be set in three parts;

(i) a fixed sum per member society, the idea being that each member society costs the secretariat a certain amount to service regardless of the number of members.

(ii) a sum depending on the number of members in a society, roughly equivalent to the present capitation fee.

(iii) a sum based on an assessment of the present financial status of each member society. U.N. or World Bank ratings were suggested.

Sorting out the difficulties of the subscription rate proved difficult. Eventually it was agreed that each society should pay $US 100, plus a capitation fee, determined from a table of ratings based broadly on a U.N. financial rating of each country.

Our contribution this year will be ($US 100 + $US 1.30/member), clearly an increase but a rather modest one. However, there will have to be further increases in the near future because the target budget of $US 26,000 settled on the first day was eventually cut back to $US 20,000.

The weather during the conference was very hot. A supply of cold mineral water was provided and although rather bitter was most welcome. It was an iced drink and rather hard to obtain in Moscow during the height of summer. Language was little problem during the conference due to the three way Russian/French/English translation provided. It was rather pleasant to chat with the interpreters during the lunch and reception breaks because few Russian people are able to speak English. The hobby of one of the interpreters was collecting English paper backs. Fortunately I had a copy of Thor Heyerdahl's "Ra" and the colour photographs were much admired. In return for my book, I received an anonymous gift a day or so later - a book about the Moscow Art Gallery.

Delegates to the meeting were housed in the Rossia Hotel, a few kilometres from the House of Friends, and supposedly the largest hotel in Europe. I had no difficulty getting lost in this huge building on my first evening. The first few days were a little difficult because the Russian idea of how to run a hotel was a little, unfamiliar. In the end bureaucracy won and I was broken into line, even to the extent of managing caviar for breakfast each morning.

The next conference will be held in Tokyo in 1977. The presentation of the Japanese delegate, in faultless English, was most impressive, and I think a most effectively organised conference can be expected. The next committee

meeting is to take place in Istanbul next year.

There was some discussion about the length of time needed to organise a conference. Four years seems rather short so the venue for the conference after Tokyo will be decided at the next committee meeting. After that the time to organise a conference may be extended to eight years. One national society made a bid for the 1985 conference.

Of interest to a geomechanics society like ours was the interest in the ISRM and IAEG at the meeting, in fact the ISRM had a representative present. One of the more positive suggestions for taking co-operation beyond mutual discussions at executive level was the idea of a combined list of members. At present the ISSMFE prepares a list every four years. Combining with the IAEG and ISRM has obvious advantages even if the list would be a little cumbersome. Preparing the present list is a considerable financial burden despite the present advertisements. It was suggested that professional cards (as in A.S.C.E. - Civil Engineering) might be a further source of revenue.

The new president of the ISSMFE is Professor Kerisel of France, who succeeds Professor Peck. The task of Secretary General continues in the capable hands of Professor Nash, whilst the Australasian Vice-President for the current term is Professor Peter Taylor of Auckland.

GEOMECHANICS ACTIVITIES IN WELLINGTON

I.M. Parton

Apart from the occasional evening symposium organised by members of the Geomechanics Society, activities in the Wellington area have reached a low point. The N.Z.I.E. Auckland Branch Geomechanics Technical Group has organised a number of successful evening meetings for people interested in Geomechanics in the Auckland area.

Drs Pender and Northey wish to see similar regular geomechanics meetings established in the Wellington area. Dr Pender, who has recently returned from a stay in the U.K., attended a number of meetings organised by the British Geotechnical Society and is very keen to organise meetings along the same lines.

The first meeting will be held at 7.45 p.m. on Wednesday, 24 July in the lecture room at the D.S.I.R. Nuclear Sciences Building, Gracefield, Lower Hutt. Speakers will be Mr K.H. Gillespie (Consulting Engineer, Brickell, Moss, Rankine and Hill), Dr J.G. Hawley (Soil Bureau, D.S.I.R.) and Dr M.J. Pender(Central Laboratories, M.W.D.). Topics will be of general Geomechanics interest and it is hoped spontaneous discussion will follow.

Those who wish to obtain specific details may contact Dr Northey (Bus. 673119) or Dr Pender (Bus 683119). The success of the Wellington group activities depend on members in the area taking an active part. Please attend.

Friends or persons wishing to join the society are most welcome. A light supper will be provided.

LETTERS TO THE EDITOR

The following correspondence has been received by the Editor:

Sir,

I refer to the series of articles by J.H.H. Galloway on measurement of in-situ soil density. Mr Galloway has very ably described the common methods available (and in use by the Ministry of Works) for finding the density of soils in the field. However, there is another method which he has not mentioned, and which I feel your readers may find of interest. This is fully described in the journal "Materials Research and Standards", published by the American Society for Testing and Materials, Vol. 6 No.3 Mar. 1966 p 139.

The method uses a 1% solution of sodium carboxymethyl cellulose (sodium CMC for short), as the measuring fluid, and in this respect it exactly follows the oil method as described in Mr Galloway's third article, in the June 1972 issue. Sodium CMC has the ability to Polymerise on contact with any polyvalent cation, such as Ca^{++},Mg^{++} Al^{+++}, etc, so if its solution comes into contact with any surface which contains a polyvalent cation then the polymerisation reaction instantly forms a strong impermeable, and unreactive skin at the contact surface. The best polymeriser salt has been found to be aluminium sulphate.

As a field density test, the method is as follows: After the cavity has been dug in the usual way, its surface is sprayed with a 20% solution of aluminium sulphate, and the sodium CMC is poured in from a weighed can. When the hole is full, the can is re-weighed and the difference gives the mass of fluid to fill the hole. When measurements are complete, almost all of the solution can be salvaged for re-use because the polymerisation occurs as a very thin layer, and only at the contact surface. Further, since the soil at the contact surface is bound by the polymerised layer, the salvaged solution is free from sediment, and can be re-used immediately, in contrast with oil, which must be allowed time to clarify before re-use.

Sodium CMC is a cheap, non-toxic substance, commonly used as a thickener in milk shakes, where it polymerises in the presence of Ca^{++} in milk. A 1% solution has the consistency of heavy oil, but as its specific gravity is about 1.004 it has a slight advantage over oil. However the chief advantage of the method is that the polymerisation film seals the surface of porous soils, through which oil would be lost.

The method can be adapted to finding the density of irregular lumps of soil in the laboratory. The lump is first sprayed with calcium sulphate solution, then weighed in air and in sodium CMC solution, from which the density can readily be calculated.

Yours faithfully,

T.A.H. DODD
Senior Lecturer in Civil Engineering

NEWS FROM THE MANAGEMENT SECRETARY

1. Management Committee 1974

The following members comprise the Management Committee for 1974:

D.K. Taylor	(Chairman)	Auckland
J.P. Blakeley		Auckland
R.O. Bullen		Dunedin
G.L. Evans		Christchurch
J.H.H. Galloway		Wellington
G.D. Mansergh	(Vice Chairman - Rock Mechanics)	Christchurch
G.R. Martin	(Management Secretary)	Auckland
R.D. Northey	(Vice Chairman - Soil Mechanics)	Wellington
I.M. Parton	(Editor - Geomechanics News)	Wellington
B.W. Riddolls	(Vice Chairman - Engineering Geology)	Wellington
P.W. Taylor	(Australasian Vice President, ISSMFE)	Auckland

2. New Members

New members elected to the Society since the last list was published in issue No. 7 are as follows:

B.J. Gallagher	Auckland
P.B. Riley	Auckland

3. Forthcoming Conferences and Symposia

Listed below are Conferences and Symposia in the 1974-75 period which we know about. Members may be interested in attending or obtaining proceedings. Further details can be made available on request.

1974

18 June	:ASTM Symposium on Performance Criteria and Monitoring for Geotechnical Construction, Washington, D.C.,U.S.A.
18-24 August	:2nd International Congress on Engineering Geology, San Paulo, Brazil.
27-31 August	:Geological Society of America Penrose Conference on Fracture Mechanics and Earthquake Source Mechanisms, Aspen, Colorado, U.S.A.
September	:Walling and Anchors Conference, London, England. (Sponsored by the Piling Committee of the I.C.E.)
1-7 September	:Third International Congress of the International Society for Rock Mechanics, Denver, Colorado, U.S.A.
9-13 "	:Centenary Symposium of the Geological Society of Belgium, Liege.
21-22 October	:Australian Tunnelling Conference on Re-Shaping Cities using Underground Construction, Melbourne.
7-8 November	:27th Canadian Geotechnical Conference, Edmonton, Alberta.
8-9 November	:Symposium on Stability of Slopes in Natural Ground, Nelson (organised by N.Z. Geomechanics Society and Nelson Branch, N.Z.I.E.)

1975

10-14 February	:N.Z.I.E. Annual Conference, Auckland.
7-10 April	:Fourth South-East Asian Conference on Soil Engineering, Kuala Lumpur.
27 April-1 May	:Australian Conference on Coastal Engineering, Queensland.
21-25 July	:2nd Australia-New Zealand Geomechanics Conference, Brisbane, Australia.
8-12 September	:6th Regional Conference for Africa on Soil Mechanics and Foundation Engineering, Durban.
27-31 October	:5th Pan American Conference on Soil Mechanics and Foundation Engineering, Buenos Aires, Argentina.

4. Proceedings, Wanganui Symposium on Foundation Engineering, September 1972

Copies of the Proceedings are still available from the Management Secretary at a cost of $8.00 for Society members and $10.00 for non-members.

5. Back Issues, New Zealand Geomechanics News

Copies of all back issues are available to members at a nominal cost of 50c per copy from the Management Secretary.

G.R. Martin
Management Secretary

GEOMECHANICS AT THE N.Z.I.E.

ANNUAL CONFERENCE, 1974

I.M. Parton

The N.Z.I.E. Conference in Wellington this year marked the first participation by the Geomechanics Society at an Annual Conference. It is now the policy of the N.Z. Institution of Engineers to encourage Technical Groups of the Institution to present one session or several sessions of papers in conjunction with the Conference in February each year. In the past the N.Z. Geomechanics Society has only been involved with the promotion of symposia at approximately four year intervals.

In 1972 the Chemical Engineering Group participated at the Conference in Christchurch and several groups were involved at the 1973 Conference in Hamilton. Participation at the Conference in this way relieves the N.Z.G.S. of a lot of the organisation required with the previous symposia (as accommodation, meals etc., are arranged by the Conference organising committee), although there still remains the task of organising topics and editing papers.

At the 1974 Conference the Geomechanics Society conducted a Group Technical Session in the form of a workshop on Lateral Earth Pressure. A workshop session was advocated because these tend to be rather informal discussions on a particular topic with free and easy discussion.

The main reference document was the recently published Issue C of the Ministry of Works and Development "Retaining Wall Design Notes". Papers were presented by Mr J.P. Blakeley, who outlined the Rankine and Coulomb theories of static earth pressure, and Mr G.H. Evans who spoke on dynamic earth pressures. Both speakers made reference to the M.W.D. design notes and discussed the application of their particular topic in the notes.

Three speakers from the M.W.D. spoke on the Retaining Wall Design Notes. Mr J.C. Rutledge stressed that the notes are intended as a guide for use in the design and construction of retaining walls and similar earth retaining structures and not as a soil mechanics text book. It is hoped that through them junior and relatively inexperienced engineers can learn more quickly how to design sound, economical walls and that a more uniform approach will result.

Mr A. Kennaird spoke on theoretical aspects behind the notes and discussed factors which affect earth pressure and how each could be estimated for a particular wall.

Dr J.H.Wood spoke on earthquake induced soil pressures. He discussed the use and limitations of the Mononobe - Okabe formula for computing dynamic earth pressure and compared results with those obtained from dynamic finite element solutions.

Mr G.A. Pickens spoke on practical aspects of permanent and temporary retaining wall structures. He emphasised the need for "engineering judgement" in retaining wall design.

Professor P.W. Taylor spoke on the design of retaining walls from an academic viewpoint with special reference to design loadings and actual sustained loads.

Following the conclusion of the presented papers informal discussion was invited. However, the presentation of the papers had taken some time and left little for enthusiastic discussion, much of which took place after the session should have closed. Generally, it was felt that the discussion was too concerned with the technicalities of the Design Notes and the contents of presented papers, with little discussion being centred around the basic soil mechanics aspects involved in retaining wall design. Perhaps this was due to the fact that many of the members present at the workshop had not managed to procure copies of the notes beforehand - despite publication of their availability.

Taken overall the workshop can only be considered a success. Members of the Society were able to gather together to discuss a topic which is of vital importance, yet one in which a full appreciation of the relevant variables is not often attained. Further activities such as this can only benefit the Society and its members.

The workshop was attended by 38 persons.

N.Z. GEOMECHANICS SOCIETY

GROUP TECHNICAL SESSION

N.Z.I.E. CONFERENCE, 1975

A call is made for papers to be presented at the Geomechanics Society Group Technical Session at the N.Z.I.E. Conference, 1975. Papers are to be of general Geomechanics interest.

Synopses are required to be submitted to the Management Secretary by July 31st. Following reviewing of received papers, successful authors will be advised of acceptance. Completed papers are required by November 1974

Dr G.R. Martin,
N.Z.G.S. Management Secretary,
C/- School of Engineering,
Auckland University,
Private Bag,
Auckland.

APPLICATION FOR MEMBERSHIP

of

New Zealand Geomechanics Society

A TECHNICAL GROUP OF THE NEW ZEALAND INSTITUTION OF ENGINEERS

The Secretary,
N.Z. Institution of Engineers,
P.O. Box 12-241,
WELLINGTON.

I believe myself to be a proper person to be a member of the N.Z. Geomechanics Society and do hereby promise that, in the event of my admission, I will be governed by the Rules of the Society for the time being in force or as they may hereafter be amended and that I will promote the objects of the Society as far as may be in my power.

I hereby apply for membership of the New Zealand Geomechanics Society and supply the following details:

NAME _____
(to be set out in full in block letters, surname last)

PERMANENT ADDRESS _____

_____

QUALIFICATIONS AND EXPERIENCE _____

_____

_____

NAME OF PRESENT EMPLOYER _____

_____

NATURE OF DUTIES _____

_____

_____

Affiliation to International Societies: (All members are required to be affiliated to at least one Society, and applicants are to indicate below the society (ies) to which they wish to affiliate).

I wish to affiliate to:

International Society for Soil Mechanics and Foundation Engineering (ISSMFE) Yes/No

International Society for Rock Mechanics (ISRM) Yes/No

International Association of Engineering Geology (IAEG) Yes/No

Signature of Applicant _____

Date _____ 19____

NEW ZEALAND GEOMECHANICS SOCIETY

NOTIFICATION OF CHANGE OF ADDRESS.

The Secretary,
N.Z. Institution of Engineers,
P.O. Box 12-241,
WELLINGTON.

Dear Sir,

CHANGE OF ADDRESS

Could you please record my address for all New Zealand Geomechanics Society correspondence as follows:

_____

_____

_____

Name: _____

Address to which present correspondence is being sent:

_____

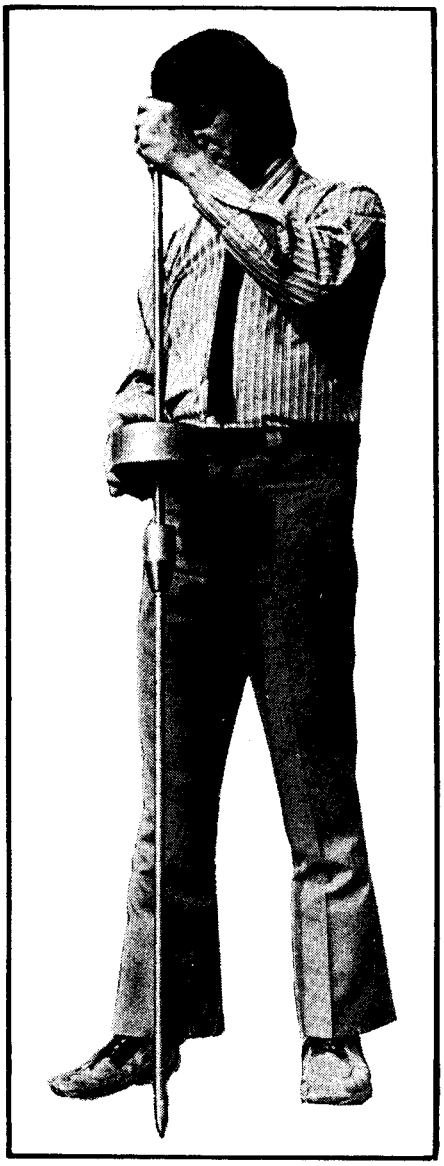
_____

_____

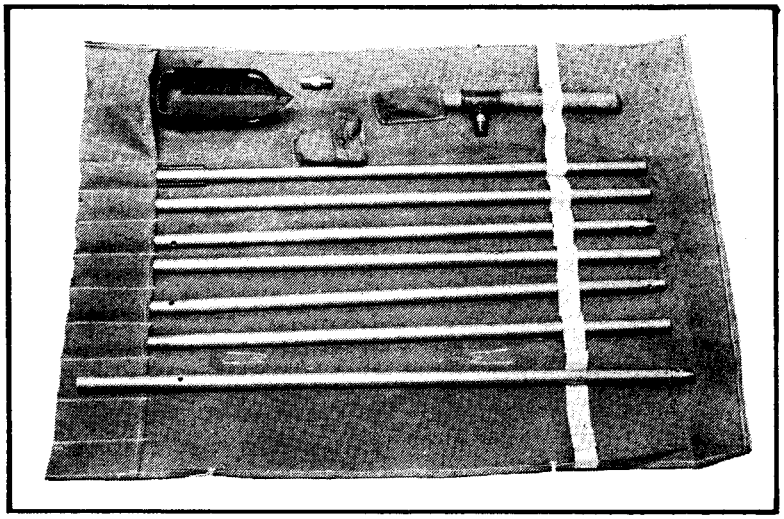
Signature _____

Date _____

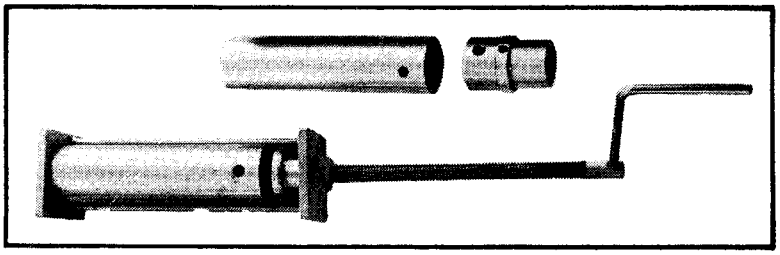
site investigation equipment



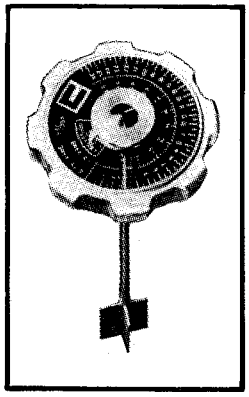
SCALA PENETROMETER
For determining in-situ soil density.
Correlated to CBR.



100mm diam HAND AUGER KIT–
6 x 1m aluminium rods.



38mm diam sampling tubes, auger adaptors and extruder.



PILCON DIRECT-READING HAND VANE TESTER.
Accurate soil shear strengths in-situ. Extension rods available.

Other equipment supplied to requirements

Brochures available from:

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