

ACCREDITATION OF GEOTECHNICAL ENGINEERS AND ENGINEERING GEOLOGISTS

Bruno Petrenas, Director of Technical Services, BE, ME, Dip PM. MIPENZ, Reg Eng, MCIT
Tauranga District Council, Tauranga, New Zealand

SYNOPSIS

Tauranga District Council has established an accreditation process to assess the academic training and practical experience applicants hold in respect of geotechnical engineering and engineering geology. This accreditation process has provided a basis on which geotechnical reports would be accepted from applicants in respect of geotechnical matters without Council having to have reports referred to independent checking.

Reliance on an annual practising certificate under the Engineers' Registration Act and/or the IPENZ Code of Ethics has proved to be an inadequate assurance of practitioners' compliance in the specialist area of geotechnical engineering.

In the past, Council officers have made their own judgements as to who are the specialists and who are not, and the accreditation procedure merely seeks to formalise that judgement and no other changes are proposed or implied. The only areas where specialist input is routinely required would be on slope stability problems of some magnitude and difficult settlement problems such as when it is proposed to build on uncontrolled fill.

1. INTRODUCTION

The Tauranga District Council under legislation such as the Building and Resource Management Acts has a responsibility to ensure that land development and subdivision and building construction is planned and undertaken to particular standards. The standards are generally of a nature to ensure that Council is protected in such matters if development and construction problems arise.

Up until May 1993 there was no formal mechanism in place regarding the acceptance of geotechnical reports from consultants. Staff made a decision from whom to accept geotechnical reports which were submitted as part of the subdivisional development process.

However, such decisions could be viewed as being arbitrary and tended to be based on experience to date. There had been requests from consultants that reports prepared by them on geotechnical matters, be accepted by Council. To achieve this in a fair and reasonable way and to ensure that Council was not being exposed as to liability issues a process to scrutinise and evaluate the academic training and experience in geotechnical matters was proposed. The proposal was to ensure that reports from such individuals were of a certain standard and quality on which assessment could be made as to whether a particular subdivisional development was to be given approval.

2. ACCREDITATION PROCESS

An established process has allowed the Council to assess the academic training and practical experience applicants held in respect of geotechnical engineering and engineering geology. The assessment has provided a basis on which geotechnical reports would be accepted from applicants in respect of the above mentioned matters without Council having to have the reports referred to another person for assessment. In addition, there were associated amendments to Council's Code of Practice for development. These amendments defined the nature of information to be provided in geotechnical reports and other information. The suggested amendment to the Code was publicly notified and opened for submissions for one month and also was circulated directly to consultants in the Bay of Plenty and Waikato areas.

The result of submissions to Council was that Council policy was confirmed to implement an approval process in respect of geotechnical engineers and engineering geologists to evaluate academic training and experience and such policy was to be implemented in general accord with Attachment A. The Director of Planning and Environment was also given delegated authority to confirm recommendation from the geotechnical panel regarding whether applications for acceptance of qualifications were successful or unsuccessful.

Presently, at the time of subdivision application, the development engineer or his assistant visits the site and makes a decision as to the levels of soils reporting appropriate. On very small subdivisions less than five lots where no particular soils problems seem apparent, no soils reports are required from the developer.

On small subdivision where there are particular soils issues to be addressed and on all major subdivisions a report is required as to the suitability of the site for subdivision and building development. At that time the development engineer or his assistant makes a

judgement as to whether reporting from a registered engineer or specialist geotechnical engineer is appropriate. The situations where specialist input is required are almost always limited to where there is a major slope stability issue to be addressed, (for example building on or near seacliffs or relic slips) or where there is a particularly difficult settlement problem to be addressed. For example, where uncontrolled filling has been placed across soft, underlying material. For those situations where we deem that specialist input is required, we are currently imposing a condition of subdivision that a specialist geotechnical engineer provides soils reports that demonstrate the suitability of the site for building development.

3. BACKGROUND

The Council's role is one of ensuring that the people submitting reports are competent and the Tauranga District Council can accept with a high degree of confidence. The fact that it is no longer appropriate for all registered Civil Engineers to undertake all soils problems has now become established and is reflected in such documents as:

(a) **NZS 4404: "Code of Practice for Urban Land Subdivision"** which defines the Soils Engineer as a person who is currently entitled to practise as a Registered Engineer and has experience in soils engineering acceptable to the Council; and

(b) **The Branz Study Report SR4 (1987): "Assessment of Slope Stability at Building Sites"** which refers to Civil Engineers who have *specialised as "Geotechnical Engineers"* and says "that not all Civil Engineers will necessarily have the required skills and experience for carrying out slope stability".

The purpose of the Geotechnical procedure is to establish and formalise in an impartial, professional and fair way, some minimums in terms of geotechnical knowledge and experience that is acceptable to Council. Its implementation will hopefully leave a high degree of responsibility etc with Engineer. To my mind, we can have all the procedures in the

world but the concept is to ensure that those involved in geotechnical matters have a sufficient degree of technical competency in geotechnical matters to allow reliance to be placed on their work. The option of engaging consultants to review a design is there, but this places the Council in the position of passing on additional costs to an applicant and the resultant delays. The customer invariably perceives the delay as being caused by "Council bureaucracy" rather than any shortcomings on the part of his design professional. Council staff are also very reluctant to criticise the designer in front of his client. Furthermore, should a designer get out of his depth on a geotechnical matter, the reviewer inevitably becomes a defacto designer as he continually points out the shortcomings of the design until at last by a process of elimination, the designer comes up with something that the reviewer will accept. More often than not this is a bare minimum solution. Why should Council, through its agent who is reviewing the design, assume this defacto designer role? It is obviously much better from a customer point of view for them to go to those who have their qualifications approved and obtain the right advice from the start.

The issue of Code of Ethics and the creation of a privileged group within the Tauranga area is not really our concern. Our concern is ensuring there is competent advice in reports being submitted to Council, that recognise local geotechnical issues and minimise Council's liability.

The role of Council is not to review and assess the adequacy of information for each project. Given the changing role, Council is endeavouring not to be a checker of a checker but endeavouring to provide a mechanism where those who meet certain requirements lay their knowledge, experience and liability on the line to a greater degree. This approach is consistent with certification and the Building Act; that is, certifiers are listed "based on competency". The greater the Council

involvement, the greater the liability we buy into.

In response to the Territorial Authorities of the Auckland Region's request for comment on the use and acceptance criteria for Producer statements, the New Zealand Geomechanics Society in November 1992, made the following comments:

"The Geotechnical Services that many members of the Geomechanics Society provide address the stability of land, slopes, compressible soils, erodeable soils, filled ground and investigation and design of foundations, earthworks and earth retaining structures. Producers include designers, specifiers and construction contractors, all of whom should provide assurance that Geotechnical matters have been assessed and taken into account in the design and construction.

Reports by providers of Geotechnical Services should be prepared by persons who have academic and practical experience at a standard recognised in the profession and acceptable to the Territorial Authority. Reports should comply with the Territorial Authority's guidelines as to procedure of investigation and supervision and content of report. They should also comply with statutory requirements and relevant standards and they should recognise the two essential aspects of Geomechanics which are *geology* and *engineering*. Specialist services such as Geotechnical should only be provided by appropriately qualified and experienced persons and do not recognise the important input of Engineering Geologists to many geotechnical problems.

Geotechnical professionals would have involvement in design and design review but perhaps the most important is construction review. Due to the inherent uncertainties associated with many aspects of geotechnical engineering, it is essential that inspections are undertaken during construction to verify design assumptions and to recommend modifications if necessary. The importance of

such inspections has long been recognised by design professionals who have recommended to their clients that such inspections are necessary and why many Local Authorities who have required inspections during construction by appropriately qualified professionals.

Producer statements in the field of geotechnical engineering should be provided only by professionals with specialist training and practical experience in the field of geotechnical engineering. The qualifications and training depend on the nature of services being provided. If a geotechnical report provides engineering recommendations then the reporter should be an experienced registered engineer. They should also be involved in observation of construction to ensure that the intent of the recommendations are adhered to and to make modifications if necessary. However, there are also situations where investigation procedures for specific sites can be defined better if they are preceded by geomorphological examination which can best be undertaken by engineering geologists. Engineers issuing producer statements should also have mandatory membership of a professional association. This could be either active membership of ACENZ or corporate membership of IPENZ.

It must be remembered that geotechnical engineering is a specialist field and it is important that only those with the necessary specialist training and practical experience should be permitted to issue producer statements.”

3. WHY HAVE ACCREDITATION?

Whilst there is quite a bit of hazard information located in various places in Council, this has not been developed into a comprehensive hazard map of the kind envisaged by different professional bodies. One of the concerns in formalising hazard information is trying to deal fairly with land owners whose properties may be devalued (perhaps unjustifiably) by a broadbrush hazard information. I am of the

view that we should only develop and formalise hazard maps for those areas where the benefit of doing so outweighs the negative aspects associated with them. We must not lose sight of the fact that we are here to look after the interests of our ratepayers and not consulting engineers.

Tauranga's soils are not any more difficult to deal with than those in many other areas of New Zealand. The development engineer has personally found them to be much more predictable than the complete jumble that is found in Auckland. The basis of a listing of accredited geotechnical engineers as I see it, is that in all areas of New Zealand there are some soils problems more appropriately addressed by a specialist geotechnical engineer than the non-specialist registered Civil Engineer (just as there are some medical problems more appropriately dealt with by a brain surgeon than a GP). It is believed that by and large the profession realises this. The purpose of the listing is to formalise the decision making as to who is the specialist and who is not. Ever since about 1984 the engineers in the County, City and District have realised the need to differentiate between the two and have simply made their own somewhat arbitrary judgement on the matter. The fact of the matter is that the reports done by specialists are as different from those done by non-specialists as chalk is from cheese. Furthermore, the reports done by the non-specialists are all too frequently less conservative than those done by the specialists. This is the reality of what is happening on the ground.

As already commented upon, the listing procedure is primarily aimed at situations where the developer (not the Council) is the client. It is suggested though that the first and most important task in managing the consultant is to ensure that the persons engaged are competent for the task (reference the FIDIC Guidelines on the selection of Consulting Engineers that places prime emphasis on "selection by ability" and lists technical competence as the first of the matters

to be evaluated). Unfortunately, many clients are not at all good in determining this and there is nothing but trouble for all parties when some homeowner has rather innocently spent their hard earned money on an inadequate report. This does occur and Council is not looking after its customers' interests when it allows them to repeatedly fall into the same trap. Council officers also end up coming under extreme pressure from enraged or heartbroken clients to accept a report from someone who is not up to the task he/she has taken on. It is far better to get it right in the first place and set up systems to ensure the right person is engaged from the start.

On the surface, the setting of standard tests sounds like a good idea, but in reality it is not. What is being suggested is the Council defining what tests etc must be done in the areas of various risk and thus making the preparation of soils reports relatively "idiot proof". In practice however, the determination of what level of testing is appropriate is dependent upon more factors than simply the area. For example, the cost of the structure proposed has a bearing. It is not appropriate to do the same level of testing for a gazebo as for a multi-million dollar project. Also the amount of testing done on nearby similar sites is also of relevance. If the engineer has already done extensive testing on the similar site next door he/she will not need to do the same amount of testing as if he/she is coming in cold. The decision as to what level of testing is appropriate is an expert decision which should not be taken away from the designer. We should allow the designer to use their skill in this matter. I am strongly opposed to the prescriptive, blunt instrument approach of Council specifying the level of testing required. It is well nigh impossible to draw up requirements that allow for all the relevant factors. If we call up the roles that fits the worst case scenario then we are faced with the alternative of either becoming bloody minded and enforcing it in all cases or alternatively backing off and agreeing to a lesser standard.

If we do back off however, we have significantly increased our liability by breaking our own rules and also by becoming a defacto designer by specifying the level of investigations.

We, in Council, are not specialist soils engineers and are not competent to judge the appropriate level of investigation. A far better approach is to ensure that only the right people are doing the work and then let them use their expertise to determine the appropriate level of testing.

When presented with a report by someone with inadequate skill, the end result is invariably far from ideal. The Council usually gets sucked in to becoming a sort of defacto designer as it is continually asked the question: "Will you accept this?" Ultimately by a process of elimination, the consultant ends up covering most of the points that Council thinks he should have. The end result however is that most of the shots have ended up being called by Council and Council has become so thoroughly immersed in the process that it is fully liable for the outcome. It should also be noted that Council does not have on its staff, specialist geotechnical engineers capable of calling all the shots on geotechnical matters.

It is agreed that it is a shame that we cannot rely on the Code of Ethics. It would be very good if we could simply ask for a registered engineer and be sure of a satisfactory outcome. The reasons for a lack of confidence in application of the Code of Ethics could be due to:

- (a) failure to realise that some geotechnical problems have now become areas best handled by specialist; or
- (b) over-estimation of their competence; or
- (c) financial pressure.

The fundamental issue is that the Council perceives a need for a specific listing of persons qualified and experienced to act as geotechnical engineers in the Western Bay of Plenty area. Reliance on an annual practising certificate under the Engineers Registration Act and/or the IPENZ Code of Ethics has

proved to be an inadequate assurance of practitioners compliance in this specialist area.

The Tauranga District Council does not accept the producer statement arrangements promulgated by the inter-professional group because they do not provide for any transfer of liability and hence there is no benefit accruing to us. This is not an overly-cautious position as our responsibilities are to protect ratepayers at large, not accept risks on their behalf in the interests of benefiting private individuals or companies. ACENZ is correct in that the application of this system logically does lead to the accreditation this for other engineering specialisations.

It is the view of the professional staff of the Tauranga District Council that it should be a role of the professional institutions to undertake the examination and accreditation of individuals in specialised fields of engineering. Indeed we believe that IPENZ should be undertaking this role, if necessary under licence to the building industry authority. In the absence of the professional bodies grappling with and resolving the issue of accreditation of specialisations then there is no doubt that other bodies and individuals will attempt to fill the gap, not entirely satisfactorily in our opinion.

A Council's geotechnical listing procedures are a local response to a problem where the professional bodies seem unwilling or unable to effectively deal with. It is the responsibility of the professionals to regulate themselves and I believe there is a perception in the community, and certainly within territorial local government that there is considerably more that can be done in regard to the accreditation of specialisation, the enforcement of the Code of Ethics and discipline of professional engineers. The profession does not appear to deal with that effectively and until that is done the community will find ways of regulating the profession externally.

4 GENERAL COMMENTS ABOUT ACCREDITATION PROCESS

The interview panel has been concerned that no engineering geology specialists have presented for accreditation to date. It is vital that engineering geology expertise is available to specialist geotechnical engineers practising in the Tauranga area and also available to assist Council where required.

The panel has also felt that it was important that the rationale behind the accreditation process should be made widely known. It should be made quite clear that the purpose of Tauranga District Council's policy on accreditation of specialist geotechnical engineers is certainly not to require that all soils problems be addressed by those who have gained accreditation. Most foundation designs and soil problems will continue to be addressed by registered engineers. There will be no Council requirement for special accreditation to address the straight forward matters.

The purpose of accreditation is to have a list of approved geotechnical engineers or engineering geologists to address those soil problems which in the judgement of the Tauranga District Council's Development Engineer, require specialist input. In the past Council officers have made their own judgements as to who are the specialists and who are not and the accreditation procedure merely seeks to formalise that judgement and no other changes are proposed or implied. It is anticipated that the only areas where specialist input is routinely required would be on slope stability problems of some magnitude and difficult settlement problems such as when it is proposed to build on uncontrolled fill. However, this is not to say that Council may on the odd occasion seek input from a specialist geotechnical engineer on the question of some significance such as liquefaction potential for a multi-storey building site.

The applicants' information as submitted was generally poor and in some cases, quite irrelevant. The panel could also see a potential problem arising with regard to the use of peer review. Peer reviews from accredited

specialists would be required if unaccredited engineers carried out relevant work. Peer reviews requested by Council of accredited specialists should also be made only by accredited specialists. With the limited number of specialists accredited so far, this could create difficulties.

5. RISK & PROFESSIONAL NEGLIGENCE

In the real world there is risk in everything. The only sure way of taking absolutely no risk is to do absolutely nothing! The real art of engineering is balancing those risks out at levels acceptable to the client and society. It is for the client, who is suggested in our case as represented by Councillors, to decide what level of risk should be taken. It is the job of Council staff to brief the client on what the risks are in a balanced way. In some cases, different District Councils are now erring on the conservative side or trying to take no risk at all. This is understandable when one considers past history of Councils taking far too much risk and being taken to the cleaners for subdivision stability failures.

There is no doubt that the nature of work performed by a professional engineer involves a blend of skill and specialisation including a recognition that there must also be a commitment to principles and ethics. However, on occasions, these two aspects can be in conflict. There has also been an increasing emphasis on specialisation within the profession of engineering. Specialisation has brought about a change in the inter-relationships of the professions found to be working together on a project. For complex projects a matrix of relationships and responsibilities between professional persons can occur. Although specialisation can be considered to be a societal phenomenon in the thinking of the consumer it does not follow that he or she will distinguish between the level of reliance to be placed on advice from a civil engineer, as against a specialist geotechnical

engineer on a matter normally dealt with by the latter.

To the consumer, he or she is dealing with a professional engineer. The consequences in law of not distinguishing between the two may be lost in the consumer but they should never be lost on the professional engineer.

Competency has the inherent quality of currency. Competency can be equated with knowledge. The difficulty today with the complexity of professions has not diminished the need for greater emphasis on currency of professional knowledge.

6. CONCLUSION

The purpose of the accreditation propose is to establish and formalise in an impartial, professional and fair way some minimums in terms of geotechnical knowledge and experience that is acceptable to Council. Its implementation will hopefully leave a high degree of responsibility with the engineer or engineering geologist. The fundamental issue is that the Council perceives a need for a specific listing of persons qualified and experienced to act as geotechnical engineers in the Western Bay of Plenty area.

Reliance on an annual practising certificate under the Engineers Registration Act and/or the IPENZ Code of Ethics has proved to be an inadequate assurance of practitioners compliance in this specialist area. It is the view of the professional staff of the Tauranga District Council that it should be a role of professional institutions to undertake the examination and accreditation of individuals in specialised fields of engineering.

7. REFERENCES

- Smith, Damien, J (1986) *Engineers & Professional Negligence*, Currency Productions Pty Ltd
- NZ 4404; *Code of Practice for Urban Land Subdivision*
- The BRANZ Study Report SR4 (1987) *Assessment of Slope Stability at Building Sites*

ATTACHMENT A

TAURANGA DISTRICT COUNCIL GEOTECHNICAL PROCEDURES CRITERIA FOR APPROVAL OF QUALIFICATION OF GEOTECHNICAL ENGINEERS AND ENGINEERING GEOLOGISTS

1.0 OBJECTIVE

Council has legislative responsibility to ensure that land development and building construction are planned and executed to adequate standards.

One of the fields in which Council will need to be provided with advice is in Geotechnical Engineering which has to do with the stability of the ground in which development takes place and by which buildings and other structures are supported.

Council is concerned to take reasonable precautions to ensure that advice given to it upon Geotechnical matters, either directly or in support of development applications, or in execution of developments, is based upon sound professional training and experience.

Both formal academic training and practical experience are required in the two disciplines of Geology and Engineering but not necessarily in the same person.

Any geotechnical investigation should be oriented in the general geology and geomorphology of the area (encompassing the particular site) of which a general study demands academic training in Geology (especially geomorphology and geological mapping) and practical experience in its application to land-use planning and to engineering problems. Such regional information may be available in previous publications or reports or it may be prepared specifically for the particular development being proposed.

When it comes to designing and implementing engineering works necessary for the use of the land, then academic training and experience in Civil Engineering are necessary with particular emphasis upon soil mechanics, geotechnical engineering, engineering geology

and encompassing design, specification and supervision of construction.

Geotechnical Engineering advice includes (but is not restricted to) the functions of the "Soils Engineer" as defined by Council's Code of Practice for Development.

2.0 QUALIFICATIONS AND EXPERIENCE REQUIRED

2.1 Academic Training

The usual requirement should be a first degree from an approved university with concurrent or subsequent specialised courses in relevant subjects.

For Geological and geomorphological appraisals:-

A university degree in Geology or Earth Sciences with specialist courses in Engineering Geology and optionally Geomechanics and/or Geotechnical Engineering.

For Geotechnical Engineering:

A degree in Civil Engineering from an approved university with core subject matter in Geology and Geomechanics supplemented with specialist courses in two electives from Engineering Geology, Geotechnical Engineering, Rock Mechanics or Geomechanics.

2.2 Practical Experience

For Registration under the Engineers Registration Act 1924, 4 years advanced practical training under a mentor is required.

The same concept can be applied to Geologists and Soil Scientists who offer specialist services thus:-

A minimum of four years' post-graduate experience in Geology applied to civil engineering or to land stability evaluation, under the tutelage of a Registered Engineer or experienced Geology or Soil Science

Graduate, who has countersigned reports prepared by the applicant.

3. APPLICATIONS FOR ACCEPTANCE

3.1 Applicants for acceptance as specialist advisers shall provide:

- * evidence of academic qualification
- * evidence of tutelage from their mentor (Registration under the Engineers Registration Act, or Corporate Membership of IPENZ shall suffice)

- * A list of relevant geotechnical reports which they have prepared, stating:

- geographic location of site
- reference number of report
- dates

- * copies of two reports selected from the above list and be prepared to supply further samples from the list on request.

3.2 Experience in the specific geological environment of the Bay of Plenty is required.

3.3 Apart from the applicant's academic and practical training and experience the constraints and facilities of his commercial organisation will be considered with relevance to:

- * Quality assurance facilities
- * Autonomy of decision
- * Delegation of support activities
- * Professional indemnity insurance

3.4 Applicants will be required to attend an interview in Tauranga, with a panel comprising two independent senior geotechnical professionals and a senior professional from the Council's staff.

EXPLANATORY NOTES

1.0 APPLICATION FORMAT AND CONTENT

1.1 Fee

A non-refundable fee of \$675.00 (GST inclusive) is to accompany each application

1.2 Legibility

Text should be typed wherever possible, and other material such as graphics should be of a quality to photocopy clearly.

1.3 Computer printouts

These may be submitted as part of sample reports but must be supported by sufficient explanatory notes and calculations to confirm understanding.

1.4 Qualifications and Experience

These are defined in the attached statement of criteria

2.0 FORM OF APPROVAL

2.1 Individual Only

Only individual applicants (and not firms) can have their qualifications approved.

2.2 Five Year Period

Each approval is valid for a period of five years only, after which qualifications and experience will be reassessed. -

However a review could be undertaken at anytime within that period where circumstances warrant as a result of an engineering incident and on recommendation of the panel.

2.3 Limitations

Acceptance of an individual does NOT imply any approval for designs that such an individual may subsequently produce or certify.

3.0 DEFERRED APPLICATIONS

3.1 Further Information

The panel may defer an application when further information is required and the applicant will be requested to supply such information.

3.2 No Additional Fee

No additional fee is required when submitting this further information although it may be necessary to supply a new statutory declaration.

4.0 DECLINED APPLICATIONS

4.1 Explanation

Reasonable efforts will be made to explain in general terms why an application has been declined.

4.2 Remedial Advice

In some cases the panel may recommend that a declined applicant undertake particular further

training, work under a mentor, or gain more experience before re-applying.

4.3 Re-application and Fee

Anyone may re-apply at any time and this will require payment of the full fee normally chargeable at the time of the re-application.

5.0 AUTHORISED PERSONS

The Oaths and Declarations Act 1957 provides that persons authorised to witness a statutory declaration include Members of Parliament, Justices of the Peace, Solicitors, Court Registrars or Deputy Registrars.

6.0 PROCESS

The panel will recommend to the Director of Planning and Environment whether an applicant is or is not regarded as being suitable for acceptance as a specialist adviser in geotechnical engineering and/or engineering geology and with or without restrictions or conditions, as appropriate.

The Director of Planning and Environment's decision shall be final.

7.0 LIABILITY

Accreditation by the Tauranga District Council does not provide for a transfer of liability from the accredited person to the Council or the panel.