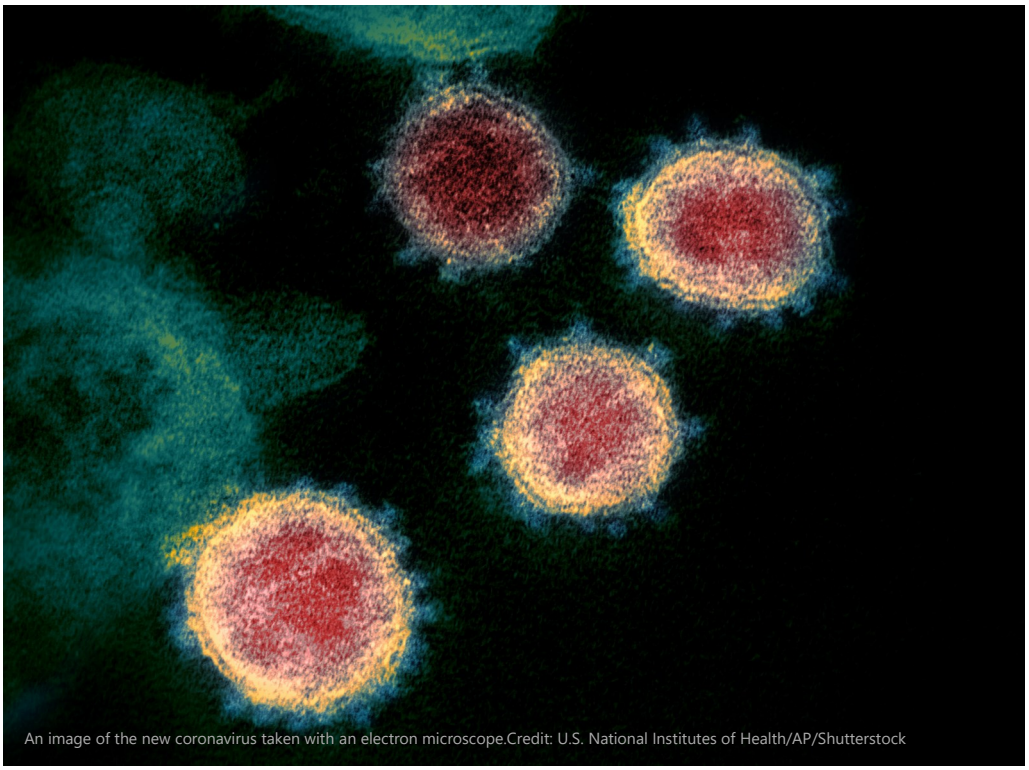
ACSEV & FFSV

2020|Nov|Issue 2020

NEWSLETTER

Association of Consulting Structural Engineers Victoria (Reg No: A0026069J) www.acsev.org.au
Foundation and Footing Society Victoria (Reg No:A0025791G) www.footingsgroup.org

COVID 19 A CHALLENGE FOR HUMANITY



An image of the new coronavirus taken with an electron microscope.Credit: U.S. National Institutes of Health/AP/Shutterstock

As COVID-19 pandemic is doing second round of infections in Victoria, the world count of infections has crossed two million and counting. The long lasting economical impact of COVID is looming over all countries irrespective of their pre COVID economical position. Impact on Australian economy due to COVID is still minimal compared to many other developed countries but still too early to predict about any economic recovery. Governments all over the world is trying everything in their armour from stimulus packages to various job creation strategies. But in reality, no one really knows how the COVID normal economy would look like except for the fact that international travel and tourism would take years to recover. There are questions being raised about the moral ground of democratic governments to order lockdown irrespective of the economical impact, the difficult question is whether life or livelihood matters more.

At ACSEV, dinner technical meetings couldn't continue due to the restrictions. Moving into webinar was not an easy option due to the nature of presentations and the facilities available to presenters and members. ACSEV committee is meeting monthly through online platforms and were very busy with matters related to engineers bill regulations which is being drafted now . Since face to face meetings would still be a challenge in the near future, ACSEV is also moving into webinar model from next month. Thanks to all member for their patience and hopefully next year much awaited ACSEV technical meetings would be back in full swing using online platforms.

NEWS

Easement of restrictions from 22.11.2020.

- Victorians no longer need to wear masks outdoors most of the time from midnight
- Victorian hospitality venues will be able to host 100 people indoors
- Weddings and funerals, can be 150 people.
- Large sporting venues will be able to use 25 per cent of their capacity.
- Indoor pools can host 150 people and outdoor pools will now host 300 people

Inside this issue

Annual General Meeting (AGM)

Pleasenote that due to Covid-19 the AGM has been postponed until March

Karl Apted
karl@apted.com.au

2019-2020

President: Karl Apted

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"I have the honour of being the ACSEV representative to this group. Whilst I cannot speak on workings of this group due to confidentiality agreements that we have been asked to abide by, I can speak to our members regarding any concerns and suggestions that they may have with the imple-mentation and operation of this Act and its associated regulations."

President's Message

Dear Association members,

This year has been somewhat quieter for obvious reasons. The Covid-19 virus has created challenges for us all.

We have so far only been able to hold the one meeting in February, our annual site inspection to Page Steel Fabrications in Derrimut where we were able to see their new Zeman steel fabrication robot in action. The visit was very interesting and the benefit of the robot was clear for larger runs of steel fabrication.

We hope to hold meetings as soon as we are allowed. At this stage it is not looking good until later this year. We have provided members renewing this financial year with a discount to memberships to reflect the lack of meetings held so far. We will likely implement the same discount for renewals next year, so please continue to renew and support the Association.

Our Association is well respected and our larger membership gives us a voice and helps with representations. We have made submissions to the Planning Minister and the Victorian Building Authority regarding allowing exclusions on Professional Indemnity Policies, this was adopted this year by Ministerial Order. We are also part of the Stakeholder Reference Group for the implementation of the Professional Engineers Registration Act.

We are investigation electronic type meetings via electronic streaming type platform, but at this stage we have not found a suitable platform.

The year has still been busy from a committee point of view, with ACSEV still having representation on the Stakeholder Reference Group for the implementation of the Professional Engineers Registration Bill by Consumer Affairs Victoria.

I have the honour of being the ACSEV representative to this group. Whilst I cannot speak on workings of this group due to confidentiality agreements that we have been asked to abide by, I can speak to our members regarding any concerns and suggestions that they may have with the implementation and operation of this Act and its associated regulations. I encourage any members to share any thoughts, suggestions, or concerns and I will consider them and raise them with the group as required.

The Act will be implemented next year, we hope to get official feedback to the profession soon.

I note that the NSW Design and Building Practitioners Act 2020 has been passed by the NSW State Government and will require certain practitioners to be registered and insured (which is not currently the case), members working in NSW in the Building Industry need to consider how this will affect them.

We are still getting many comments regarding professional indemnity insurance, and registration renewals.

With regards to Victorian Building Authority Registered Building Practitioner renewals (the 5 year renewals) it is essential that you get your renewal in within the 3 month period before renewal is required. Late renewals may lead to cancellation of your registration and reapplying as a new applicant. This could take some months.

Professional Indemnity Insurance is still on ongoing issue, with some insurers no longer offering renewals. We are still seeing the premium increases flow through from last year (in July 2019 there was a large increase felt by most of members, of whom half renew their policy October 30th). Insurers are advising some rises likely again this financial year.

At this stage, committee intends our first meeting (when we can hold one) to be regarding professional indemnity insurance. We hope to cover what one can do to reduce premiums and reduce any conditions. We may also cover risk management strategies that do assist.

ACSEV also has interests in ongoing research projects. Refer to articles elsewhere in this newsletter for further information.

I encourage all members of our Association to contact the Committee and Office Bearers with any questions, issues, concerns, or even comments on how we are running the Association on your behalf.

The Committee is also still here to help you with any issues you may have. Networking and informal mentoring offered by ACSEV members and the Committee can be of enormous benefit. If you do not know or have concerns about elements of the profession or design queries, additional feedback can be of enormous benefit. There is an extensive amount of knowledge and experience in our Association that can be accessed, just ask. Committee members are always willing to offer their advice.

I hope to see you at a meeting some stage this year.

Regards,

Steve Buratto
ffsv@buratt.com.au

2019-2020

Chairman:	Steve Buratto
Vice Chairman:	Andre Merheb
Secretary:	Scott Emmett
Treasurer/Membership:	Francis Hsieh
Asst Treasurer:	Ramon Leoncio
General Committee:	
	Luke Tymensen
	Russell Brown
	Tim Gibney
	Xavier Smolders
	David Tuaine
	Philip Vawdrey
	Stephen Darmawan

" The meetings are a place where people are able to attend, ask questions, acquire knowledge and participate in discussions and most importantly network with professional peers."

Chairperson's message

Dear Members,

I am humbled and at the same time pleased that I was supported by fellow committee members to be elected to Chairman of the Foundation and Footings Society of Victoria. I have been a FFSV member for over two decades and vice chair for the last few years.

I'd like to take this opportunity to thank Luke Tymensen for his tremendous work over the last few years for the effort and dedication to FFSV. Luke will continue his support as a committee member. The society is forever grateful and wish him all the best.

Discussions at committee level can be quite passionate and at the same time informative. These discussions can lead to productive industry topics that are flagged for presentation at our meetings.

The role of FFSV and the committee is to provide an avenue for further and continued learning for all members, including non-members who are encouraged to join. The meetings are a place where people are able to attend, ask questions, acquire knowledge and participate in discussions and most importantly network with professional peers.

The committee meeting this year was held in March and elected office bearers for 2019-2020.

This year has thrown quite a curveball for us all, making it an interesting year to start my FFSV Chairman journey. Unfortunately due to restrictions we have been faced we've had to place presentations on hold. As a committee we are keen to provide our members as much technical information as possible. During this time we are endlessly considering possible topics and ideas at committee level in order to execute this.

We have been working on a new Practice Note No.8. The structure and the initial information were provided by our past chairman David Lawrence and we appreciate his contribution. It was further developed and recently released through our member's portal on the FFSV website. Some minor but important changes were also made to the previous Practices Notes and further amendments will also be made as more information, research and changes to the codes occur.

The aim of these Practice Notes is to unify and standardize site investigation methods in Victoria for housing and other buildings of similar size and construction.

We have also been working on making the website more interactive for members. Further improvements to the website are forthcoming with further technical information on past presentation also being uploaded.

This year members would have noticed once their registration was renewed they received log in details to the FFSV website. The membership renewal date periods have changed to July 2020-June 2021, this means members gained 7 months free from October 2019 up until now.

The research project has also stalled due to the current situation and hope to progress when possible.

The application for the review of AS2870-2011 was conducted by Eric Fox and unfortunately has also now been stalled. We will endeavour to provide support so that we can push ahead to achieve an outcome and keep everyone updated.

I want to personally thank each and every committee member and members of the FFSV for their ongoing support and understanding. I look forward to seeing you all at future meetings nights when possible but in the meantime updates will be provided via email.

Stay Safe,

Best of Regards,

Aims of Foundation and Footing Society

- Promote a higher standard of geotechnical investigation for low rise industrial, commercial and residential buildings.
- Develop an appropriate site investigation code for new constructions, repairs and/or similar re the above buildings.
- Exchange technical information with all related professionals.
- Conduct regular meetings, including excursions and seminars between ourselves and specially related professionals.
- Seek to gain input into relevant codes and Australian building standards relating to the industry.
- Ensure that the members of the organisation or association be well vetted.
- To encourage affiliate membership amongst related professional groups and/or organisations.

WORKSHOPS UPDATE

Workshops planned for 2020 will be on hold over until 2021.

We are planning to hold a series of afternoon only workshops running from 3 – 6pm, subject to COVID-19 requirements in 2021.

The current topics we have proposed include:

Timber material basics and how to recognise and prevent mould in timber.
Earthquake engineering – a case study/worked example.
Piling design – a case study/worked example.
Waterproofing performance of deep basements.
Software workshops – how to maximise job profitability using software.

COVID SAFE PLANS

Several of our members have asked for assistance in preparing a COVID-safe plan for their organisation. Information can be found at the following website:

www.dhhs.vic.gov.au/workplace-obligations-covid-19

A template can be downloaded from the ACSEV website

Please feel free to edit this template to suit your workplace requirements.

Student Placements

Jenny Norrish
Treasurer , ACSEV

As we all know, stems are becoming the leading light at long last in our government both state and federal, but the problem being, kids are requiring work experience to get their degrees. Some universities insist on three months others like six months. They all have varying criteria, some require that they be paid, some require they don't. We have a need to both protect our own ongoing industry and to ensure that those that are good get a chance to get into the profession. On that basis I'd like you all to think about whether you can look at a three month or a six-month stint in your business to help somebody get their degree. There are many advantages, which I can speak to personally, and you are only locked in for a three month stint or maybe six, and you can make sure you get someone that is compatible by doing sensible interview. I understand that as small practitioners we all have a problem of how we get someone to be useful five days a week for three months straight. The answer is we have negotiated in the past for it to be two days a week, plus on the odd occasions when things are quiet at the University a weekend or two of work. How often have you really wished you had someone in your office to go out and hold the end of the tape and not take somebody away from finishing a major project they are working on. Just think about how often you would like to have someone to help you out two or three days a week, if not every week but on some occasions. If you look at a 70-day commitment over a year, you would I am sure find functional use of benefit to both you and them. I would like you to think very carefully about this as there's going to be a shortage of work but in the future, there's going to be a shortage of someone with enough experience and knowledge to want to buy your business.

There may be something in it for you at the end of the rainbow. I look at you though from the point of view of it is a good thing. It is also nice to meet fresh ideas that have not been tainted by reality. If any of you need help in working through a criteria or discussion point or method by which you might need to go through interviewing, I would be more than happy to help. If you can only commit to a shorter period than the 70 days as a minimum per annum, there might be someone else who only wants 20 days a year and we can amalgamate you via ACSEV. We do hope that you look at this positively as there's going to be a large number of graduates coming out this time who will be struggling to get a job, however, in three years' time it probably won't be the graduates coming out that we'd like to think. Keep it in mind and do the right thing by the kids, yourself, and the industry.

Email Russell Brown via russellb@ribrown.com.au if you are interested.

Australian Standards for timber buildings

Russell Brown
R.I.Brown Pty Ltd

The basic code for the design of timber structures is AS 1720.1-2010 currently incorporating amendments 1 and 2. It is a very complex code as it covers timber with multiple strengths, durability and also takes into account the length of time that loads are applied to the structure. Further it covers the methods of connection and how they are to be analysed, it covers manufactured timbers such as plywood, laminated veneer lumber, glue laminated construction and relies heavily on a set of normative references, which are Australian Standards (AS and ASTM), Australian and New Zealand Standards (AS/NZS) and British Standards (BS) in Appendix A.

Apart from two sections, the code is all normative. The only two elements that are informative are in the appendices being, Guidelines for serviceability (Appendix B) and Miscellaneous design information(Appendix G). All else contained within the document is to be treated as normative and is an integral part of the standard. It is thus a very rigid code and in its first sections does not contain the normal statement that this code is not intended to limit the engineer's capacity to use other methodologies where appropriate and of proven value, thus it is a near complete controlling design code for timber structures.

Of some interest however is that the informative section of the code, Appendix B 'Guidelines for serviceability', that controls deflection thereby the sizes of members, particularly beams. Yet the section is informative, brought about by the fact that Appendix C 'Guidelines for serviceability' in Australian Standard 1170.0-2002 is also informative where serviceability (deflection) is concerned. Appendix B becomes significant as it refers to AS/NZS1170.1 and indicates where several values in it are to be overridden, where housing is concerned. This occurs under timber roof systems and members, wall systems and members and timber floor systems and members

Australian and New Zealand Standard AS/NZS1170

This set of codes which basically covers all the loadings and how one is to interpret them for all constructions. They collectively cover general principles-imposed loads, such as dead load and live load, the action of winds and the action of snow and ice , and earthquake.

AS/NZS1170.0 is a very complex code and requires a reasonably competent and experienced engineer to interpret and come with the right loading combinations and the right factors to be utilised in their application. All appendices to this code are informative save for Appendix F which is normative as it is for use solely in Australia. However, the appendices that affect housing are covered in Appendix A, B and C where special studies may be utilised to help in the design of a given timber element, in particular the use and the accumulation of test data for the purpose of design and of significant importance Guidelines for serviceability limit states (deflections). The important note is that it is informative, as are A and C, and it is this section that the timber structures code AS1720.1 overrides in part in its design requirements i.e. Appendix B.

AS/NZS1170.1 permanent imposed and other actions is a lot simpler as it contains only limit state information and the combinations that one should look at. An experienced engineer should be the only one to attempt to interpret it for the use of construction.

The most complex code of all this set is AS/NZS1170.2 wind actions. This code becomes incredibly complex as it requires an understanding of the wind and how it's affected by the ground over which it travels and the direction from whence it comes. It also requires an understanding of the shape of the building and how the wind affects that given shape, and the elements on that construction such as corners and overhangs. The code also requires an understanding of a limit state load for strength and similar criteria whereas it also gives velocities for use for deflection and all serviceability calculations; the two are not the same and require a degree of understanding in their application. It also includes allowance for reduction of loads based upon the total area that the wind is affecting, and it allows for the design of harmonics and vortex shedding of loads, all of which are very complex to analyse. All of its appendices, which are quite elaborate are normative and are required to be followed if utilised; the only one that isn't normative is appendix G which is informative and relates to the accelerations for wind sensitive structures which ultimately affects serviceability/deflections.

Australian Standard AS1684.1-1999

This code came about as an attempt to simplify the rather complex criteria involving Australian Standards AS1720.1 and AS1170 series. By implying geometric limitations and making the code applicable to class 1 and class 10 buildings only, it simplified the design required and the time that was needed to design the timber components for residential construction. Section 1.3 contains an allowance for assumptions to be made for design that can be demonstrated to be satisfactory and may not fully comply with the intentions of this code. Thereafter it shows examples of how to analyse individual elements within a normal pitched house i.e. rafters under purlins, ceiling joists etc. It can do this by assuming that construction will follow certain practices as laid down in standards to which it refers. It in turn under 'reference documents' refers you to the standard set AS1170, AS1684, AS1720 but also includes a reference to AS4055-2012 wind loads for housing.

Australian Standard AS 4055-2012

By using rigid criteria such as height, width, roof slope etc, it minimises the amount of work required to formulate methodologies of design and the factors to be utilised compared with the rather complex wind code AS1170.2. Another simplification that it puts into place is that you have wind classes known as N1 through to N6 and it is accepted that once you are within one of those categories you utilise the maximum value as given in the relevant table 2.1A .

Even if the velocities calculated using the more complex wind code are less, you default to the high value, thus there is some loss of economy in terms of forces used but simplification of methodology throughout. Further and of academic interest to most engineers, Table 2.1B is for cyclonic regions C and D, and even though there appears to be an overlap of the velocities in C1 and C2 relative to N3 and N4 there are significant differences in the manner in which a cyclone affect buildings and thus the need for separation between the two, even though the design velocities appear to be identical. Its basic purpose is to simplify the loads to be applied where they involve individual members, an example is table 4.1 which simplifies the total design loads required for anchorage. Noting also is looking at that table, one can see the differences in applied forces between the N3 and N4 and C1 and C2 categories.

Australian Standards AS1684.2-2010 & AS1684.3-2010

Both of these codes cover construction upon which the other codes for analysis of wind and design parameters are also interrelated by relying upon the methods by which construction is carried out i.e. how an element is held down, what forces are to be taken, how they are to be handled whether one uses nails screws etc, and they contain numerous examples to help in the selection of a correct method of construction and the manner in which elements are to be held together and the way in which they are to handle the forces that are being applied to them as derived by the previous codes.

Further, these codes also call up supplements that are based upon work done over the years to arrive at the sizes to be used for specific elements such as floor joist F grade 11 unseasoned. There is a supplement that will give you all the sizes from rafters, batons etc all the way down to stumps.

In addition, there are accepted industry productions mainly from timber promotion council and the manufacturers of various timbers particularly LVL's, plywood etc, that also give you supplementary tables which in the main are accepted throughout the industry. An example of the same being supplementary tables load width edition. Thus, a builder or an engineer is able to detail and to a large extent design a construction utilising the codes for that of housing, and only where the house falls outside the parameters given, would reference to the more detailed design codes be applicable.

There is one additional code AS1684.4 simplified non-cyclonic areas which makes it even simpler to utilise in performing a design procedure but does lose some cost economics and is noted as doing so within itself. Its fundamental limitations are contained in the preface on page 2; the major difference being that it does not cover N3 or N4 classification for wind and the buildings are required to be somewhat smaller, but as most housing is built outside of cyclonic areas and the vast majority of houses are covered by the geometries given, it is a step in the right direction for simplification with very limited loss of function.

ACSEV/FFSV RESEARCH Update

Russell Brown

AS 2870 :2011 Research

ACSEV and FFSV have been funding research on AS 2870 to improve the provisions in the code through industry linked research based on field testing and practice knowledge. The expenditure was 6000 AUD per organization per year for three years matched by grants from other sources including Victorian government. This has resulted in three PhD thesis and several technical papers published from 2016-2020. This is a remarkable achievement considering the progress achieved in understanding the reactivity of soil and the method of foundation design which is still a developing branch of study. This will immensely help the practicing engineers to understand the limitations of the code provisions especially in highly reactive soils and abnormal moisture conditions.

ACSEV and FFSV members contributed heavily by sharing their data of field investigations (moisture levels) of varying sites, soil classification and nature of buildings. Thanks to all who contributed in kind and provided valuable assistance to the research activity. As you would appreciate reliable data is the backbone of any successful research, and industry linked projects like this have more success in producing better outcomes rather than being purely academic.

The overwhelming evidence from all these researches is that the moisture levels impact the measurements of IPT and we need to find better ways to find reactivity irrespective of the time of testing. More research needed since this is a complex problem involving many parameters which cannot be easily solved. The climate change induced weather patterns adds another layer of complexity into the mix.

The outcome of these research is available for members and public and details below.

PhD Thesis

1.Karunarathne, Aruna Nishantha , 2016, "Investigation of expansive soil for design of light residential footings in Melbourne"

2.Lopes, Dominic, 2017, "New post-construction site characterisation models for low-rise buildings founded on highly expansive clays"

3.Wagle, Deepti, 2019, "Damage potential to residential structures due to ground movement"

Conference Papers/Journal Articles

There are several journal articles published related to the research and some of them are given below. We believe these information and knowledge will form the basis for further research in to residential footings and thereby improving the provisions in the code especially in footings in highly reactive soil.

1.Karunarathne, A. M. A. N.; Gad, E. F.; Rajeev, P;2020, Effect of insitu moisture content in shrink-swell index, Geotechnical and Geological Engineering, Vol. 38, no. 6 (Dec 2020), pp. 6385-6392

2.Lopes, Dominic; Karunarathne, Aruna;2017, New conditioned soil index test and characteristic ground movement calculation model, Geotechnical Special Publication: Proceedings of the Second Pan-American Conference on Unsaturated Soils (PanAm Unsaturated Soils 2017), Dallas, Texas, 12–15 November 2017 , Vol. 2017-November, no. GSP 303, pp. 81-89

3.Karunarathne, A. M. A. N.; Fardipour, M.; Gad, E. F.; Rajeev, P. ; Disfani, M. M.; Sivanerupan, S.; Wilson, J. L. ;2018, Modelling of climate induced moisture variations and subsequent ground movements in expansive soils, Geotechnical and Geological Engineering, Vol. 36, no. 4 (Feb 2018), pp. 1-23

4.Fardipour, Mohammad; Gad, Emad; Sivagnanasundram, Siva; Rajeev, Pathmanathan; Karunarathne, Aruna; Wilson, Joh, 2016;Interaction analysis of waffle slabs supporting houses on expansive soil,Innovative Infrastructure Solutions, Vol. 1, no. 1 (Dec 2016), article no. UNSP 20

5.Karunarathne, A. M. A. N.; Gad, E. F.; Disfani, M. M.; Sivanerupan, S.; Wilson, J. L. ;2016,Review of calculation procedures of Thornthwaite Moisture Index and its impact on footing design, Australian Geomechanics Journal, Vol. 51, no. 1 (Mar 2016), pp. 85-95

6.Lopes, Dominic;The mixed success of Australian Standard 2870 in the past 30 years,2nd Pan-American Conference on Unsaturated Soils (PanAm-UNSAT), 'Swell-shrink and tropical soils', Dallas, Texas, 12-15 November 2017 / L. R. Hoyos, J. S. McCartney, S. L. Houston, and W. J. Likos (eds.), no. 303, pp. 257-267

STEEL Handbook

ACSEV is partially funding a project to prepare a steel hand book with simple connection details with the help of fabricators. As you would appreciate the major cost of steel structures is the labour associated with it and not necessarily the quantity of steel you use. Many engineering details are very costly to fabricate since the input from fabricators have not gone into the preparation of details. Fabricators are last in the chain of production and they end up with non practical details which either increase the cost or reduce the quality. Either way, it is not improving the project out comes. For the first time, engineering details are developed taking into consideration the input from the people who actually make it work. This is an innovative approach to develop solutions with the input from all sectors of industry to drive down cost, improve safety and sustainability.

This hand book has been in the process now for some years and we have been able to attract a major fabricator in the western suburbs to be the industry partner. This will facilitate to engage students from Swinburne to prepare graphs and charts(better presentation) which will immensely help the use of the hand book. So far 25,000 AUD has been pledged as a stipend to same which has not been disbursed yet.

Draft Technical note (Design for fabrication) was also developed in response to discussions with both fabricators and designers to improve efficiency and economy of steel construction. This technical note is written from a fabricator's perspective with the aim of producing more economic designs. It reviews the advances in elements for steel fabrication that have implications on the cost effectiveness, reduction in occupational health and safety (OHS) risks and minimisation of environmental impacts.

Waffle pod on screw piles

FFSV is funding a research with Swinburne University to undertake a full scale testing of screw piles holding down waffle pod. Victoria University is also joining the research program by providing a site for full scale testing. The planning has been going on for the past few months and it is now in the advanced stages of design. Testing will involve injecting into the ground massive amounts of moisture to induce heave and that any filling associated the construction will primary will be over compacted. The intention is see if it is possible to actually create a means of holding down slabs when they are being heaved. Please note that vast majority of failures that we investigate are related to heave.

To ensure that the research into screw piles goes ahead after coronavirus permits we have already agreed to fund 210,000 AUD or thereabouts but we are hoping to get industry partners and government to match with our contribution. We are already looking at three industry partners to donate various items such as screw piles, steel, concrete and some labour. If all those come to fruition there may infact be almost no cost at all. We are very hopeful as the mathematics would indicate that such a system will work in highly reactive sites. As most of our construction now appears to be on reactive soils or infill sites, a verification that we can design structures that will not move extensively would seem to be a good use of our time and money. I do hope this update as to where funds are being spent meets with your approval, of course this is in addition to the annual seminar expenses. We will be inviting speakers from these research programs to disseminate practical information to members.

ACSEV Membership fees 2019-2020

☐	MEMBER	$185.00	☐	MEMBER (Country)	$145.00
☐	ASSOCIATE	$185.00	☐	ASSOCIATE (Country)	$145.00
☐	RETIRED	$70.00	☐	GRADUATE (6 years or less)	$90.00
☐	STUDENT	NIL	☐	LIFE MEMBER	NIL

BECOMING A FOUNDATION AND FOOTING SOCIETY MEMBER

The Foundation and Footings Society of Victoria was formed in 1991. The association grew of an initial informal meeting in July 1991 of engineers, engineering geologists and technicians involved in the geotechnical assessment of building sites. The society provides regular meetings with excellent speakers three to four times a year including a joint meeting with ACSEV. These meetings do attract up 100 practitioners and colleagues created a great environment to share knowledge and advance your professionalism. The society also funds research into soils and structures that sit on them and has membership levels

Infrastructure thought Leadership series: Large scale sleeper retaining walls

ENGINEERS AUSTRALIA

Engineers Australia through Swinburne University approached ACSEV for providing speakers for the Infrastructure thought series seminar which was delivered in Melbourne, Sydney, Brisbane and Townsville. **Russell Brown** (Principal, R.I.Brown Pty Ltd) and **Biju Balakrishnan** (National Technical Manager, Intrax Consulting Group) volunteered for this and presented in three cities, Biju presented in Sydney and Brisbane and Russell in Melbourne. Co speakers were **Dr Martin Larisch** (Principal Geotechnical Engineer, Golder) and **Kim Guttridge** (Principal Engineer, WSP). This was a part of thought leadership series which Engineers Australia is delivering in partnering with industry representative Austral Masonry. All these events attracted attention from wider engineering community as retaining walls are becoming more and more common as we are constructing on difficult terrains.

AS 4678:2002 was the main topic of discussion which is being revised now. Russell Brown also took the opportunity to provide information about ACSEV and technical seminars to audience and distributed copies of 200th newsletter. Melbourne event was also live streamed as a webinar and is now available at the following link. https://www.youtube.com/watch?reload=9&v=rJH7q8lqdCU

SIMPLE STRUCTURES

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We offer our customers advice on the correct product and provide support that includes same day or next day dispatch.

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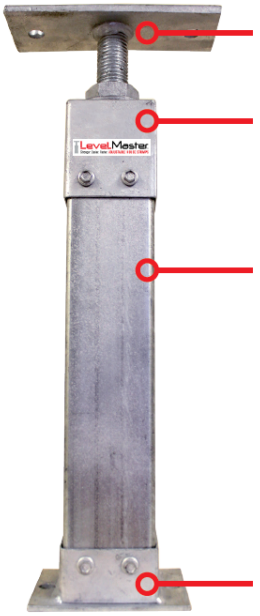
- ✓ State Certificate of Compliance available for each product
- ✓ Full engineering certification by a structural engineer (peer-reviewed)
- ✓ 120mm of adjustability with a custom M30 x 200mm thread
- ✓ Hot Dipped Galvanised Structural Steel
- ✓ Extensive range of fittings and tops
- ✓ Easy to use
- ✓ No welding required*
- ✓ Shortest industry lead time
- ✓ Free assembly
- ✓ First choice for designers and specifiers
- ✓ component drawing files available



ADJUSTABLE BRACING

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AS 2870 vs AS 3600

This article is a compilation of three projects reviewed in the last 2 years, all partially used AS 2870:2011 and in part AS 3600. When projects were checked using section 4 of AS 2870, they do not measure up unless you are using uncracked section irrespective of what E value you chose. Further swelling pressures were ignored and many practical details in edge beams were not functional. Broadly these three projects analysis was done in the past to check AS 2870 standard designs came up with the conclusion that they do not work. Then anything less stiff than standard design has only limited chance to succeed.

The introduction of every possible means of supporting housing construction comes with the situation of does it or doesn't it comply with AS 2870 and/or is it better to be analysed under AS 3600. Both codes are called up in the NCC and thus have legal status. The problem is that AS 2870 comes with a range of criteria that AS 3600 does not.

AS 2870 comes with a concise statement that the project is to last for 50 years and does not have to last longer. AS 2870 anticipates a 5% failure even if all elements are complied with. It instructs that there are responsibilities of owner, builder and designer, site maintenance for one and grading away of the soil for another. The responsibilities also include maintaining of all plumbing and non-planting of trees too close or making allowance for trees that have already been planted and are growing too close.

Thus, AS 2870 cuts a few corners, in fact computer program analysis, which was not readily available at the time AS 2870 was first introduced in the 1980's, today will indicate that under some loading conditions and moisture level slabs deem to comply will not work. That is straight out of AS 2870.

There have been surveys done, admittedly questionable in some cases, that would indicate that we do have a 5% failure rate. We appear to have a reasonably low litigation rate contrary to the feelings of some of you out there. Noting here that we should not use litigation as the means by which we measure as engineers whether construction is adequate or inadequate for the purpose. I think the question comes if we then look at AS 3600, what criteria does it come with?

Well you could if you wish, cut and paste, and therefore you'd have to put in all the riders that are in AS 2870 such as 50 years and 5% failure rate , and broadcast on the front of your computation sheets see if it will be acceptable to a building surveyor. AS 3600, AS 4100 and AS 1684 are all predicated on a life span of something approaching 100 years and they also don't tolerate a 5% failure rate, in fact most loading codes assume something in the order of 1 in 10,000 failure i.e. reinforced concrete design by AS 3600 should have a failure rate of less than 1 in 10,000 and if the structures are really important that creeps out to perhaps one in a million. Nothing like that can be achieved in housing if economy is placed as part of the criteria for design.

Thus, if you choose to use AS 3600 strictly as it is written, you are bound by the definitions that come with it unless you disclaim them, but then are you really using AS 3600?

Over the years we have had a range of solutions; piles to credible depth and floating suspended slabs sitting on them, nothing to hold them down. When in fact a large amount of failure caused by heave generated from plumbing leaks of which I have written many articles in past newsletters. Heave is far more likely a causation of failure than trees, as an example. The bored piers and the hold down technology within AS 2870 doesn't require you to actually hold your structure down, in fact the handbook and commentary written for the code indicates you shouldn't do so as the additional weight on them when being heaved will interfere with their functionality. If you do put in a hold down system, you are required to use AS 3600; and back to the same argument, to what level of control are you then obliged to give and do you wish to use the disclaimers in AS 2870 and then use AS 3600 as your analysis basis. If one looks very carefully at how AS 2870 is derived, it is a cocktail, it "assumes" that we do not have a cracked section, in fact as noted previously, the original text being the basis for the code starts off with doing your analysis with an un-cracked section and you assume your depth cubed by all of your various widths over the width of the slab and you analyse it. The truth is then contained in the same book issued by Swinburne University many years ago, where it talks about cracking being inevitable.

More importantly, AS 3600 requires that when analysing a structure to consider the effects of shrinkage and all pre-loading and determine what loss of capacity is occurring. As a consequence, one only needs to look at a raft slab and note that all the beams technically are to go into natural ground and thus form anchors at every 4m centres in reactive soils. Therefore, you're guaranteed to get shrinkage and it is going to result in tension within the steel, reducing its capacity. The cocktail of mixing and matching is unsafe, and certainly from a legalistic point of view I see it as a nightmare.

We all know that every structure in AS 2870 in fact has to crack for the steel to actually function, to generate the moment capacity that we assume is needed to control the movements. As a professional engineer and/or geotech, the reality is, it is up to you. I do think we need to keep these facts in mind, if you step outside of deemed to comply codes, you step into another one that is deemed to comply, you need to follow its dictates and rules. I would note that we should all be in favour of innovation, anything that can improve the functionality of our slabs and our housing. Rest assured that ACSEV and FFSV are still committed, but have been held up with coronavirus, to doing investigations for screw piles to a depth below the Hs value and to be utilised as hold down to control heave and hopefully eliminate same, particularly in highly reactive soils. This research will be going again the moment the coronavirus permits, or should I state the moment our state government's interpretation of the coronavirus permits. I leave you with that thought. Please let me know your views on this topic and email me your comments back.

…….. R.Brown

OBITUARY

Richard Eckhaus

Richard Eckhaus was a very active member of ACSEV, he was on the committee for many years and served as Chair for at least one term.

Richard was very heavily involved in the engineering profession, working to support and promote structural engineers. He was chair of the Victorian Structural Engineering college for a number of years. While in this position, he encouraged younger engineers, particularly women engineers, to join the committee, and for the committee to run a very active program for all structural engineers.

I met Richard while a member of the ACSEV committee and I worked with Richard on while on the Vic Structural Brach committee.

Richard enjoyed good food and robust discussions on current ideas and political developments. Richard could adopt strong positions and argue forcefully for what he thought was correct. I have had the pleasure of dining with him and a guest speaker at La Luna restaurant following a structural branch meeting and on more than one occasion at one of the suckling pig special events put on by the restaurant.

On a number of occasions, Richard with my wife and I attended the annual duck and pinot event organised as part of the Melbourne Food and Wine Festival. A significant number of restaurants were visited, at each a different duck course was tasted and a different pinot sampled. On completion it was home by public transport to recover.

In recent years Richard developed a degenerative condition that slowly stole from him the ability to project his voice and restricted his ability to prepare and enjoy good food. The condition did not reduce his mental abilities. It must have been very frustrating having to watch others in discussion without being able to express his opinions.

.....Laurence Beesley, ACSEV committee member (retired)

Richard Eckhaus was a force of nature. Capable, strong willed, energetic, argumentative, bright and principled. Richard understood what it is to be an engineer, he had an appetite for work, he could think out seemingly unsolvable problems, argue for a course of action, and stayed positive even when confronted with a multitude of problems.

Richard was bought into the world by indulgent and loving parents who confronted the horrors of the holocaust. I knew very little about his parents, but I know that his relationship with his parents was bold and expectant. Richard studied engineering at University of Melbourne, went to work with the Country Roads Board in the bridge department. Others who worked with Richard at that time knew Richard as a productive designer who worked diligently at his duties, and spent much time reading journals and texts.

Richard then worked as a sole practitioner as Richard Eckhaus Consulting Engineer and had an office in Punt Road, Prahran and later moved to Auburn Road, Hawthorn, for Eckhause Clayton and Partners and later with Barry Gale. Richards had many multi-storey buildings to his name, working for the families of the Glenvilles and Wolfsteps and Smorgons. His portfolio of projects is prodigious and technically tight.

Richard was generous when he saw genuine effort. He often paid Christmas bonuses and bonuses to staff after completing large projects.

Richard was imbued with a series of principles, that he forged and stood by throughout his working life - such as: Often your best thoughts are your first thoughts. or, It is better to be consistent and wrong, than inconsistent and right, and when all else fails, Let's sleep on this problem, and let the solution find us in the morning.

Richard worked his way through Engineers Australia committees, first at the structural branch in Victoria, and by his drive and personality, he ended up chairing Engineers Australia National Structural College Board. Richard Eckhaus faced a difficult time when his motor disease caught up with him, and he faced his demise with courage, never losing the essential Richard.

Richard Eckhaus left an indelible mark that runs through many pages and crossed many lives. I have some of his ink on me - I owe Richard a lot.

Vale good colleague Richard Eckhaus, an engineer who made the world a better place.

.....Greg Schofield , Committee member Association of Consulting Engineers, Victoria ACSEV (1992-1997)

My Story and its relevance to Covid-19 and the workplace in 2020!

Jenny Norrish
Treasurer , ACSEV

I set up my home-based business 28 years ago after working with a large (150+ staff) engineering firm for over 9 years. At work, I had colleagues at every turn to assist with technical matters and mates at every other desk to chat about our weekends and holiday plans. Coffee breaks were invariably timed to allow a 10-minute chat about footy tipping competitions or the latest sports results. Lunches were either a jog around Albert Park Lake or lunch out with workmates, and Friday afternoon happy hour (after work) allowed work colleagues to understand each other better and build trust. In summary, working in an office environment, whether a staff of 5 or 150, provided security to younger staff to let you know that someone always had your back.

Moving to the next stage of my career involved setting up a home based small business.

A lot of my ACSEV colleagues have faced the same situation themselves when setting up their businesses, and you will see some similarity between many of the issues we are facing today as a result of Covid-19 as businesses are requiring their staff to work from home. This includes:

- Working around children and learning how to divide your attention.
- Focussing on work when there are distractions around.
- Eating food at allocated meal and coffee breaks and not all day long.
- Seeking guidance from colleagues when you are faced with a difficult technical problem.
- Committing to working during regular work hours.
- Believing in yourself when there is no one around to tell you that you are doing a good job.
- Taking exercise breaks to stay alert.
- Setting up a suitable long term workstation, to avoid neck and back issues.

Let me point out a couple of interesting facts and make some suggestions that might be worth considering in your workplace.

Visual contact between humans is critical. This allows us to look out for each other.

Keep an eye out for distracted colleagues and ask them if they are doing okay.

Remain in contact with colleagues, whether they be staff or ACSEV members. Try ZOOM calls or Skype calls with visuals. Remember, we are all there to support each other.

Plan your work day. Set aside dedicated work times, times for meetings, time for phone calls, time for exercise and time for food breaks. And stick to this. This will help maximise your work output.

If your organisation has ***multiple staff*** all working from home, perhaps allocate 30 minutes each week for a group ZOOM conference. Allocate time initially for each staff member to talk about how they are coping and what issues they have faced during the week. Allow group brainstorming of ideas to problem solve. Try a social interaction such as a trivia quiz. Allocate a quiz master, and everyone can be involved. This might be a 15 minute quiz, taking questions from online resources, current sporting events, or elsewhere, and will allow staff members to unwind, interact, keep an eye on each other, and problem solve any issues that have arisen over the previous week. Staff will look forward to these times.

If you are working from home and there are ***children*** at home, understand that children do need you too. Maybe set aside some time during the morning tea break or your exercise break that involves interaction with kids. The kids will appreciate this time and they will wait for this positive interaction rather than being ignored. This does take some practice, but the positive results will benefit everyone's relationships and allow you to focus on work during work time.

The changing workplace as a result of Covid-19 emphasises the benefits of ACSEV.

Perhaps we could still have "dinner" meetings online on the third Wednesday of the month until in-person meetings are allowed. ZOOM dinners, BYO coffee or wine, and we can try a networking session. I'd love to hear your feedback.

MEMBERSHIP UPDATE

Renewal notices will be issued in the coming weeks to all members who were financial in the 2019-20 year but who have not yet renewed their membership.

If you have not received a renewal notice and would like to follow up your membership, please contact our treasurer, Jenny Norrish, via email at treasurer@acsev.org.au

Tag Teaming

This true story starts a long-time back, overseas where a very young man decided he would come to Australia and after 10 years of working in various industries decided to become an engineer(No:1). He achieved that by getting a degree and started working with my firm somewhere around 2000, and therefore he was forced to do his designs without the aid of computers for at least 18 months. He specialised primarily in industrial buildings i.e. tilt panel construction, portal frame, tin clad construction and residential construction, of a nonrepetitive nature. From my past comments, when something comes out of the computer that's wrong you need to know how to verify it by hand, and this young man certainly does know how.

After parting company, he started his own organisation and did an enormous amount of work alongside an architectural draughtsman who also drew structural documentation and he provided computations for same; instead of doing one or two jobs a month he was doing two and three jobs a week of an industrial nature, as a consequence he has an enormous amount of background into all the codes and manuals that go into the design of industrial buildings, about which this story relates.

The documentation that was used and was well understood includes the following: **Tilt up technical manual by Cement & Concrete Association Australia July 1980, Design of tilt up concrete wall panels by Concrete Institute of Australia July 1992, Australian Standard 3600 (1988, 2009 and 2018 editions), Australian Standard 3850 (2015 and 2003 editions), Precast concrete handbook by National Pre-cast Concrete Association Australia 2009, Australian Standard 1170 relating to loads to the construction**. Not all the above documents are referenced in the NCC, any edition.

Some of the salient points here are that the information from the concrete institutes of the various backgrounds include hand methodologies of analysing for second order effects, crude but effective, and some even refer you to AS4100 which is a steel code. The reason for same is that the steel code has a much more refined method of defining effective lengths and also has an 'α m' section for calculating out the actual allowable stresses when you have complex bending moments, none of which is as well handled in AS3600. Hence the reason for a reference to a steel code that seems to have no use at all in the design of tilt panels.

Moving on, we now have a project that comes to fruition in 2017 involving the design of four rather large warehouse/factories in Melbourne's West. Two units have a crane inside and others a higher wall for storage, thus an 11m high tilt panel is the basis for the construction of two of the units with a springing line at the 9.5m mark. Analysis is done utilising past experience to minimise the need to do unnecessary calculations has they have been done often in the past, resulting in a tilt panel of 180 mm thick with two layers of mesh, one per face being SL102 plus a 12 diameter bar both faces on all edges; standard fixed connection at the bottom in the anticipation of a fire leaving the panel going vertical, capable of carrying a wind load .25kPa which I believe is full fixity. Then, we have a roof pitch of 2% plus an addition for pre-cambering taking it to 2.5%. The main panels being approximately 5 m wide.

The building was sold to an investor who in turn leased it to an unknown tenant who paid for six months rental and filled the building with unrecyclable plastic and rubbish, this being cheaper than attempting to dump it at contaminated landfill sites (cost approx. $250,000). After the warehouse was filled almost to the brim, somewhere in the order of 3-5 m up the walls, the landlord discovers same after 6 months and is forced to remove the rubbish at his expense and to have it dumped in a legally correct manner, incurring major costs.

In the doing, a front-end loader hits a corner panel at the end of the building with a raking angle iron across its top at 9.0m up. The panel breaks at the bottom and moves laterally, in addition various scratch marks have occurred in and around the building from the front-end loader and perhaps the trucks, as the building is being emptied, plus the walls are stained from various oozing chemicals that have leached out of the rubbish. Not a good look.

My office was called in and we(No:2) issued a report recommending removal of the lower part of the concrete panel with proper temporary support, leaving the mesh in place and spraying concrete into the old mesh plus repairs to the base connection. Noting the building is built on the boundary line and there is limited capacity to take the complete panel off and to put a new one in as the site adjoining may not be able to be used. The costs to do either were at or about the same as supporting what is some 8.5m or so of the panel and thus repairing and making good the bottom.

The owner of building made an application to his insurance company to cover the costs, the insurance company engaged an engineer(No:3)to look at same. The first investigation does not result in a formal report, just email dated 4 December 2019 (plus a follow up email).

The first review of the project by the insurance company selected engineer(No:3), notes that it is using AS3600 (2018 edition) which is not the correct standard, it should be the 2009 edition. It is noted by said engineer(No:3) that it will produce the same results; somewhat correct but I am choosing to stay with AS3600-2009 for reasons which become apparent. He also goes on to say "the existing panels are structurally inadequate (my apologies but the standard jumps about all over the place, so this may be a little hard to explain)". The problem appears to be more with the author than it does with code.

The **first error made when it was called up as an un-braced wall** when the fixity at the bottom is capable of bending moment to resist 0.25 KPa wind forces after the roof has collapsed in a fire. Further the purlins are connected into this wall with an angle iron bracket at around 9.6m up from the bottom of the slab, thus the location of bracing is at about 9.6m, and the roof is fully braced along the top of the wall. The point here is if it wasn't braced it would fall over.

This gives a panel height from restraint to restraint of an L to D of 53.3 i.e. over 50. However, we really should be looking at effective height and to do this we need to analyse both the top and the bottom of the panel which is clearly restrained at the bottom, and because of the raking angle and the bolts into the precast panel having a rake on them they too create a moment capacity at this point, possibly k=0.75.

If one ignores this criteria and applies a wind load to the wall, it is virtually a uniform load, both for the vertical cantilevering piece which is in the order of 1.4m and thereafter a span below of around 9.6m. This will give us inflection points in the main length of about 6.5m. Choosing to use such an analysis method which will then give you a L/D ratio of 38.9, well below the targeted L/D of 50.

If we also look at AS3600-2009, Clause 11.4 effective height (a), we note that k can be 0.75 if we have restraint at both ends, we do. As a consequence, we could use a k of .75 of the complete 9.6m and we get an L/D of 40. **However, I am advised some engineers think that this may well be a stretch.**

There is no need to stretch. We do not have any problem because the panel has reinforcement in both faces. **If we use Section 10 of the code which is for columns figure 10.5.3 (A) k is somewhere between 0.7 and a 0.85 buckling mode, and again we get an L/D of 45 <50**.

The independent consulting expert(No:7) says you can't do that because the panel doesn't comply as it doesn't have ligatures to contain the vertical reinforcement. This would indicate they are now "jumping around reading the code" in that 11.7.4 restraint of vertical reinforcement can be ignored where it says if you're concrete has a stress level in compression of less than .5 then you are okay provided your concrete is below 50MPa in strength (which it is) and either the vertical reinforcement is not used as compression reinforcement (it clearly isn't as we have two layers of it, it's tension reinforcement only) and importantly the vertical reinforcement ratio is also provided relative to .01 and .0025. Every requirement in C.L.11.7.4 is achieved, therefore the panel can be designed as a slender column without the need for ligatures, thus we can go to section 10. Thereafter once were in section 10, I would note that the L/r ratio certainly is now 0.7 of the length of 9.6, divided by .3 x 180, giving us an L/r of 125 which just exceeds the 120. This forces us into a vigorous analysis better known as a "PD effect" which for a panel carrying very negligible amounts of wind load relatively speaking, and with mesh in both faces that is on the high side and fully braced at 9.6m, it is easily handled.

Importantly, analysis has been done many times for panels of like and similar varying in thickness from 170-200mm and they all seem to work quite well, at least for the last 30 years. The consulting engineer then goes on to say (which creates the real problem for all parties) that as this panel is defective (so are all of them) we are looking at a building that may need to come down.

Another oversight is that this panel is a corner panel and has a fair degree of rigidity at the top connection where a channel frames into it as well. This email report with no computations to back it up was vigorously rejected by the design engineer, thus the insurance industry called in an "independent assessor" and that's exactly how he introduced himself on the phone to the design engineer, but he knows as per his instructions that there has been an investigation alleging negligence of design and that he is to review this noting the reasons why it's not negligent have already been given to him.

I am informed by the design engineer that one of his questions was do you use AS3850 and the answer was yes of course one does, it's an excellent code (not called up in the NCC) for the design of panels during construction, which is an area that NCC tends not to get into i.e. cranes and things that go bump in the night. A criticism is that the design engineer was using AS3850 (2003 edition). There is some "mumbo-jumbo" in the assessment that AS3850 was upgraded in 2015, and the design was done in 2017.

The point being even though the engineer used AS3850-2003, it contains essentially exactly the same criteria as AS3850-2015, no matter which way you jump you end up in AS3600 for the structural design of your panel without a few hints as to what to do which was incorporated in the AS3850-2003 edition which was dropped in the 2015 edition because those same "hints" were now in AS3600-2009 and thus were redundant in AS3850.It's simple; AS3850-2003 preceded AS3600-2009 and it had some useful hints which were taken up in AS3600-2009 but nobody saw fit to do an amendment to the 2003 edition of AS3850.

The inference being that the engineer(No:1) haven't complied with the NCC is totally wrong. The NCC doesn't call up any edition of AS3850 in any of its editions. All direction in all editions of AS3850 is to go to AS3600 and/or AS4100 which are in the NCC.

The independent engineer(No;4) ignores the concept of second-order analysis as being a means of achieving a design if one chooses to accept that the panel has some degree of capacity to be treated as a height of 1 times its height of 9.6 which I believe it to be, take it as 10, we do get an L/D 58.3. That in turn sends you straight to section 10 of 3600 (2009 edition) which by second-order analysis will give you the panel that has been used as being more than satisfactory. One reason ignored is that when one gets any form of bending moment which is the thing that induces the deflections, you also get a vertical load upwards from the wind, thus there tends to be a counterbalancing of second-order effects.

As a consequence of his conclusions which ignore the use of second-order analysis which would prove the panels are structurally sound, he goes on to say that the panel needs to be thicker and by definition the whole factory and would need to be thicker; it has opened up a can of worms. He has also blackened the name of a good design engineer(No:1) unnecessarily.

As a consequence, a second report/letter based on a computer generated second order design was put into the owner/insurance company and began utilising a second-order analysis which the first investigating engineer said he wouldn't use, why I have no idea other than perhaps didn't know how to do it? And how was he able to dismiss what is in the code?

The independent engineer(No:4) gets to review the input using second-order analysis and agrees that it actually makes the panels work, but continues to indicate that the original design engineer(No:1) by hand with no computer program did not actually do such an analysis, when in fact it's already being done time and time again by hand starting 20 years ago. The results of same are in the concrete institute documents for various panel thicknesses, the main one which is relevant to this is 170mm panel, two layers of mesh of a given area. This can be utilised quite readily to prove that this panel being 180mm thick and similar, works more than well.

The attitude that we have to design/do computations for each and every building again and again is in incorrect, we don't and shouldn't have to as extensive experience of constructions of this kind should not have to be repeated when it's obvious the answer is right.

Once you've done at least four second-order analyses and discovered that you always get an answer that is verifiable by an L/D ratio of 1 to 60 without further input, I think it's irrelevant as to whether that calculation is included in the computations in each case.

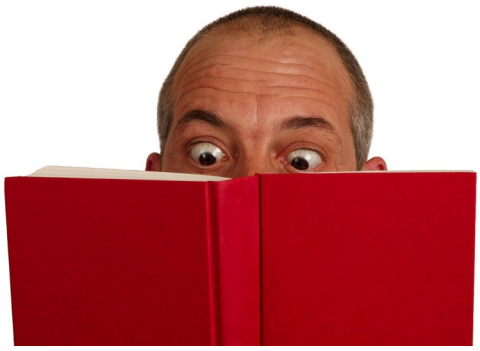
On a similar note, I rarely if any put in to the computation relating to waffle pods when they're supported on screw piles as I've done so many times I can't see the point in doing it again (if requested we dig them up).

This sets a dangerous precedent where he believes experienced engineers cannot design structural elements outside of the deemed to comply requirements of the Australian Standards is totally wrong. It is not outside the requirements of Australian Standards use second order methods, it's been verified time and time again with like and similar to be well within and a shortcut method of using an L/D of 60 or similar is a very quick way of making sure the structure was adequate with the least amount of time wasted doing computations for no real value or purpose.

Ultimate confusion comes in the independent engineers second report item 5.2 and I quote "it should be pointed out that at no time has any engineer alluded to the fact that the building is structurally inadequate. The issue at hand is one of technicality".

This tale indicates a high degree of unethical conduct and I believe that not accepting that a design engineer can and should, if experienced enough, use any shortcut method to arrive at a structure on the drawings which is the item used for construction (not the computations) is a correct and proper methodology of design, analysis and ensuring that structures are correct. To this day have never met a concreter who ever built a concrete structure with only the computations in his hand i.e. no drawing. A question is raised that in section 11, a structural element can have only a K of 0.75 or 1.0 where as in section 10, it varies with rigidity of supports like and similar to AS 4100, why??

……Russell Brown, R.I.Brown Pty Ltd



1. I'm okay, you're okay *by Thomas A Harris MD*
2. The Art of War *by Sun Tzu, any edition in English*
3. The Science of Fear *by Dan Gardner*
4. A brief history of mankind *by Yuval Noah Harari*
5. AS 3798:2007 Guidelines for Earthwork
6. Freakonomics *by Steven D Levitt and Stephan J Burner*
7. Super Freakonomics *by Steven D Levitt and Stephan J Burner*
8. Future Babble *by Dan Gardner Dutton*
9. Games People Play *by Eric Berne*

And for fiction, try listening to Willie Nelson and Bob Dylan!

Two Easy Ways to Guarantee the Quality of Your Reinforcing Steel

By Eric Lume, BE MIE AUST CPENG (RET), National Engineer, Steel Reinforcement Institute of Australia

Over 140,000 tonnes of steel reinforcement is supplied in our market each year from unknown origins. If 'uncertified' steel is supplied on one of your projects then there is a high risk the reinforced concrete element could fail. Even though our design drawings might specify steel reinforcement to AS/NZS 4671 *Steel reinforcing materials*, it's difficult to prove conformance once the steel is fixed and the concrete is placed.

The Steel Reinforcement Institute of Australia (SRIA) is making it easy for you to guarantee the quality of the reinforcing steel to Australian Standards by following one of these two simple methods:

Method 1: **Use an approved member of the Steel Reinforcement Institute of Australia.**
Our 9 Full Processor Members are certified by an independent JAS-ANZ accredited organisation, such as ACRS, that their reinforcing bar and mesh conforms to AS/NZS 4671.
Method 2: **Specify on your drawings: 'A JAS-ANZ accredited 3rd Party Processor Certificate (ACRS or equivalent) must be supplied with all steel reinforcement at procurement, before any concrete is placed'.**

This certificate is proof that the supplier's reinforcing bar and mesh conforms to Australian Standards. A 3rd party mill certificate will not always suffice. The mechanical properties of steel reinforcement change when a bar is bent or straightened from a feed coil, and when bars are welded together to make a sheet of mesh. These products are only covered by a Processor Certificate. Quality starts at the design stage. The above two methods are easy ways to ensure the reinforcement conforms to Australian Standards.
Please feel free to contact me at eric.lume@sria.com.au or 02 9144 2602 with any steel reinforcement related enquiry.
The SRIA is a not-for-profit industry association that supports reinforcing steel quality and capability in Australia's building and construction industry. We are the hub of knowledge for Engineers, Designers, Builders, Suppliers and Students interested in understanding the benefits and applications of reinforcing steel.

Engineering competency for the future

Biju Balakrishnan MIEAust CPEng NER
Engineering Manager, Intrax Consulting Engineers

Competency in any profession is a response to the present and future demands of the industry it is serving. Civil Engineering is no different. The question is how do you define the competency of a profession when you have uncertainties and challenges around you? This article looks at this from an engineer's perspective, leveraging author's experience in various engineering organisations including start-ups, government and private consultancies over a period of more than two decades.

Competency of any engineering organisation is a collective know how of engineers worked over a period and varies. Therefore, developing proficiency of each engineer is important to any engineering organisation. The best method to approach this problem is by looking at the fundamental "*knowledge systems*" each engineer should be relying on to develop their competencies. If an individual has a clear understanding of the relevant *knowledge systems* and a good grasp of each, then developing engineering expertise is natural and spontaneous.

What are the important "*Knowledge Systems*" for Civil/Structural engineers? What are the areas where they need to be current and thorough with? How these knowledge systems help them to develop appropriate and relevant competencies to serve their customers well? As it is evident, this is a broader topic and might be relevant to all engineering disciplines, but I must warn you, this article is written from a Civil/Structural perspective and therefore must be read with caution when applying to other disciplines. The *knowledge systems* are presented below in the order of priority.

Environment

I am writing this when an unprecedented global pandemic is changing the world we live in, permanently. Every engineer should understand the environment we are living in, impacts on our prosperity, whether it is global warming, pandemic, climate change or man-made environmental catastrophes. The notion that only government or powerful organisations have the responsibility is outdated and every engineer can make a difference if they develop knowledge about the environment they live in. Unlike other engineering professions, every line drawn by a Civil/Structural engineer on a piece of paper alters our planet, in most cases irreversibly. Therefore, the understanding of how our actions affect the environment is important, and with such knowledge we can always develop competencies to mitigate or even avoid undesirable impact.

Scientific Knowledge

In our long history of existence, the engineering systems we see today are relatively new. The electrons were invented in 1914, computers in 1936, smart phones in 1995 and gravitational waves in 2015.We can confidently infer that we are still living in an era of basic inventions. Engineering is an "*innovation*" based on scientific "*inventions*" of generations. *Inventions* happen in laboratories whereas *innovation* happens in engineer's mind.

The recent advancement in Quantum physics will produce materials which we have not seen before and might act differently to the conventional materials. The scientific knowledge about climate change might influence selection of construction material, how it is manufactured and finally its use and disposal. Cloud based computing power might increase many folds by quantum computers and would give engineers ability to model and analyse real scenarios with ninety nine percent accuracy. With more computing power, Mathematics get the much needed shot in the arm for solving complicated equations.

Understanding science and developing knowledge systems around it, is important for any engineering discipline. Civil/Structural engineers should be conversant with the development of scientific theories and should apply such knowledge into practice through smart innovations.

Technology and Application

The progress of humanity for the last few hundred years is because we could convert *inventions* into *innovations*, thanks to industrial revolution in nineteenth century. When we invented protons in the early twentieth century, no one would have imagined that we would be using it for cancer treatment. Engineers make *innovations* by developing appropriate technology and apply to solve everyday problems.

Civil/Structural engineers must use modern technology to provide smart solutions to the society. Using drones for survey or adopting virtual reality for designing structures to using cloud computing to analyse complicated structures, opportunities are unlimited. Advanced FEM modelling which incorporates accurate material properties almost simulate actual reality and provide a powerful tool to engineers. 3D printing is disrupting many industries and civil engineers are also benefiting from this advancement. If we ever colonise any other planet soon, 3D printing is the most appropriate method for construction.

Developing a knowledge system around technology and application is important for Civil/structural engineers to create smart solutions for com-

Loads and Failure modes

The best definition of an engineer is “the one who visualises failures”. The challenge of any engineer is to anticipate critical loads which will make the failures. Loads are futuristic and failures are realistic. As we understand more and more about the natural world, we are identifying more and more loading types, intensity and duration which will accelerate the failures.

A better understanding of loads is critical for any Civil/Structural engineer. Environmental loading (wind, earthquake, climate) are the most difficult ones to predict and with accelerated climate change, engineers will be challenged to design structures which are future proof. Sea level changes, repeated floods and droughts will put pressure on all kinds of natural and man made structures and Civil/Structural engineers have their job cut for them, to provide robust solutions.

Understanding failure is a difficult area, as we do not get much chance to study failures in real life. Advancement in numerical modelling has created a cost effective method to run multiple loading scenarios in a complex structure. This added with the power of cloud computing, is a game changer to understand and predict failure modes. Civil/Structural engineers should develop knowledge about numerical modelling and its effective use.

Economy and Commercial aspects

Civil construction is the main economic driver for most of the developed and developing economies. Understanding the micro and macro economic impacts of engineering is critical to the development of competencies to design critical infrastructure. Choice between two structural systems might look easy from an engineering perspective but would be different from an economical view point. For example, for developing countries creating unskilled labour is also important along with skilled labour. A labour-intensive development would make economic sense in such scenarios.

Another aspect is to understand the business model of any project an engineer is working on. Understanding how the financial aspects are monitored, measured, analysed, and corrected will define the success of any project. Understanding the numbers game for a project from planning, budgeting to profit-loss statements are not finance department's realm anymore. Every engineer should understand how their actions are translated into financial outcomes so that they are aware of the impact they can have by taking appropriate decisions at the right time. Now with modern computers, there is clear, live financial information about projects available on your desktop. Developing knowledge systems around economical and financial outcomes are very important for Civil/Structural engineers.

Conclusion

Civil/Structural engineers have a important role to play by developing proficiency around the above mentioned knowledge systems. It is the role of an individual to understand the expertise of their area of practice and develop and maintain appropriate knowledge base and create capabilities to provide smart solutions to the society. Without an elaborate and up to date knowledge system underpinning competencies, it is difficult to respond to difficult engineering challenges of the future.

2020 TECHNICAL MEETINGS/SEMINARS

Date	Topic	Speaker	Action	Dinner Venue	Meeting Venue
January, 2020	No meeting				
19 Feb, 2020	Page Steel		R.B	Site Visit	Dandenong
18 Mar, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
15 Apr, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
20 May, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
17 Jun, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
15 July , 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
19 Aug, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
16 Sep, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
21 Oct, 2020		Cancelled		Box hill Golf Club	Box hill Golf Club
18 Nov, 2020	Anchors		J.N	Webinar	
December, 2020	No meeting				

Paul Uno, Director (ETIA)

Engineering Training Institute of Australia (ETIA) CPD Seminars

www. etia.net.au

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LIVE STREAMED COURSE LIST

- Tue 27 + Wed 28 Oct 2020 — Pile Foundations Design Geotechnical Workshop
- Thu 29 October 2020 — Wind Design Workshop: Low & Medium Rise Structures
- Wed 4 November 2020 — Wind Design Workshop: Dynamic & High Rise Structures
- Thu 5 November 2020 — Concrete Pools & Tanks Design Workshop
- Tue 10 November 2020 — Metallurgy Materials Workshop
- Thu 12 November 2020 — Shallow Foundations Design Workshop
- Tue 17 November 2020 — Retaining Walls Design Workshop
- Thu 19 November 2020 — Slope Stability Design Workshop
- Tue 24 November 2020 — Blast, Fire & Progressive Collapse Workshop
- Wed 25 + Thu 26 Nov 2020 — Glass & Aluminium Façade Design Workshop
- Tue 1 December 2020 — Value Engineering: Principles & Applications Course

Become an ACSEV member

The Association of Consulting Structural Engineers Victoria (ACSEV) is a professional association of structural engineers that provides technical and professional support to its members. ACSEV aims to facilitate better communication and goodwill between structural engineers, particularly those in small practices, and to advance the knowledge and professionalism of all members through technical training and regular contact with experienced engineers.

Our members specialise in structural engineering design related to the building industry on projects including commercial buildings, industrial developments, residential developments, domestic housing, institutional buildings, retail developments, bridges and various other structures.

Membership is offered at various levels to students, new graduates and industry associates, with full membership status available to qualified and experienced structural engineers eligible for either Building Practitioner (Vic) registration (EC - Engineer Civil) or membership of Engineers Australia.

Membership form can be downloaded

WEB LINKS

Timber advisory	www.timber.org.au
Concrete institute of Australia	www.concreteinstitute.com.au
Cement Australia	www.cemaust.com.au
Concrete Masonry Association of Australia	ww.cmaa.com.au
Cement Concrete and Aggregates Australia	www.concrete.net.au
Australian Steel Institute	www.steel.org.au
Victorian Building Authority	www.vba.vic.gov.au
Australian Stainless Steel Development Association	www.assda.asn.au
Forest & Wood Products Australia	www.fwpa.com.au
The Australian Timber Database	www.timber.net.au
Wood Naturally Better	www.naturallybetter.com.au
Galvanizers Association of Australia	www.gaa.com.au
Australian Building Codes Board	www.abcb.gov.au
Australian Glass & Glazing Association	www.agga.org.au
Foundations and Footing Society of Australia	www.footingsaustralia.org.au
Engineers Australia	www.engineersaustralia.org.au

YOUR CONTACT DETAILS CHANGED???

Please let us know

Please contact

Membership Officer:

Francis Hsieh

0412 913 515

firsttalone@optusnet.com.au

SUBMISSIONS WANTED

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Engineers Fees

A sample of ACSEV members were surveyed in 2017 with regards to fee scales. The results printed do not include GST.GST must be added to the above rates. In addition, vehicle costs should be charged at the RACV scale. Members are not bound by this schedule. The range given is middle and some consultants may charge more or less dependant up on project difficulty or skill level required and size of project.

EXPERT WITNESS	$300-$400
DIRECTOR/PARTNER	$250-$350
SENIOR ENGINEER	$200-$250
ENGINEER:	$130-$200
SENIOR DRAFTSPERSON:	$130-$170
DRAFT PERSON:	$100-$130
OFFICE ADMIN	$90 -$110

AS/NZS 5131 & AS 4100

2020 UPDATE: SUMMARY OF CHANGES AND IMPLICATIONS

AUSTRALIAN STEEL INSTITUTE

OVERVIEW

On 14th August 2020, Standards Australia published an amendment to AS/NZS 5131:2016 *Structural steelwork – Fabrication and erection*. Following this, on 21st August 2020, Standards Australia published a revision to AS 4100 *Steel structures*.

AS 4100 and AS/NZS 5131 work together to ensure risk-minimised, fit-for-purpose design and construction outcomes for steel structures. They are therefore significant for all members of the steel supply chain, including steel manufacturers, distributors, steel detailers, fabricators, erectors, designers, constructors and certifiers. **All members of the steel supply chain should be aware of the 2020 changes to these Standards,** the implications for their business and business relationships, and their duty of care under both Workplace Health and Safety (WHS) and National Construction Code (NCC) regulations.

Mental Health Awareness

Jenny Norrish

The workplace has certainly taken on a different persona in 2020.
October is *Health and Safety month*, and I believe that now is as good a time as any for us to review the past few months, understand the benefits and challenges of working from home, learn how to use this information to prosper in the workplace and look to the future with positivity.
Worksafe Victoria has a series of 45 minute long webinars that might be of interest. There is no cost to attend any of their events.
Topics include:
Surviving Covid-19.
Lessons learnt from leaders during Covid-19
Working from home? What employers need to consider.
Leading the way: Industries innovating workplace mental health prevention.
The importance of leadership in workplace mental health during Covid-19 and beyond.

The Brown Report

Yes, we are now moving into the phase of crafting the "*regulations*" which will implement the "*legislation*" that has already been passed in state parliament with regards to engineers bill. As we noted in our submissions to the parliament when it was being debated, the devil was going to be in the detail, and so may be the good news. As you all know, particularly our regional members, the legislation went through with some rather horrendous concepts that we felt were both unprepared, impractical and achieved little other than more paperwork. ACSEV President, Karl Apted, is one of the advising members representing ACSEV including other stakeholders in drafting the regulations. Noting that I believe the Minister handling the "*regulations*" is a little different to the Minister who was handling the "*legislation*", thus there are some differences, particularly if you have been on the website and attempted to answer the questions put forwards for those wishing to make a submission. Like all good engineers, I left it a little too late to go onto the web and have a look at the questions they wanted answered and to do them in far more detail than I think they deserved. I did put some dot points in, but I did not put in the specifics which I've included below as the points that I raised and felt still require a whole raft of quantification. My basic background comes from both soils and structure, and the basic document that I believe is fundamentally flawed is the Australian Standard 2870. The problem with holding that view is that the code is in the NCC current edition and past editions and is thus legally referenced document. It is also noted as a deemed to comply document.

Proposed in the legislation is to call up prescriptive standards and the one listed now is Australian Standard 1684. They also noted that other examples are to be included. From that I believe that the regulations or at least an appendix to them, will contain a list of documents that can be used by people who do not have to be registered. Yes, you read that right. Part of the regulations is going to define engineers who must be registered i.e. those who are supervising, signing off documentation and responsible for training etc. On that score those practitioners will need to be registered and should have a breadth of experience and ample qualification to fulfil that role, particularly where the public is concerned. I believe that this is an excellent step in the regulations.

Equally, the regulations allow practitioners not to be registered but to perform certain functions provided they are doing so under supervision. As a consequence Australian Standard 1684 makes good sense in that it does give you the size of timbers to be utilised, the grades of timber that you can use and it also facilitates the use of trade literature that in turn complies with it. Thus, carpenters clearly not qualified engineers use it often in construction and we are asked to go on site and approve it in some cases. I'm sure there are many more examples such as purlin charts put out by a manufacturers, amazingly the old Lysaght's referee if you're designing roof gutters for houses etc, thus I think the concept is excellent.

The problem comes as to what you should put in where structural engineers are concerned, and that raises the question of Australian Standard 2870 which currently is listed as a reference document in the NCC current edition and all past editions, thus it is a legal reference. The problem is, does it form and create itself as a deemed to comply document with a prescriptive attitude within it. The answer becomes complex, do you have to be a registered practitioner to be able to work out whether abnormal moisture conditions exist before you say the standard does or does not become relevant? Do you do have to be able to determine whether you're mixing foundations i.e. pads isolated to pick up verandas and raft slabs picking up the body of the building, does this constitute non-compliance and thus require a structural engineer to analyse? What level of input is required in a soil report so that the soils engineer who we believe is most likely to be registered, can walk away and say I've done my job and then the structural engineer who reads that soil report can do theirs without further quantification? Or if further quantification is required does the original soil testing practitioner have adequate qualifications to answer same?

This I believe will be one of the hardest codes for the regulatory body to determine, basically because we are sitting upon it the greatest wealth investment in this country being our houses. Equally, we have one of the biggest workforces of a defined and well boxed in nature known as the housing/construction industry and those that spring from it. Would we need subdivisions if we were not building houses? Would we need roads and rails to connect up to our subdivisions and our houses if we didn't have houses? Of course, it's a chicken and egg question and you can work it out whether you build a rail and therefore the houses occur or did the houses happen and they put a train station near?

If one is to read a Australian Standard 2870 now, it is in fact entirely possible to ascertain what a classification is by looking at construction in and around i.e. you don't even need to be anything, you can be the builder/carpenter and make that assessment.

That raises the question is a building surveyor and/or a structural engineer allowed to rely upon such an assessment and/or more importantly, should they?

Another area of major concern with Australian Standard 2870, and it's rather large impact upon the wealth of this country, is that various investigations and significantly better computer analysis have been done over the last 5 or 10 years indicating that there is some very strong question marks where Australian Standard 2870 is concerned and more importantly highly reactive sites are concerned.

As rebuilding within our inner suburban areas of all major cities is occurring, the sites have to be called a P because we are pulling down and building on which means we must have abnormal moisture conditions relative to what was there to start with and what is going to be there after the new construction is finished.

The gap in knowledge and technical literature on what should or should not occur on such sites, leaving it up to engineers to make the decision, thus the devil is always in the detail, and if this devil can be then encapsulated and further investigation work done and quantification, I would hope that Australian Standard 2870 can be utilised but I believe it will need to be corralled.

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