CROSS Australasia in association with Structural-Safety UK

The Institution of Structural Engineers

CROSS-AUS

Confidential Reporting on Structural Safety - Australasia

Newsletter 3 | February 2020

Editorial

Welcome to our 3rd Newsletter and an especial welcome to our growing list of subscribers.

The NSW Government's proposed **Design and Building Practitioners Bill 2019>** in response to the **Shergold Weir Building Confidence Report>** is currently with the **Legislative Assembly>**. To quote the NSW Minister for Better Regulation and Innovation, Kevin Anderson: *It is the Government's intention to create a robust registration scheme that delivers on the Shergold/ Weir recommendations and applies to all types of practitioners who perform the function of preparing plans and making compliance declarations, including engineers.*

While the current focus and much of the **discussion within EA is around registration>**, that is just a starting point and will not by itself ensure that the required standards of design and construction are being met. Being registered demonstrates that a certain level of competence and experience has been achieved. Mistakes will still be made and thus we must have rigorous processes of design and construction whereby each stage is independently checked and reviewed by competent engineers.

The reports in this Newsletter cover a range of issues and you may have had similar experience with some of these such as cold-formed steel trusses (AUS-4), glazing systems (AUS-5) and carrying out modifications in old buildings (AUS-10). Problems related to maintenance of structures (or lack thereof) have been with us for a long time and AUS-12 poses the question – should a Maintenance Manual be included with the as-built documents for all structures?

DIRECTOR:
Mike Fordyce

Issues around temporary works continue to give rise for concern; this time related to the erection of prefabricated concrete (AUS-11). A recent **ENZ news item>** about a scaffold collapse in NZ should be read by all engineers involved with construction. It is very much about sharing lessons learned and concludes with the words: *No one wants an accident on their watch, and it's too late to do anything when it has happened.* This has led to the formation of a **Temporary Works Forum in NZ>**; there has been a very active **Temporary Works Forum (TWf)>** in the UK for several years; there is one in **HK>**; and one is being established in Australia.

An even more serious collapse was that of the Pedestrian Bridge in Miami, Florida in 2018. The US National Transportation Safety Board has just released its **final report>** which makes for sobering reading. CROSS will be making further comment on this in due course.

CONTENTS

HOW TO REPORT

For more information, please visit the How to Report> page.

If you have experienced a safety issue that you can share with CROSS-AUS, please Submit a CROSS-AUS Report>.

If you want to submit a report by post, please send an email to administrator@cross-aus.org.au> asking for instructions.

KEY

- (R) CROSS-AUS Report
- (C) CROSS-AUS Panel Comments
- (N) News
- (I) Information
- › Denotes a hyperlink

CROSS-AUS

VISIT: **www.cross-aus.org.au >** EMAIL: **administrator@cross-aus.org.au >**

AUS-12: Maintenance of multi-storey buildings

(R) REPORT

A correspondent notes that the issues, including structural faults, currently affecting several high-rise buildings in Australia are inevitably focused on design, construction, and certification; whereas there are other issues relating to ongoing inspection, maintenance, and (ultimately) demolition which seem to have been ignored. They question if owners of major buildings with no knowledge or understanding of structures, design life and material deterioration know how to look after their assets. Would they think to turn to a "professional person" to provide them with advice, and if so, who would they go to and what would it cost? Reacting to serious incidents when they occur appears to be the common approach, but this may incur very high expense to building owners.

Most buildings will have a Maintenance Manual for the building services (e.g. air conditioning and lifts), but the correspondent doubts that many will have one for the structure, identifying key parts of the structure that should be inspected/ maintained on a regular basis, rather than waiting for a problem to occur and then fixing it. As key parts of the structure may be very difficult, if not impossible, to access, then systems should be designed and put in place to allow access. The correspondent also questions what happens when the building owner changes, in terms of hand-over of a Maintenance Manual?

The correspondent further notes that most occupants of commercial and public buildings will probably walk through the building lobby where a fire-safety certificate is publicly displayed; although it may be placed where it is hard to read and probably is not noticed by many of the occupants. Despite this, the correspondent believes it is time to introduce legislation for all major buildings to display a certificate in a public place that clearly states the building has been inspected and found to be compliant with the design codes for its current occupancy and usage.

(C) COMMENTS

There are many examples of **structural failures arising from lack of maintenance>** and although the provision of a maintenance manual would be expected for many types of civil structures such as bridges and dams, they are rarely, if ever, provided for buildings; and there appears to be no requirement in any state or territory legislation, apart from the general obligations on persons who construct and design structures to provide information under the work health and safety legislation. In the UK, the CDM (Construction Design and Management) Regulations require final drawings and other material to be handed over to the owner after completion. Unfortunately this may not always be done, or the records may not be complete, but the intention is to have relevant information available for access in the event of later problems.

We accept that our motorcars and our own houses require regular maintenance, yet it appears that many owners of major buildings, such as multi-storey apartments, assume their structure to require no maintenance and that materials not exposed to view have an infinite life. Areas of the building exposed to the weather, such as the exterior façade, are particularly vulnerable but may never be inspected until the owner is alerted to a significant issue.
At the very least, the external façade of buildings should be inspected on a regular basis (say every 5 years) by suitably qualified personnel and preventative maintenance carried out before major problems arise. A difficulty is that some critical components, such as façade fixings to the main frame, are usually hidden and not easily inspected without significant effort.

The digital age has brought the promise of BIM, however general feedback is that this rarely gets used post construction, thus creating a missed opportunity. Furthermore, as buildings become ever more complex, there is no legislative or other formal requirement, other than good housekeeping by a client, to keeping records of what was actually constructed. Is this good enough? Should there be a formal record of what has been constructed? In the UK, the Hackitt report **Building a Safer Future>** recommends that a digital record should be maintained for all High Rise Residential Buildings and ultimately held by the owner.

Our attention has been drawn to **ISO 15928.3 Houses –Description of Performance- Part 3: Structural Durability>** that is part of a set of ISO framework standards for single family dwellings, and is focussed on structural durability, including a section on maintenance. Although the intended use is for developing performance standards for housing much of the content of

(I) INFORMATION

What should be reported to CROSS-AUS?

Structural failures and collapses, or safety concerns about the design, construction or use of structures.

Near misses, or observations relating to failures or collapses (which have not been uncovered through formal investigation) are also welcomed.

Reports do not have to be about current activities so long as they are relevant.

Small scale events are important - they can be the precursors to more major failures.

No concern is too small to be reported and conversely nothing is too large.

Your report might relate to a specific experience or it could be based on a series of experiences indicating a trend which may require industry or regulatory action.

Benefits of CROSS-AUS

- Share lessons learned to prevent future failures
- Spurs the development of safety improvements
- Unique source of information
- Improved quality of design and constructon
- Possible reduction in injuries and fatalities
- Lower costs to the industry

Subscribe to CROSS-AUS

If you are reading this and you are already a subscriber, please pass it on to your colleagues and encourage them to sign up via the **Email Updates>** box on our website. Or if you wish to do a bulk email upload for your organisation, please contact us at **administrator@cross-aus.org.au>**. It is by sharing experiences and learning from others that we can all make a contribution to improving structural safety and standards of construction

this standard is applicable to larger buildings and it could provide a starting point for the development of standardised guidelines for the structural durability performance and maintenance of all buildings.

We invite your response to the following questions via the **Feedback>** page on our website:

- Should a maintenance manual to cover structural issues be provided at handover as a matter of course along with the manuals for building services and the like?
- Should as-built documents be collated by a regulatory body, i.e. council or state based?

SUBMIT REPORT>

SUBMIT FEEDBACK>

AUS-4: Light steel truss issues

(R) REPORT

A reporter believes that we need to raise awareness of some deficiencies in the light steel truss industry (trusses made from cold-formed steel sections). The reporter's experience is that the deficiencies are representative of some fabricators but not all of them.

Figure 1 shows a connection where the members have been cropped well beyond the connection point. Figure 2 shows another example of the fabrication of trusses resulting in an eccentric load pattern. According to the reporter, there are limitations with some software packages that are commonly used to design light steel trusses in that they do not allow for non-concentric loading of members as shown in Figure 2.

Another example of non-concentric loading noted by the reporter is when the top chord of a truss is stiffened by the fabricator doubling up, or boxing, the member with an additional member fastened alongside the top chord. While the software output may give the number of fasteners required, it does not indicate a connection technique/arrangement.

According to the reporter, **AS4600>** (Cold-formed steel structures) does not provide any guidance on eccentric truss load paths and the only option for industry is to design to the **North American Standard for Cold-Formed Steel Structural Framing, AISI S240-2015>**. However, in this instance, the reporter notes that eccentricity appears to have been ignored in the design and that there is a disconnect between the software, the fabricator and the certifying engineer. The reporter suggests that a simple solution could be to make certifying engineers more aware of the limitations of some of the software packages being used. The reporter has seen many certifying engineers rely solely on the fabricator to input support locations correctly into the software and has seen this performed poorly by the fabricator.

The reporter believes it is unlikely that there are many issues in the domestic market where truss design is simpler with smaller spans. However, the reporter is aware that light steel trusses are being increasingly used in the commercial/refurbishment market and would recommend that all engineers thoroughly review light steel truss designs for any structure, paying close attention to any areas requiring transfers, boxed members or additional connections.

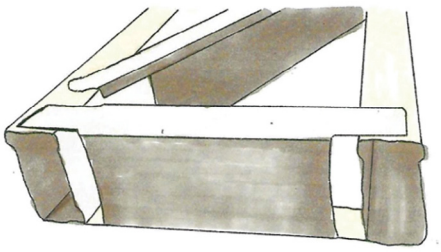

Figure 1
Cropped Members

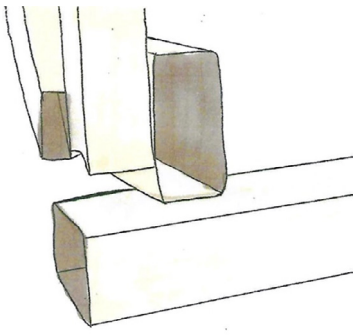

Figure 2
Eccentric connection

(I) INFORMATION

We welcome your Feedback

We encourage you to give us **feedback>** on any of these matters or to **submit a report>** on any safety issues or matters of concern that you may have.

Responsibility for Building Quality

A recent article in Architecture & Design - **The declining quality of our buildings>** - notes that the Shergold Weir report, by focussing on certification, compliance and enforcement misses the point that it is the builder who should be responsible for the construction and it is the developer, controlling the builder, who is ultimately responsible for the building.

National Construction Code Seminars

In March and April 2020 the ABCB will be presenting the **2020 NCC Seminars>** in all capital cities. The seminars will focus on answering common technical enquiries concerning the application of the National Construction Code (NCC) Volumes One and Two, and information relating to the changes contained in NCC 2019 Amendment 1.

Updated standards

Comments have closed on **DR2 AS/NZS 2785:2019>** - Suspended ceilings - Design and installation. The proposed revisions introduce a 'seismic grade' for the design of suspended ceilings. As new updates and amendments to standards are published engineers and designers should remain up to date.

(N) NEWS

Disaster Resilience

As we continue to witness extreme weather events, attention is drawn to the **2018-19 Major Incidents Report>** published by the Australian Institute for Disaster Resilience that provides an authoritative overview of major incidents in Australia from July 2018 through to June 2019 as identified by emergency services.

C COMMENTS

According to the **Australian Steel Institute (ASI)>** the use of cold-formed light gauge steel is a growth area in Australia.
Our country arguably leads the world in the development and manufacturing of leading-edge, cost-effective, high-performance roofing and walling systems.

The ASI further notes that there is increasing use of cold-formed light gauge steel in **mid-rise construction>** and gives examples of some recent developments of mid-rise (up to 7–8 storeys) commercial and residential buildings with cold-formed light gauge steel used for the majority of the primary structural framing.

However most of the technical information available in Australia relates to low-rise residential construction from organisations such as the **National Association of Steel-Framed Housing (NASH)>**.

The reporter highlights several issues that can arise with this form of construction and one could add fastener edge distances for tension members and potential buckling at the cropped ends of compression members. And as eccentric connections are common with these types of trusses it is surprising that the available software does not take this into account.

This would appear to be another example of the effects of scale as highlighted in **SCOSS Alert>** of November 2018, where we take a system that is well established at one level (in this case low-rise residential), and extend it to another level that requires a more fundamental re-appraisal of the application in terms of the design, fabrication and construction.

A further matter raised by the reporter is that the software being used may not give the complete picture. Concerns with software generally have previously been expressed to CROSS and engineers must always be aware that it is they, and not the software, who are responsible for any subsequent problems. Software cannot replace engineering judgement and working from first principles. 2019.

SUBMIT REPORT>

SUBMIT FEEDBACK>

AUS-5: Sliding glass door - two-part subhead failure

R REPORT

A correspondent received a report regarding the failure of a glazed sliding door system. Upon inspection it was noted that the system is comprised of a two-part subhead, which includes a removable bead. They note that this type of system is gaining popularity in Australia for its ease of installation. The removable bead relies on mere millimetres of bearing in the hook-type arrangement seen in Figure 3a.

In the report the correspondent received, the contractor had riveted the removable bead to the glazing suite (Figure 3b). This then only required a small amount of building movement to dislodge the bead from the subhead, resulting in the glazing suite pushing into the building. The correspondent believes there is an apparent lack of understanding of allowances for building movement within some areas of the glazing industry.

Similarly, the correspondent considers there is a gap in the industry where the fixings of the glazing suites to the structure are often not engineered or certified. The glazing suite itself may be certified to the glazing code, but the fixings/attachment between the glazing and the rest of the building are often overlooked – particularly on small to medium sized projects. Thus certifiers should ensure that the glazing designer's certificate states that the fixing methods of the glazing suites to the supporting structure have been designed to withstand design loads.

The correspondent recommends that engineers should examine these two-part subhead systems and be convinced of their suitability. They suggest that a fixing between the two parts of the subhead be made after installation, to prevent dislodgement of the bead during its lifespan (Figure 3b).

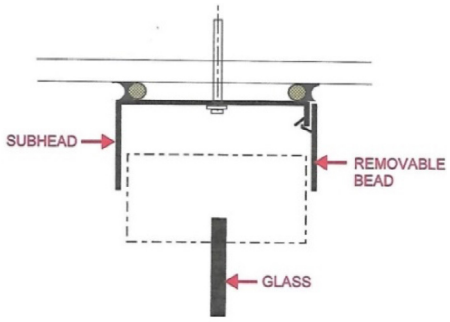

Figure 3a
General Arrangement

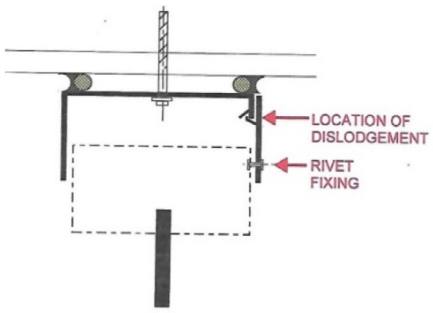

Figure 3b
As installed

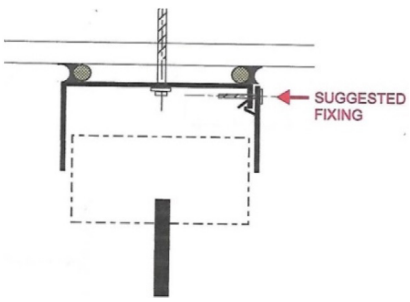

Figure 3c
Suggested fixing

C COMMENTS

As the correspondent has stated, there is a lack of understanding of building movement by many building practitioners, including engineers, architects, builders, and sub-trades such as the example given here. All structures deflect under load; concrete structures will continue to deflect over the long term; tall buildings will have significant shortening; and buildings move with changes in the environment (heating and cooling; wetting and drying).

Our attention has been drawn to another movement related incident, in this case in **high-rise buildings>** where the movement of the building under wind has been transmitted to the steel-framed internal partitions resulting in very high noise levels in the apartments up to 70 Db.

Therefore, it is important that the design of glazing, curtain walls, internal partitions and similar attachments, makes allowance for the expected movements, both short and long term. To ensure this happens, the structural engineer should provide a building design and movement report for all buildings where significant movement is expected. Tolerances in construction must also be considered where small margins can affect safety-critical components.

The **Centre for Window & Cladding Technology (CWCT)>** in the UK is a leading information provider and trainer in the field of building envelopes and glazing. Although there is no direct equivalent in Australia, the **Australian Glass and Window Association (AGWA)>** does provide some industry guides.

SUBMIT REPORT>

SUBMIT FEEDBACK>

AUS-10: Near-miss when modifying brickwork

R REPORT

A reporter's client had wanted to create a new door opening in an existing brick wall. The brick wall was on the first floor in an old building (>80 years old) and was supported on a suspended concrete beam (refer Fig.4). The proposed new opening was located over an internal concrete column. An angle lintel was installed at the head of the proposed opening by partial grout removal and the opening was formed.

As the bricks were being removed, sudden cracking occurred in the beam and adjacent slab. The reporter's opinion is that over time, the concrete beam had experienced creep and was no longer supporting the brickwork; the brick wall was 4m high and was spanning between the columns as a deep beam. Cutting a hole in the brick wall above the concrete column removed the support for the wall at this point, resulting in a sudden load re-distribution back into the concrete beam. According to the reporter, the beam was originally designed to support the weight of the wall and the cracking in the beam appeared to be related to the sudden shear load transfer at the end supports.

The reporter considers this to be a near miss, as the shear capacity of the concrete beam was unknown, and a brittle failure could have resulted. The reporter's view is that the damage would have been avoided if the concrete beam had been propped prior to forming the opening as this would have allowed for a gradual transfer of load back on the beam. However, this had not been anticipated as the reporter thought it was a straightforward operation to install an angle lintel in a simple wall.

The reporter had a similar experience on another project when a suspended concrete beam cracked after there was a sudden re-distribution of load during modifications to brick walls above. They say it was harder to predict in this case due to the more complex nature of the structure above, but they have now learned to always prop the concrete structure when it is supporting masonry that is being modified.

N NEWS

Seismic Design of Non-Structural Elements

The **ABCB>** has drawn attention to the requirement to design certain non-structural building elements (including walls and partitions; ceilings and services) to resist earthquake forces in accordance with AS1170.4. This has been picked up by several industry bodies such as the **QBCC>** and **Master Builders Queensland>**.

N NEWS

Fire Safety Engineering

The **Warren Centre>** has recently released its 4th report in its series on Fire Safety Engineering: **The Role of Fire Safety Engineers – Interim Report>** and notes that this is an interim step in the overall Warren Centre task of developing "Roles and Competencies for Fire Safety Engineers". It further notes that as feedback is sought from the broad building design and construction community, some adjustments to the specifics of the future roles of FSEs may be required.

N NEWS

Shergold Weir Report Implementation

The Building Ministers' Forum (BMF)> at its **December 2019 meeting>** noted the progress made by the Australian Building Codes Board (ABCB) towards implementing the recommendations in the **Building Confidence Report>**. This includes amendments to the 2019 National Construction Code (NCC) dealing with performance solutions to strengthen their consistency and quality; development of a new CPD module to ensure building practitioners have a better understanding of the requirements within the NCC; development of a new nationally consistent definition of 'complex buildings' with a view to inclusion of the definition in the NCC.

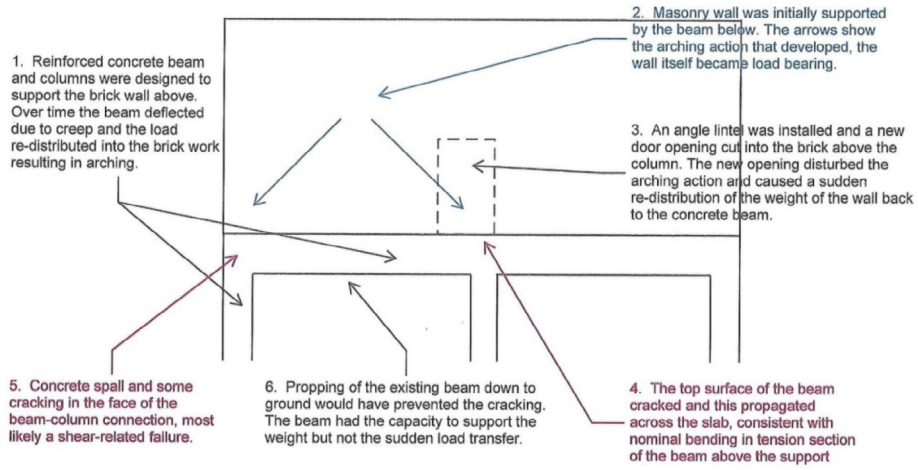

Figure 4
Elevation of brick wall and supporting structure

COMMENTS

This is an interesting and not uncommon problem when modifications are made to old buildings that may result in some unwanted surprises if a conservative approach is not adopted. In this example, the reporter has learned to always prop the structure first before carrying out modifications that might affect its behaviour. Although it is unlikely to change the final load on the member, the point of the propping is that it can be released slowly in a controlled manner so that any load redistribution can take place slowly and not suddenly, avoiding potential stress amplification due to impact.

However, propping alone may not alleviate the problem if the structure will be adversely affected by the modifications such as changing the applied load pattern. Thus, it is important to get an understanding of the structure in question before any work is carried out. With cases such as this, where a masonry wall is tending to arch over the supporting structure, the initial investigation could include the removal of the skirting (if present) at the base of the wall to check if there was a horizontal gap or crack at this location.

If the age of the structure is known and drawings are available giving reinforcement details, then it should be a relatively straightforward exercise to check the adequacy of the structure for any resulting adverse load following the modifications. If reinforcement details are unknown, and if the modifications are going to significantly increase the load on the member, then further investigation should be carried out to identify the reinforcement at critical sections.

In the case reported above, the reporter states that they were satisfied that the beam had been originally designed to carry the wall, but notes that the shear capacity was unknown. In an 80 year old building probably built before World War 2, shear design was not well understood and often bent up bars over the columns were used for shear reinforcement. When investigating and evaluating the performance of older structures reference should be made where possible to relevant text-books of the day such as: Salmon E.H., Materials and structures, Volume II, The theory and design of structures, Longmans, Green and Co, 1938.

SUBMIT REPORT>
SUBMIT FEEDBACK>

NEWS

Fatal Accidents in Queensland Mines & Quarries

A **recent report>** prepared by Dr Sean Brady has reviewed fatalities in Queensland mines and quarries for the past 2 decades with some sobering findings, including that *"Unless it makes significant changes to how it operates, the rate of fatalities is likely to continue at current levels" and "fatalities are typically a combination of banal, everyday, straightforward factors, such as a failure of controls, a lack of training, and/ or absent or inadequate supervision"*. CROSS-AUS expects that many of Dr Brady's findings would have relevance in the wider construction industry.

NEWS

International Building Quality Centre Launched in Canberra

The International Building Quality Centre> (IBQC) was **launched in November 2019>** at the University of Canberra with the stated objective: "To be a sounding board or point of reference for law reformers, policymakers and stakeholders intent on designing building regulation that provides the greatest opportunity for the realisation of codes and laws that maximise: public safety; cost-effective and efficient construction systems; and sustainability within the context of the built environment."

NEWS

Taiwan Bridge Collapse

The importance of maintenance of structures is highlighted by a recent **bridge collapse in Taiwan>** possibly due to corrosion of suspension cables.

AUS-13: Dislodged finger plate on highway bridge

(R) REPORT

A correspondent received a report about a 1.5m long section of a steel finger plate expansion joint on a highway bridge that had become dislodged. The dislodged finger plate was found to have been secured with only one of the two intended fixing bolts. According to the correspondent, the missing bolt was not fitted as it clashed with a drainage channel/gulley immediately below its intended position, and no alternative fixing was provided.

The finger plate was dislodged by a passing large vehicle travelling at speed, which suffered some damage. It is very fortunate that the plate did not strike another vehicle or anyone in the area. However, the damage was sufficient to disrupt traffic for an extended period while emergency repairs were carried out.

(C) COMMENTS

Bridge expansion joints are subject to very concentrated wheel loading, and fatigue failures of the joint components are common. For example, **Roads and Maritime Services (NSW) Bridge Technical Direction BTD2008/10>** provides valuable guidance on the selection, design, installation, assessment, maintenance and rehabilitation of bridge expansion joints. To quote from this document: "bridge deck joints can be very costly if not properly designed, installed and maintained. The replacement and rehabilitation of joints invariably involves costly traffic management and personnel working under hazardous conditions, often at night. The better the joint, the more money saved over the life of the bridge and less disruption to traffic."

Although the age of the bridge is not specified, the incorrect fixings should have been identified either in commissioning or at ongoing condition inspections. It is vital that all bridge inspectors are adequately trained to identify such problems, and that this training and performance is subject to periodic review.

This serves as an example of a poorly designed and executed detail where only 50% of fixings were installed. Coordination of proprietary and post-fixed products with base structures always requires specific attention during both design and construction.

This was a near miss that could have had serious consequences considering the size of the component and the speed with which it must have been ejected.

SUBMIT REPORT>

SUBMIT FEEDBACK>

AUS-11: Design and erection of prefabricated (precast) concrete

(R) REPORT

A correspondent considers that many structural engineers do not consider the erection methodology when designing prefabricated concrete structures. Their view is that many structural engineers, known as the *In-service designer* in **AS 3850 (Prefabricated Concrete Elements)>**, use sophisticated software to design the structures but do not always consider how the prefabricated concrete elements are detailed, specified, manufactured and erected; how these integrate with the final structure; and how to document those processes correctly. The Safety in Design requirements for prefabricated concrete are sometimes ignored or poorly understood. The correspondent believes that erection procedures must be specified by an experienced structural engineer who understands both design and construction.

The correspondent also considers that many contractors do not fully understand their statutory requirements regarding the erection of prefabricated concrete elements and may not be prepared to pay for the cost of the temporary works design. The erection of prefabricated concrete elements is a temporary works design in the same way as formwork or deep excavations and requires the same level of input. The correspondent makes reference to the Professional Guidance Note on Temporary Works by John Carpenter[1] where he states: *Temporary works are a vital element of most projects. They demand careful attention by all duty-holders if economic loss and accidents are to be avoided.*

Prefabricated concrete elements can weigh between 1-40 tonnes, and if not properly restrained in the temporary condition, significant failures and possible loss of life can occur. It is the correspondent's experience that contractors will commonly split the prefabricated concrete works into a supply package and an erection package, with the award of each package commonly assigned to different organisations. Who then takes responsibility for the erection procedures?

There have been some recent failures resulting in the loss of life associated with the erection of prefabricated concrete in Australia, and it is the correspondent's opinion that these incidents could have been avoided if the correct erection procedures had been documented and carried out appropriately on site. They also believe that the various health and safety regulators in the States and Territories of Australia should demand to see the erection procedures, temporary works design and documentation for prefabricated concrete from an *Erection Designer* before any erection occurs on site.

The correspondent quotes the Director of Structural-Safety in the UK, Alastair Soane, who said *"the reasons for failures can be generically attributed to the **three Ps - people, process or product**."* and *"ultimately most are related to people. Causes include one or more of the following: incompetence; negligence; oversight and carelessness; greed; disorganisation; poor communication; misuse; or neglect."* [2]

References

[1.] Carpenter, J., Temporary works and the structural engineer, Institution of Structural Engineers, The Structural Engineer, December 2012

[2.] Soane, A., Temporary Works Toolkit, Part 5: "Temporary Works Failure - What Are the Common Causes", Institution of Structural Engineers, The Structural Engineer, January 2017.

COMMENTS

The publication **"Construction and Erection of Bridge Beams" (Worksafe Victoria, 2004)>** followed a fatality that occurred in 2000 during the erection of a precast concrete bridge beam. This comprehensive document could serve as a template for the requirements for safe design, manufacture, transportation and erection of large precast elements. To quote from the document: "Prior to manufacture, the erector, in association with the design engineer and the principal contractor, should have planned the complete construction and erection sequences. The planning process should be documented as part of a Work Method Statement and take into account: ....." (the document then gives a comprehensive list that is relevant to all forms of prefabricated elements)

The installation of prefabricated concrete elements is broadly covered in **AS3850.2>**. (Prefabricated concrete elements – Building construction) and as noted in the scope:

"This Standard provides requirements for planning, construction, design, casting, transportation, erection and incorporation into the final structure of prefabricated concrete elements in building construction."

When several parties are involved, and especially with specialist sub-trades as in this case, the question of divided responsibilities is always a concern. Safe Work Australia's **Guide to managing risk in construction: Prefabricated Concrete>** (Sept. 2019) sets out the responsibilities of all parties and notes that: "Everyone involved in construction work that uses prefabricated concrete elements has health and safety duties when carrying out the work."

The Guide further notes that: "The in-service design engineer must think about the practical implications of their design, and how risks to health and safety can be eliminated or minimised during construction." And that: "A suitably competent person, such as an engineer with experience in such matters, should be engaged to develop a safe system of work for the erection of precast or tilt-up concrete or panels. This person is referred to as the erection design engineer."

The use of a suitably competent person should be specified in the contract documents and their details should be requested and verified to ensure that they have the relevant experience to understand how the building will perform in both the temporary and final condition. Reference should also be made to the relevant Codes of Practice and other guidance material that has been legislated under work health and safety (WHS) legislation in each state and territory, e.g. WHS Queensland's **Tilt-up and pre-cast construction>**.

The **National Precast Concrete Association Australia (NPCAA)>** has a wide range of resources covering all aspects of precast concrete such as this fact sheet on the **temporary bracing of precast elements>**.

The intent behind the obligations in the documents and guidance material referred to above is to ensure that there is an erection designer who is responsible for the overall installation planning, methodology and temporary stability of prefabricated concrete elements. In most cases this is not the permanent works designer. As contractors look to reduce costs and deliver projects in shorter timeframes than scheduled , these tasks are frequently fragmented and allocated to various parties. As a result, the temporary works engineer may be reduced to designing the bracing and propping.

SUBMIT REPORT>

SUBMIT FEEDBACK>

PARTICIPATION

The success of the CROSS-AUS scheme depends on receiving reports, and individuals and firms are encouraged to participate by sending reports on safety issues in confidence to **CROSS-AUS>**.

FEEDBACK

If you have any comments or questions regarding this CROSS-AUS Newsletter, please **Submit Feedback>**.

FOLLOW CROSS-AUS

@cross-aus

@cross_aus

EMAIL UPDATES

Sign-up> to our mailing list for email updates from CROSS-AUS, including the latest CROSS-AUS Newsletters.