NEWSLETTER – December 2015

A word from our Chairman

One of the primary objectives of the Station's formation was to improve the safety of those who experience cyclones and severe wind events, as well as minimising financial loss and suffering not to mention the consequential social costs. This was brought to the forefront during the year and culminated with the release of the Northern Australia Insurance Premiums Taskforce interim report.

Along with some of our major stakeholders and supporters the report called for mitigation work on buildings to minimise the level of post cyclone claims as the most important issue. The CTS has a major role to play in the retrofitting of pre 1981 homes in the North and indeed we have already completed a lot of excellent work in previous research.

There is of course the inevitable question on "who pays"? Several options have been proposed under the various models but if insurance is to be remain at an affordable level then the overall losses must be kept as low as possible.

It is absolutely critical that CTS remains the pre-eminent independent research and testing authority at the forefront of risk mitigation and building resilience. The CTS has already demonstrated this by our actions with the investigative work we do in response to cyclones by recognising our role in community safety and recovery. We can extend our impact by working with others to develop strategies to encourage risk mitigation, leading to safer more resilient communities. Further research and expansion of programs on wind driven rain water ingress and storm surge is essential if we are to achieve our objectives.

Finally, I express my sincere thanks to the Board and the staff for their continued support and contribution to our Strategic Plan 2015-2020 which was released this month. I believe the document is a realistic and achievable road map for the future directions of the CTS and I look forward to reaching our goals.

John Galloway,
Chairman, CTS Advisory Board

Webinar series

Following various damage surveys (especially the recent roof failures from Cyclone Marcia) and inspections of new housing in both cyclonic and non-cyclonic regions, the CTS with assistance of the Qld, Vic and WA state governments along with our Benefactor funding has commenced producing a series of webinars to promote better renovation and building practices for wind load resistance for homes. The surveys of housing under construction in Melbourne, Brisbane and Perth were a part of our CSIRO Flagship project "Climate Adaptation Engineering for Extreme Events".

https://cyclonetestingstation.com.au/community-education/community-education

Some of the webinars are for homeowners while others are for builders and designers. Current topics include;

-Upgrading your roof – for Homeowners

-Retrofitting a roof – for Builders

-Re-roofing after storm damage – for - Homeowners and Builders

-Wind classifications for houses – for Builders and Designers

-Examples of determining the wind classification – for Builders and Designers

-Wind classification and rating – for Homeowners

Cyclone Marcia

Tropical Cyclone Marcia crossed the Queensland coast at the sparsely populated Shoalwater Bay on 20 February 2015. At this time Tropical Cyclone Marcia was forecast as an extremely destructive category 5 system (estimated peak winds in excess of 250 km/h). The forecast track map is shown in Figure 1. As the system moved south over land, it lost intensity. On reaching Yeppoon, the maximum gust recorded by the Bureau of Meteorology at their 10 m high automatic weather station (AWS) was 156 km/h, suggesting a Category 2 system. The Bureau's AWS in Rockhampton recorded a maximum gust of 113 km/h, consistent with a Category 1 system. It should be noted that the measured wind speeds were considerably less than the design wind speed for importance level 2 buildings (e.g. houses) of approximately 250 km/h. However, the system caused significant damage to residential and commercial buildings in Yeppoon and Rockhampton. Flash flooding in and around Rockhampton, severely damaged several properties and infrastructure.

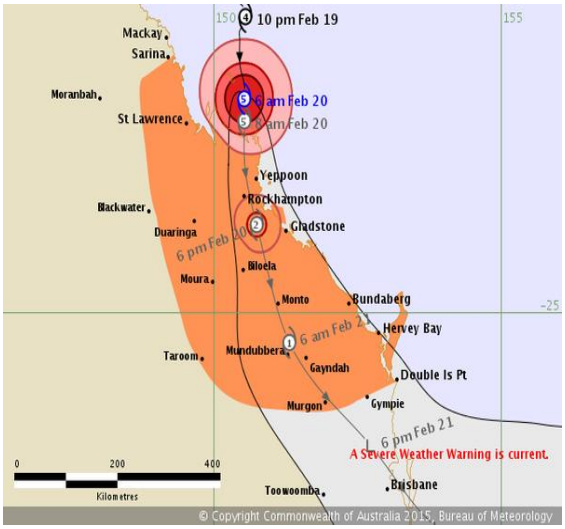


Figure 1 BOM Forecast track map for Cyclone Marcia

The CTS team of David Henderson and Daniel Smith were joined by Matt Mason (UQ) and Ryan Crompton (Risk Frontiers) to conduct the damage survey. Not surprisingly, the majority of structural damage from wind loads occurred in older (pre-1980) housing whose construction predated Appendix 4 of the Queensland Home Building Code (1981). Damage to these buildings generally related to roof failures where inadequate roof tie down were unable to withstand the wind loads. In many cases the house had previously been re-roofed with new cladding and roofing screws, but the connections from the battens to the rafters were still the original 75 mm nail(s). To avoid this mode of failure, when re-roofing houses of this age strapping of battens to rafters and rafters to top plates of external and interior walls is recommended. Details for upgrading of older housing can be found in the Standards Australia Handbook HB 132.2 and in Timber Queensland builder notes published by QBCC. Topographic speed up of winds was also a factor in the damage to housing. The re-roofing of older structures in exposed locations needs to incorporate the required tie down details for the site wind classification, as per AS4055.

More surprisingly was the amount of damage to elements of modern multi-storey residential and commercial low rise buildings in Yeppoon and Rockhampton. There were several observed cases of multi-storey buildings with wind damage to the upper storey roofs, fascia, soffits and flashings as well as their roof top mounted equipment (air-conditioning units, vents, HVAC, and antennas). These failures of the building envelope led to; exacerbated water ingress damage to multiple units. The failure of windward fascia resulted in ceiling collapses from the pressurized roof space. Of additional concern, these failures generated wind driven debris. This failure was all at wind speeds well below the design levels for the region. To learn more, have a look at our Engineers Australia magazine article on the observed issues of poor design detailing and construction practice from this event: https://cyclonetestingstation.com.au/publications/content/cyclone-marcia-article-in-engineers-australia

Damage from Cyclone Olwyn

Geoff Boughton and Debbie Falck on behalf of CTS conducted a damage survey of Exmouth in Western Australia, following Tropical Cyclone Olwyn. The measured wind speeds at Learmonth (32 km south of Exmouth) showed peak 3 second gusts of 180 km/h. The estimated peak gusts in Exmouth were around 185 km/h, which was less than 70% of the Region D ultimate limit state design wind speed for housing (allowing for the conversion of 3 second gusts to design wind speeds).

Geoff and Debbie noted that the houses that were repaired and retrofitted after TC Vance (1999) experienced little structural damage. This is expected, as the wind speeds in TC Olwyn were significantly lower than both the design wind speed and those recorded in TC Vance.

Although the wind speeds were around the level at which buildings should remain serviceable, there was significant damage to many houses and buildings from wind-driven rain entering through flashings, windows and doors. Water damaged plasterboard ceiling and wall linings, carpets, and timber floors as shown in Figures 1 and 2.

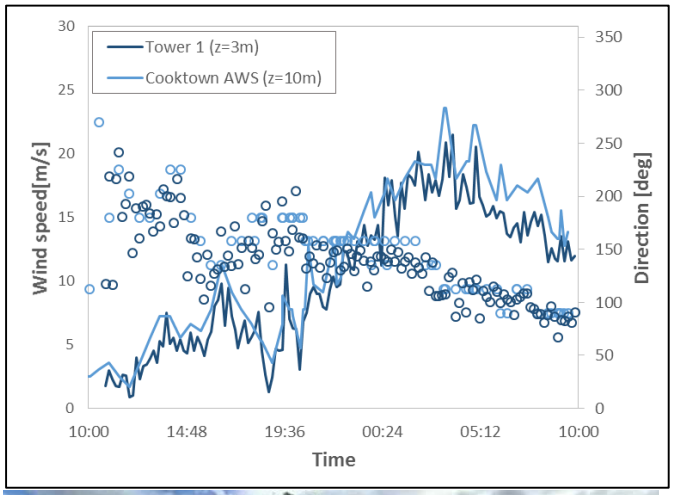
Report of the damage investigation along with recommendations published on CTS website…

https://cyclonetestingstation.com.au/publications/content/technical-reports/tech-report-61/view

Cyclone Nathan

Daniel Smith, Korah Parackal and David Henderson travelled to deploy SWIRLnet (Surface Weather Information Relay and Logging network) in Cooktown ahead of Cyclone Nathan. Cyclone Nathan made landfall as a Category 3 system (BOM) on March 20th 2015 north of Cape Flattery, well north of Cooktown. We deployed our six SWIRLnet towers in the Cooktown region. Each tower records data locally at 10 Hz and transmits 10 minute summary files via modem. Thankfully, Cyclone Nathan tracked to the north and Cooktown avoided the severe winds so we were able to collect great wind speed data in and around the town for different terrain and shielding categories without there being too much damage.

The CTS team had great support from the Cook Shire Council, QFES, SES and Cooktown residents. The Cook Shire gave us permission to install one of our 3m towers near the 10m AWS tower at the airport. The plot of the data is shown here. The solid lines are the maximum 3-second gust every 10 minutes with the open dots being the wind direction.



Visit to the CTS by the Northern Australia Insurance Premiums Taskforce

Members of the Federal Government's Northern Australia Insurance Premiums Taskforce visited the CTS to learn about housing performance in cyclones. From the CTS library of damage investigations we were able to show the response of different house and building types to wind, rain and storm tide. The Taskforce found the demonstrations of the wind driven debris test rig impacting on screens and the cyclonic loading of cladding in the pressure air-box revealed the potential for severe damage if our homes are not up to the task of resisting the wind loads. David Henderson took the Taskforce out to new homes under construction to see the level of detail incorporated into modern homes built in cyclonic regions as well as an inspection of an older house that has had retrofitting to its roof structure carried out.

John Ginger, Korah Parackal and Navaratnam Satheeskumar attended 17th AWES Conference in New Zealand

Disrupted flight plans to the 17AWES Workshop in Wellington on 11-13 February meant that only John Ginger made it the Welcome Session on the 11. Navaratnam Satheeskumar (who had to wear borrowed clothes form Korah due to lost luggage) and Korah Parackal made it to the last day and gave their presentations to a very appreciative audience. George Walker and Geoff Boughton (who did Simon's presentation) were also flying the CTS flag.

David Henderson, Simon Ingham and Daniel Smith returned to Townville after spending a pleasant night in Western Sydney.

The CTS presentations were:

-Wind loads on contemporary Australian housing, by Parackal, Humphreys, Ginger and Henderson.

-Loading effects on timber truss to wall connection in a contemporary house, Satheeskumar, Henderson, Ginger and Wang

-Wind loads on suspended conical roof structures, Foley, Ginger, Peoples and Henderson

-Testing of garage doors and large access doors, Ingham and Stark

-Vulnerability model development for extreme wind events, Konthesinghe, Stewart, Ginger and Henderson

-Improving the resilience of Australian legacy housing to severe wind events, Smith, Henderson and Ginger

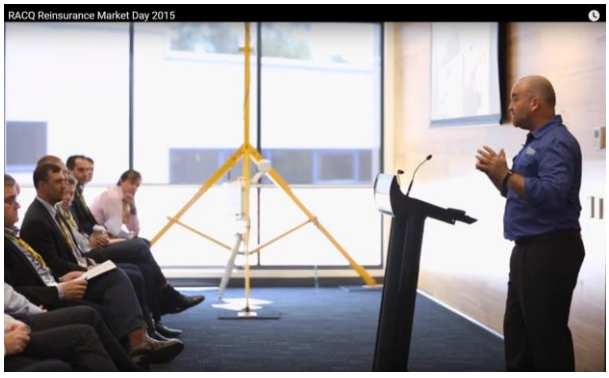
Daniel Smith & student Korah Parackal attend the AFAC 2015 Conference

Daniel and Korah attended the Australasian Fire and Emergency Service Authorities Council (AFAC) and Bushfire & Natural Hazards CRC annual conference in Adelaide in September. This was a great opportunity to engage with fellow researchers on current efforts at the CTS which include Korah's CRC project on modelling progressive failure of roofing connections under dynamic loading and Daniel's CRC project investigating strategies for retrofitting existing housing to increase wind resistance in severe weather events.

The CTS participated in the RACQ's Market day in Brisbane

The CTS was commissioned to travel to Brisbane to assist RACQ with their insurer's market day. We transported our wind driven debris simulator in a customised shipping container which was modified to act as the catch wall for the wind driven debris. The delegates witnessing the demonstrations were taken aback at the amount of damage the hardwood timber did to the cladding, doors and security screens.

We conclusively demonstrated the importance of properly testing window protection systems – impacts need to be in the centre of the screen as well as near a corner and edge as the differences in stiffness and support changes the products survivability!



Have a look at the highlight video…
https://www.youtube.com/watch?v=Xniz2bzE77Q&feature=share

Cyclone awareness/preparation events in Townsville and Cairns

We participated in the community awareness events in Townsville and Cairns to promote home owner preparations (general home maintenance and inspections prior to season, and preparations for cyclone watches - tiding yard, pulling down shade cloth, window protection, etc). The link gives a checklist…
https://cyclonetestingstation.com.au/community-education/is-your-house-prepared-for-a-cyclone/view

People at the CTS

The CTS have had some staff changes and a new student begin this year.

Cam Leitch and Tony Walther have left the CTS this year. Tony has relocated to Brisbane and commenced with Qld DPI. Cam has partly retired but continues lecturing a subject here at JCU and assisting with the occasional research project. We want to thank Cam for all his hard work and commitment to CTS and our community.

Andrea VanDerWal is our new Administrative Assistant, she has taken over from Marilyn Twomey. If you have anything you need in dealing with the CTS please get in touch with Andrea at andrea.vanderwal@jcu.edu.au

We would like to welcome new student Korah Parackal who began his studies this year. Korah aims to better understand progressive failures in light framed structures due to wind load during his PhD with the CTS.

PhD student Amy Lovisa has completed her studies and handed in her thesis. She has taken a job in New Zealand. We congratulate her and wish her all the best.

Facebook

Please check out our Facebook page for updates

https://www.facebook.com/cyclonetestingstation

The role of CTS Benefactors

The Cyclone Testing Station is an independently funded entity within James Cook University. CTS was established to minimise the loss and suffering that would otherwise occur when severe wind events impact communities. To achieve this aim, CTS needs to conduct research, assist in the development of building codes and standards and play a role in the education of both the building industry and the broader community.

Funding is needed to do all of this. Most of us know that funding is difficult to find today. CTS relies on benefactors from government and industry to support its operations and allow the team to play a role in identifying issues, developing standards and providing community education.
The CTS team would like to thank its long term sponsors and benefactors for their generosity over many years. The companies involved don't do so because of any direct benefit but understand that the community and broader industry is better off if issues are identified early and addressed quickly.

CTS is always looking for new benefactors who are willing to help the organisation achieve its objectives. Whether you are able to offer once-off support or can come on board as an annual benefactor, the CTS team would be pleased to talk to you if you can help to make housing and other buildings safer for all the community. Please contact Graeme Stark, on 0429 270066 or graeme.stark@jcu.edu.au if you are able to help.

The Cyclone Testing Station wishes to thank all of our Benefactors and Sponsors for their continued support