The Unrestrained Column

"*To err is human, to engineer is divine*"

July 2013

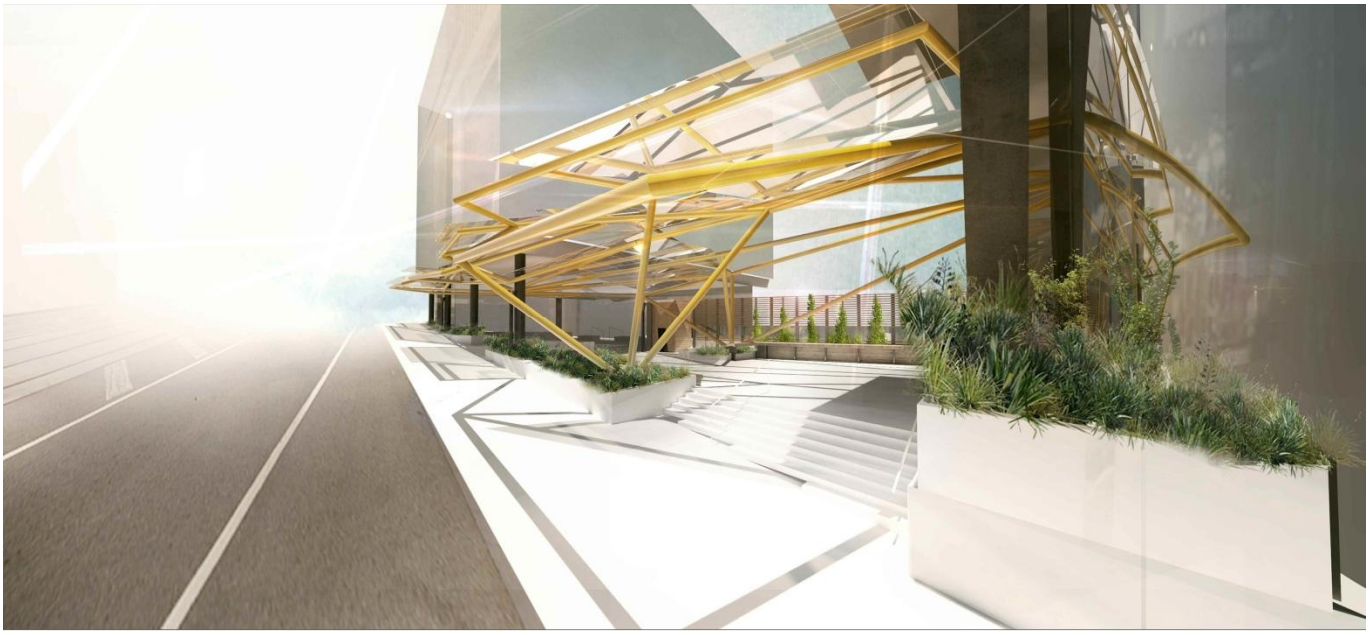
Office News

This month we welcome following recent starters to the ANZ Building Structures Teams - Irini Vazanellis (Graduate Engineer) and Camilo Pinto (Trainee Structural Drafter) both in Melbourne and Robert Smith (Technical Director), Andy Yuen (Graduate Engineer) and Sam Meredith (Senior Technical Officer) who join the Sydney team.

Project Wins

Sydney office has recently picked up two new residential schemes – Princess Street, Brighton Le-Sands and Parnell Street, Stratfield. Both schemes are approximately 70 units and is repeat business from SJV Architects who are obviously happy with the team.

Melbourne office is currently delivering an interesting urban art sculpture that forms a canopy between two existing buildings, shown below. They are working directly with the artist and Hassell architects in a design-led 3D environment to create a unique steel structure that meets the functional and design intent. All node details and connections to the existing structure are different. However we developed a system with only one typical slice detail. This has been a project to test their analytical capability and design creativity!



In Brisbane, Thiess Contractors have today been awarded the $1.1billion Moreton Bay Rail link. AECOM is part of the design team and will be providing structural engineering to the seven new stations along the 12.6km route.

This newsletter features Radu Bliuc from the Sydney office and Phil Latham from the Brisbane Office who give us an interesting synopsis of their careers to date.

Sydney

Introducing Radu Bliuc

Radu came to Australia in 1998 after he was awarded a postgraduate scholarship by UNSW and the Australian Defence Force Academy. Previously, he had been working as a consultant engineer and junior lecturer at the same university where he graduated in 1994, Technical University of Iasi, Romania.

In Canberra he worked on his PhD Thesis entitled "Structural Behaviour of High Strength Reinforced Slabs". The thesis was mainly based on the experimental work that he conducted in the ADFA laboratories on samples with the concrete strength between 50 and 95 MPa. His efforts were rewarded by Concrete Institute of Australia with the National Engineering Bursary, a biennial award made to post-graduate students studying engineering, chemistry, materials science, building science and other relevant subjects which contribute to the research knowledge base of concrete in Australia.


Dubai Towers, Doha

In 2002 Radu started to work for Robert Bird Group delivering a diverse range of projects. Among the most representative were the King Street Wharf Complex of buildings and the Wild Life Sanctuary at Darling Harbour.

In September 2008, days before the start of the Global Financial crisis, Radu was flying back from Dubai after finishing a peer review of the design of Burj al Alam by Arup. The tower was supposed to be over 500 m tall and, if constructed, would have been the tallest office tower in the world. In the last two years before the GFC, Radu was part of a team of Sydney and Dubai Engineers under the direction and mentoring of Dr Andy Davids that worked on the design, site support and reviews of some of the most recognisable towers and structures in Middle East.

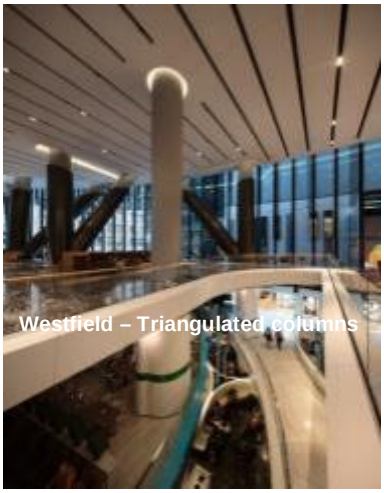

Alhamra Tower

During that time Radu was one of the designers of Dubai Tower in Doha (400m tall) (architect RMJM) and the main reviewer of Al Hamra Tower tallest sculpted tower (412 m), Kuwait (architect and engineer SOM), and other residential developments in Middle East. He published a paper on differential shortening of composite columns in high rise structures.

As the market tamed its desire for high rise structures, Radu started to work on Australian infrastructure and commercial projects such as: Port Botany Expansion, and Westfield City, Sydney. His contribution to the former project, now located across AECOM's Sydney office, was the design of some critical items such as retaining wall system, temporary works, triangulated columns and architectural steel roof in collaboration with John Wardle Architects (JWA).


Westfield – Steel Roof

Three years ago when he joined AECOM, Radu was the structural team leader of the Energy2U Alliance. The alliance assisted Ausgrid to deliver its 8 billion network upgrade project. The most prominent project delivered by Radu's team was North Sydney electrical substation.


Westfield – Triangulated columns

In September last year Radu joined the NSW Building Structures Group. He is currently involved with the Epping to Thornleigh Third Track, Rail project where he is the Station's Structural Discipline Lead, and the Transgrid Substation panel, where he is fulfilling the same role.

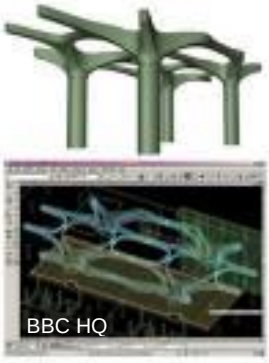
Outside work, Radu plays B grade soccer for Sans Souci FC. He enjoys his coffee and most of all spending time with his family composed of wife Dana, children Diana (18), Andrei (15) and dogs Chelsea (Labradoodle) and Captain Cinnamon (Hungarian Viszla).


Architect's impression of the new North Sydney substation from Berry Street

Brisbane

Introducing Phil Latham

Phil is an Associate Director in the Brisbane office and became the second person (after Tom Dawes) in the ANZ Building Structures group when he joined in November 2009. Having grown up and studied in Sydney, his first real job was with SKM where he worked on both infrastructure and building projects. After a few years he left Sydney for London where he spent the next 7 years filling his passport with stamps travelling, with his top 3 destinations being Jordan, Venice and Iceland. Based in London, he worked initially with SKM Anthony Hunts and then later with Whitbybird (now Ramboll) where he was fortunate enough to work on a wide range of projects including Wembley Stadium, Royal Ascot Racecourse, BBC HQ, Granary Wharf, Leeds, a 50-storey tower in the UAE and the British Embassy in Jakarta.



His career highlights include leading the structural design for the main building for "Ferrari World" in Abu Dhabi, which is the world's largest indoor amusement park all themed around Ferraris. This ~US$1.5bn facility went from some concept sketches to shell and core completion in approx. 2 ½ years and includes the world fastest roller coaster taking riders from 0 to 240km/hr in 4.5 seconds!

Ferrari World

Another project highlight, albeit a very technical one, was working on an Offshore Substation for a wind farm located 30km of the coast of Belgium in 25m of water. A key innovation was the integration of a 20-tonne Tuned Mass Damper within the driven pile foundation, to control the dynamic response of the foundation to wave loads. With waves hitting the foundation every 6 seconds, the structure was constantly moving and the introduction of the TMD increased the design life from 4ys to 21yrs by control fatigue cracking. At the time of design, it was the first known example of using building and bridge technology (use of TMD's) in offshore structures.

Phil returned to Australia in late 2009 to settle down and play 'grown ups' and he has since married his long term partner Anne, bought a house and started a new generation first child, Sophie Joyce Latham. Sophie certainly got her good looks from Phil!

Since joining AECOM, Phil has worked on the design and construction of a wide range of projects including a new rail station at Springfield, numerous buildings for Defence (Land 121 / Land 17 / ELF Singleton), Flinders St Mall and Brisbane Girls Grammar.

Good News

Nick Morphett's wife (Sydney) had a baby Clementine Rose Morphett two weeks ago. Congratulations Nick!

Thought for the month

The worst mistake anyone can make is being too afraid to make one.

Structural Groups around ANZ

Office	Engineers	CAD	Total
Adelaide	0	0	0
Auckland	13	6	19
Brisbane	9	4	13
Canberra	1	0	1
Christchurch	13	0	13
Hamilton	2	2	4
Melbourne	11	4	16
Perth	10	3	13
Sydney	21	8	29
Total	**80**	**27**	**107**

Skylines

Last month's skyline was Vienna. A fantastic prize awaits the first person to correctly identify this skyline by e-mail to derek.forbes@aecom.com who will also gratefully receive contributions to the newsletter.

Structural Conundrum

It turns out that there is a lot of things wrong with the Death Star, from its implausible garbage shoot, gaping chasms inside rooms and preposterously high energy weaponry. As a Structural Engineer, however, what nags me the most is the structure.

The problem is gravity.

Leaving aside the exasperation of the second, larger, model; the first Death Star had a diameter of 160km. To put that into perspective- the Shard of Glass in London is just short of 310m, or to use a more traditional unit: The first Death Star could hold almost 429 trillion elephants.

I know what you're thinking: it's in space- there is no gravity.

Actually the Death Star comprises 21588 internal levels stacked north-to-south, which means the structure has a 'right-way-up', and is simply a big space-ship with a gravity generator at the base, rather than a planetary body with an attractor at the centre. Additionally; the films never show people gliding along corridors, so it is fair to assume the Death Star gravity is 1g, just like Earth.

The AS1170 is woefully unequipped for designing a 21.5 thousand storey building. Luckily, however, someone has already worked out that the ship has a crew of nearly 1.2 million (bewilderingly this works out at an average of 53.8 people per floor). Assuming everyone weighs 80kg, the personnel load alone hits 0.9 GN.

Then you have the spaceships. It gets a little harder to work this one out, but as an engineer you have to pick the worst case loading; so assume that every ship is a fully loaded Millennium Falcon. I expect this equals out to the certainty we're working with. That gives us an additional dead weight of 15.2 GN.

Allowing for a very forgiving 2.5 kN/m2 nominal floor and furnishing load (this is the future), the total weight of the floor structure is approximately 1'036'000 GN; completely eclipsing the weight of any of the users. The films show, however, that the Death Star is full of inexplicable holes, and therefore this can be charitably reduced by 50% to 518'000 GN.

Some very back-of-a-fag-packet maths will tell you that even if the Death Star was made of a hitherto undiscovered S1000 steel, the base of any central support pillar (allowing for distribution to the outer shell) would need to be somewhere in the region of a 500x500m solid S1000 steel column.

At almost 180 GN the column would have its own gravity, with enough pull to pin anyone within 15m to it.

Of course, maybe it's just held up with 'the force'.