

## PENTOMINIUM Dubai Marina

Construction of Pentominium started in 2009. At 526 metres and 126 floors, it was promoted as the first exclusive 'whole floor apartment' project in Dubai.

Developed and constructed immediately post the 2008 Global Financial Crisis, due to financial stress on the developer, Pentominium was put on hold in 2012 when construction was at level 30.



Client/Developer Trident Properties

Architect AEDAS

Engineer Hyder Consulting

Project Director Bill Parker

Contract Value 300M USD



Construction systems:

The engineering of the structure managed a slenderness ratio of 1:18, one of the tallest to be designed and built.

A significant "A Frame" transfer structure at level G to 6 required tie structures through the core to the perimeter of the raft at both G and B1 levels. The ties consisted of 4 sets of 3 by 120mm thick 600 deep high tensile steel plates stud welded prior to embedment. Three 11 tonne sections each of approx. 18 metres, were craned and then 'rolled' through the core walls before site welding. Staggered junctions to facilitate site welding were necessary. Each weld was of 56 hours duration.

The southern half of the tower was shorter by 26 levels and had sections of up to 5 floors excised. The outcome was a structure that was inherently 'out of balance' – 126 v 78 levels. To counter that, the structure was being constructed 800mm out of vertical alignment, targeting equilibrium upon completion.

As Project Director for Arabian Construction Company (ACC), Bill was responsible for the development and implementation of all construction systems including the survey strategies to build 'out of vertical'. A key to the structure was delivery and pumping of 100F'c concrete to a height of over 300m.

## EUREKA TOWER Melbourne

The tallest residential tower in Australia at its completion in 2006, Eureka Tower was 300m tall at 90 storeys.

An inspired design from Nonda Katsalidis and Karl Fender, this slender tower replaced planned twin squat office towers of 30+ storeys that would have overshadowed its neighbours.

Receiving plaudits from the city planners for its striking design and low impact; every apartment in the complex has views. The gold glass facets, create the shimmering effect which clads the penthouses with uninterrupted 360 degree views.



Client Eureka Tower Pty Ltd.

Architect Fender Katsalidis Australia

Project Director Bill Parker

Contract Value 250M AUD

Contractor Grocon



Innovative construction systems:

The tower construction pioneered double height core formwork systems – casting 2 floors each 11 working days.

In addition, the project was the first in Australia to utilise internal man materials hoist to the top of the jump-form, providing safe access and emergency access to the full height of the construction.

First time implementation of 'jump-lifts' utilised the running gear of the final lifts as temporary rapid man and materials access though all levels of construction.

Zone fire separation allowed the lower lift rises to be occupied in 25 storey batches as the upper floors were completed.

*'This is a good example of construction intelligence and innovation at its best having an immediate impact on the execution of a complex tall building project.'* Bill Parker

As consulting Project Director to the Eureka Tower Developer JV Board, Bill was responsible for the development delivery - starting with the initial feasibility in 2000, through design team appointments, project cost plan development, bank lenders liaison, sales and marketing, construction and handover to the purchaser/occupants in first quarter 2006.

## PRINCESS TOWER Dubai Marina

On completion in 2012 Princess held the Guinness World record as tallest residential tower at 414m and 100 storeys.

Developed and constructed during the 2008 Global Financial Crisis, Princess was delayed due to financial stress on the developer and their purchasers.

A monumental structure of “tube in tube” design to manage the wind and earthquake stresses of a waterfront position on the Arabian Gulf, the project presented many challenges in implementation.



Client/Developer Tameer

Architect Adnan Saffarini

Project Director Bill Parker

Contract Value 200M USD



Construction systems:

Collaboration between ACC and Grocon saw the implementation of the Lubeca hydraulic jump-formwork system for both the lift core and the perimeter column and beam system - the ‘tube in tube’ structure.

Both the core and the perimeter structures had a significant transfer structure at level 6 and belt structures at plant floors 24, 52 and 78; requiring the formwork systems to expand and contract in thickness at each of these, and then further contract as wall thicknesses reduced through the tower height.

Following immediately after Eureka in Australia, Princess adopted the same vertical transportation systems - utilising internal man materials hoist and jump-lifts.

A key innovation was the erection of the façade from the trailing perimeter protection screen, attached to the column and beam jump-form. The facade installation kept pace with the structure throughout its entire height.

As Project Director seconded to Arabian Construction Company (ACC) from Grocon International, Bill was responsible for the development and implementation of all construction systems for the tower, project delivery to the client and handover to the purchasers. A key to maintaining delivery was negotiation with the Developer for a modified programme to facilitate finance for contractor and subcontractor payment plans, to ensure continuous construction and manage customer confidence.



## ABU DHABI PLAZA Nur-Sultan (Astana)

The tallest tower in Central Asia at its completion in 2020, Abu Dhabi Plaza's Main Tower is 382m tall and 78 storeys.

From an original Norman Foster concept, the design encompasses 5 towers across a 45,000m<sup>2</sup> footprint. Combining hotel, residential, retail and office accommodation in 550,000m<sup>2</sup>, Abu Dhabi Plaza is the epitome of a modern mixed-use development in Central Asia.

The apartments atop the main tower provide 360° views across the steppe landscape.



Client Abu Dhabi Plaza Eurasia

Architect HKR

Project Director Bill Parker

Deputy PD & Commercial Director Nicos Papandreou

Technical Director Matthew J. Esther

Contract Value 1.1B USD

Contractor Arabtec - CCC JV

Contract Form Design Construct

The challenges:

*Taking an inherited design and developing it into an optimised and constructable solution.*

The JV took over a partially constructed foundation with multiple flaws and proceeded to strengthen and reconstructed these all the while moving forward with the execution of the project. Working in BIM the JV's design team reviewed all design parameters, redesigned and resolved all coordination issues for 5 towers that sit atop 4 basement carpark levels and 2 shopping levels.

Completely redesigning the 3 main towers as composite structures, we optimised the floor plate designs and incorporated the steelwork tonnage saved into 'erection columns' to rescue cycle times resulting in a 9-month reduction on the initial project programme.

*Construction through -50°C temperatures.*

Adapting marquee temporary structures as 'heated zones' to allow large scale raft foundations, and vertical climbing enclosure structures heated to allow concreting of otherwise exposed floor slabs, both through winter.

*The full story of the challenges and lessons learnt on this project can only be told 'face to face'.*

As Project Director Bill was responsible for the total management and planning of the design-construct phase of delivery. Nicos was responsible for all commercial aspects of the procurement and contracting process, including local government liaison. Matthew was responsible for the re-design multi-disciplinary consultant team who converted the concept design into a solution that focussed on constructability and optimisation.

## HOSPITALITY PROJECTS

### Middle East & Africa

Matthew and his practice WY & Esther Engineers have had leading roles in the planning, design and execution of a number of 5-Star+ hotels resorts in the Middle-East and in Africa. Two examples of these are the Zabeel Saray Hotel in Bahrain which is operated by the Jumeirah Group; the other is the LXR Hotel located on the main island of Mahé in Seychelles and is one of the superior brands operated by Hilton.



This Jumeirah branded 5-Star luxury 200 key hotel is located on reclaimed land. The hotel's focal point, the Manor House, has a range of all-day dining offerings, a high-end spa facility and a cluster of 12 luxury villas. The project was designed and co-ordinated in BIM across all disciplines and solutions developed to integrate the structure within the architectural expression of an exacting Andalusian vernacular. The design was optimised to minimise material quantities in particular the foundation scheme made use of soil improvement rather than the more expensive deep foundation solution.

Client Seven Holding

Multi-Disciplinary Engineering Design

Matthew J. Esther & WY & Esther Engineers

Total Built Up Area c. 35,000sqm

Project Value Approx. 250m USD

These projects required extensive adaptation of local technologies and limitations to deliver world class projects in complex and difficult site conditions. From the initial review of the Zabeel Saray project it was clear there was enormous benefit to reassessing the entire design with the selection of soil improvement more than halving the cost and time to executing the foundation system.



This latest addition to the Hilton brand in the main island of Mahé in the Seychelles, offers 5-Star luxury with two private beaches on the Indian Ocean. This hotel development sits within a lush tropical plantation with 44 luxury suites in a villa setting, offering unique vistas owing to the sharp relief and change in elevation throughout the site. The key engineering challenges were the integration of the buildings within their natural surroundings and adapting locally available technology and making best use of the local know-how to build the various villas on what is a complex site made up of the distinctive smooth granite outcrops (or glacis) which are common in the Seychelles and prevalent throughout the site.

Client Crown Prince's Office – Abu Dhabi

Civil & Structural Engineering

Matthew J. Esther & WY & Esther Engineers

Total Built Up Area c. 16,000sqm

Project Value Approx. 50m USD

## TRILOGY LIMASSOL Cyprus

With an iconic concept by WKK it is the height of a modern residential living in the Mediterranean, consisting of three premium high-rise buildings with offering a residential, retail and leisure experience of world-class specifications.

This cluster of three 40-storey towers is located on the southern coast of Cyprus and is configured to provide 360° vistas of the city and coast of Limassol. The towers each have a built-up area of 35,000sqm and are linked by a 2-level common podium which occupies the entire footprint of the building plot of 20,000m<sup>2</sup>. The project is set for completion in 2022.



Client Trilogy Limassol Seafront Ltd

Client's Representative & Project Director

Nicos Papandreou

Value Engineering and Constructability Experts

Matthew J. Esther & Bill Parker

Total Built Up Area 135,000sqm

Project Value Approx. 400m USD



The principals of EPPIC were involved in this project in various capacities, all of which were critical to the success of the project.

Acting on behalf of the investment shareholders, Nicos is currently the Project Director for the project and is responsible for all strategic and delivery aspects of the project, including corporate governance, authorities liaison, design, sales, marketing, development, construction, finance and accounting.

Bill and Matthew carried out the peer review and constructability consultancy for the project, focussing on developing value engineered solutions that provided an optimised design that improved the overall constructability credentials of the project. Once code compliance was verified the construction sequence was optimised to minimise floor to floor construction cycles, simplified the core layouts and reduced the material demand, all of which combine to achieve an improved programme and reduced construction costs.

This project is another good example of the EPPIC *'total management'* approach of bringing construction intelligence to the forefront of the project planning, design and execution stages of the project. The foresight of the construction process allowed critical decisions to be made at the planning stage which allowed the design was adjusted to achieve a simpler construction sequence. This brought benefits of time and cost which afforded the Trilogy team the necessary time to concentrate on the quality of their flagship real-estate offering.