

<p style="text-align: center;"><b>Steve O'Sullivan , Framework Director</b> <b>Heathrow Terminal 2B project presentation</b></p>
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## **Introduction**

Thank you Duncan, good afternoon ladies and gentlemen welcome to T2B.

My name is Steve O'Sullivan and I look after the BAA account for Balfour Beatty and have been involved here at Heathrow for more than 10 years.

In the next 15 minutes or so I will take you through how our relationship with BAA has matured over the past 10 years and our delivery of T2B.

## **Developing the BAA relationship**

We have been a supplier in various forms to BAA since the early 90's.

Starting with the construction of the international pier at Glasgow Airport.

Through the acquisition of Mansell in 2003 we joined the BAA framework.

In 2000, we were appointed to our first contract on the T5 project the Heathrow Express and Piccadilly Line rail extension tunnels rail and mechanical and electrical services fit out.

Followed by the T5 main Station.

At the same time, also part funded by BAA, we carried out the new motorway connections to Terminal 5 from the M25.

So with the build-up of these contracts and not forgetting the 106 toilets and 18 ancillary buildings delivered by Mansell we, over time and through our various operating companies, effectively 'crept up' on BAA to be their second largest supplier on Terminal 5.

In 2008 we were appointed to the current framework. We have subsequently delivered projects across all BAA airports including the £95m first phase of Terminal 2B August 2010.

## **Aerial view of Heathrow - 2014**

This is an aerial view of Heathrow in 2014 with the completed terminal 2 superimposed.

- North runway
- South runway

Existing Western Campus – T5A, B, C

As you can see the "Toast rack configuration" 90 degrees to the runway is far more efficient for aircraft turnaround time.

Central Terminal Area

Terminals 1, 2 & 3, configured around the original military airport, cross runways creating cul-de-sacs.

Inefficient for aircraft turnaround times.

New Terminal 2 configuration replicates the more efficient T5 "Toast rack"

By 2014, T2A and T2B will be delivered with capacity for 20M passengers.

The design safeguards for phase 2 of terminal 2 development which extends T2A North and adds T2C continuing the "toast rack" to the East increasing the passenger capacity to 30 million.

### **Heathrow's New Terminal 2**

An artist's impression of Heathrow's new terminal 2.

### **Terminal 2 Replacement (T2) at Heathrow**

Two main buildings T2A/T2B plus their associated infrastructure.

A £2bn investment by BAA replaces the old 1950's terminal 2 and will be the home of the "Star Alliance" Airlines.

Operational by summer 2014.

### **T2B – Design and Build by Balfour Beatty.**

T2B delivered by Balfour Beatty as a single point of service to BAA utilising the services of six operating companies including Parsons Brinckerhoff. Delivery from concept design through to handover.

### **T2B Phase 1 – Completed by Balfour Beatty**

Phase 1 was completed in October 2010. Six pier-served aircraft stands including capability for the A380's. Three stands delivered early in December 2009 for use over Xmas.

Overall, pier was delivered early, safely, defect-free and to budget.

### **T2B Phase 2 - Being delivered by Balfour Beatty**

Phase 2 currently under construction.

Delivers 10 more pier-served aircraft stands, retail provision, airline lounges and operational accommodation.

Provides a safeguarded baggage basement for future expansion.

Also in the centre section of the substructure is the underground passenger tunnel connection from T2A to T2B and the safeguarded Track Transit System station and baggage tunnels for future expansion.

### **T2B Phase 2 - Programme challenge**

Includes complex management of stakeholders and design briefs.

During the design stage the basement was effectively doubled in size to safeguard for the future baggage facility and tunnels to T2C. This gave us a real programme challenge. Effectively a 4-month over-run.

Utilising BIM 4D modelling and through a number of Peer reviews with group companies and our supply chain, we came up with a solution that delivered the required completion date.

### **Slide**

The revised construction methodology is a hybrid of top down and bottom up construction techniques enabled by the installation of 2km of diaphragm walling by our Ground

Engineering business (the largest Dwall project in Europe). This allows us to concentrate on the programme critical path and deliver both the substructure and superstructure at the same time.

### **Enabling Phase 2 – the October 2010 story**

Enabling Phase 2 to get possession of the phase 2 site footprint, we were in full control of our own destiny! We needed to complete:-

Phase 1 and truncation of Pier 3

Decommission the Southern Stands of Europier.

Move this 300 tonne office to its current location.

Open Kilo Cul-de-sac allowing the aircraft to the South of Europier to be relocated, truncate Europier and release the site footprint of phase 2.

### **Office move video clip**

The office was moved as a “Monster Move”!!

The move itself was planned in great detail with BAA operations, if at any point the move failed or stopped on route this would have caused major disruption to airport operations.

On the 30<sup>th</sup> September after the last flight we were given permission to move onto the taxiway; the whole operation was a success and completed 2 hours early.

If we had moved the office traditionally, disassemble and reassemble, this would have been at least a 4 month process.

This was a great example of innovation and collaboration.

The move was two years in the planning included contingencies for unseen events and as a result was completed early safely and without disruption to the airport.

### **Construction challenges**

T2B is the largest ever airside project delivered for BAA. T5 was a landside project as is T2A.

The difference between landside and airside is the security requirements.

All people, plant and materials on T2B are subject to BAA airside security clearance. That means for all staff and operatives full criminal record checks and five years' employment references are required. We currently have a workforce of 877 on site and will peak at 1,600 in April 2012.

With the turnover of labour/trades, this is likely to equate to six to eight thousand individuals requiring security clearance.

The logistics of general deliveries and the removal of 575,000m<sup>3</sup> of spoil requires in over 500 daily vehicle movements required through airside security without impacting on airside operations.

### **Achievements**

Through our early contractor involvement, the design - owned by Balfour Beatty - has been completed on programme and a £30m saving achieved.

Our ground engineering business completed piling on programme and the diaphragm walling ahead of programme.

Safety, consistently at the top of BAA's contractors' safety league.

All project programme milestones were achieved.

### **Effective project controls**

Effective project controls are key to the management of any project but particularly large complex and critical infrastructure.

At T2B we have developed a system with the help of our in-house programme management team at Parsons Brinckerhoff which monitors and manages our progress from the 4D BIM Model through the production manager system to the daily key performance indicators

### **Systems map – Realising BIM**

Realising the full benefits of BIM - the ability to pull together the various software tools to maximise the benefit of the model environment.

### **Building Information Management (BIM)**

The implementation of BIM techniques with the help of PB has been extremely helpful in assessing change by creating full desk top reviews before implementation.

On a complex project the management of interfaces is key and having a 4D model has allowed us to address these interfaces to the benefit of both cost and time.

### **Next steps**

The hybrid of top down and bottom up construction techniques have allowed us to concentrate on the programme critical path.

This means although we are still working on the heavy civils work in the substructure we are in the superstructure working on the steelwork, the envelope of the building and recently through our engineering services capability have commenced the installation of the M&E services installing the first of £6m of M&E services modules.

Next year we have to deliver £200m of work and will reach a peak of £1m/day.

### **Balfour Beatty differentiators**

Finally our differentiators on T2B.

A single point of service to the client from concept through to handover utilising full group capabilities including PB – end-to-end ownership.

Leading health and safety, and sustainability agendas.

Through PB, leading the project controls and BIM agenda whilst creating a culture of innovation that provides real value the client.

### **Why Balfour Beatty?**

We believe the integrated capabilities we are going to showcase here today differentiate us from the competition.

**Mike Peasland, CEO, Construction Services UK**  
**Knowledge and integrated delivery as a key differentiator**

Good afternoon everybody. I am Mike Peasland and I am responsible for our construction activities in the UK leading our Construction Services UK Division.

**Title slide**

You have heard from Steve O'Sullivan, how our operating model works here at Heathrow Terminal 2 and heard from Steve Morgan the customer's view of our performance using this model.

**Knowledge and integrated delivery as a key differentiator**

We believe this model differentiates us from our competitors but of course one swallow doesn't make a summer, so I initially wanted to share with you some of the other critical and complex infrastructure that we have delivered this year using the wide knowledge capability that resides within our business.

**M74**

So firstly, the M74 in Scotland – "The missing link" as they call it - a £440m contract completed in June this year - nine months ahead of schedule. Here we were using the collaborative skills of our major and regional civil engineering resource along with associate general construction capability. This section now joins up the end of what was the existing M74 to the M8 in Glasgow and the M77 on the south side.

**A3 Hindhead**

The A3 at Hindhead, a £289m contract to relieve the bottleneck which was Hindhead. The contract was officially opened to traffic on 27 July 2011, a significant date for other reasons as well, which I will come to later.

Again, using our civil engineering expertise, combined with our building expertise, but this time also using our knowledge and skills in mechanical, electrical and traffic management systems, to largely self-deliver the tunnel systems.

The project was completed again nine months ahead of the contract completion date.

**Fife Hospital**

The major extension to the Victoria Hospital Kirkcaldy in Fife, a £170m PFI project which provides 11 operating theatres and 500 beds - completed on programme in October this year. In the last five years we have delivered over £1bn of acute hospitals in the UK, which has not only allowed us to build asset knowledge in this area but also allowed us to develop further skills in critical and complex infrastructure which we can take into other sectors. Collaboration across this project included our investment and financial engineering skills. Our construction and mechanical and electrical capabilities as well as facilities management to be delivered through the concession period.

### **Aquatics Centre**

The Aquatics Centre at the Olympic Park completed on 27 July 2011, exactly one year ahead of the opening ceremony. In delivering this £265m project we have brought together design expertise from Parsons Brinckerhoff, and our ground engineering, civil, building and mechanical and electrical resources to deliver what will be once legacy mode is complete, the iconic structure of the Olympic Park.

### **Blackfriars**

And finally Blackfriars. This £460m contract is showcasing again the collaboration across our business in delivering critical infrastructure. The complex refurbishment of the existing structure, the extensive temporary works, the building, structural, civil engineering mechanical and electrical expertise have all been delivered through our own resources and the added advantage of specific expertise from Parsons Brinckerhoff in design and knowledge of the Network Rail and London Underground systems has added real value to our offering.

### **Major customers 2011**

So just to recap here are the customers in 2011 where we have been delivering our collaborative and integrated offering.

So, what does this mean for the future and how we position ourselves going forward?

### **Knowledge capability**

Well, we believe our knowledge capability across our sector is second to none. We cover more of the vertical markets than most of our competitors and we believe this wide knowledge capability is a key differentiator.

So rather than looking at our business through solely the construction lens we start with our broad based knowledge capability where our differentiation lies.

This wide knowledge capability from across the group can then be used to input our customer asset knowledge to address how we add value to our customers' activities rather than solely provide a service. This philosophy added to our knowledge of the growth markets allows us to clearly define the appropriate vertical markets we will address.

Using our knowledge capability as our foundation allows us to be more agile in moving between vertical markets as market conditions change.

For example our knowledge of the complex services integration in acute hospitals has given us a great foundation to tackle the energy from waste market where an understanding of the technology, the interfaces and the integration of the system is critical.

## **Growth markets**

So where else are we looking to employ this philosophy? Well, three of our growth markets are:

- Energy
- New nuclear
- Rail

## **Energy gap**

In the energy markets, we are building the skills to be an EPC provider and the addition of Parsons Brinckerhoff is accelerating our opportunities here. We have three current opportunities in the Energy from Waste sector where we are 1 of 2 and are awaiting final selection.

## **New nuclear**

Whilst we believe we have the requisite skills to tackle the key civil and structural engineering challenges, we also have the ability to add the key mechanical and electrical integration in this area and reduce interface risk for the customer.

## **Rail**

In the Rail market we are addressing Network Rail's requirement to look at new ways of operating to help them deliver on their cost reduction challenge.

On the East Kent Spur – Plumstead to Abbey Wood –we are working through an ECI process which includes Parsons Brinckerhoff on rail design and our construction services business delivering ground engineering, civil engineering, rail infrastructure, station build and mechanical and electrical systems.

So I hope through this short presentation you have gained an understanding of our integrated offering and our ability through our customer asset knowledge to truly differentiate us from our competition.

I will now handover to Andrew who will talk about how we transfer these skills to the global markets.

**Andrew McNaughton, Chief Operating Officer**

**Knowledge transfer and inter-divisional synergy**

Over the past few years, we have brought together a broad capability across the life cycle of key infrastructure assets. With this capability and scale operations, comes a deep knowledge of the assets, how they perform and hence how they can be improved to bring value to the customers.

The key for us is to be able to capture and utilise the knowledge and deploy it for customers around the world. I would like to take a short time to take you through two case studies about how combining knowledge across the group has driven innovation and opened up opportunity for us.

The first is in the Building sector and addresses how we have taken learning and transferred it across market sectors and geographies.

In earlier presentations today, we have heard how here at Heathrow, we are utilising our modular systems for M&E services and realising the benefits from the offsite manufacturing processes.

We have also seen how we are using BIM modelling, not only to support the design manufacture and commission process, but also as a programming and work briefing tool.

These techniques are not new to us; we have been manufacturing plant and equipment modules for a number of years and have a well-established high end manufacture and assembly facility at Wednesbury in the Midlands.

The key for us is combining these elements together and applying the knowledge gained through our experience of constructing and operating assets, to drive design innovation that delivers value to customers.

Many of you will have seen details of Birmingham Hospital that entered into operational service in 2010. At Birmingham, the techniques of modular construction and modelling were applied to new areas, particularly quality, commissioning risk management and efficiency. In addition to the prefabrication and pre-assembly of M&E systems, we used the model to examine installation techniques for cladding and curtain walling for the building. Through the design process, we developed, with the manufacturer, a system that installed the external walling panels from inside the building. This eliminated the need for external scaffolding and the risk associated with cranes lifting countless panels. It also meant that the majority of the building skin, measuring 65,000 sq.m., was installed by a squad of six people.

Inside the wards, we not only preassembled all the bathroom pods, but also produced prefabricated bed head units that were installed with all the electrical equipment and medical gas systems fitted and tested offsite in the factory.

The bed head units particularly addressed issues relating to quality and commissioning. Taking this further, we have found, through our experience of owning and operating hospitals, that a key element of the operational efficiency of the facility, is the availability of operating theatres. These are areas with complex life critical systems and therefore quality of installation is key. Through the use of design models, we were able to develop fully prefabricated operating theatres. Since this time, we have received defect free handover certificates for subsequent hospitals at NVSH and Fife.

We have been taking the learning from healthcare across other sectors of the building market. In the Education sector, we have been addressing the challenge of reducing the cost of delivering and have taken our knowledge in production systems further into modular construction. Taking the learning from over 250 schools and academics built in a traditional manner, we have designed a system build model that allows flexibility built around a set of



components. Now known as BBI600, the system is being used to reduce the cost and increase the quality of the schools portfolio in Hertfordshire.

Even where customers prefer a more traditional form, we are applying the systems techniques to reduce construction and maintenance/life cycle cost. An example of this is Ealing High School that we are currently designing and building.

The knowledge we gain from these developments, allow us to provide thought leadership in the industry. It is therefore real output from asset performance that we fed into our recent submission to the Department for Education's Capital Review, that was facing up to the challenge of reducing the cost of ownership of schools.

Equally, it is knowledge about the cost of ownership that allows us to develop new service offerings for customers. An example of this is the energy services company model that our Support Services division has developed. The basis of this model is to provide investment, with the support of financial partners, in improvements to assets that reduces energy consumption. The investment is repaid through the reduced energy costs over the remaining life of the asset.

The principles presented relate to activities here in the UK, but the value of our knowledge is to be able to deploy it for the benefit of customers around the world. To this end, our US Construction business has been, for some time, driving the use of BIM to integrate design and construction. A great example of this is Parkland Hospital in Dallas, which is similar in scope and scale to Birmingham. Where we are now taking forward the knowledge transfer is in the area of prefabrication. We have now reached the point of establishing our first manufacturing facility in the USA and the operations team from the UK are in Texas finalising the facility and processes. We anticipate commencing fabrication in February 2012. This is certainly pushing the boundaries in the USA and as we continue to develop the model in our current bidding, we are confident that the operational savings that it delivers will provide a real market differentiation for us in the US Building sector.

But can we be confident that we can export the concept from the UK? The truth is we have already achieved it. This is our manufacturing facility in Abu Dhabi. We established a trial facility in Dubai three years ago and this facility has been established to service our ongoing M&E contracts across the UAE.

One example of the real efficiencies that this can bring was the Crowne Plaza Hotel that we completed in Abu Dhabi about eighteen months ago. We originally planned to have 1200 operatives on site constructing in a traditional manner. Post construction, our review showed that using the offsite assembly facility, this reduced to just under 1000.

The use of BIM to integrate design and construction is a common feature for our operations around the world, whether in PB for M&E design in Singapore, or our construction business in Hong Kong, where models are used extensively, not just for buildings, but for infrastructure and transportation projects. Here, the use of models to give clarity of design, manage risk and quality and give confidence of delivery, are proving to be a differentiator. This was the case on a recent award for MTR, where the customer chose our team over the lowest price. Since award, the customer has adopted the model as the primary tool to control design integration.

It is in the area of transportation infrastructure, and particularly rail infrastructure, that is the source of the second demonstration of our use of knowledge as a differentiator. In particular, how the breadth of capability and the ability to harness it has given us the confidence to access opportunities we would have previously achieved.

A simple example of this is shown in the centre of the slide. This is a montage of an innovative prototype for floating track bridge for the metro in Seattle. It is being designed by PB. The project was secured by incorporating components developed by our rail technology business in the UK. Our ability to transfer technology and offer confidence in constructability are key factors in our success.

Our heritage in rail is the delivery of projects and technology in heavy rail and mass transit, both in Europe and further afield. Some time ago, we established our capability in rail projects and maintenance in the USA. Whilst modest in scale, it has grown in reputation for quality of delivery, particularly in mass transit. Our position in the US market developed significantly with the acquisition of PB and brought capability and experience in design, project management and systems integration. These skills, combined with our existing delivering capability, gave us the credibility and confidence to move forward as a partner with Fluor to bid, win and manage the Denver P3 project. This is the first occasion that we have been successful on a project of this nature that also includes the delivery of rolling stock for the line.

Our delivery capability in the UK, and in particular on London Underground, has been utilised by PB's transportation business. The ability to leverage the knowledge and experience of upgrading the London Tube network, was a key factor in PB becoming the Programme Manager for Washington MTA and developing their plans to upgrade the Washington transit system.

In the UK, we have successfully brought together capability, not only in rail design and rail delivery, but our civil, building and M&E capability, to offer a solution for the East Kent Spur for Crossrail. In this solution, all of the business units are performing as an integrated team with Network Rail. The ability to offer full service capability from the group was a differentiator and a key success factor.

The latest step in our capability to harness the combined knowledge and experience across the world, is in Australia. PB and the Rail Construction business have formed a combined design and construction team in JV with civil contractor, Thiess. This team has been successful in securing a major section of the rail upgrade in Melbourne. The combination of design and construction is seen as unique in the Rail sector in Australia and our ability to integrate design with delivery is seen to bring real value to our partner.

Rail is just one sector where the integration of capability is allowing us to offer solution to customers and partners. We equally see evidence of this in other transportation sectors and markets such as Power and Natural Resources. We are confident that as our capability to combine and transfer the knowledge of the group increases, so will the breadth of business opportunity in markets with growing infrastructure needs.