

# OVERSEAS DELEGATION 2019 LONDON

SMART MOBILITY IN THE CITY OF TOMORROW



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## **Messages from Advisors**



**Ian Chung**

President, HKIHT

As part of the programme celebrating the 20th anniversary of the Hong Kong Institution of Highways and Transportation (HKIHT), our first-ever overseas delegation to London took place. The journey was both remarkable and successful, and it helped to explore Smart Mobility in the City of Tomorrow with the three key sub-themes of “Innovation, Sustainability, and Infrastructure Funding & Policies”. Most importantly, for our young engineers, there was an awakening of the potential for leadership, a desire to understand the intelligent transportation infrastructure of a smart city, and a new perspective on technological development and its application.

The most pleasing aspect was the manner in which the delegation received encouraging support for our young engineers from different companies and institutions. Our youngsters’ dedication to increasing their knowledge from an overseas perspective is to be commended and demonstrates their passion for improvement. And, on a wider scale, this trip has allowed them to grow by highlighting the opportunities and challenges of this new era.

During the seven-day delegation there were a series of seminars and visits to some of the most innovative and sustainable infrastructures in London: High Speed 2, Crossrail Elizabeth Line, and Luton Airport - Direct Air and Rail Transit. Along the way we communicated with a series of professional organizations and well-respected firms. It was with these parties that we gained valuable insights in to forward-thinking infrastructure planning, smart mobility, advanced technology, sustainable solutions, project management experience, and infrastructure investment strategies. We are also proud to have signed an MoU with the Chartered Institution of Highways and Transportation (CIHT) to strengthen our relationships with overseas institutions.

These activities not only fostered an exchange of knowledge between the two cities, but also provided valuable exposure for our young professionals - they are the ones who will be leading the highways and transport infrastructure industries in the future. I believe that the experiences gathered on this trip will facilitate our professionals to pave the way for Hong Kong to develop into a better, safer, and smarter city.

The trip proved to be a major success and it’s important that those who helped organize it are recognized. I would like to express sincere gratitude to two of the delegation’s advisors, Ir Francis Sootoo and Ir Francis Kung. Without their assistance the overseas liaison could not have been arranged successfully. I would also like to give my special thanks to the Construction Industry Council for its financial support through the Construction Innovation and Technology Fund (CITF).

A special mention must also go to our London counterparts of the CIHT, Institution Civil Engineers, NEC, and Urban Movement for kindly arranging the delegation’s activities. Last, but not least, I would like to thank all the members of our organizing committee as well as the delegates joining the event. Without the support and efforts from you all, this delegation could not have succeeded.

I look forward to seeing you at future HKIHT events as we work together to support, promote, and strengthen our profession and industry.



**Francis Kung**

Council Member, HKIHT

“We need New and Fast, not Old and Slow” was how Lord Robert Mair concluded his inaugural presidential address as the 153rd President of the Institution of Civil Engineers. Now it is my belief that it wasn’t people he was talking about, but rather the ways we in which we, as professionals engage society by providing innovative engineering solutions through optimal use of technology.

The United Kingdom is a place where engineering ingenuity is not only well promoted, it is well-nurtured, and consistently encouraged. The use of practical technology to streamline projects greatly enhances efficiency in civil engineering mega projects, and is highly relevant to Hong Kong’s thriving highways infrastructure industry. Digital Transformation has never been more relevant to the engineering industry, and will prove to be an enabling tool to produce value-added solutions.

This Delegation lies directly in line with our institution’s Visions and Missions, namely to promote education, training, research and development of the science and art associated with highways engineering and transportation. Our delegates will surely benefit from learning about UK’s rich engineering history, as well as exchanging professional experience with local engineers. By learning the different local practices of engineering design in the UK, our delegates will gain invaluable insight as to how empowering proper use of technology may be.

I am pleased that the Delegation was received with overwhelming support from our members, our fellow engineers, and most importantly our young engineers. By continuing to connect and foster engineers from all disciplines, all backgrounds, and all walks of life through unique experiences such as our delegation, we may move forward as an industry holistically.

I would like to thank the Organizing Committee in coordinating this Delegation, the receiving parties throughout the Delegation, and our sponsors and delegates for their support.

## **HKIHT Overseas Delegation 2019 to London – Delegation Report**



**Francis Sootoo**

Council Member, HKIHT

I am greatly honour and delighted to have participated as an Advisor in the first HKIHT Overseas Study Visit to London from 10 to 17 August 2019 organised by our Young Committee (YC) as part of the 20th Anniversary Celebrations of the founding of Institution in 1999.

I would like to extend my sincere thank you and great appreciations to our Committee led by Samson, Leon and supported by Athena, Clara, Claire, to name a few for a very successful visit. It is indeed a very well organised visit. Despite the fact we have an extreme tight daily schedules and sometimes long travel distance in between each visit, the profound team work of our delegation leaders and the delegates were able to get us to each location in a timely manner.

I trust all the young delegates had a wonderful time and enjoyed this culturally stimulating historical city of London.

I hope the various smart and iconic transport infrastructure projects visited, Technical Talks, ICE BIM Seminar and Cultural Tours have enlightened and enriched their knowledge that inspired them to further help develop and transform Hong Kong into a leading edge future smart, sustainable and technological advance liveable city in Asia.

Once again, I would like to express my heartfelt congratulations to the Committee and all the delegates for organizing the first successful overseas trip.

I look forward to our next technical visit.

## Overseas Delegation Report

### Visit to London Transport Museum

Vehicular traffic together with railway transport in London has become popular during the 19th century.

The primary purpose of the museum is to conserve and explain London's transport history. Besides displaying many examples of buses, trams, trolleybuses and rail vehicles from 19th and 20th centuries, the museum collections also include photographs, sound recordings, posters and artworks.

One of the features in London's transport is their artworks and posters. They not only served as a wider vision of corporate transport design, but also a path for the public to understand the design process and provide insight into the development of a corporate identity for London's transport.



**Seminar on Smart Mobility by Transport for London**



The delegation began with the fruitful presentation from the Head of Foresight of Transport for London (TfL), Iain Macbeth. Iain is the leader of the Automotive & Intelligent Mobility team within Transport for London's Innovation Directorate who mainly focuses on assisting the automotive sector in the implementation of the Connected & Autonomous Vehicles (CAVs). During the presentation, Iain shared some of the insights about the relationship between TfL and car manufacturers as well as automotive suppliers. TfL set up a trail site at Greenwich and Olympic Park and successfully launched the CAVs to travel from London to Oxford. Iain expressed that the success of the trail means technology for CAVs is capable to allow passengers to travel from one point to another in a safe and comfortable situation. Apart from the technology aspect, he showed some concerned on the issues faced during the policy and strategy development of CAVs in London. For example, it is still unclear to define who should be the responsible party in case of a car accident. Iain also introduced the approaches that have been taken in the promotion of Ultra Low Emission Vehicles in London including education to the public about the benefits of adopting energy-efficient means of transport.

After acquiring the ideas of developing CAVs from TfL, the delegates also got the chance to understand more about the background and design concepts from the CITIES FORUM. It was presented by Zeina Nazer, the Co-Founder of CITIES FORUM. The CITIES FORUM is an international organisation with experts from multidisciplinary specialized in various breadth of topics related to sustainable urban development. CITIES FORUM aimed to play the role of a leader in initiating different stakeholders to address and solve the issues in urban and sustainable development.

[London Infrastructure Plan 2050 @Arup](#)

London has been Arup's home since 1946 and is the heart at its development ever since. Arup owns a sound expertise in today's areas of built environment by bringing together a community of collaborators over 90 disciplines.

This knowledge sharing session with HKIHT was led by Chief Economist Alexander Jan, Data Scientist Fred Shone, City Economics Associate Adriana Moreno-Pelayo. They provided an overview on topics of Transport Movement Insight, Economics Planning and London Infrastructure Plan 2050.



“Transport is a cornerstone of my vision for a fairer, greener, healthier and more prosperous city”, says Sadiq Khan - the mayor of London. London has a vision to be a modern city where possesses the most appealing walking, cycling and green public transport that offers active, efficient and sustainable transport choices for Londoners. Enabling choices not only for Londoners, but on a macroscale, to support as a global city model in reducing congestion and optimally allocating resources of transport.

London has been securing a series of new infrastructure projects - including Northern Line Extension and Crossrail in support of its long term infrastructure plan under new era of continuous growth in infrastructure demand, further ensuring a brighter future for all Londoners and leading as a competitive global metropolitan city.

The first half of sharing session examined a key topic in today's modern transport field - Movement Insight (MI). A brief opening was made on introducing fact of the undergoing changes into a highly data-driven society, and MI was identified as an approach about utilising data to better understand transport. The leading speaker of first part session addressed present challenges ahead facing by the industry. The increasing complexity of client's question of interest in transport underpins need to upgrade current models and approaches. To be at the leading edge on mastering modern technology is determinant.

New technology approach suggests to transform the existing standardised visualization which normally takes days to produce into a real-time traffic visualization by taking in powerful real time data. The leading speaker of first part session also shared the agent-based modelling - a modern approach with pre-defined rules and variables featuring all inhabitants particularly in a metropolitan city - that implies the ultimate goal to address the most complex questions clients may have.

Follow-up questions from the delegate directed to the agency-based model assumptions and the simulated population segmentation methodology concerning the great complexity of population in London.

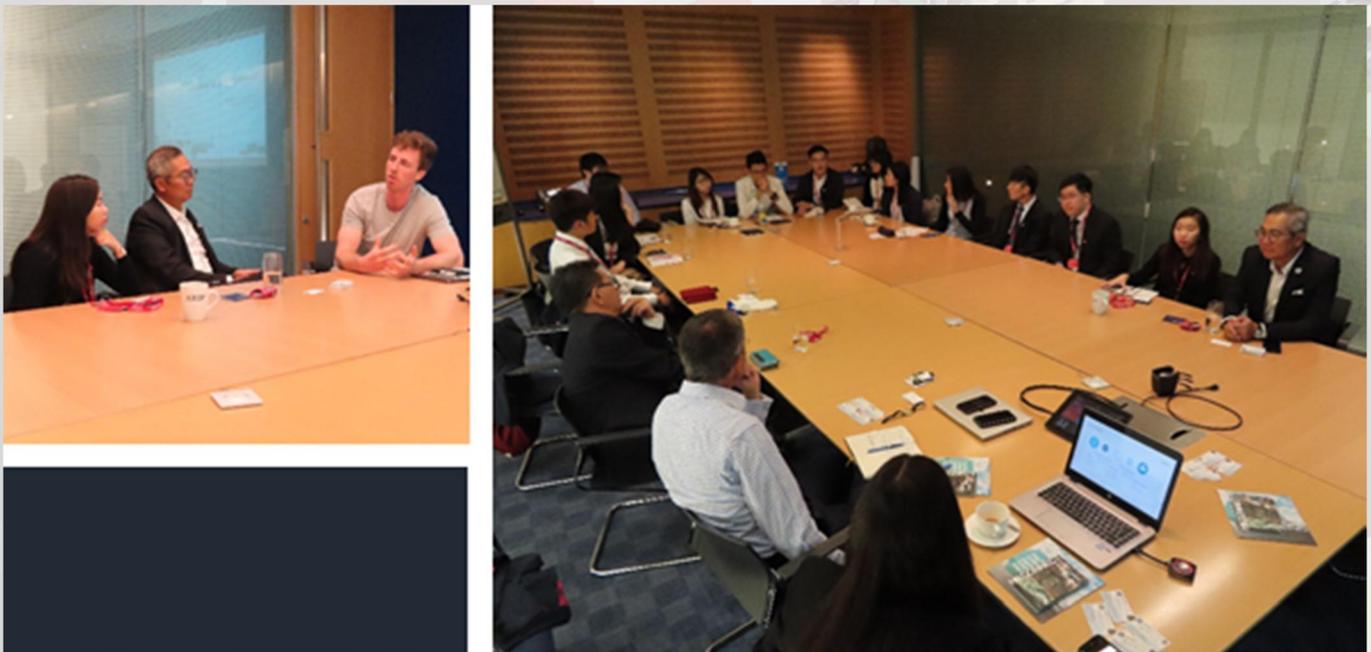
## **HKIHT Overseas Delegation 2019 to London – Delegation Report**

The second half of sharing session introduced economic planning and its joint application in London Infrastructure Plan (LIP). It started with an introduction to economic planning team of Arup in which comprises of economists and policy experts with expertise both in the UK and internationally on infrastructure projects. The economic planning team works in the specialised sectors such as transport, planning & regeneration, environment & sustainability and public sector economic policy.

The above background introduction later bridged to their recent research consultation work in LIP. The leading speaker of second part session shared their key objective - developing a cost model that is able to identify funding gaps and potential funding resources for strategizing future investments in delivering and maintaining infrastructure that London needs.

The consultation process started off by defining sectors in scope, following by liaising with Greater London Authority teams to understand future investments and costs, further through modelling to obtain robust results on funding and baseline funding gap.

Delegate member initiated a funding mobilization feasibility discussion on question of ways to enable lower income class of citizens to afford future high-tech transport services - concerning sharply rising social injustice and widening income inequality.



**Seminar on Road Investment Strategy 2 and Fleet Operator Recognition Scheme by CIHT**

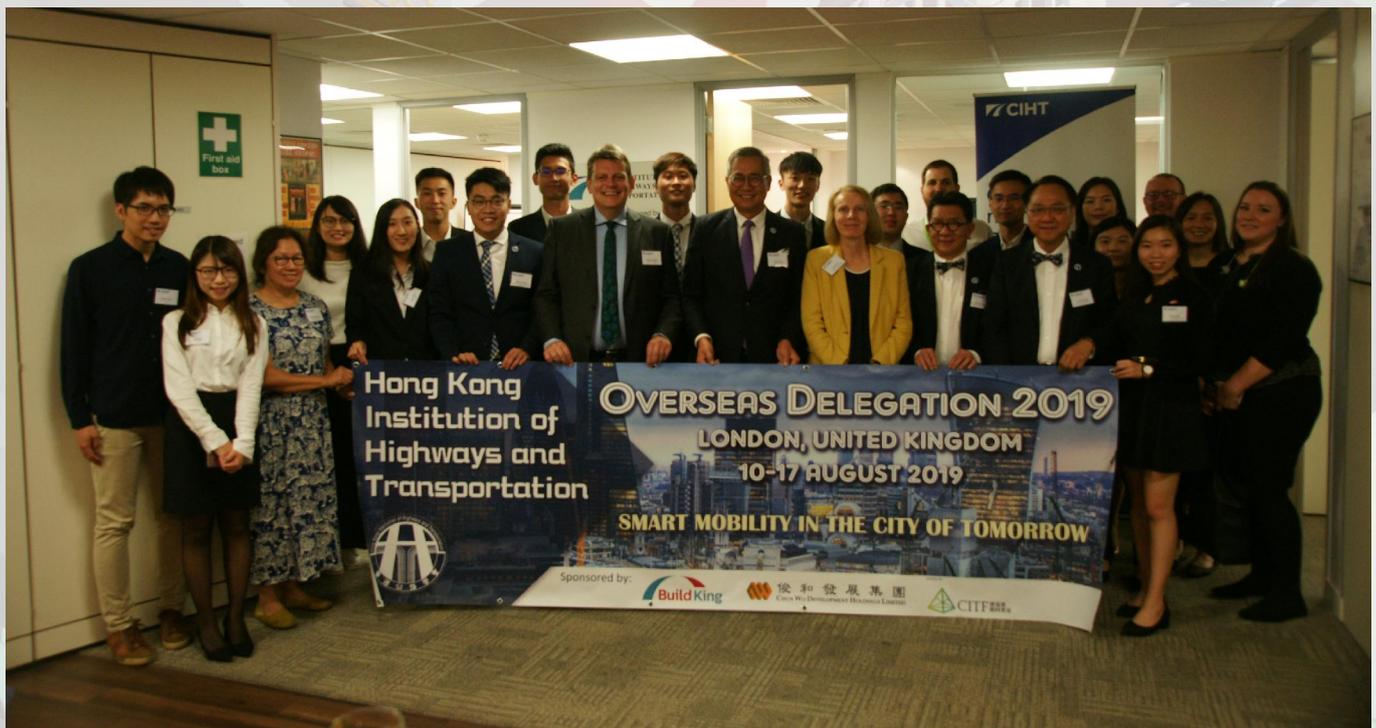
The Chartered Institution of Highways & Transportation (CIHT) is a charity, learned society and membership body for with 12 UK regions and a number of international groups. CIHT represents and qualifies professionals who plan, design, build, manage and operate transport and infrastructure.

It was one of the key activities in this delegation to visit CIHT for not only signing the Memorandum of Understanding on upcoming collaboration, but also to bridging up the members of both societies on exchanging our views and understanding on highway and transportation developments.

The visit was started with a warm welcome from Mr. Martin Tugwell and Ms. Sue Percy, the President and CEO of CIHT, and also the introduction from HKIHT about the institution.

After signing the Memorandum of Understanding, we had Mr. Andrew Hugill, the Director of Policy & Technical Affairs from CIHT, to share with us on the update on England's Road Investment Strategy and a video presentation from Mr. Paul Wilkes from AECOM on the Fleet Operation Recognition Scheme.

The event ended up in the Networking session which provided opportunities for delegates to get in touch with professionals from the transport and infrastructure sector in the UK. We got to know each other and exchanged our views on the traffic conditions in both Hong Kong and London, to understand more about the impression of our city from different views and discuss on the possible way forward.



**London Railway Projects Showcase by Grimshaw**

Grimshaw Architects is a global architecture firm that are known for their design of transport infrastructures. We had the opportunity to chat with them about their involvement in High Speed 2 (HS2) and Northern Line Extension Project.

HS2 is an ambitious project planned to transform the UK’s Victorian railway infrastructure to meet the demand of the 21st century. It connects London to cities in the Midlands, including Birmingham, Manchester and Leeds. The development aims to generate growth in the region and enhance rail connectivity for the city.

Declan McCaffery, Partner from Grimshaw Architects, spoke to us about Birmingham Curzon Street railway station (hereto referred to as the Station), which falls in Phase 1 of HS2.

The Station, scheduled to be opened in 2026, would have 7 high-speed platforms. It would also function as a public space for Birmingham city centre. The new station is located within a brownfield site at the Eastside district on the edge of the city centre. It will be integrated into an extended tram network, as well as offering pedestrian, cycle, taxi, bus and conventional rail connections to the rest of the city.

Working together with stakeholders including HS2 Ltd, Transport for West Midlands, Network Rail and Birmingham City Council etc., Declan McCaffery highlighted that the design will be people-centred that would respect and contribute to the history of the location, namely the Grade-I listed original Curzon Street station.

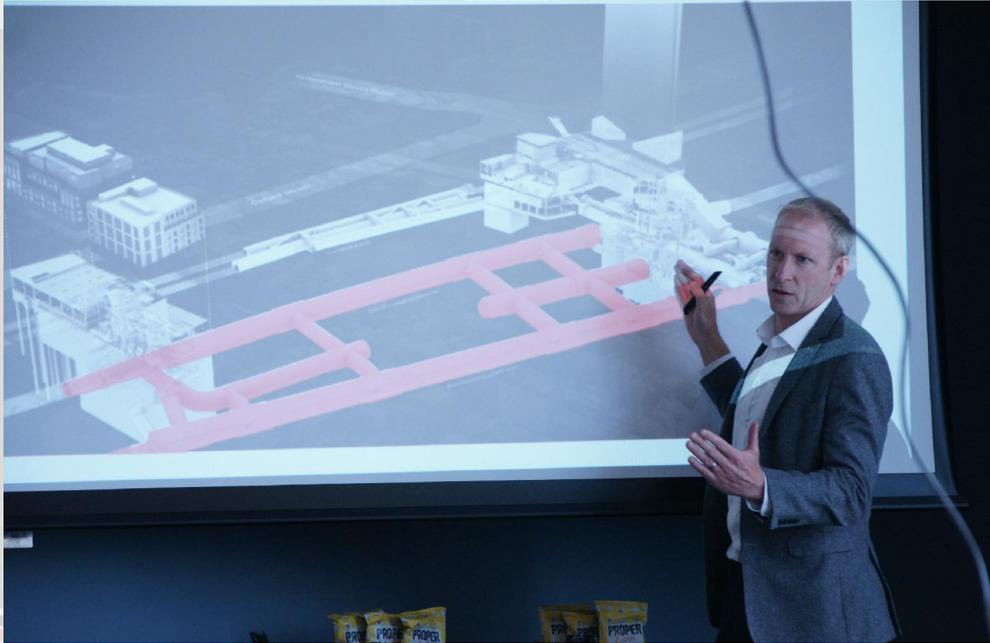


## **HKIHT Overseas Delegation 2019 to London – Delegation Report**

Grimshaw's vision of the Station includes the low arch design with a coffered soffit would undoubtedly be an instant recognisable structure in Birmingham. The West concourse, located within the grand arched space, would consist of both platform and waiting areas which is similar to modern airport terminals. The East concourse, on the other hand, has been designed to include the historic Curzon Station building as part of the revitalised New Canal Street scene.

The Northern Line Extension consists of building two new underground stations, Battersea Power Station and Nine Elms station. The planned opening date is autumn 2021.

Neill Clement, Partner from Grimshaw Architects, highlighted that the eastern entrance at Battersea will provide a distinctive gateway to the heart of the existing local communities as well as those working and living at the new developments in Nine Elms. The station would also orientate passengers with views of the iconic Battersea Power Station and provide a convenient interchange with onward transport modes.



[Visit to London Bridge Station by Grimshaw](#)



After a comprehensive overview on the major London railway projects, Mr. Mark Middleton, the partner of Grimshaw, gave us a guided walk through the renovated London Bridge Station.

The London Bridge Station is a central London railway terminus connecting London underground stations in Southwark, south-east London. As the first terminus built in London in 1836, London Bridge Station was under a five-year redevelopment construction from 2013 to 2018, with the total project expenditure of around £1 billion.

Once we entered the London Bridge Station, what presented to us was a spacious concourse with sufficient natural lighting and artistic timber lined façade, which provided a comfortable and warm space for passengers to relax and make their interchange. In order to create a significantly sized space, the old brick arches were removed and the concept of Y-shape column was implemented.

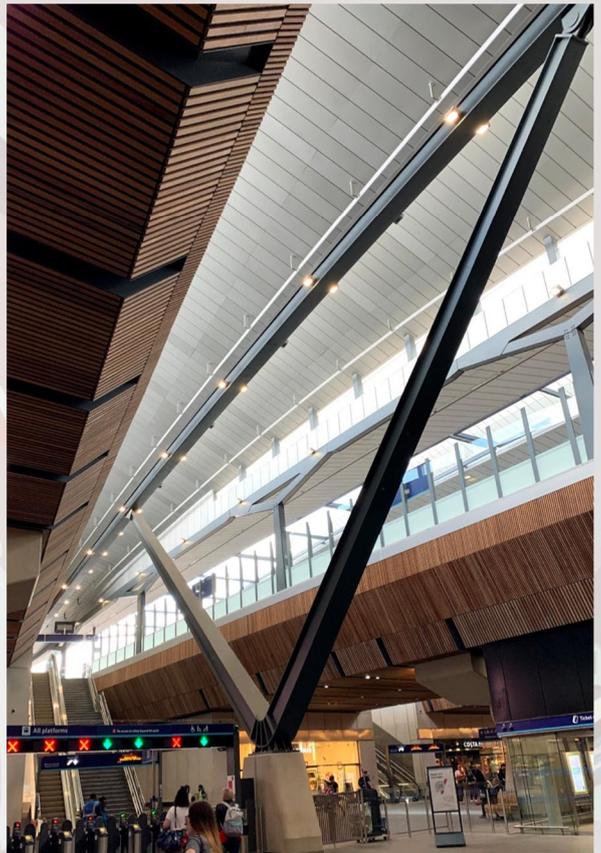
After visiting the station concourse, we were then brought to the elevated platform. After the expansion and realignment of the railway tracks, three terminating platforms were replaced by new through platforms to increase the passenger capacity by two thirds comparing to its original one. Together with the Shard development adjacent to the station, the upper platform presented a convenient linkage to the bus and taxi stations. Mark described the project as an “open-heart surgery” as the daily operation of the station had to be maintained during the construction period.

The final spot of our tour was the Western Arcade. The new concrete quadripartite arches seamlessly merged with the historical Victorian brick arches in the Arcade, which provides a direct connection to the Underground. It demonstrated that the preservation of the historical heritage was emphasized in this renovation works.

The tour was ended with a nice group photo at the transition between the preserved and new arches.



*Guided walk through the London Bridge Station led by Mr. Mark Middleton*



*New platforms, facades and roof designed by WSP & Grimshaw*



*The newly-constructed pedestrian walkway through Stainer Street, where the preserved brickwork arches are on the left and new arches on the right*

**[Visit to Crossrail Elizabeth Line \(Liverpool Station\) by AECOM](#)**

The Elizabeth line is a new line for London which will stretch more than 60 miles from Reading and Heathrow in the west through central tunnels across to Shenfield and Abbey Wood in the east. This new railway, currently being built by Crossrail Ltd and will stop at 41 accessible stations, 10 newly built and 30 newly upgraded, and is expected to serve around 200 million people each year. During the site visit, we were given not only a brief introduction of Liverpool Station but also the construction progress and the architectural design concepts as follows.

Liverpool Street Station accommodates Crossrail as one of the "Elizabeth line" stations at new underground platforms to the south-west of the existing station building. Trains will run west towards Heathrow Airport or Reading in Berkshire via Paddington, and east to Abbey Wood in south-east London or Shenfield in Essex. There will be a new ticket hall with step-free access next to the Broadgate development, with a pedestrian link via the new platforms to the ticket hall of Moorgate, providing direct access to London Underground's Northern line and the National Rail Northern City Line at Moorgate. Thus, Liverpool Street will appear on the Tube map as an interchange with Moorgate, similarly to Bank and Monument.

The six off-peak trains per hour that currently form the TfL Rail "metro" service from Shenfield will be doubled in frequency and diverted into the Crossrail tunnel after departing Stratford. Additionally a four trains per hour peak-only service will be retained between Gidea Park and Liverpool Street into the existing terminus over the Great Eastern Main Line between Stratford and Liverpool Street (omitting Whitechapel). Once Crossrail opens, platform 18 at the main Liverpool Street station will be decommissioned to allow platforms 16 and 17 to be extended, enabling them to accommodate nine-carriage trains.

By the end of 2019, final fit-out and testing and commissioning are due to completed at many stations and Dynamic Testing will be in its final stages. This will allow the new stations and rail infrastructure to be integrated with the rest of the railway.

During 2020, testing of the completed railway including an extensive period of trial running and trial operations to build absolute confidence in the safety and reliability of the whole system before opening to the public will be undertaken.



## ***HKIHT Overseas Delegation 2019 to London – Delegation Report***

Due to the complexity of the remaining work, Crossrail Ltd has identified a six-month delivery window between October 2020 and March 2021 for the start of Elizabeth line services through central London. Crossrail Ltd will be able to provide increasing certainty about when the Elizabeth line will once we start to fully test the operational Railway and integrate the train and signalling software.

The central section of the Elizabeth line will open between Paddington and Abbey Wood and link the West End, the City of London, Canary Wharf and southeast London with initially 12 trains per hour. It is expected that all stations on the route will open except for Bond Street which will not be ready to open until 2021. Once the central section opens, phased services will be introduced across the entire route, with full services across the Elizabeth line from Reading and Heathrow in the west to Abbey Wood and Shenfield in the east, commencing as soon as possible.

Regarding the architectural design of Liverpool street station, there is a number of physical constraints below ground at Liverpool Street made the station one of the trickiest to thread into the urban fabric, including a maze of sewers, existing Tube lines and the Post Office Railway. In addition, layers of the city's history had to be revealed before much of the work could get underway, which in total uncovered nearly 4,000 skeletons from the Bedlam burial site as well as thousands of artefacts dating back to Roman times. Moreover, Liverpool Street is with unified architectural design inside the ticket halls which is driven by the desire to maximise height in these constrained spaces. A shallow, folded ceiling plane formed by ribbed pre-cast concrete panels breaks the perception of the low flat ceilings to create a greater sense of space, scale and movement. The grooved, angled ceilings could be seen to resemble the pinstripes, often seen in the suits of City workers. A subtle sparkle of mica in the fibre-reinforced white concrete will glow with indirect lighting.

The entrance into the underground eastern ticket hall is through a striking, five metre high glazed canopy located in an open pedestrian plaza. Natural light will filter below ground during the day, while at night the canopy acts as a lantern with artificial lighting from inside shining out of the glazed entrance to illuminate the streetscape.

The western ticket hall is at street level and accessed through an angular portal entrance, framed by bold blue coloured glass. Glass panels and acoustic panels made from perforated enamel steel will be used on walls, while terrazzo will be used for the floors.

New forecourts and plazas around each entrance will create pedestrian friendly, accessible spaces with wider pavements. This will allow people to gather and dwell whilst maintaining clear pedestrian flows in and out of the station.

In addition to the station improvements, Crossrail has been working with the City of London on proposals for improvements to the area around the station as well.

## Seminar on Strategy for Transportation at AECOM

AECOM in the United Kingdom has involved in many aspects of infrastructure development, delivering public and provide projects.

The UK National infrastructure delivery plan 2020-2021 stated that 35% of the infrastructure investment goes to transportation and another 35% goes to energy. By the end of 2020-2021, 46.2 billion pounds will be spent on railways, such as construction on HS2 Phase 1 from London to Birmingham, service and plans for Crossrail 2 and the new London Bridge Station. Furthermore, 12.6 billion pounds will be spent on road to enhance the connectivity throughout the whole United Kingdom.

In AECOM UK, they have been adopting advanced technology to enhance their design quality. By using virtual reality for design review in the Schiphol Airport project, the designers were able to walk and look around in the structure from a passenger point of view. This would often inspire the designer to create better solutions or ideas for the project. In order to boost the efficient, they have been expanding the Digital Component Library, which allows the designer to apply relevant elements to their project efficiently.

Apart from applying technology, AECOM UK has been research and delivering projects with automation, such as the Automation in Road construction and performance monitoring, advancing the traffic control by using the big data and 5G Cellular technology

For construction, they aim to pre-fabricate more components off site so that they could shift work from busy site to more structured and controlled facility and shorten the construction period.



Site Visit to TfL Elizabeth Line Woolwich Station



*Iconic station sign at the island platforms and dynamic signage above screen door for conveying passenger information*



*Images of memorial plaque on the façade of Woolwich station structure. Colloquially known as 'dead man's penny', it is issued to the next-of-kin of killed service personnel in war*

Woolwich is a district at southeast London which had been an important naval, military and industrial town. The new Woolwich Elizabeth line station, funded by a property developer, is about to catalyse urban renewal with more new residential development and access to new job opportunities, by improving public transport connectivity to this part of London cutting journey time by about half. In this event, we visited the Woolwich station structure including the at-grade concourse and underground station box.

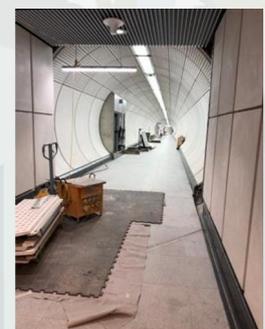
Entering the underground structure of the station, we were welcomed by the much wider space at corridor and platforms – very much different from stations at the existing Underground network that developed over a century. We were introduced by site team that a fleet of modern, spacious trains equipped with Wi-Fi access would serve the line at high frequency. It is very much appreciable that at project planning, TfL has put enormous effort to design this railway line to a vastly improved commuting experience for passengers – this is important to attract patronage and further, encourage people's use of public transport.

It is worth noting that residential block is already built on top of the underground station box. It shared a lot of similarities to a Transit-Oriented Development one can find on top of an MTR station in Hong Kong.

While the interior architectural finishes are almost complete, we are also impressed how the element of bronze blended into the architectural design of the station so well in aesthetical perspective – on the columns, on the façade of concourse. The site team has explained why this architectural design element is extensively used in Woolwich station – to commemorate the military heritage of the town – the Royal Artillery, Royal Arsenal nearby and the history of two World Wars this town ties to – a humanistic touch to an otherwise cold, plain concrete box.



*Spacious corridors and platforms*



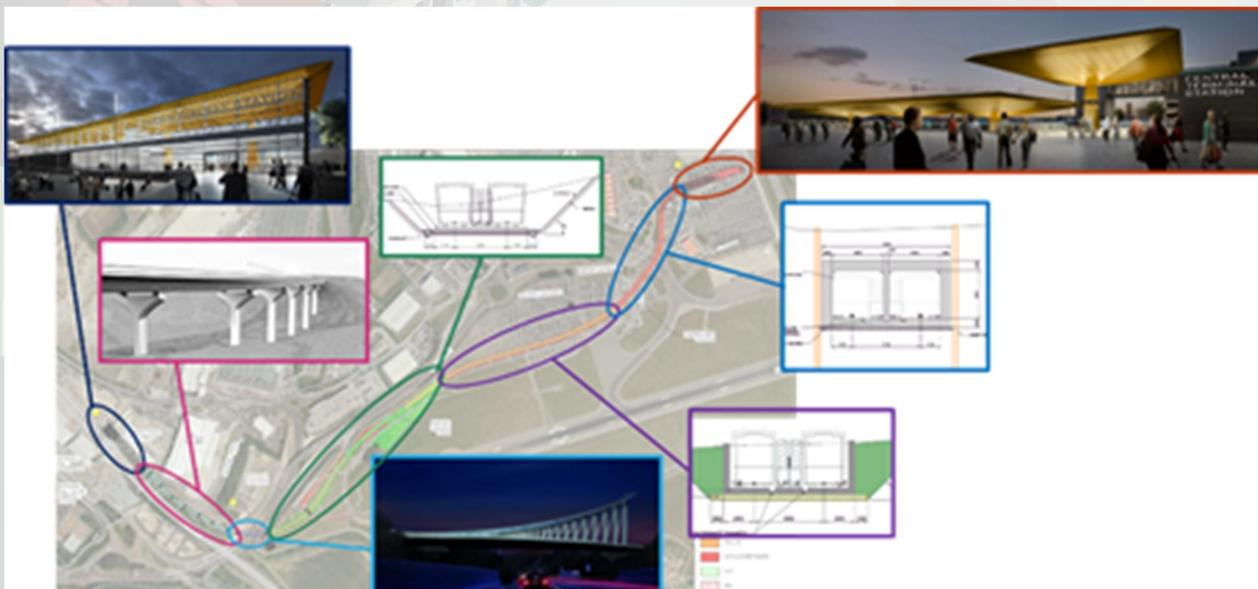
**Visit to London Luton Airport - Direct Air and Rail Transit (DART) by Arup**

London Luton Airport is located in the north of London, which is the 4th largest airport serving the London area. Currently, visitors of the airport could arrive by changing to shuttle bus at Luton Airport Parkway Railway Station which is about 2km apart from the airport. In view of the increase of demand of the airport, the shuttle bus has been operated at capacity. Long passengers' queue for the bus is not rare, which gives poor satisfaction to passengers. To enhance the connectivity and speed travellers from Luton Airport Parkway station to the terminal of London Luton Airport, Arup has been commissioned by London Luton Airport Limited to undertake the scheme design, preparation of specifications, achieving planning permission and providing technical support to the Client during construction. The automated guided people mover, named as Direct Air and Rail Transit (DART).



*Current Shuttle Bus Service*

DART project consists of a viaduct, a signature bridge and a 'cut-and-cover' tunnel beneath a live taxiway with aim to minimize the adverse impact imposed to normal operation of the airport and the road network in the proximity due to construction. This project has started design, planning, costing and procurement in year 2016. Tendering stage of this project was through dialogue process, aiming to look for the contractor with high capability of conducting the construction with excellent proposal in maintaining the normal operation of the airport and good understanding of the project constraints. The construction contract, FIDIC Yellow Book Design and Build, has been awarded to Volker Fitzpatrick-KIER joint venture in year 2018 with target commissioning of the rail in year 2021.



*Project Alignment*

## ***HKIHT Overseas Delegation 2019 to London – Delegation Report***

The key site constraints include the interface with existing landing lights and the taxiway of airport. Landing lights provide the direction of the aircraft to the runway when taking-off and landing. The destruction to the landing lights and the taxiway would induce significant safety concerns to the aircraft operation and threaten the life of the public. Thus, closely monitoring of the ground condition and regular liaison with the authority for the construction has been conducted.



*Construction adjoining to the Landing Lights*



*Tunnel Construction beneath existing Taxiway*

**Introduction of NEC and Tour at ICE**



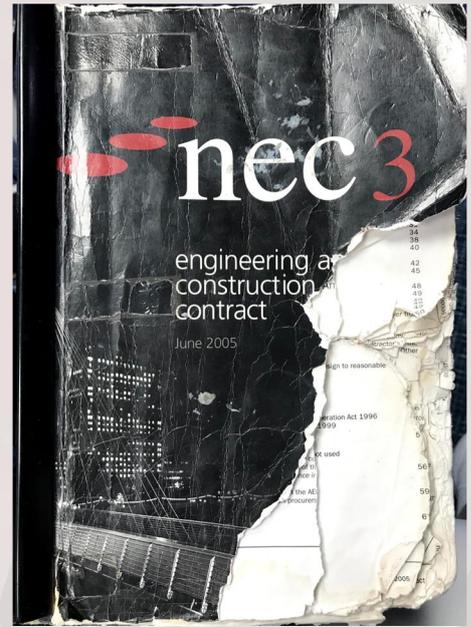
After a 30-minute tour in the Institution of Civil Engineers at 1 Great George Street, Mr. Richard Patterson, an experienced NEC and Procurement Specialist, gave a vivid lecture on NEC by turning complex theories and concepts into perspicuous flipcharts. He introduced the composition of NEC3 family and the new members of NEC4, namely the Design Build and Operate Contract and Dispute Resolutions Services Contract, and how different types of contracts could be used among various stakeholders in a project.

Different from the traditional contract types, the Engineering and Construction Contract (ECC) in NEC offers considerable flexibility to projects because the Employer could tailor optional clauses for better risk allocation. In NEC4, more secondary options and dispute resolution options could be selected while the main options A to F are opened for ECC. The payment mechanism, incentive for cost and time saving, risk sharing and contract administration of the six options were compared and detailed.

The requirement of ECC is to construct in accordance with the Works Information (or Scope in NEC4). Subjected to the level of design, the Works Information stipulates the performance requirements. ECC Clause 60.1(1) second bullet allows the Contractor to provide his design with a change to Works Information instructed by the Project Manager (Clause 14.3 refers) so that the design details would not have time implications on tendering.



*Photo taken during Richard's NEC lesson*



*Richard's copy of NEC3:ECC (June 2005 version)*

Some unique characteristics of NEC, such as the requirement of timely decision making process, clear allocation of responsibility, as well as proactive risk management procedures were highlighted. The contract's modular structure and ordinary English avoiding legalistic terminology also make it more intelligible for users with non-law background.

Richard concluded the seminar with a key endnote "TALTEO (Talk and Listen to Each Other)" to echo with the mutual trust spirit and collaborative mind set for an effective project management.

## Tour on Street Design by Urban Movement

Urban Movement, the organization includes transport planners, landscape architects, traffic engineers and urban designers offered us a wonderful guided walk around Vauxhall underground station, explaining their design concept and implementation on the complex of pedestrian walkways, vehicle lanes and cycling tracks in one of the busiest intersections in London traffic network. Mr. Christopher Martin, the Co-founder and Director of the organization with more than 14 years' experience in urban projects friendly met us at the Vauxhall St George Wharf Pier and prepared the notes with record photos for us to visualize the improvement from the old Vauxhall bridge road.

The tour started by walking along Vauxhall Bridge (South Side), which is a very busy main artery through London that takes a large amount of traffic. It has recently been modified with rearranged walking and cycling tracks to make it a better place to spend time and enjoy. However, the junction to be regenerated is located near to the very busy underground and bus stations, it imposed lots of difficulties to maintain the harmony between the busy traffic and leisurely cyclists and pedestrians. The urban designers in London come up with a solution with minimized cost and impact to daily operation. They smartly rebuild the central island which now includes both the pedestrians and cycling routes and redesign the signal timing so that the risks of the traffic conflicts are alleviated. They also included the cycle and walking only tunnel, right next to the busy traffic from the Vauxhall Bridge, separated by the piers of the bridges supporting the Vauxhall Train station. The exit of cycling tunnel is connected to the Cycle Superhighway 5 works passed the Oval Cricket Ground. Moreover, there are also bicycle parking area inside the tunnel which is convenient for the cyclists to continue their journey on buses or underground. As the street typology are like streets in Hong Kong, regeneration in London gave us a good example to follow.



After passing through the cycling tunnel, one can connect to the Harleyford Road, which is recently retrofitted streets with well-developed walking and cycling tracks. The cycling tracks here is bound by continuous concrete curbs and raised brick walk paths which provide a safe cycling environment encouraging the citizens to ride on bikes instead of driving. Make a turn at Kennington Oval road, the opposite end of Harleyford Road, one can access to Kennington Lane by passing through the Vauxhall Street. Even for small driveway like Vauxhall Street, one can see that the urban designers also included several speed humps controlling the vehicles speed to maintain the safety of cyclist. Walking into Tyers Street, we moved into the recently regenerated Vauxhall Pleasure Gardens, to access Vauxhall Walk. Vauxhall Walk is a landmark street that has recently been dramatically changed and is where the Mayor of London launched his 'Healthy Streets' policy. The street with traffic management ensuring the street is attractive to walk, cycle, and spend time. Urban designers also included the Sustainable Urban Drainage, which is a hidden drainage system inside the street planters to deliver environmental resilience and afford people shade and planting to make the street more relaxing. The Vauxhall Walk is connected to a small residential community street called Bonnington Square. This quiet residential enclave has also been refurbished to slow vehicles and make it very much a place for people.

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The guided walk given by Urban Movement really inspired us a lot, the redevelopment at Vauxhall is a working example which proves that it is possible to merge the busy traffic, even for extensive pedestrian flowrate from underground station, with the relatively slow and relaxing cyclists. They also showed that the retrofitting works are not as costly as in our mind, it can simply be achieved by adding speed humps, redesigning the central island and dividing the existing streets into lanes and cycling tracks. The sustainable urban drainage in Vauxhall Walk also provide us an idea to combine the road planters and urban drains to release spaces on streets.



## ICE BIM Implementation: Putting People First

Building information modelling (BIM) is one of the most important and powerful techniques in the construction industry nowadays. It's surely transforming, permanently, the way in which construction and restoration projects are done. This transformation will lead to better construction quality, as well as a more profitable industry and more proficient work.

This course focuses on the changes in behaviour and environment requisite for the successful employment of BIM throughout projects or organisation, and what developmental or personal capabilities people may need to implement BIM Level 2 culture.

In our current society, change in software or the technical environment become less crucial than people's ability to motivate themselves and their team. To create a better environment where people could collaboratively engaged, it is important that people should be considered to be at the foreground of change.



To better understand and learn from this mindset, delegates attended a fruitful one day in-house training course which was held at ICE Training Center. This programme emphasizes on putting people first and was instructed by Steven Eglinton, director of GeoEnable. As an information management and project management specialist, Steven has over 15 years' experience of both hands-on implementation and strategic development of Information and Knowledge Management activities, particularly with Infrastructure Asset Information, Geospatial Information, BIM and classification systems.

Throughout the implementation of BIM, there are several key assets of a successful decision-maker covered in this course:

- Change management
- Good governance
- Communication skills
- Stakeholder management
- Collaborative working practices
- Project risk
- Roles and responsibilities
- Continuous improvement

The course reinforce understanding of BIM principles and practice of delegates by providing a clear way on how to lead, or be a valued member of a project team implementing BIM culture. Including how to enrich knowledge of change management, good governance, effective communication, stakeholder management, collaboration and project risk.

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Besides the key skills required for successful roll-out of Building Information Modelling as mentioned above, there are more detailed instructions given during the course. For instance, the teamwork and group dynamics are crucial during the implementation of BIM. People may know that group works could bring over numerous benefits than individuals. However, how to improve efficiency in one group, and how to create dynamic environment between group members are the responsibilities of a leader.

First of all, defining clear roles and responsibilities is a critical aspect. The roles could be defined by the hierarchy of needs or according to diverse strength of individual group member. Leaders who instructs the implementation of BIM throughout the programme should be also motivating and inspiring. As communication is an active way to gain feedback and questions from the team, it should be two-way information exchange rather than one-way. This requires the decision-maker to trust peers work while gaining their trust at the same time, through which people could create a shared sense of ownership of projects.



Upon the completion of this one-day training, delegates were awarded with ICE Certificate for BIM - a unique ICE award which proves delegates have received the training and guidance necessary to be able to implement Building Information Modelling (BIM) Level 2 in future career.

## **Research & Insights**

### **Research 1: Innovation**

#### **Insight 1: Innovative Construction Method**

##### **The Issues of Construction Industry**

The construction industry has been criticized of being inefficient and lack of innovative ideas. The inherited reason resulting from the slow process of development in construction methods, technologies and technique is that every project is in fact unique in nature. Every project has its own site constraints, different underground conditions as well as affected by different types of weather. Therefore, it might be difficult to set-up a mono-type of innovative construction method which can be applied to every project.

##### **Innovative Construction Method**

The term 'Innovative Construction Method' covers a wide range of modern techniques which comprises of the recent developments in the material technology, design procedures, project management, structural analysis and etc. Incorporating advanced construction technology can improve the quality, efficiency, safety as well as the value of money. The innovative construction methods Modular Integrated Construction (MIC) and sustainable construction material will be mentioned in the following sections.

##### **Modular Integrated Construction (MIC)**

Modular Integrated Construction (MIC) refers to a construction whereby free-standing integrated modules (completed with finishes, fixtures and fittings) are manufactured in a prefabrication factory and then transported to site for installation in a building. It is an emerging innovative construction method to be adopted by the public housings in Hong Kong as it processes various benefits when comparing with the traditional construction method. The on-site construction time can be reduced by more than half when the workers are more experienced with the process of connecting different parts. As the on-site construction time are dramatically saved, the construction costs as a result can be saved. It is because the hourly rate of the workers in Hong Kong is much higher than those in mainland china where the factories are located. Also, the building performance will be enhanced as the construction components are tested and certified before the prefabrication process, the quality of finishes, drainage pipes, and etc. can be guaranteed. In addition, the risks and conflicts between different parties including E&M, structural, geotechnical, and waterworks can be identified and solved at the earlier stage. Hence, the chance of abortive work in the later stage can be avoided so the more cost can be saved.

However, there is a drawback of adopting MIC into building with complicated design. As we all know, all the components are connected and constructed in the prefabrication factory with different types of models. It is applicable to buildings or flats with same layout which is commonly used in the public housing. However, in the case of private house, the design and layout are usually tailor made to accommodate the better views. Therefore, the MIC might not be applicable in private house market due to the various layout design.

In the long run, with a better logistics management, planning, project management and skilled labour, MIC surely will be the common type of construction method in the construction industry especially in the building with similar design and layout.



*Photo above: An example of Modular Construction*  
Source:

<https://www.bd.gov.hk/en/resources/codes-and-references/modular-integrated-construction/index.html>

**Sustainable Construction**

Sustainable construction is a global trend to cope with the escalating problem of climate change. There are several options in promoting sustainable construction such as sustainable planning, adoption of green materials as well as to reuse, recycle construction materials.

Sustainable planning can be used for site formation that adaptive to the topography so that to reduce the public fill. The optimized site formation layout can minimize the amount of excavation and creation of C&D materials. Hence, more cost can be saved for transportation and energy. In addition, it is also possible to use steel to erect the formwork instead of using timber. It is common that the timber will be dumped directly to the public fill after using few times. The durability and strength of metal formwork on the other hand is much higher when compared with timber as it can be reuse for more times on site. Hence, less construction materials will be generated if steel formwork is adopted into the construction site. In addition, much energy can be saved when the construction material with lower embodied energy is used, for example, the use of certified timber from sustainable source or the use of PFA/GCBS in concrete mix. Furthermore, the introduction of vertical greening on building and noise barrier is also a kind of innovative construction method which enhance the visual and air quality. Different green wall system such as the mesh and modular drainage box system can be applied to reduce possible heat island effects.



Photo above: An example of vertical greening on a building  
Source: <http://greenscape-ltd.com/product/vertical-greening/>



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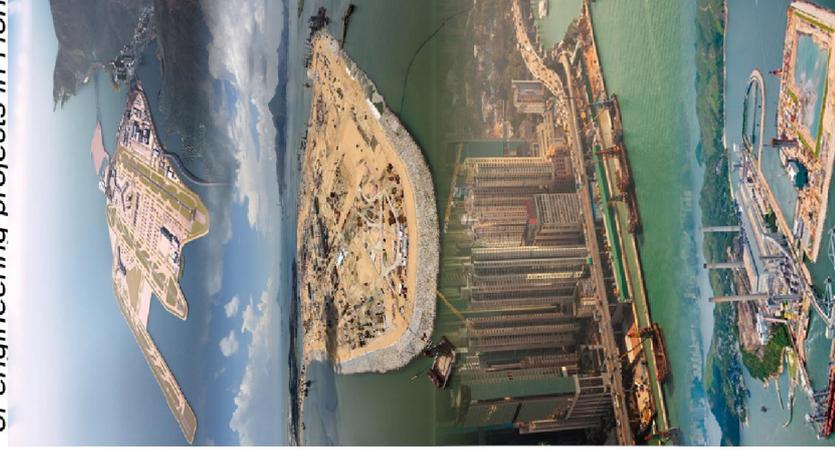
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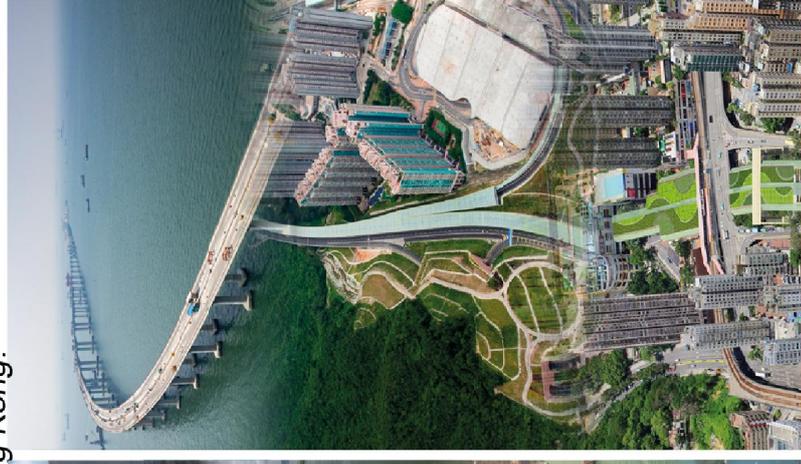
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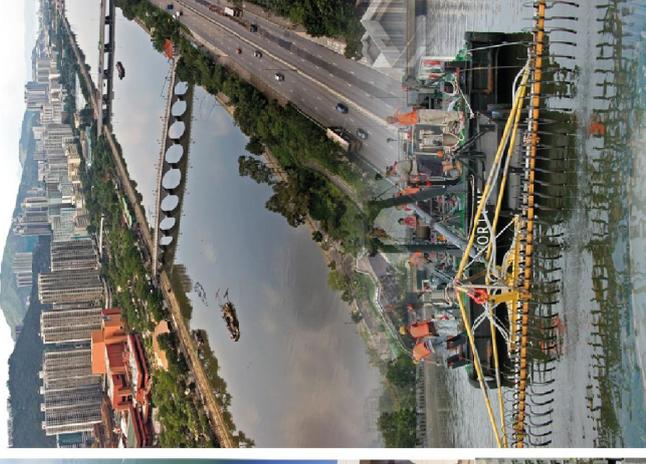
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## **Insight 2: BIM Implementation (Application in HS2 & Crossrail)**

### **BIM implementation in Crossrail project**

It is important to appreciate that BIM is not simply about 3D models, and is not just about buildings, but about all infrastructure projects including Crossrail project. Collaborative work is a core theme of the UK Government Strategy - and for Crossrail project this involves convergence of Computer-aided design (CAD), BIM and Geographic information system (GIS) information with other types of project information, within a digital setting, such that the right information is available to the right person, in the right form, at the right time. The key value to be gained from the adoption of BIM is the creation of a “digital Crossrail” that can be built virtually, which allows the design to be developed to improve and eventually optimise the design, construction, operation and decommissioning. When a Crossrail model has been built it can be used to support decision making and answer questions. The model has to be managed and leads to two potential uses of the M in BIM: modelling and management. The management of the model requires collaboration with all parties in the programme implementation including the supply chain as well as the operators of the railway. In the context of Government policy, the client organisations by adopting BIM will enable better optimisation of the asset being constructed.

It is fair to say that there was no single technological innovation that made Crossrail so successful with regard to data and information management – in the same sense that BIM is not new either. An interoperable suite of software alongside fully embedded procedures based on industry standards were the key to Crossrail’s success story. The key lessons learnt are:

- Treat data as a valuable resource
- Establish requirements at business and project level
- Structure data with the end-user in mind from the start
- Good asset breakdown structure & classification at the beginning
- Use relational databases from the start
- Create a Common Data Environment

### **BIM implementation in HS2 project**

HS2 is committed to utilize the power of BIM to build and operate a High Speed Railway, where assets are designed, constructed and maintained digitally using both graphical & non-graphical information, in a Common Data Environment providing real-time access to reliable and accurate data.

Since High Speed Two (HS2) is committed to utilize Building Information Modelling (BIM) on a scale that is unprecedented in the United Kingdom. The power of BIM could accelerate the process of building and operating a High Speed Railway, where assets are designed, constructed and maintained digitally using both graphical & non-graphical information in a common data environment providing real-time access to reliable and accurate data. HS2 will use BIM for electronic storage and use of digital data, helping to deliver: collaboration across the entire programme; and optimised design for manufacturing and assembly opportunities. In order to achieve these ambitions, the supply chain’s capability must match HS2’s requirements. At the industry day in November 2013, it was evident that significant parts of HS2’s potential supply chain are either unfamiliar with the aspects of BIM that HS2 wishes to deploy, or lack the skills to apply them. What we can learn from HS2 project is how it examined whether the supply chain can meet HS2’s needs and recommends ways of closing any skills gap.

Any project of this scale will create many challenges, but procurement is what specified in HS2 as the most difficult one. This reflects that procurement plays a vital role which needs enough detail for the supply chain. Making sure to have the right information and BIM standards within the contracts, and making sure to have the right incentives in place would ensure successful delivery on project requirements. It’s also

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crucial to maintain the balance between under specifying to have complete flexibility in the supply chain, and over specifying which may decrease the level of innovation.

### **Learning from HS2 and Crossrail projects: How to successfully implement BIM in a project**

From implementation of BIM in either HS2 or Crossrail project, we can summarize some characteristics of a successful BIM project. First and foremost, project manager needs to keep the standardisation. This was the first aspect that should be made clear in the project – making sure that everyone had standards to work to that achieved standardised data deliveries, and that there was a standard common data environment that people actually worked in. In that case, people could improve the validation and assurance processes and streamline some of the delivery, and therefore, examine what efficiencies could be achieved.

One of the biggest benefits of BIM is that by working in a virtual world, the project can be tested and certainties realised very early because the whole process is about mitigating risk. The risk would be quite high when people finally get onsite and know what's going to happen, when it's going to happen, what will go where, where people will be. BIM implementation at an earlier stage has meant a change of working compared to traditional projects. BIM is very much about a cultural change and about people making decisions early on in the project. It has certainly presented more opportunities than it has frustrations, and provided a big learning curve for both the client and the supply chain.

It is to a certain degree that HS2 is reaping the lessons learned from Crossrail, since the latter was Europe's largest construction project. It was said that the Crossrail project would be exploiting, exploring and developing technologies that will be copied and built upon in future projects. This means that understanding on assets could actually be made before the construction. Even though when there is nothing has been built yet, the understanding of virtual assets could reach a certain level of detail from past projects. Moreover, through the process of BIM implementation, information capturing continues to develop to mature as construction going on, moving to as-built asset information. The big benefit is having a really efficient hand-over of information from construction, to operations and maintenance. By working in a data driven environment, and to a standardised approach, data hand over could become quite easy and hence lead to the success in BIM implementation.

### **Insight 3: Movement Insights and Value Management**

Over the decades, transportation means has been played an increase vital role in social interaction, economic exchange and globalization. Expenses on transportation has also been surging, especially in public transport. The transportation companies have introduced advanced technology, other than cash payment, to settle the fee in order to enhance the convenience to the passengers and minimize the labor requirement in dealing with payment in the stations. The technology allows for the physical payment and virtual payment.

#### **Physical Payment**

Traditionally, passengers have only been allowed to settle their transportation fee by direct pay in cash (i.e. buying the single ticket) or using the Stored Value Cards (i.e. Octopus Card in Hong Kong and Oyster Card in London are examples.). The Stored Value Cards can be topped up through the direct payment in the stations. Although using Stored Value Cards are more convenient when comparing with buying a single ticket (especially during peak hour which long queues happened frequently), the passengers still need to bring along with additional cards in their wallet.

Thus, the payment by bank cards have been introduced by the transportation companies. People nowadays is more appealing to multi-functional payment means, which they do not require to bring along with loads of cards. In London, the passengers of the subways could use their bank cards to direct pay at

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the ticket gates when the bank card consists of the contactless function, which are usually the RFID technology or near-field communication (NFC). Since the payment will be directly deducted in passenger's bank or credit card, they are also no longer required to store extra money in other cards or payment systems, which would reduce the possible loss due to the bankruptcy of the stored value card company.

### **Virtual Payment**

With the wide application of smart phones, people are now encouraged to the virtual payments. Virtual payment means the payment is delivered through a virtual card instead of by cheque or cash. The users are only required to install the mobile app with registered stored value cards or bank cards in the smartphone. Near-Field Communication (NFC) and quick response code (QR code) are the two common technology adopted.

For payment adopted QR code technology, when passengers arrive at the ticket gates, they are just required to open the Mobile App (i.e. Apple pay, Android pay and Alipay are examples) in their smartphones, they can get into the paid area with the accepted “bee” sound from the gate. For payment adopted with NFC technology, the mobiles are put close to the ticket gates, the payment will be automatically pop up and the passengers just need to accept the payment. The NFC technology offers easier transactions compared with QR code. In spite of this, both technologies allow passengers to complete their payment within seconds in contactless way.

The virtual card payment has also been developed and adopted in Japan, Hong Kong, Guangzhou and Shanghai metro and etc. This application is not only introduced in the transportation field, but also in the retails. Thus, the passengers do not need to bring along with any cards, but just with their mobile phone. They can settle a wide range of the daily transactions made.

### **Challenges**

Undoubtedly, the fast and simple payment via bank cards and mobile app is attractive. Surging of users, me included, are changing payment ways to the new technology. There are potential risks which makes the cash payments still being the essential, if not fundamental, payment means. The new technology heavily relies on the supply of electricity and network. In order words, the payment would hardly be completed if there is a shortage of electricity or network being interrupted. Therefore, as the consumer, we should not just rely on e-payment channels but shall also get prepared for the conventional payments. For the government and service providers, they should proactively ensure the security of e-payment and virtual payment instead of just blindly promote the advantage of new technology and the public of the possible risk of it.

Research 2: Sustainability

**Insight 1: Hierarchy of Road Users**

Sustainability is one of the key elements to be considered when planning for development of a city. With a view to address the uprising social needs/ problems without compromising the availability of resources for future generation, it is used to be challenges for planners/ engineers to come up with sustainable solutions in environmental, economic and social aspects.

For busy cities like Hong Kong and London, road spaces in urban areas are always congested by vehicular and pedestrian traffic, while congestion is always one of the most critical problems to be resolved before pushing further developments. To address the increasing traffic attracted and generated by new developments, resources (space and right of way) should be wisely allocated to different groups of road users.

In Hong Kong, to promote green transport modes (with low carbon emissions), the government has commenced pedestrian studies like *Consultancy Study on Enhancing Walkability in Hong Kong* and the *Review of Assessment Mechanism for Hillside Escalator Links and Elevator Systems and Preliminary Feasibility Studies*, with a view to supporting the Government's "Walk in HK" initiative and creating a more pedestrian-friendly environment in our city. With a view to promote "walk more, ride less", people are encouraged to reduce the use of mechanized transport for short-distance commuting, so as to alleviating traffic congestion, improving air quality and making walking an integral part of life in Hong Kong as a sustainable city.

Sharing the similar initiative of promoting sustainable transport development, in London, better environment is target to be constructed for walking, cycling and public transport. Hierarchy of road users has been clearly setup for guiding the road planning strategy, putting pedestrians and cyclist at the first, while private car users shall come last:



Figure above: Different transport modes at a glance

With the site visit to Vauxhall and the surrounding areas by Christopher Martin, the Co-Founder and Director of Urban Strategy, we have seen that traffic calming measures have been widely implemented in London, for uplifting the walking environment over the city. Priority is given to pedestrian at road junctions by implementing speed tables with same types of pavers at footpaths, while planters are implemented in the form of buildout to keep sufficient width for pedestrian movement.



Photos above: (Left) An example of enhanced cycleway; (Right) An example of buildout planter on carriageway

Unlike Hong Kong, cycling is another focus for promoting low carbon transportation in London. From the seminar on overview of London infrastructural projects, site visit to Vauxhall, as well as our daily experience throughout the delegation, we have experienced the government's effort on promoting cycling and got the chance to have a close look on one of the featured infrastructural projects in London, Cycle Superhighways. Promotion of cycling has been launched in London for a couple of years, with the first batch of cycle superhighways opened since 2010 and 2011. During these years, Transport for London conducted numerous off-street trials to test adaptation of European best practice design (*International Cycling Infrastructure Best Practice Study* by ECF) to UK. Subject to further enhancement on design standards, the second generation of cycle superhighways was built to be physically separated from car traffic, which further prioritized cyclist among all other vehicular traffic.

Facing similar land issues as Hong Kong, space in central London is severely limited. Therefore, the revolution for implementation of cycle superhighways always requires a complete redesign of the street. The designers attempted to maintain the pre-existing external kerb lines of the carriageway (to avoid reducing the space for pedestrians or greenery) but fit in a 4-metre wide cycling path in between them. As a "give and take" issue, the road spaces would need to be rearranged for pedestrians and cyclist, which means the nos. of car lanes would need to be reduced, with narrowed width/ removal of central median. In regards to the light from experience of London, it provides another possible way for facilitating the promotion of green transportation. It has never been too late for contributing on sustainable developments and it is time for us to review the most suitable hierarchy of road users for our city.

## **Insight 2: Spatial Development of Infrastructure**

### **Introduction**

Apart from changing the travel habits of residents by promoting walking and cycling in the city, the challenges of urbanization, such as growing population and increasing environmental consumption, can also be acknowledged by redeveloping existing infrastructures such as terminals and airports.

As highlighted in the London Plan, a statutory spatial development strategy for London published by the Greater London Authority in 2016, retrofitting buildings can make a significant contribution to the climate change and resource management. Instead of new construction, renovating current infrastructures can often be more cost effective and sustainable up front.

A sustainable redevelopment project includes considerations from planning, construction and operation stage – such as securing sustainable procurement of materials, minimizing carbon dioxide emissions and waste generation, promoting use of renewable natural resources, as well as protecting biodiversity and green spaces. Two examples from London will be detailed below to demonstrate how expansion of existing infrastructures could be done successfully to balance demands for development with the need to protect the environment, and to achieve social and economic objectives.

### **Redevelopment of London Bridge Station**

London Bridge Station, built in 1836, is the first railway terminus in the central London. As one of the oldest stations and the fourth busiest station in the country, the passenger and rail capacity of the station has to be increased in order to ensure the station can cater for the unprecedented passenger growth in the near future. Thus, the six-year station redevelopment work, under the Thameslink Programme, has been delivered from 2013 to 2018.

To increase the passenger capacity, the project began with the removal of the original railway arches and the construction of a new street-level concourse. After the establishment of the new concourse, with a size as the pitch at Wembley Stadium, the space for passengers has been expanded two-third larger than before. All railway platforms at London Bridge Station can now be accessible from single place, which greatly enhanced the passenger experience. With the new Stainer Street walkway and entrances on Tooley Street and St Thomas Street, the connectivity of the station to the surrounding areas has also been improved.

Apart from creating a spacious concourse for passengers, the track layout has also been reconfigured under the project in order to increase the rail capacity and relieve the bottleneck London Bridge Station faced. Before the realignment of the railway tracks, there were nine terminating platforms and six through platforms at the station, which meant that the available space for the trains passing London Bridge to other destination was limited. Indeed, only one Thameslink train per hour can be provided during the peak hour at the former London Bridge Station. However, things changed after the platforms have been swapped, which means there are now nine through platforms and six terminating platforms instead. More trains can then serve London Bridge Station as the intermediate station. By now, the train frequency has been raised from originally 16 trains per hour to 24 trains per hour.

The redevelopment work not only focuses on the increase in the station capacity, but also introduces different sustainable designs into the station. The new street-level concourse has been designed with natural ventilation and does not require any heating or air conditioning throughout the year. The use of natural light has also been implemented into the design of the dynamic roof canopies. With natural ventilation and lighting in the station, significant energy saving and reduction in carbon emission can hence be achieved. Besides, retailing has been emphasized since the planning stage. With the reconfigured layout of the station, up to 92,000 sq. ft. of new retail space has been provided, which is the most among

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all Network Rail Stations. This will bring much more economical value inherent in the transportation and also act as a catalyst to the business of surrounding areas. In addition, the preservation of cultural heritage is a crucial part of the redevelopment. For example, the new concrete arches were seamlessly merged with the historical quadripartite arches at the Western Arcade and the Grade II listed brickwork wall along St Thomas Street was also refurbished, which retained the rich history of the station as much as possible.

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### **Insight 3: Crossrail Passenger Experience**

As the UK's population is set to reach 10 million in 2030, its transport system must be enhanced to cater this increasing demand. New East to West Railway of Crossrail is a key part of the UK's plan to maintain London's place as a world-class city by providing capacities for considerable growth and maintaining the highest standards in urban transportation.

Crossrail is the first project of huge scale to consider sustainability from the beginning and embed sustainable thinking into its planning. Crossrail published the sustainability strategy in 2009 as construction of the Elizabeth line began at the Canary Wharf site. The strategy set a path to ensure Crossrail would make a positive contribution to the UK by providing various transport choices and supporting a sustainable pattern of growth in London and the South East of UK. It acts as an example presenting how the new railway will benefit passengers and the city when it becomes operational and the sustainable delivery of the new railway project looking at its design, construction and future provision for sustainable operation.

The strategy set a holistic approach aimed at delivering economic, environmental and social sustainability improvements in the UK. Crossrail also set seven sustainability themes that were aligned to its two sponsors, Transport for London and the Department for Transport, including Economic growth, sustainable consumption and production, addressing climate change and energy, protection of natural resource, improvement in health, well-being and happiness, safety, security and health and equality of opportunity and social inclusion. Key sustainability initiatives were identified, and objectives and targets were set where possible. Where there were no available relevant benchmarks, the approach was to either use informed judgement to select a nominal target, or an objective was set with a view to observe what could be achieved and provide benchmark data for later projects to use. Each initiative would work towards delivering a sustainable railway.

Crossrail's sustainability performance is told through the well understood themes of social, economic and environmental sustainability and is designed to meet the aspirations of our joint sponsors (Transport for London and Department for Transport), stakeholders and future passengers.

During the delegation to London, we visited the Liverpool street station on Elizabeth line which is one of the Crossrail station located at City Centre of London. It is still under construction and planned to be operating from late 2019. The Elizabeth line is a new line for London which will stretch more than 60 miles from Reading and Heathrow in the west through central tunnels across to Shenfield and Abbey Wood in the east. This new railway, currently being built by Crossrail Ltd and will stop at 41 accessible stations, 10 newly built and 30 newly upgraded, and is expected to serve around 200 million people each year.

Liverpool Street Station accommodates Crossrail as one of the "Elizabeth line" stations at new underground platforms to the south-west of the existing station building. Trains will run west towards Heathrow Airport or Reading in Berkshire via Paddington, and east to Abbey Wood in south-east London or Shenfield in Essex. Providing more options for London's citizen or travellers from other countries travelling from the Airport to the city centre. There will be a new ticket hall with step-free access next to the Broadgate development, with a pedestrian link via the new platforms to the ticket hall of Moorgate, providing direct access to London Underground's Northern line and the National Rail Northern City Line at Moorgate. Thus, Liverpool Street will appear on the Tube map as an interchange with Moorgate, similarly to Bank and Monument.

Enhancement in the travelling speed and time provides more opportunity for economic growth and it helps in attracting the people from other zone to work outside from their hometown. The six off-peak trains per hour that currently form the TfL Rail "metro" service from Shenfield will be doubled in frequency and diverted into the Crossrail tunnel after departing Stratford. Additionally, four trains per hour peak-only service will be retained between Gidea Park and Liverpool Street into the existing terminus over the Great

## **HKIHT Overseas Delegation 2019 to London – Delegation Report**

Eastern Main Line between Stratford and Liverpool Street (omitting Whitechapel). Once Crossrail opens, platform 18 at the main Liverpool Street station will be decommissioned to allow platforms 16 and 17 to be extended, enabling them to accommodate nine-carriage trains.

For improving the people's well-being and happiness, Liverpool Street is with unified architectural design inside the ticket halls which is driven by the desire to maximise height in these constrained spaces. A shallow, folded ceiling plane formed by ribbed pre-cast concrete panels breaks the perception of the low flat ceilings to create a greater sense of space, scale and movement. The grooved, angled ceilings could be seen to resemble the pinstripes, often seen in the suits of City workers. A subtle sparkle of mica in the fibre-reinforced white concrete will glow with indirect lighting. The use of indirect lighting can effectively reduce the energy consumption by minimizing the redundant lighted area, which can address the theme of energy saving.

The entrance into the underground eastern ticket hall is through a striking, 5m-high glazed canopy located in an open pedestrian plaza. Natural light will filter below ground during the day, while at night the canopy acts as a lantern with artificial lighting from inside shining out of the glazed entrance to illuminate the streetscape. Such design can utilize the use of natural resource.

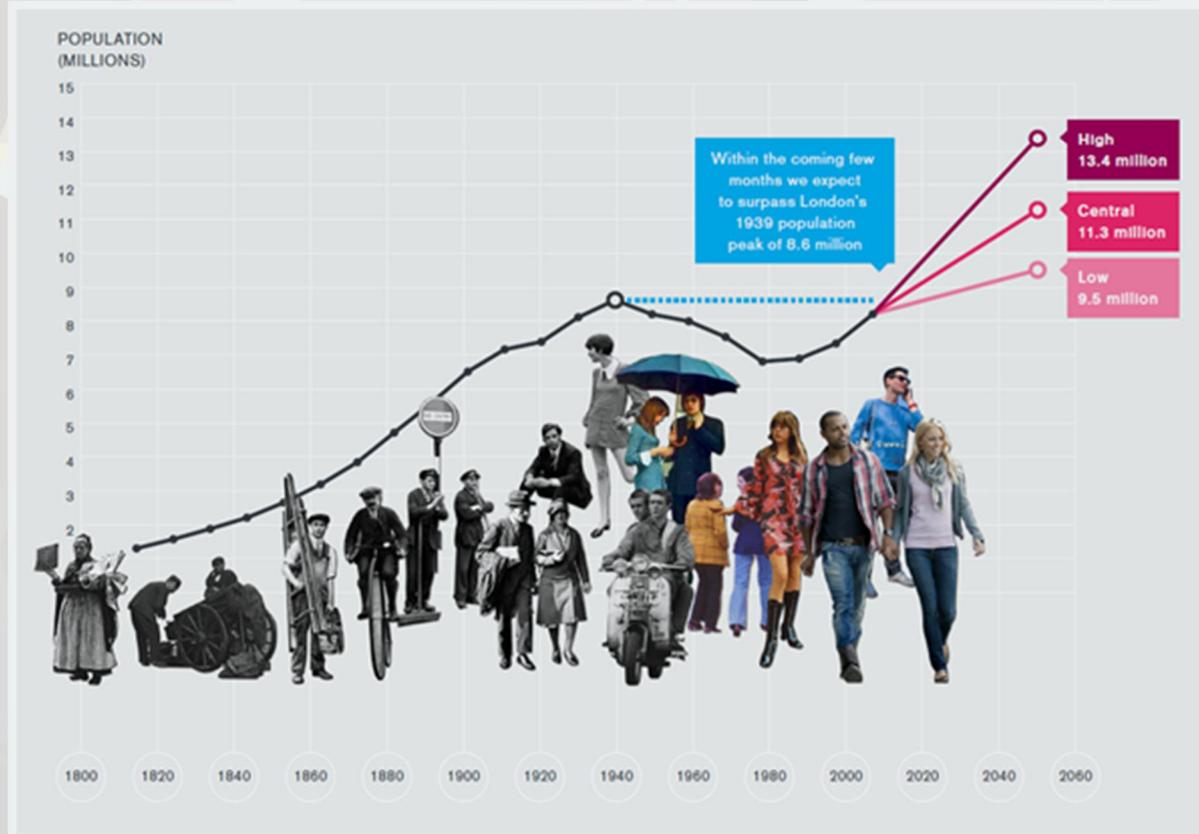
For improving the happiness of travel, Transport for London (TfL) and Aviva Investors have completed a deal that will see a mixed-use scheme above Crossrail infrastructure and opposite the new Liverpool Street Elizabeth line station's western entrance at 101 Moorgate. The City of London granted Crossrail and Aviva Investors planning permission in 2012 for a six-storey mixed-use development, which includes more than 51,000 square feet of office space and more than 2,500 square feet of ground-floor retail space.

In conclusion, Crossrail in London presented as a great example of a sustainable transportation development, with enhancement in architect design utilizing the use of natural resources, improvement in speed and access to other end of UK, providing more job opportunity and mobility and a better place for people's happiness.

## Research 3: Funding and Policies

### **Insight 1: Fiscal Devolution on Funding Gap Reduction**

#### **Introduction – Background of London**



**LONDON'S HISTORIC AND EXPECTED FUTURE POPULATION GROWTH**

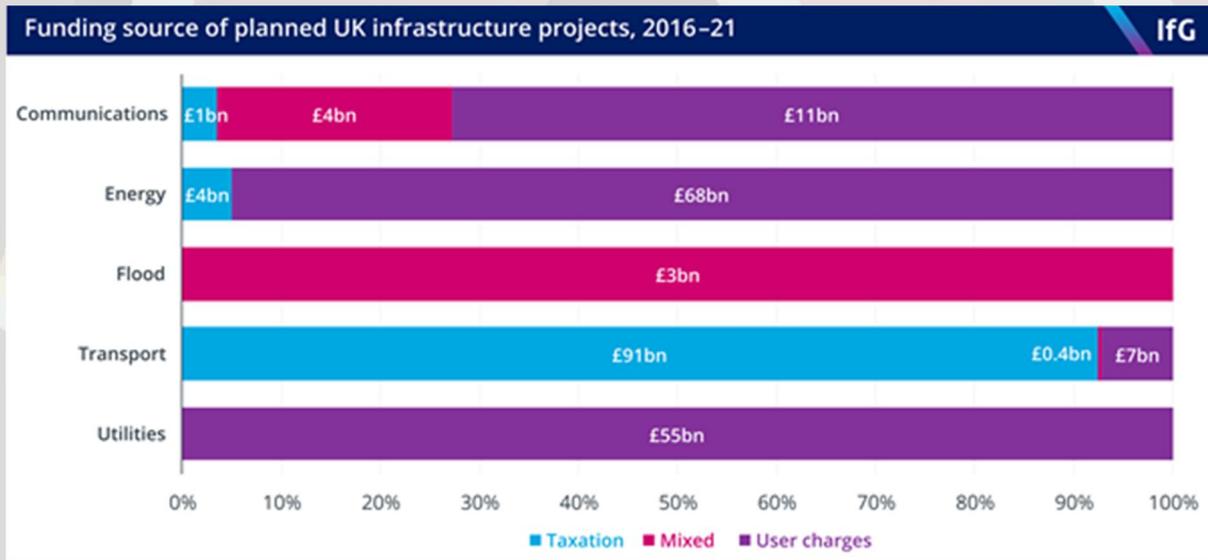
Source: GLA Intelligent Unit

London's population continues to grow and has broken line of 9.0 million in the last few years. By 2050, it is projecting to hit amount of 11.3 million, with high 13.4 million and low 9.5 million from the above figure. Impact of a noticeable growth in population implies an increase in the demand for public transport. For example, rail demand is seen to rise by 30% before 2025, London's airports are going to be reaching capacity near 2030 by Transport for London (TfL). To deliver London's future infrastructure, transport demands and to support its growth for sustaining as a leading global hub, adequate funding functions a key role.

#### **Estimate Result of Funding Gap**

However, estimate reveals a large funding gap in comparison to the current level of funding which urges a need to search for potential solutions on reducing this funding gap, as the issue of funding not only signals a financial challenge ahead but also critically underpins a vital question 'who will be able to eventually pay for lifecycle of the infrastructure project'. A direct cost could lead to development projects lagging behind the schedule or further project cancellation. The London Infrastructure Plan 2050 outlined £1.3tn necessary for total investment in developing London's infrastructures. The Mayor's Transport Strategy, published in 2018, presented a result of £32bn funding gap in transport sector. Based on the research consultation work conducted by Arup, it identified a number of ways to reduce the funding gaps, such as an emphasis on step of fiscal devolution.

**Reasoning and Advantages of Fiscal Devolution**



Source: IfG analysis of Infrastructure and Projects Authority, 2017, "National Infrastructure and Construction Pipeline Autumn 2017". CC BY-NC

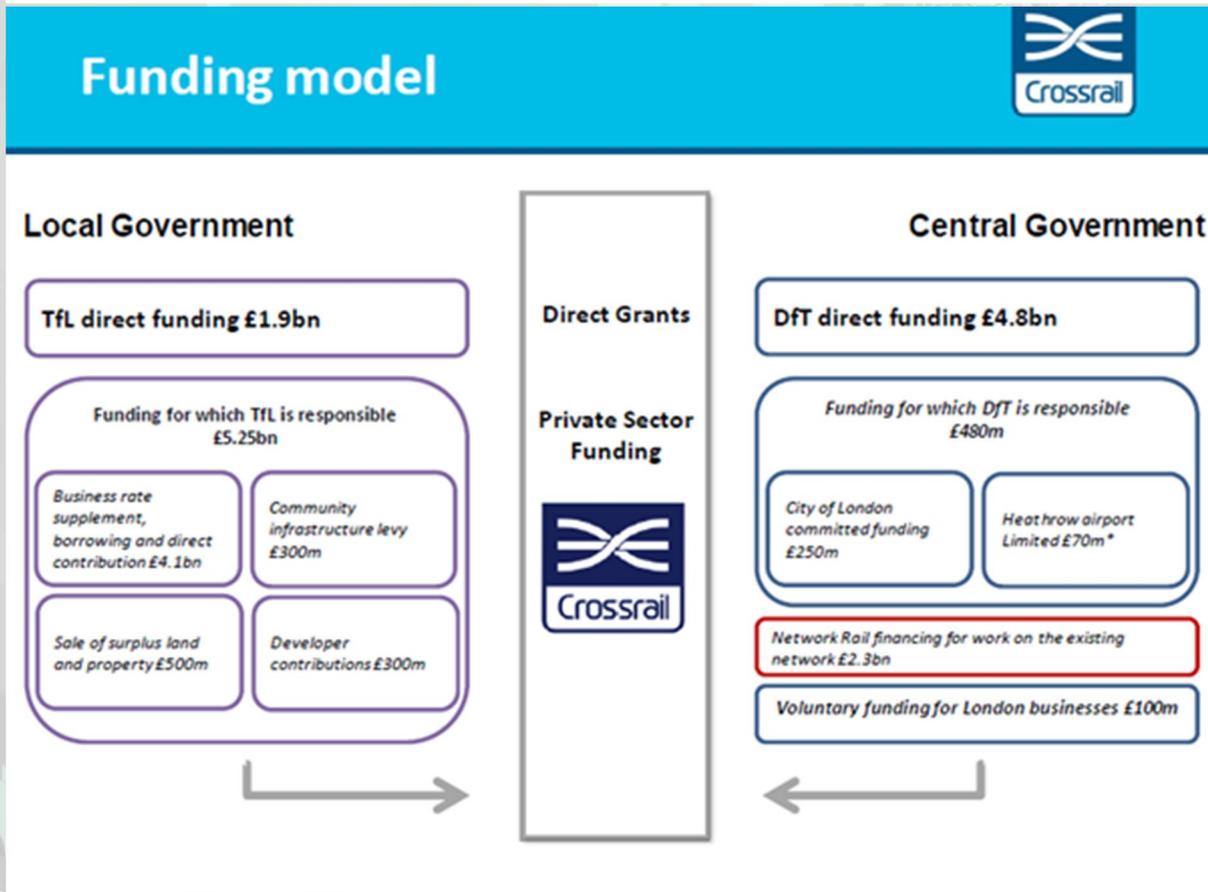


Figure above: CROSSRAIL MOVING LONDON FORWARD – FUNDING MODEL

Source: Crossrail

Taxation provides a major source to fund infrastructure projects, particularly for transport sector shown by the chart above. However, the London government (local authority) faces limit in mobilizing tax revenue. The mayor of London currently controls fundraising powers restricted to council tax (tax imposed on domestic property and collected by local authorities, e.g. houses), business rate (tax imposed on property used for business purposes collected by local authorities, e.g. offices), and user charges (charge for service use, e.g. transport fares), which in sum comprise direct control only 5% share of locally raised

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taxation - a clear limited fiscal autonomy in contrast to New York that owns nearly 50%. Under current setting, London is seen as a country-wise net contributor (to public finance) not net beneficiary in eyes of central government when central government redistributes taxation revenue and offers grant to district at local level, which puts the London government in a relatively passive role in fundraising. In 2015/16, London contributed £136.7bn far more than £110bn of total public expenditure devoted to London.

Therefore, the research introduced fiscal devolution as a next step for an eventual move to reduce future funding gap (i.e. by decentralizing fiscal power – transfer of expenditure responsibilities and revenue assignments to lower levels of government).

**Provision of stronger incentives for local government in infrastructure fundraising.** A successful fiscal devolution therefore expects to provide a broader tax base for the London government. A stronger fiscal controls at the local level on its own transport and other infrastructure investments is consequently feasible, from the basis of having a more effective, consistent and integrated service. This could diversify disposal range of taxes and revenues, from devolving a full suite of property taxes to the London government to generate funds, as well as to provide a stable base against which government of London can prudently borrow. A direct benefit could be to push infrastructure projects, such as Northern Line Extension project, moving forward.

**More efficient delivery of local preferences.** Since the government of London could be better at capturing taxation information and spending in their regions than the central government, it grants their means, through a combination of devolved property tax measure mentioned above, to further increase extraction of land value from taxing value uplift on property catalysed by infrastructure development. As an example, the local government can work with boroughs, such as the Greater London Authority (GLA) and TfL, to develop objectives and options of a land value capture charge. A funding model provided by the Crossrail shares a direct figure that currently only half of direct funding is managed by the local government (£1.9bn) while relatively size of funding from central government (£4.8bn) is far beyond doubled, pointing limitation on delivering local preferences.

### **Brief Summary**

In short, fiscal devolution sets out an opportunity for the London government to make self-determined investments in infrastructure to meet the challenge of funding gap so to encourage a sustainable growth in infrastructure development for the capital.

### **Reference:**

1. Londoncouncils.gov.uk. (2018). Funding infrastructure | London Councils. [online] Available at: <https://www.londoncouncils.gov.uk/our-key-themes/infrastructure/funding-infrastructure> [Accessed 11 Oct. 2019].
2. Ministry of Housing, Communities & Local Government (2018). Local authority revenue expenditure and financing England: 2018 to 2019 budget. [online] GOV.UK. Available at: <https://www.gov.uk/government/statistics/local-authority-revenue-expenditure-and-financing-england-2018-to-2019-budget> [Accessed 11 Oct. 2019].
3. Arup.com. (2015). [online] Available at: <https://www.arup.com/projects/london-infrastructure-plan-2050> [Accessed 11 Oct. 2019].

Insight 2: Privately-funded Projects VS Public-Private-Partnership

**Introduction**

In most cases, the costs of public infrastructure projects are ultimately recovered through consumer bills, user charging, public funds from taxation, or a combination of these mechanisms. To launch projects, however, a large amount of initial capital investment (finance) is needed. This can be provided either through public or private sources, or a mix of the two.

For example Crossrail, one of the receiving projects of this delegation, is financed by direct public funding of local (London) government, central (national) government and private sector funding through various kinds of financing agreements such as the case of Woolwich station under which a property developer would build the basic box structure for the station at his own cost and transfer to Crossrail while construct his own development overhead.



Figure above: (Left) Woolwich station box structure, constructed by property developer Berkeley Homes and handed over to Crossrail for remaining fitting-out works, (Right) Inside the Woolwich station structure with subsequent fit out works almost completed by Crossrail’s contractor. Photo taken at this delegation.

**Current status in the UK**

In the UK, transport infrastructure is mainly financed by public funding at a proportion of over 85% (year 2016 figure). The involvement of the private sector is much lower compared to the overall proportion of public spend on other economic infrastructure excluding public sector social funding – 36%. In this regard, private funding does not play a major role in funding among the UK’s transport infrastructure projects.

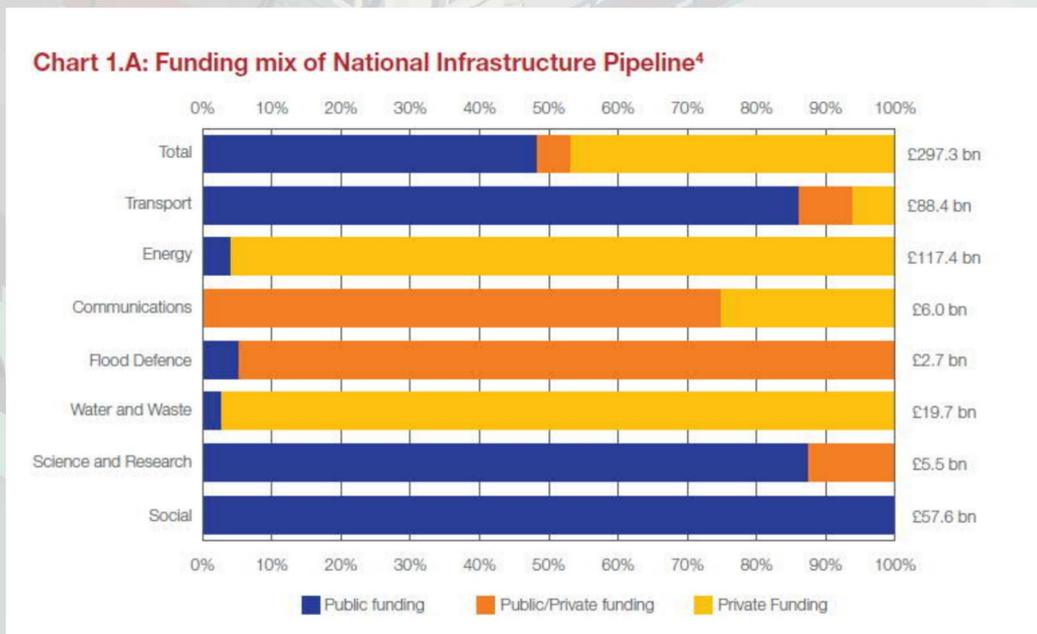


Figure above: Funding mix of National Infrastructure Pipeline in the UK

**PPP / PFI**

PPP, Public-Private-Partnership also known as PFI or Private Finance Initiative in the UK, are Long-term contracts where the private sector designs, builds, finances and operates an infrastructure project, while the public sector pays an annual fee for say 25 to 30 years.

In the UK, PPPs have delivered £56 billion of private sector capital investment in over 700 infrastructure projects. These do not only include transport infrastructure but also other public / social services and services for the military. Through this arrangement, national infrastructure investment can be increased without raising government debt or public spending. Other advantages include control of construction costs due to incentives for the private sector, improvement of operational efficiency, quality and maintenance of assets.

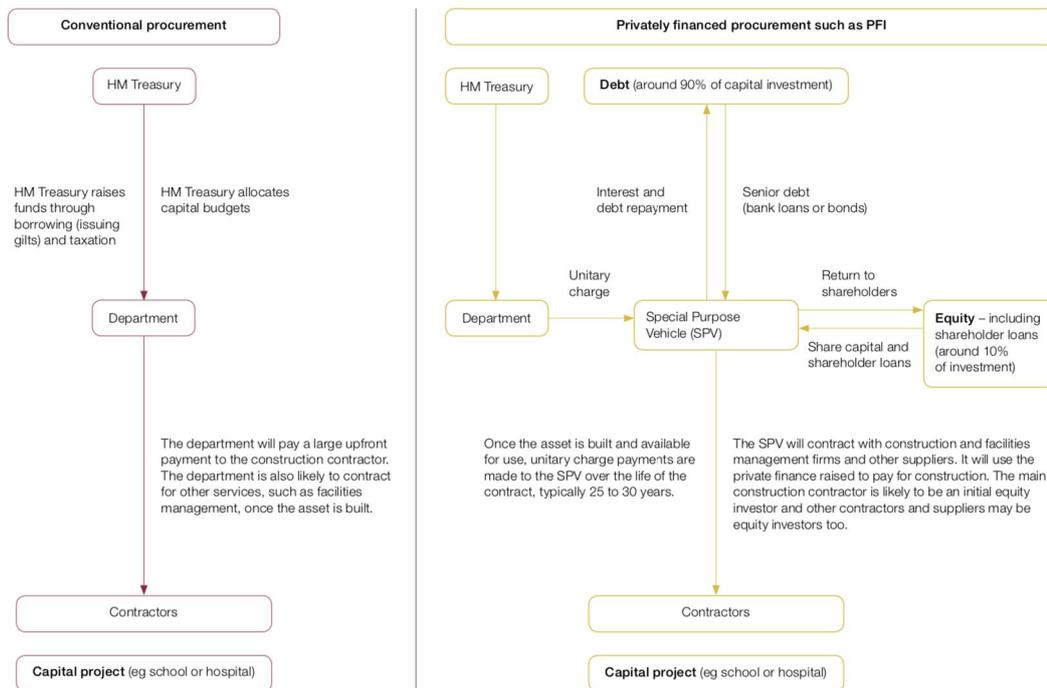
**A comparison between conventional public-funding vs privately-financed (PFI) Procurement**

For a conventional public-funding procurement, the government’s treasury would obtain the funds the project needs through borrowing and taxation while allocating the capital budgets. The government responsible for execution of the project will pay a large upfront sum to the contractor collected above to proceed construction. Once the construction work is completed, the department may also contract out the subsequent operation and management of the asset.

On the other hand, Special Purpose Vehicle (SPV) – a private finance company set up for the project plays a central role of a PFI procurement. SPV collects fund from equity and by borrowing through bank loans and / or bonds to pay for construction of new asset. Once the construction work is completed and operation commences, the government makes ‘unitary payment charge’ over the contract term of typically 25 to 30 years, which cover debt repayment, financing costs, maintenance and any other services provided.

**Figure 1**

Comparison between private finance and conventional procurement



Source: National Audit Office analysis

Figure above: Comparison between private finance and conventional procurement

**Problems with PPP / PFI and attempted solutions**

Over the years, several problems with PFI have been recognized. Particularly in the UK –

- i. After 2008 financial crisis, long-term loans become more difficult and expensive for the private sector to obtain from commercial banks, while they can be obtained relatively cheaply by the government, making PFI less financially viable.
- ii. There is lack of announced projects (e.g. in 2010-11) created PFI market uncertainty in a short term

In view of these issues, a review and reform to PFI has been undertaken by the UK government in 2012, leading to the creation of Private Finance 2 (PF2). Under the revised scheme, the government would become a shareholder in future projects, to ensure a more collaborative approach to improving project performance and managing risk, to provide greater transparency of public private partnership arrangements and to improve overall value for money for the public sector. The level of equity is increased and the level of debt is lowered. Despite the above, this reform has been reversed eventually because of the improvement of lending market (diminished purpose of the reform), the inflexibility of PF2, and also because PF2 brings fiscal risk to government.

**UK’s move to attract more private sector funding**

The UK government has initiated the UK Guarantee Scheme to support private investment in ‘nationally significant’ projects. By offering a government-backed guarantee of the repayment of principal and interest payments on infrastructure debt issued by the private borrower to banks or investors, UKGS helps infrastructure projects access debt finance where they have been unable to raise finance in the financial markets. UKGS is not a form of ‘state aid’.

UKGS can issue up to an aggregate sum of £40 billion of guarantees to at least 2026. To date, guarantees have been approved for 10 projects with a capital value of around £23 billion.

| <b><u>Infrastructure projects supported by UKGS</u></b>     |   |               |                  |                   |
|---|---|---------------|------------------|-------------------|
| <b>Project</b>  | <b>Guarantee</b>                        | <b>Status</b> | <b>Sector</b>    | <b>Region</b>     |
| Drax Power - conversion from coal to biomass                | £75mn (bond)                            | Released      | Energy           | Yorkshire         |
| Sustainable Development Capital Limited                     | £9mn (loan)                             | Released      | Energy           | UK                |
| <b>Northern Line Extension</b>                              | <b>£750mn (standby liquid facility)</b> | <b>Issued</b> | <b>Transport</b> | <b>London</b>     |
| <b>Mersey Gateway Bridge PPP</b>                            | <b>£257mn (bond)</b>                    | <b>Issued</b> | <b>Transport</b> | <b>North West</b> |
| Ineos Grangemouth - Shale gas import and storage facilities | €285mn (bond)                           | Issued        | Energy           | Scotland          |
| Speyside CHP plant  | £48mn (bond)                            | Issued        | Energy           | Scotland          |
| University of Northampton - relocation of campus            | £292mn (bond)                           | Issued        | University       | Midlands          |
| Countesswells - 3,000 unit housing development              | £86mn (loan)                            | Issued        | Housing          | Scotland          |
| University of Gloucestershire - Pittville Student Village   | £39mn (bond)                            | Issued        | University       | Midlands          |
| Hinkley Point C   | £2bn (bond)                             | Approved      | Energy           | South West        |

*Table above: Infrastructure projects supported by UKGS as at Aug 2017*

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Beside support from the national government, various funding sources from institutional investment are also sought for.

For example, the UK has been the second largest recipient of funds allocated by European Investment Bank (EIB) to date; over £1 billion of investment has been obtained from the National Association of Pension Funds & Pension Protection Fund through the Pensions Infrastructure Platform (PiP). Nevertheless, when considering local government pension scheme totalling at £190 billion, it is appreciated that there is still great room to increase pension funds' investment to infrastructure projects. Insurers' Infrastructure Investment Forum is established to encourage British insurers to invest in UK infrastructure. Insurers have already invested over £5 billion in infrastructure projects. For example, £200 million investment in new rolling stock for the Govia Thameslink Railway.

### **Reference**

1. National Infrastructure Delivery Plan 2016 – 2021, Infrastructure and Project Authority, 2016
2. PFI and PF2, National Audit Office, 2018
3. Infrastructure Investment UK & Ireland, AECOM, presented 13 Aug 2019
4. Moving London Forward, AECOM & Crossrail, presented 13 Aug 2019
5. GOV.UK website, retrieved 7 Oct 2019

### **Insight 3: Cost-effective Policy**

#### ***Transport of London is facing a financial challenge.***

- TfL's financial situation became even more uncertain on 23 June 2016 when the UK voted to leave the European Union. TfL appears to have no plans about how it will manage any loss of funding, research, or staff from the EU.

#### ***Increase income***

- Most of the TfL's income comes from fares revenue, and this will continue to grow as London's population increases and Elizabeth Line opens. But fare growth can't be taken for granted,
- TfL is now hamstrung by the Mayor's promise to freeze fares and protect the existing concessionary fares structure.

#### ***What has TfL done?***

- TfL continues to implement its ambitious commercial plans, but its property development initiatives now have to accommodate the Mayor's wish to increase the share of affordable housing. This will inevitably reduce TfL's financial return on these sites.

#### ***Concessionary fares***

- The Mayor committed to provide certainty to a large number of passengers in London, but it comes at a cost to TfL in terms of lost revenue. The concessions are provided for child, students, elderlies and tourist etc.

#### **Introduction**

Transport for London (TfL) has been facing a number of significant financial challenges since 2016. In this research, we are going to study how TfL has overcome the challenges by different measurements. TfL's financial situation became even more uncertain on 23 June 2016 when the UK voted to leave the European Union. TfL appeared to have no plans about how it will manage any loss of funding, research, or staff from the EU. We are going to reveal how TfL manage the risks and consequences of the referendum result in its Business Plan.

In the business plan, TfL set out its best estimate of the impact of the UK's exit from the EU on TfL. It included an assessment of the impact on:

- Passenger growth and fares income
- Borrowing costs
- Commercial plans
- Staff recruitment and retention
- EU grants and EU-funded transport research.

The Mayor instructed TfL to review its concessionary fares system to ensure it could meet the objectives of his Transport Strategy.

#### **The challenge - Loss of the revenue grant**

In the 2015 Spending Review, the Government accelerated how fast it was cutting its revenue grant to TfL to zero. TfL's previous business plan (published in 2014) had not assumed significant cuts to its revenue grant. And while TfL told this Committee in January that it had been expecting the Government to stop providing revenue funding by 2020-21, the Government brought forward this cut-off point by two years to 2018-19. According to TfL, the Government had cut its grant funding by a total of £2.8 billion from 2015-16 to 2020-21. As Mike Brown, Transport Commissioner, told this Committee

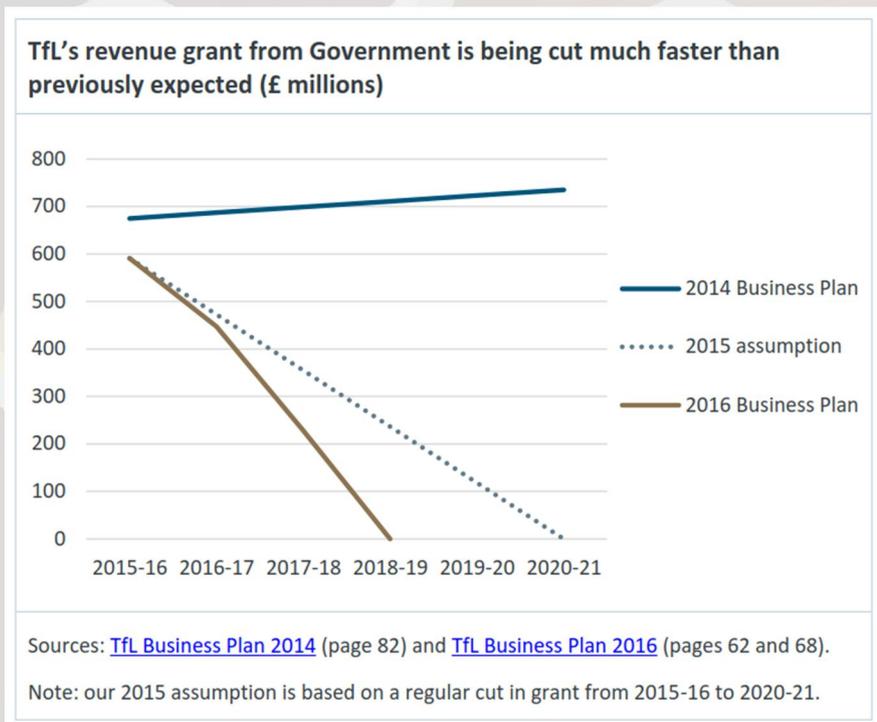


Figure above: TfL's yearly revenue grant from Government, 2015-21

In January 2016, TfL told us this would equate to approximately £300 million less to spend on capital projects a year than previously planned.

### **The challenge - Concessionary fares**

The Mayor's committed to protect the existing concessionary fares— in line with the policy of previous Mayors Livingstone and Johnson—provided certainty to a large number of passengers in London, but comes at a cost to TfL in terms of lost revenue. TfL offers a range of concessions based on:

- Age (such as the 5-10, 11-15, and 16+ Zip Oyster photocard, the 18+Student Oyster photocard, the 60+ London Oyster photocard, and the Freedom Pass).
- Employment (such as the Apprentice Oyster photocard, the Bus & Tram Discount photocard, the Jobcentre Plus Travel Discount, and the Veterans Oyster photocard).

TfL lost almost £300 million of fares revenue in 2015-16 as a result of these concessions. Some of these concessions are more costly than others. The 60+ London Oyster photocard, for example, was introduced by the previous Mayor and provides Londoners over the age of 60 with free travel on public transport in London until they reach state pension age and qualify for a Freedom Pass. But as the state pension age steadily increases, more and more people are becoming eligible for this concession, reducing TfL's fares income by more every year. It has been reported that the cost to TfL was £22 million in 2013-14 and it has more than doubled to £55 million in 2016-17.<sup>18</sup> By 2019-20 it is forecast to reach around £100 million a year.

### **The solutions**

In June 2016, the Mayor and TfL announced that they had identified savings to cover the first two years of the fares freeze pledge:

- "A fundamental review of TfL's organisational structure to review management layers and eliminate wasteful duplication across all its functions, including bringing together engineering operations and IT departments (estimated saving – £20-25 million).
- Improved procurement and renegotiation of contracts from suppliers and other third-party spending which accounts for over two thirds of TfL's total budget (estimated saving – £50-60 million).

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- The reprioritisation and consolidation of IT projects which delivered relatively low benefits (estimated saving – £20-30 million).
- Freezing recruitment for all but the most essential roles and significantly cutting the most expensive of the existing circa 3,000 agency contractors currently engaged by TfL. A reduction of over 100 IT contractors alone will save around £2 million.”<sup>22</sup>

### **Merging engineering functions**

The Mayor’s plan to merge TfL’s surface and underground engineering functions aims to deliver up to £25 million of efficiency savings by bringing together their procurement and office functions, but this is a fairly insignificant contribution towards the £640 million fares freeze. TfL has been keen to stress that it is not just looking to reform its engineering departments, and that its Business and Finance Review is going much further to identify savings across the organisation.

### **Review of concessionary fares**

In view of TfL’s financial position, it was a good opportunity for the Mayor to ask it to assess the cost-effectiveness of its various concessionary fare schemes. Passengers in London benefit from a number of concession schemes, which are set by TfL, the train operating companies and London Councils.

The Mayor has a responsibility to ensure that these concessions are well-targeted and are effectively achieving his policy objectives. After all, fare revenue that is foregone because of these concessions could be used to improve the transport network for all passengers. While we recognise that it is politically difficult to change or cut an existing concession, we risk sleepwalking into a situation where existing concessions are no longer fit for purpose, and more deserving passenger groups are missing out.

The 60+ London Oyster Photocard is one example of a concessionary fare that may not be the best solution to a given problem. It has been reported that the cost of this scheme to TfL will rise from £22 million in 2013-14 to some £100 million a year by 2019-20 as the state pension age increases. A truly fundamental review should include some consideration of whether TfL’s existing concessions are the best way of achieving the desired outcomes.

The Mayor is taking steps to review TfL’s concessionary fares for its own staff, and has requested a review of TfL’s free travel arrangements for the nominees of staff earning a base salary of £100,000 or more. This is to tie-in with a wider review of future appointments of staff with a base salary over £100,000, and a base-pay freeze for the Transport Commissioner and other senior staff. While these are highly-visible measures, they are not going to make a significant impact on TfL’s finances. The Mayor should instruct TfL to review its concessionary fares system to ensure it meets the objectives of his forthcoming Transport Strategy.

### **Increasing income from fares**

Almost half of TfL’s total income is from fares revenue. As the chart below shows, it dominates TfL’s key income streams:

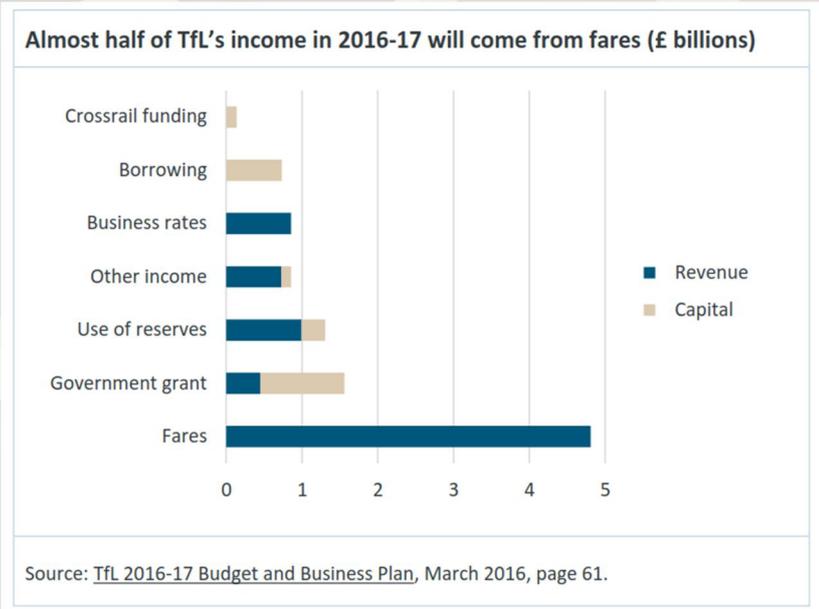


Figure above: TfL's income breakdown, 2016-17

TfL's fares income will continue to rise over the next four years despite the fares freeze. From 2018, TfL will benefit from the additional fares income generated by the new Elizabeth Line. And, as London's population and economy grow, more and more passengers will pay to use TfL's services. According to TfL's March 2016 Business Plan, TfL was expecting its income to increase from £4.8 billion in 2016-17 to some £6.6 billion in 2020-21. The fares freeze could reduce this 2020-21 figure to nearer £6.4 billion.

TfL will have to ensure that it maximises the fares income available to it during this period. One risk to this income is the recent fall in bus passenger numbers. As the chart below shows, demand for bus services in London has fallen for the last 18 months after years of steady growth.

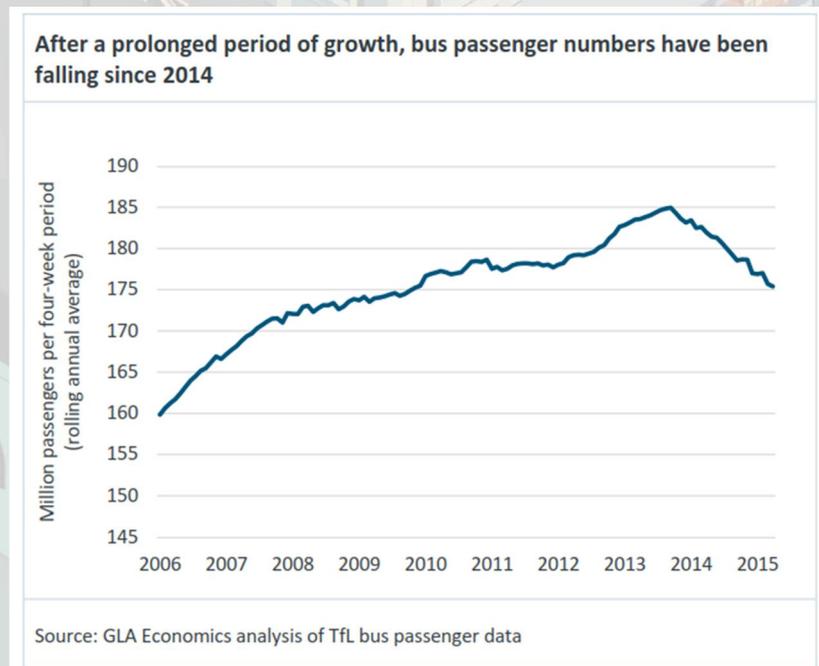


Figure above: TfL's yearly bus passenger numbers, 2006-15

## **HKIHT Overseas Delegation 2019 to London – Delegation Report**

Bus fares are important; in 2016-17, they will be worth some £1.6 billion – a third of TfL’s total fare income.<sup>36</sup> Tackling the decline in bus demand is therefore crucial for TfL, and tackling congestion on London’s roads is a key part of this. Congestion makes journey times longer and less predictable, and puts people off using buses. The average excess waiting time in 2015-16 is also getting worse.<sup>37</sup> The Transport Committee is currently examining road congestion and what can be done to reduce journey times and improve reliability for all road users.

### **Reference**

1. London Assembly, Budget and Performance Committee, September 2016
2. <https://www.london.gov.uk/press-releases/mayoral/mayor-welcomes-chancellors-pledge>
3. TfL’s Chief Finance Officer, Ian Nunn, speaking to the Budget and Performance Committee on 7 January 2016.
4. Mayor’s Budget Guidance for 2017-18, July 2016
5. GOV.UK website, retrieved 7 Oct 2019

## **Delegate Introduction & Reflection**

### **Leon Kwan – Delegation Manager**

I am Leon, the delegation manager of this HKIHT Overseas Delegation to London 2019 and the external secretary of the HKIHT Young Committee. It was definitely an amazing and unforgettable experience to make this delegation happens. In the beginning of delegation planning, the organizing committee have set goals to include the most remarkable and interesting on-going highways and transportation projects in the delegation itinerary, such as high-speed 2, cross-rail and Luton airport transit. Throughout the time of contacting the visit points and arranging the overall logistic plan, we have faced rejections and difficulties to fit visit points in the schedule without clashes but we never gave up on attempting with new ways. We wanted the best for this first HKIHT delegation, as well as to provide some great exposures for the participants. After all, it was an extraordinary experience to successfully solve different urgent issues with the committees during the visits. It was challenging but also rewarding. My biggest takeaway in this delegation is the strategic infrastructure planning in the UK, which promotes social equality and sustainable development in the country.



### **Samson Pung – Chairman, HKIHT YC**



Samson is the Assistant Resident Engineer in AECOM. He was working in the project management team of transportation business line for the design of highways of the going reclamation project in Tung Chung East. He is also the Chairman of Young Committee of HKIHT Session 2019.

This is the third year for me to serve HKIHT and I found it has been very fruitful and enjoyable to see things happening outside Hong Kong. I have been to Beijing, Shanghai and the Greater Bay Area to meet the counterparts of the Institution with other Young Committee. This time we really want to organize something different to celebrate the 20th Anniversary of HKIHT. With the collaborative effort with Young Members Engagement and China Relations team of the Committee, we started to plan for the delegation from April to make it happen. The Overseas Delegation 2019 to London was a remarkable and successful journey, with the theme of Smart Mobility, throughout series of seminars and site visits. We are also proud to have MOU signed with CIHT at our delegation to foster our relationships with overseas Institutions. Special thanks to the Honorary Advisors and Organising Committee for their dedication and effort in making it happen.

Hoping that this Delegation could drive our Young Members to engage with HKIHT and strengthen the momentum of the Young Committee :)

**Athena Ng – Deputy Delegation Manager**



I am Athena, an Engineering Management Trainee in Chun Wo, currently working on the project for road improvement works for the development of Anderson Road Quarry Site.

I have always been fascinated by the advancement of London as one of the world's leading cities. This inspiring and eye-opening trip has given me an opportunity to witness the achievements of London in the past years, and more importantly, to appreciate the similarities and differences between London and Hong Kong. Not merely travelling, we could visit various mega-scale infrastructure projects and discuss with different stakeholders, from planning stage in High Speed 2 to construction stage of Luton Airport, and to testing and commissioning of Crossrail (Elizabeth Line). I also had a deeper understanding on the government's policies for encouraging green and innovative streetscape designs, and I wish Hong Kong could also take a more sustainable approach in urban planning and development.

Being one of the organizing committee of the trip, I would like to thank our advisors and the team for their efforts in organizing successful journey!

**Cara Li – Deputy Delegation Manager**

I am Cara, recently working as a Graduate Engineer in the Transport Consulting Team in ARUP. During my past two years of work, I have been getting involved in planning studies with traffic assessments, also the pedestrian environment improvement studies at Kowloon East and Hong Kong Island North.

This is my first-time visiting London and I am grateful to have such a chance to look into the transport system and relevant planning strategy of an overseas city that facing similar challenges as Hong Kong. In the light of site visits to the on-going infrastructure projects, seminars on town planning/project design, as well as the interaction with the professionals, we are having a wide variety of exposure to the transportation developments in London with implementation of technological advances and get in touch with the design principles for sustainable development. It is a great opportunity for us to learn from overseas experience/ projects and gear ourselves up for shaping our city a better place.



**Amy Wong – Logistics Officer**



I am Amy, working as an assistant engineer in transport consulting team of Arup. Taking the role Logistic officer in this delegation, I am so glad to be given the chance to participate in this remarkable trip, which provided us with both cultural and engineering exposure of London. This was not the first time that I visited London, while this trip provided me the engineering and planning point of view to appreciate London. Not only we visited the construction sites for transportation system in London and further connecting to Wales and Scotland, but we were also guided by the planner to walk through the local districts to understand the planning and policy strategy for promoting green mobility, and, encouraging citizens to change from private mode of transport to public transport. Shaping a better world through engineering is not just talking about providing more and more infrastructure. It is also about how we make good and optimize the use of existing provision to accommodate the fast changing of society and meeting the unlimited demand from the residents.

**Marco Yeung – Logistics Officer**

I am Marco Yeung – the Logistics Officer of this London delegation. My responsibility includes planning route to each event and arrange transport for our fellow delegates. Working in the Geotechnical – Tunnelling Team of AECOM, I have been tasked on structural design for varies underground stations of new metro lines overseas like the KVMRT SSP Line 2 in Kuala Lumpur, Malaysia and the Orange Line Project in Bangkok, Thailand for the last few years.

This is one of the many reasons why I found it a very rewarding trip. The focus of the professional events during the 8 days was on transportation and urban planning, which does not seem to have direct connection to my engineering discipline – yet these events have been great opportunities for me to gaining exposure to other aspects of civil engineering projects – in which high level project decisions have impact, in various degrees, to the detail engineering design and implementation level – geotechnical and structural that I work in daily basis.

I truly feel honoured to be able to participate in the first overseas delegation ever organised by HKIHT Young Committee. I would like to thank our fellow delegates, advisors and sponsors. Without their devotion and careful planning, advice and financial support, this trip would not have been possible.



**Jason Wu – Overseas Liaison Officer**



Jason began the first year of his career in 2018. Having graduated with a master degree from the Department of Government, the London School of Economics and Political Science. Jason has life experience at cities across countries - Hangzhou (CN), Singapore (SG), Lancaster (UK), and London (UK) - before launching his new chapter at Hong Kong.

The Overseas Delegation 2019 to London was everything meaningful - sights and people - that I had experienced. While looking back at the days we had in London, my mind fills with an immense amount of inspirations from all project visits. When we walked into the newly reopened London Bridge Station, the presence of redevelopment completion was surely impressive. A completely transformed concourse, and modified tracks, reflect its successful delivery as a feat of engineering. This delegation visit also offered precious opportunities to share and exchange ideas to professions with different backgrounds, widening our vision of approach to smart city from different angles.

**Nicol Cheung – Overseas Liaison Officer**

I am Nicol Cheung who is currently working in Water and Urban Development Department in AECOM. My daily work is mainly about project management of Kai Tak Stage 5B Development Project, to coordinate with the supporting teams and deliver the project on time.

It is my pleasure to be one of the delegates and have the chance to understand the master planning mind set of London. We are also fortunate enough to know the perspectives from different stakeholders in the construction of railway infrastructure including the client (Transport for London), consultant and contractor. Visit to the new line for London, Elizabeth Line, is the most impressive one. The major feature of Elizabeth line is that line managed by TfL and operated by Hong Kong MTR. The construction of new line requires extensive coordination between all the parties including the underground utilities companies as they have to maintain the normal operation of complex London underground. The complexity of the project reminds me of the extension of admiralty station for South Island Line in Hong Kong. Also, there are many sustainable architectural ideas into the platform such as the use of natural light and timber as a building material. These ideas can also be incorporated into the Kai Tak development to provide a vibrant and energetic built environment.



**Queenie Tse – Overseas Liaison Officer**



I am Queenie, I work in the WUD team at AECOM. In this delegation I acted as one of the Overseas Liaison Officer.

The London Delegation was an eventful and fruitful trip. Through exploring London, I found a lot of parallels can be made between London and Hong Kong, and what better way to explore these ideas than with like-minded colleagues and leading experts in London.

Having studied in London during my University years, I can truly say that we couldn't be in London at a better time – when mega infrastructure projects are implemented in full swing. We were able to see different stages of these developments, including High Speed 2 which is heatedly discussed in the Parliament, Luton Airport's Direct Air to Rail Transit system which is at its construction phase, and Crossrail (Elizabeth Line) which is near completion.

Amongst all that we saw, my personal favourite was the implementation of the Cycle Superhighway and Quietways in London. These are two polar opposite cycling routes and designs that were developed at the same time throughout the City. Together with the idea of healthy streets, the Cycle Superhighway and Quietways transformed the streets of London, making it safer, cleaner and more sustainable. I hope this could be the vision of new towns in Hong Kong in the future.

**Bella Wu – Publication Officer**

Bella is an Assistant Resident Engineer in WSP (Asia) Limited, currently working on a Highways Department project to provide universal access facilities at public footbridges and elevated walkways. She has also been involved in the infrastructure design for HKAA North Commercial District and Kwai Chung Lift and Pedestrian Walkway System in her past two years of work. The HKIHT Delegation to London was a horizon-expanding and rewarding trip. Through the 8 days programme, delegates were exposed to a series of seminars, workshops, technical visits, networking events, as well as panel discussions with local experts and government representatives. Having the unique opportunity of witnessing the construction of mega-scale projects such as the new Crossrail Elizabeth Line and the Direct Air and Rail Transit (DART) Development in London Luton Airport, attending practical BIM and NEC lectures, along with being introduced to London's sustainable street design and holistic development strategy, we have gained in-depth and comprehensive insights into the city's integrated transport network and its world's leading smart mobility technologies. London's foresighted urban planning which supports its rapid growth and maintains its place as a global city is also worth learning for Hong Kong.



Special thanks to HKIHT, our advisors, organizing committee and fellow delegates for making this successful delegation possible.

**Bruce Wong – Publication Officer**



I am Bruce Wong, an Assistant Resident Engineer in Mannings (Asia) Consultants Limited working on a Water Supplies Department Agreement. I am one of the publications officer in this delegation.

It is my first time to explore London from a view other than as a tourist. This delegation offered opportunities to meet parties in different sectors which contributed to the development of London's infrastructure, which we not only look at their products, but also be able to understand the ideas of every design and the difficulties that they have encountered.

Among the infrastructural plans and works we have studied, the most impressive one is London's dedication on promoting cycling in the city. London has been transforming from typical vehicle-based transport system to a cycling friendly one. Besides expanding cycleway networks, the local authorities have also implemented creative ideas to promote cycling by imposing restrictions on vehicle travelling, such as constructing additional planters on carriageway to reduce travelling speed. Perhaps we may take reference from London to enhance cycling in Hong Kong.

**Claire Ngok – Secretary**

I am Claire, currently working at AECOM. My role was a Secretary of this delegation to London. We knew it was going to be a big job when we were first started organizing the event, especially at the initial stage, there were no delegates helping but few YCs. However, as the pieces started coming together, it is grateful that we started to have delegates joining us very soon. Everyone contributed a lot of effort to this delegation and demonstrated their perfect social and cooperation skills. Moreover, this delegation is definitely a fruitful trip for me as it provided a precious chance for us to visit one of the large scale infrastructure works in London such as construction of the Luton Airport Direct Air-Rail Transit as well as construction of Crossrail station. In addition, the seminars given by various companies such as HS2, AECOM and Arup etc respectively have broadened my horizon on transportation planning as well as the financial aspect. I am now working at the structural discipline indeed and this trip brought me some new insights of other disciplines. It is always heard that no matter how much we know in any area, there are always new things to learn and things we have previously learned that we need to be refreshed in. It is really thankful for HKIHT to organise a delegation like this.



**Xavier Chan – Technical Officer**



I am Xavier Chan working in AECOM as a structural graduate engineer. It was a treasurable chance to me to explore this beautiful and advanced city, experience London’s innovation, sustainability, and local cultures with our advisors and other delegates. I learnt far more than what I had expected. Apart from technical knowledge, through preparation and visits in the trip, I also learnt about management, planning and social skills which have widened my horizon. During this delegation, what inspired me the most was how the construction professionals in London incorporate cutting-edge technologies with historical and existing structures. For example, building façade and the Victorian arches inside the old London Bridge Station are kept and seamlessly connected to the new railway complex in city centre. Similarly, the Tate Modern, a suspended power station, is masterly transformed into a live art, film and painting exhibition centre. Architects also minimized the construction works to demarcate street usages by making use of existing roads in Vauxhall.

**Anthony Yip – Treasurer**

I am Anthony, now working as an Assistant Resident Engineer in AECOM for Road Widening and Retrofitting Noise Barriers on Tai Po Road (Sha Tin Section). In this delegation, I acted as the treasurer to manage the budget and expenses.



Throughout the 8-day exploration in London, there were many opportunities for delegates to discover both the technical and cultural aspects of London. Visiting significant transportation projects in London at different stages, from investigation, design, construction to renovation, we gained first-hand experiences on how engineering options have been developed and what factors have been considered to shape up the final product. It also reinforced my engineering knowledge earned when I was involved in the detailed design of oversea metro stations.

Apart from the technical visits, the guided walk at Vauxhall on street design by Urban Movement also impressed me a lot. It brought me a brand new and innovative idea on sustainable development. In the general perception, we might think that vehicles are the most convenient means of transportation. However, things are different in Vauxhall. The street design there has turned the traffic pyramid upside down, which means walking and cycling became the most preferable ways to travel from one place to another. To incorporate this concept, highways and traffic lanes exclusive for cyclists were hence introduced and developed. It indeed delivered a new possibility to us when considering the street design for the new town development in Hong Kong.

**Joe Xie – Delegate**



I'm Joe from Meinhardt Infrastructure and Environment Ltd, currently working on Central Kowloon Route - Yau Ma Tei East design and build project. As one of the delegates in this London overseas delegation trip, I would say the visit was phenomenal and successful. The trip has a specific focus on Smart Mobility but also touches on experience exchange throughout various infrastructure projects. In addition to this, it also provides a great chance for HKIHT members to become better acquainted with peers, committees and the advisors.

For me, this is one of the most memorable trips I have ever had as it provides a different insight to explore London. From the perspective of a tourist, London could be a beautiful and vibrant city which has been well known in the world. However, it was found to be much more attractive when we have the chance to look at London from the view related to transportation and urban planning. A number of projects such as High Speed 2 and Luton Airport are dedicated to provide better travel experience for citizens. Through the street visit lead by street designer, I could feel the consideration made on better, more sustainable living environment where all people were always put at the first place. I do hope we can share the same vision back to Hong Kong throughout our work in the future.

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