TenBroeke Engineering Co
Rail Services

Collaborative based management driven by experienced people to protect your liabilities, margin and cashflow

- Systems Engineering (Assurance) product portfolio
- - Communications & Control Systems product portfolio

Contact:
Sherman Havens
Sherman.havens@tenbroekeco.com
Mobile: +44(0) 7887059710
www.tenbroekeco.com

TenBroeke Co
Transforming Infrastructure Delivery

TenBroeke Engineering Rail Services

Enabling engineering optimization across rail infrastructure

PROJECT CRITICAL CHALLENGE

- *Retrospective engineering rapidly becomes a blame game which no one wins – costs time, money, and leads to poor company relations and customer service*
- *Need to proactively address this area*

The TenBroeke Approach

PRINCIPLES

- **Risk assessment – identify risk each party takes and how this is priced**
- **Ensure each party fulfils its obligations via collaborative approach**
- **Capture change as assurance progresses, not after the event**

ACTIONS & RESOURCES

- **Consultancy and Operational**
- **Network of experts with vast experience across rail industry**
- **Refined methodology & processes**
- **Contract term flexibility**
- **Scale up / down as required**

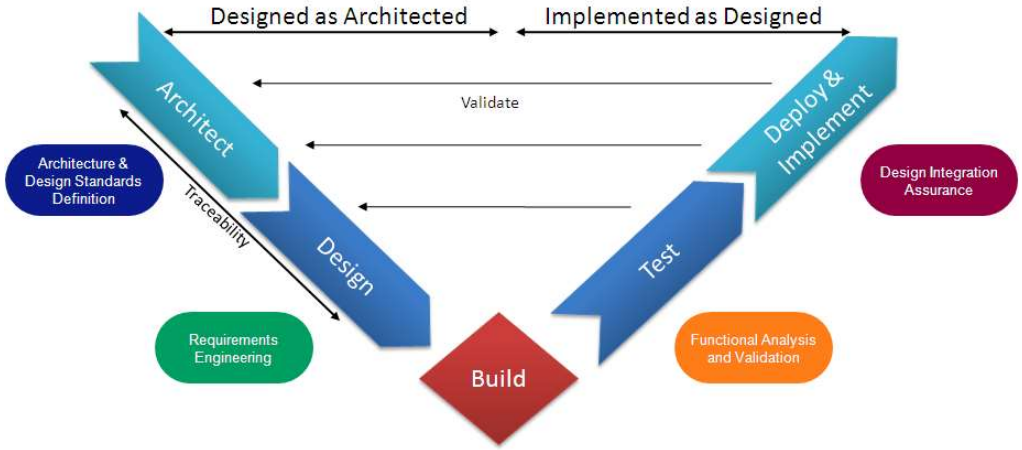
RESULTS & BENEFITS

- Proven resource worked with Bombardier, Hitachi, Siemens
- Successful assurance programmes
- Increased operational confidence
- Old Oak Common / Canary Wharf
  - Crossrail
  - Bedford Caudwell / Northam / Ashford

TenBroeke Co
Transforming Infrastructure Delivery

System Engineering Rail Services

Services delivered through proven Systems Engineering principles		
1. Needs Statement Development	2. Concept of Operations Development	3. Requirement Development (DOORs, ComplyPRo, custom)
4. PRAMS - Performance, Reliability, Availability, Maintainability, Safety - Targets Calculations Demonstrations		
5. Engineering Safety Management - Common Safety Method		
6. Interface & Integration Management - Configuration & Change Management		
7. Compliance Certification - Verification - Validation		



TenBroeke Co
Transforming Infrastructure Delivery

Technical Rail Systems Engineering (Assurance) Product Portfolio

Audit

- Conducting assurance status assessments
- Review quality of input information and results
- Monitor and audit Contractor evidence for suitable compliance
- Provide KPIs to demonstrate programme compliance
- Provide competency assessment of team / organisation
- Provide review of submittals and work in progress

Implementation

- Develop Systems Engineering Management Plan (SEMP)
- Integrate into project team & agree roles and responsibilities
- Provide customer facing support and reporting
- Manage supply chain inputs
- Provide required deliverables and KPIs

Recovery

- Identify missing / incomplete processes.
- Conduct HAZID and provide cost estimation
- Build Plan of Action and Milestones
- Provide technical guidance to project team to implement
- Monitor and review progress with lessons learned to ensure completion stay on schedule

Training

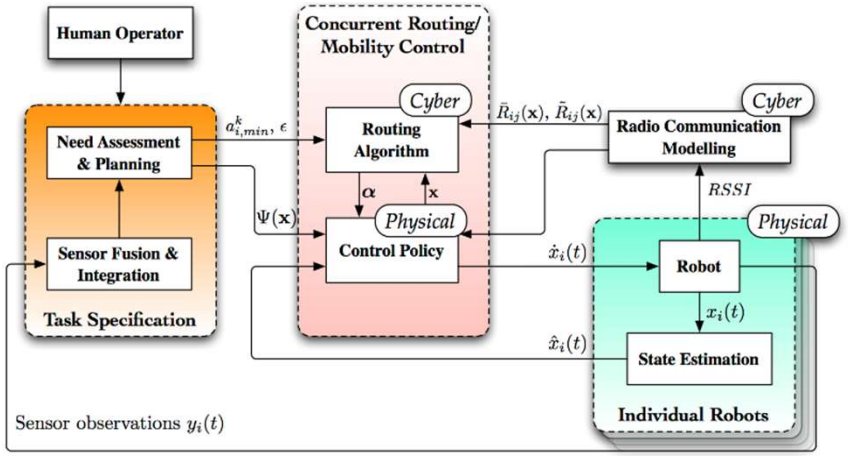
- Provide training in Systems Engineering Principles
- Classroom training for teams
- Individual mentoring in project environment
- Development of procedures and process for implementation
- Promote collaborative working to help reduce cost of poor quality

Services provided from Pre-Tender stage through Operational stages of projects / endeavours

TenBroeke Co
Transforming Infrastructure Delivery

Communications & Controls Services

Project Engineering & Management				
Asset	Stations	Depots	Rolling Stock	Control Centres
Scale	Small to major			
Networks	Fixed and mobile			
Leaders in Multi-Discipline coordination of interfaces and integration of systems and sub-systems				
Design	Strategy	Requirements	Concept	Detail
Services	Supplier Selection	Interface & Integration Management	Build Compliance	Testing & Commissioning
	Operational Acceptance		Maintenance Management	



TenBroeke Co
Transforming Infrastructure Delivery

Approach

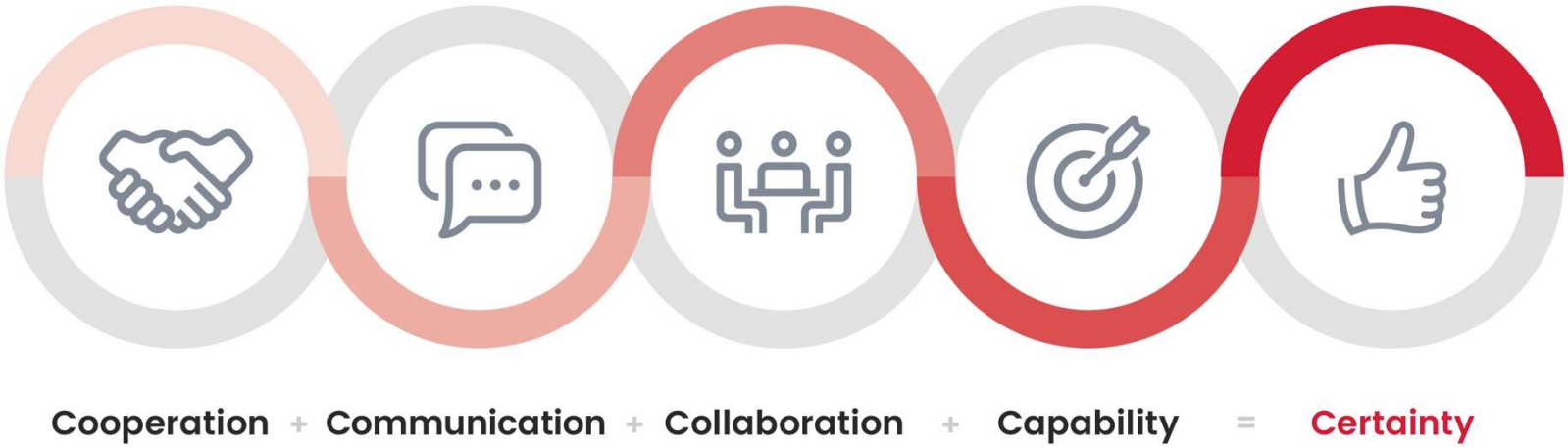
Audit	Implementation	Recovery	Training
Quantifiable and objective project review to identify progress against plan. Provide competency matrix and build plan to bridge any shortcomings.	Ensure a project - Depot, Station, Rolling Stock etc - is implemented using Systems Engineering principles to maximise performance and profitability. Support Multi-disciplinary projects through all phases.	Investigation of asset development, working with all involved parties to identify the sequence of events, where liabilities lies for failure to deliver and management of the actions needed to get the asset to where it needs to be.	Provide training in Systems Engineering and assist in building knowledge and competency within the organisation.

Services provided from Pre-Tender stage through Operational stages of projects / endeavours

TenBroeke Co
Transforming Infrastructure Delivery

The TenBroeke Co difference

We nurture business relationships built on cooperation, communication, collaboration and capability to provide the certainty of a successful outcome.



TenBroeke Co
Transforming Infrastructure Delivery

Old Oak Common

Client: Bombardier Transportation

Purpose: Supply rolling stock, maintenance services and train maintenance depot, supporting the Crossrail project

Contractors:

- D&B contractor – VINCI
- TenBroeke Co – Client Technical Advisors and Assurance Programme delivery

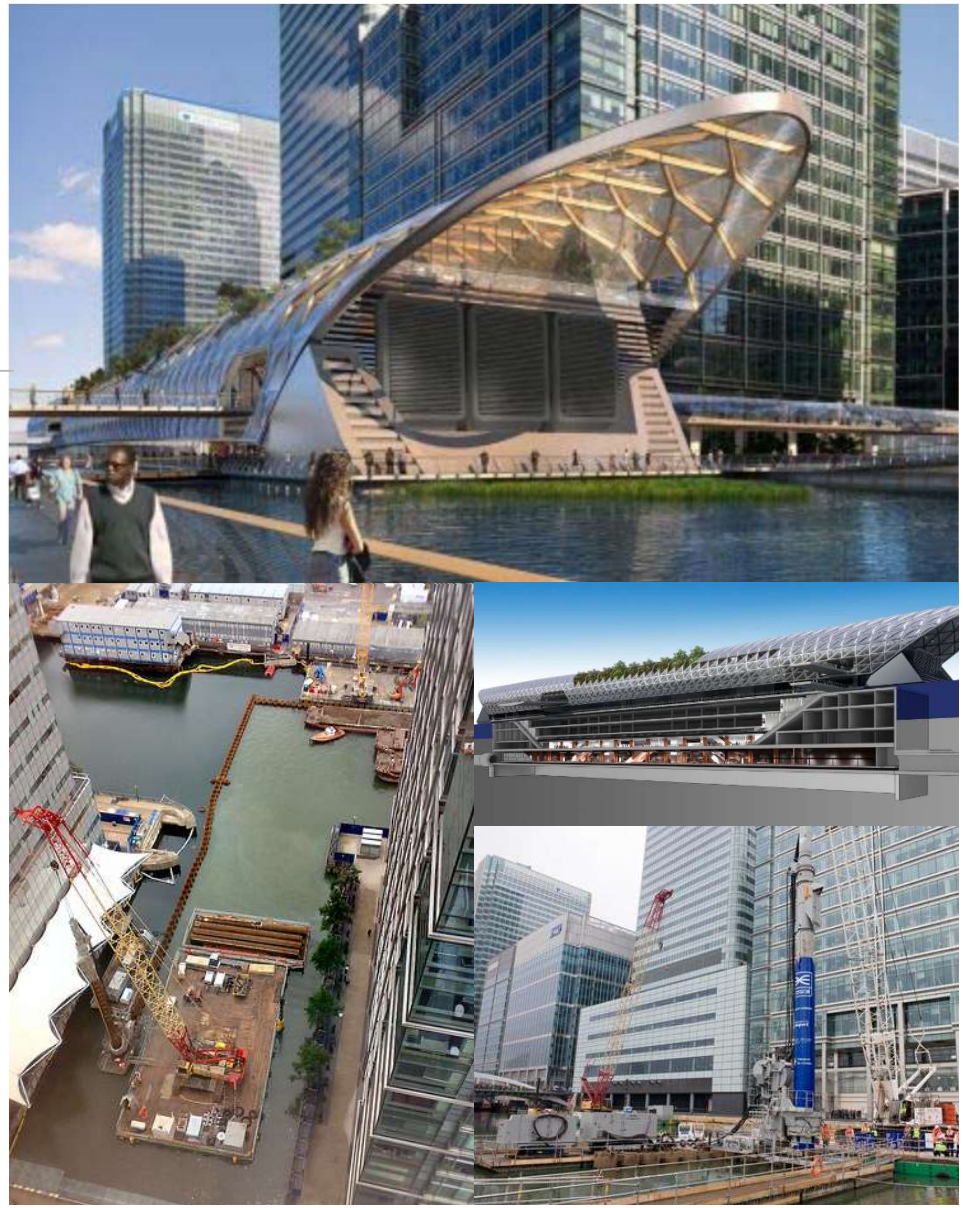
Canary Wharf
Crossrail Station

Construction of the £500m new station / Connection of the Canary Wharf Development and Commercial and Retail Development with a live railway. 240m x 35m x 35m deep, constructed in dock

Management: rail interface, cross relationships with other stakeholders, incl. DfT, TfL, Crossrail and Network Rail; OSD development; ran Data Room for legal agreements; led Assurance Procedures

Awarded Four Crossrail Assurance Group Design Certificates for Canary Wharf Crossrail station - for completion of each of the staged processes laid out by Crossrail for the design assurance.

TenBroeke Co
Transforming Infrastructure Delivery



TenBroeke Rail Assurance Services

	Bedford Caudwell Depot	Northam Depot	Thameslink Infrastructure
Problem	*Time-critical transaction due to late Government decision*	*Finance pressures meant the depot had to be off-balance sheet.*	*Support Bombardier bid for Thameslink – £5.5 bn scheme*
Insight	Collaboration approach essential for successful delivery	Siemens / Consortium Approach	TenBroekeCo procurement process – optimize the scope, recast risk transfer accepted by appropriate parties
Action	Fifty week programme – First Consortium solution of finance, design and structuring	Innovative finance and delivery structure – operating lease off-balance sheet + negotiations with wide variety of counterparties	Fully financed package for 2 new train care facilities and infrastructure for manufacture, entry into service and maintenance of new rolling stock fleet valued over £1.5bn.
Outcome	Accelerated land acquisition and planning consents with delivery on time to budget with major price advantages gained with no compromise to quality	First transaction of this type in UK. Support of Desiro fleet for South West Trains	Successful delivery with significant savings vs construction cost estimates, managed numerous Government changes to bid, improved financial security

TenBroeke Co
Transforming Infrastructure Delivery

TenBroeke Co
Transforming Infrastructure Delivery

References

"I always feel more confident dealing with complex infrastructure projects when I have TenBroeke Co alongside me."

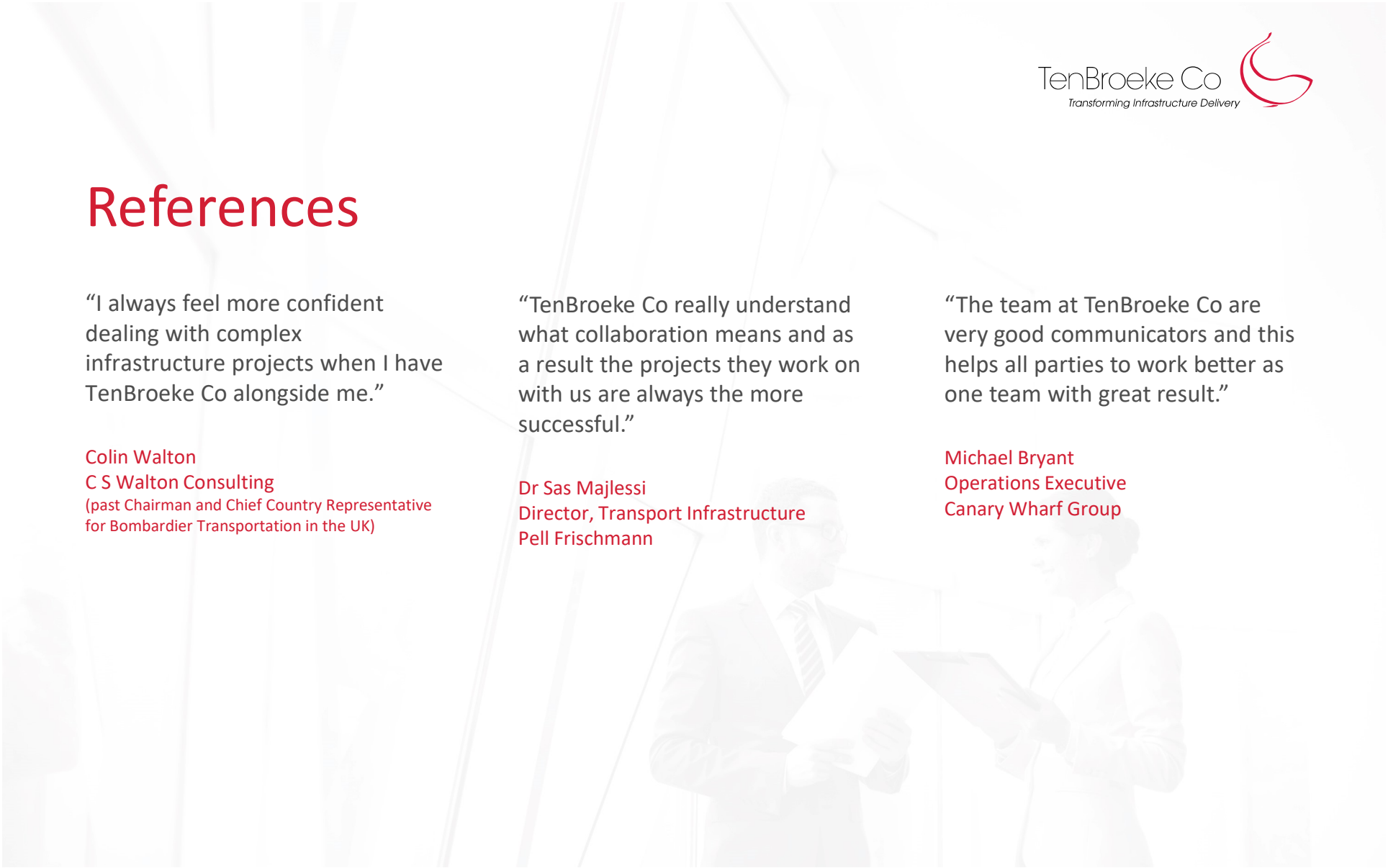
Colin Walton
C S Walton Consulting
(past Chairman and Chief Country Representative for Bombardier Transportation in the UK)

"TenBroeke Co really understand what collaboration means and as a result the projects they work on with us are always the more successful."

Dr Sas Majlessi
Director, Transport Infrastructure
Pell Frischmann

"The team at TenBroeke Co are very good communicators and this helps all parties to work better as one team with great result."

Michael Bryant
Operations Executive
Canary Wharf Group



People

Sherman Havens

Director, TenBroeke Engineering

- Engineering & Design Management expert
- Leadership, Management, Collaboration
- Systems Engineering, Communications & Controls
- Extensive experience in large Government sponsored Infrastructure projects including rail, university, data centres, and naval communications including global rollouts and regional deliveries in North America, Europe, Middle-East and Africa
- 25 years in U.S. Submarine Force. Senior Systems Engineer, Space and Naval Warfare Systems Command
- Joined TenBroekeCo in 2018 to head the Engineering capability and expand both capacity and offering
- WSP UK - Technical Director for Systems Engineering, Communications & Controls (SECC); member of the WSP Global Technical Excellence Team for Transport & Infrastructure
- Crossrail - Systems Engineering Lead Engineer for 5 Crossrail Projects including Stations and Portals
- KAUST, Thuwal, Saudi Arabia - Technical Lead Integrator, world's largest USGBC certified LEED Platinum Project
- Specialist in network centric design/ implementation on multiple projects - Crossrail, London Underground, Dockland Light Railway, Network Rail, Data Centres – with focus on both fixed and wireless infrastructure
- Attention to user needs and requirements ensures satisfaction and survivability of the systems

People

Paul Tweedale
Managing Director

- Procurement, Finance & Structuring
- JP Morgan Chase trained. Joined HSBC in 1988, worked in London, New York and Hong Kong
- 2000 to 2008 Head of Business, New Product Development and Risk Management within HSBC Rail (now Eversholt Rail)
- Part of Senior Management Team with responsibility for rolling stock portfolio of 3,500 vehicles valued at £2.5bn covering passenger, freight and on-track plant. Portfolio also included train maintenance depots
- Investment / ownership business (through operating leases) with oversight of investment criteria, new build decisions
  (RV considerations), ongoing asset management (including day to day maintenance, safety management systems, overhauls), return conditions, project and risk management, whole life costing
- Management of interface between customer (train / freight operators) and supplier (manufacturers, construction, maintainers), government, regulator, infrastructure owner / maintainers, legal , finance

Core principles of how we work

Mitigate Risk

Experience – business, technical and commercial

Connections – access to expert resource

Management – complex stakeholder and supplier relationships

Provide clarity

Understanding of the true risks and opportunities

Provide the right advice to enable the best decision to achieve effective and profitable results

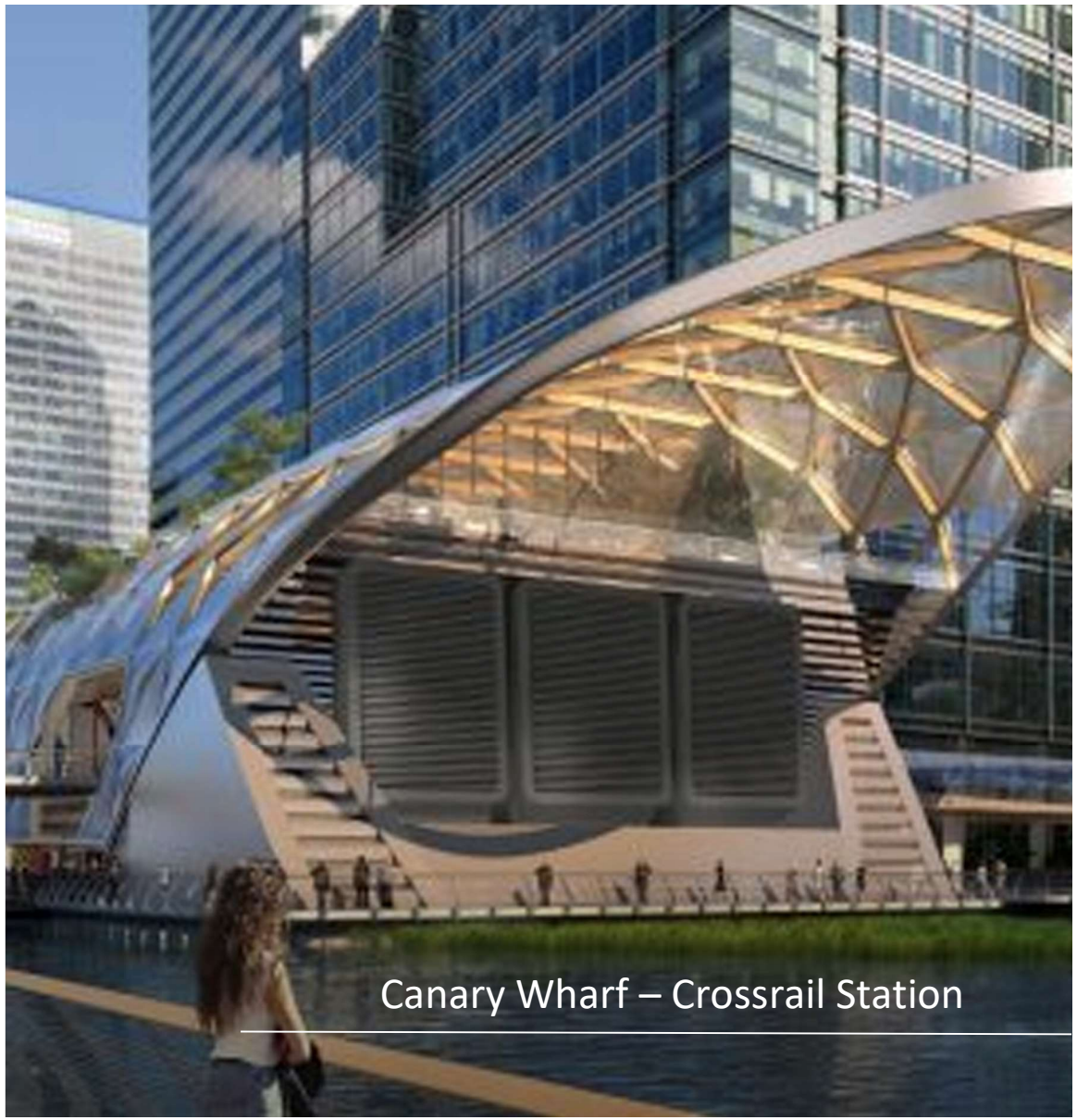
TenBroeke Co
Transforming Infrastructure Delivery

Bedford Cauldwell Depot

Multi-disciplinary independent expert advisers on infrastructure

Specialist, international advisory company, focused on delivery and long term management of major infrastructure assets.

TenBroeke Co
Transforming Infrastructure Delivery



Canary Wharf – Crossrail Station


We look forward to working with you
Contact:
Sherman Havens
Sherman.havens@tenbroekeco.com
Mobile: +44(0) 7887059710
www.tenbroekeco.com
TenBroeke Co
Transforming Infrastructure Delivery

Example Compliance Matrix

Utilising ComplyPro™

DPSS ID	CPFR Ref	DPSS Text	CRV	Information	Gates	Discipline	Compliance Argument Id	Gate	Compliance	Compliance Rationale	Supporting Drawings	Supporting Reports	Review Status	Review Comments	Review Status Set By	T&A Criteria	T&A Qualification	T&A Results
C422.34	CPFR4517	At ticket lines a GLAP (or where appropriate, a ticket office overlooking the gateline) shall be provided with heating/cooling, ventilation and a means of communication. It must be capable of swift access and provision of safety for the member of staff within. The GLAP should also be seen as a welcoming place for passengers to ask questions.		Requirement	WTH	Architecture/Premises Mechanical	C422-Comp.19	WTH	Partial	A built in (i.e. not free-standing) GLAP has been incorporated into the C422 station design in the WTH. The GLAP location ensures swift access provision to staff that it is welcoming due to its proximity to the station entrance. This information is captured within the C422, C660 and C690 works information. The heating and cooling design is provided by C422 to maintain relevant temperature in the room which is co-ordinated through ICD process.	Dean Street/Western Ticket Hall Ground Floor Part Plan - Sheet 1 & 2 of 4: C422-LAO-A-DDD-N105_1-22000 C422-LAO-A-DDD-N105_1-22001 Dean Street/Western Ticket Hall BoH Room Layout Gate Line Attendant with Ticket Point: C422-LAO-A-DDC-N105_1-20251. Dean Street/Western Ticket Hall combined Services Layout - Level +0 - sheet 1 to 2: C422-LAO-M-DDA-N105_1-23130 C422-LAO-M-DDA-N105_1-23131 Dean Street/Western Ticket Hall combined Services Layout - Level +0 Mezzanine: C422-LAO-M-DDA-N105_1-23135.	Interface Control Document RIBA Design Stage F C422 - C660 Communications & Controls Systems: C422-LAO-R3-GPS-N105_WS089-50001. Interface Control Document RIBA Design Stage F C422 - C690 Automatic Fare Collection: C422-LAO-F-GPS-N105_WS089-50001. C422 Tottenham Court Road Station - Architectural Specification Addendum: C422-LAO-A-RSP-N105_WS089-50001. C422 Tottenham Court Road Station - Dean Street/Western Ticket Hall - Hevacomp Model Calculations Report : C422-LAO-M-XCL-N105_WS090-50001.	Designer Approved	Layout drawings & architectural specification referenced - C.I (21.11.2015)	Celestine Igbenoba	Inspection	Inspection of design documentation that provison has been made for heating/cooling, ventilation and a means of communication at ticket lines where ther is a GLAP (or where appropriate, a ticket office overlooking the gateline). Inspect design documentation for provision of GLAP and capabilities for heating/cooling / ventilation Provsion of GLAP on design drawings Inspection of completed GLAP space on site Inspection of built products against design documentations Inspection of installed GLAP against design outputs and specifications	
C422.40	CPFR4814	Crossrail Stations shall be part of the local community and thus security measures shall extend to station property boundaries and adjacent infrastructure permitting secure onward transit for passengers and employees.		Requirement	GYB	Architecture/Premises	C422-Comp.24	GYB	Partial	The Ground floor detail plans for the GYB show the locations of bollards. This approach to the design has been agreed with Chris Stevens (CRL Head of Security). The design is based on the risk assessment document (carried out by CRL) but cannot be provided as a reference due to its security sensitivity. CRL Head of Security's acceptance of security comments is evidenced within the 'Records of Security Review' document.	Goslett Yard Box/Eastern Ticket Hall Ground Floor Part Plan - Sheet 3 of 4: C422-LAO-A-DDD-N105_1-32002.	C422 Tottenham Court Road Station - Architectural Materials Proposals Schedule: C422-LAO-A-TSC-N105_WS089_2-50001. C422 Tottenham Court Road Station - Architectural Specification Addendum: C422-LAO-A-RSP-N105_WS089-50001. Records of Security Review: C422-LAO-O5-RGN-N105_WS089-50001.	Designer Approved	Can a email be attached from CRL security advisor demonstrating his satisfaction? MV CRL security advisor's acceptance is evidenced in records of security review - C.I (10.12.2015) Security record will be issued	Celestine Igbenoba	Inspection	Inspection of design documentation that security measures extend to station property boundaries and adjacent infrastructure permitting secure onward transit for passengers and employees. Inspect documentation for proposed security measures. This should be followed up by physical inspection / observation of installed security features	