

Jacobs Rail & Transit



ABOUT JACOBS SOLUTIONS

Our 1,500 Rail and Transit professionals worldwide support over 230 clients with the right mix of engineering, program delivery, and operations management expertise. We design and help deliver the most challenging capital improvement and expansion projects, to keep people and goods on the move while enhancing customer experience and environmental sustainability.

As a global leader in transportation, we embrace our position as a leading consultant and seek to be the trusted partner of choice. We work with our clients to create transportation solutions

that deliver value for society in a more sustainable world, with a focus on Rail and Transit owners and operators in the United States, Canada, United Kingdom and Europe, the Middle East, Asia-Pacific, and Australia / New Zealand.



Jacobs

Challenging today.
Reinventing tomorrow.

JACOBS SERVICES

Whether your journey includes keeping pace with capacity demand, accelerating technology innovations, ensuring safety and security, or maintaining existing transport networks, we are on board to serve all aspects of high-speed and conventional passenger rail, freight and logistics, mass / public transit, and innovative bus solutions.



PROGRAM AND CONSTRUCTION MANAGEMENT

As the top ranked Program Management firm⁽¹⁾, Jacobs provides program and construction management services for complex transportation and transit programs worldwide. We draw on our integrated processes and databases, refined through delivering award winning projects. Our multidiscipline approach takes advantage of best practices developed across large, complex transportation programs.

MAJOR PROGRAMS

At Jacobs, we work with our clients to deliver some of the largest and most complex infrastructure programs. Our work spans the full range of services from Staff Augmentation to full Delivery Partner approaches. We tailor our support to each client's requirements. Among the major programs we support in Asia-Pacific are:

Johor-Singapore Rapid Transit System Link Systems Consultancy | Malaysia – Modern Light Rail Transit (LRT) shuttle crossing the Straits of Johor via a 25 m-high bridge. System consultant for design and management of all systems for the RTS Link.

Jakarta-Bandung HSR | Indonesia – Provided technical advisory services in 2 stages to PT Pilar Sinergi BUMN Indonesia for the 142 km high speed rail. Conducting an independent technical review of the project on ways to optimize project schedule and budget to completion and consider alternatives, if necessary, to meet project funding limits.

KVMRT Putrajaya Line | Malaysia – Jacobs is responsible for the reference design, specification and ongoing support for the procurement of all rail systems including design, construction and testing and commissioning. Jacobs is also providing services to the contractor for detailed design.

Iskandar Malaysia Bus Rapid Transit | Johor, Malaysia Jacobs is providing BRT planning, operations, vehicles, systems engineering, traffic consultancy and detailed engineering design for Skudai Corridor. We provided detailed design of 4 km busway viaduct and an elevated bus station.



Note: (1) by Engineering News-Record



RAILWAY SYSTEMS AND ROLLING STOCK

We support bus and rail system projects with a focus on requirements definition, procurement, testing and commissioning, technical advisory services, condition assessments, manufacturer auditing, maintenance planning, and major overhaul and modification programs.

VEHICLE PROCUREMENT



KLAV 27 Kelana Jaya Line Fleet Refurbishment | Malaysia

Jacobs provided consultancy services to the Client for the entire project duration, including defects liability period. Jacobs reviewed and provided feedback on the Contractor's detailed design; reviewed and accepted test procedures and reports, as well as providing full-time site surveillance on site, overseeing all refurbishment works.

RAIL SYSTEMS

Ampang LRT Extension | Malaysia – Jacobs was lead designer for the systems aspects of this extension. The scope of services included provision of specialist systems

engineering input to rolling stock, railway systems, operations and maintenance aspects, and the provision of tender support services.

KLIA APM Asset Replacement Programme | Malaysia

Jacobs advised on replacement of replace the 24-year-old Automated People Mover (APM) system at Kuala Lumpur International Airport with a new system whilst minimising impact on the airport operations. Jacobs supported the tender process and was later employed as the Project Management Consultant (PMC) responsible for managing and overseeing the project's execution.



DESIGN SERVICES

Among our specialized services, we offer design for signals, communication systems, mechanical and electrification systems; and ballasted, direct fixation, and embedded trackwork including special trackwork, down to the supporting structures including bridges and tunnels for all bus and rail modes.

KL LRT Shah Alam Line | Malaysia – Jacobs is providing expertise as the Independent Checking Engineer to undertake design reviews of the railway systems against design specifications and international standards through construction phase. Jacobs is also engaged on the Trackworks Detailed Design scope. As design consultant, Jacobs' involvement spans all aspects of the track design, installation, and quality supervision of the rail system.

Kolkata Metro | India – Jacobs was commissioned to deliver detailed design services for an elevated viaduct from Subhash Sarobar to Salt Lake Sector – V of the East-West Corridor of Kolkata Metro, Kolkata. The project involves the

construction of a 4.7 km double track viaduct and a 1.6 km single track viaduct for the depot line and future expansion. Jacobs's scope included Structural Analysis, Design, Detailing and submission of Design Reports and Construction Drawings.

Our KVMRT2 coordinated 3D Model, demonstrated value through and created opportunities to automate through trackwork parametric design. It sets the benchmark for integrating digital engineering practices for the rail industry.

Dynamic Modelling allows tens of thousands of assets to be automatically placed and changes to alignment directly translating to automatically updated drawings.





TUNNELING

Our railway tunnel and underground station design capabilities include:

- Expertise in soft ground and rock tunnelling
- Skills in station design and pedestrian modelling
- Expertise in fire life safety and ventilation systems
- Mechanical, electrical, power and communications specialists
- Professionals skilled in geology and geotechnical design
- Significant experience in client and construction support services



We have experience in all types of construction methods including shield tunnelling, SCL methods, full face TBM, EPBM, slurry shield, roadheaders, drill and blast, pipejacking, thrustboring, directional drilling and immersed tube.

Cross Island Line CRL 115 Tavistock Station & Tunnels | Singapore – Construction of new underground Tavistock MRT Station and tunnels on the Cross Island Line. CRL Phase 1 is 29 km long comprising 12 stations. Jacobs is engaged by Sato Kogyo Pte Ltd as designer at the Tender Design stage and continued to support at the Detailed Design and Construction stages.

Kowloon-Canton Railway Corporation – Kowloon Southern Link Contract No. KDB400 | Hong Kong
Contractor's designer for multi-disciplinary engineering and architectural design services for the design of 1.05 km of underground tunnel and a 6-storey tunnel ventilation building, which form part of this new 3.8 km underground railway.

CONSULTING AND ADVISORY SERVICES

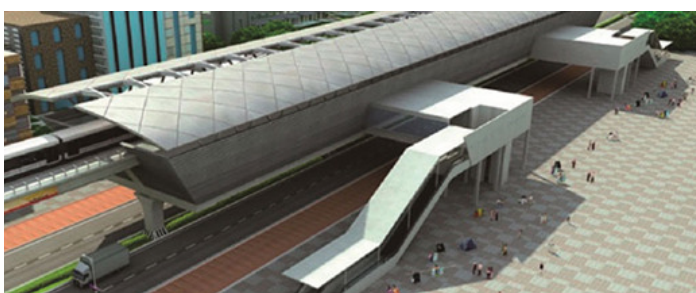
We are a diverse, global team of technical experts, advisors and practitioners who work collaboratively across all market sectors. We work throughout the infrastructure lifecycle from strategy, financing and economic advice, business case and planning advice, through to capital and operational delivery improvements across our client's organizations. Our ability to provide real and robust, deliverable solutions and trusted advice leads to better, more certain outcomes and greater sustained value.

ADVISORY AND PLANNING SERVICES

Keeping pace with our rapidly changing world is a monumental challenge. We help clients stay ahead of the game with our broad range of policy, planning, technology, funding, procurement, asset management, safety, security and resiliency consulting services. Supported by global thought leadership. We provide transport planning and traffic consulting services that cover the entire spectrum from transport policy and strategy development to detailed implementation of transport network improvement schemes and traffic engineering.

Penang LRT | Malaysia – Jacobs supported the successful bidder for the Penang Transport Masterplan Project Delivery Partner. That worked evolved into detailed planning, ridership forecasting and economic appraisal of the Proposed Bayan Lepas LRT Line which will run between George Town and Penang Airport initially, and ultimately onto three reclaimed islands at the south of Penang island.

Trans-Sumatra and Trans-Java Feasibility Studies | Indonesia – Jacobs developed a Pre-Feasibility Study for the Government of Indonesia and Government of Japan exploring rail options across for the whole Trans-Sumatra and Trans-Java corridors. The Pre-FS stage involved planning, CapEx and OpEx estimates, economic and Financial Appraisal, freight and passenger forecasting.



ADDITIONAL SERVICES

In addition to our core Program Management, Construction Management and Design services Jacobs is investing in new technologies and capabilities to help our clients take on their biggest challenges. Among the new capabilities that Jacobs can deliver to rail and transit clients are:



StreetLight

Using our proprietary data processing engine RouteScience® to algorithmically transform trillions of spatial data points over time, StreetLight measures vehicular, transit, bicycling, and pedestrian travel patterns, making them available on-demand via the world's first SaaS platform for mobility, StreetLight InSight®.



Artificial Intelligence

Jacobs has recently expanded our partnership with Palantir, focused on leveraging Palantir's AI capabilities to commercialize new AI solutions spanning critical infrastructure, advanced facilities, supply chain management and more.



PA Consulting

Jacobs 65% stake in PA Consulting unlocks expert support grounded in a deep understanding of the systems and technology that shape the rail and transit sector. No other combination can offer the same mix of technology and consulting expertise.

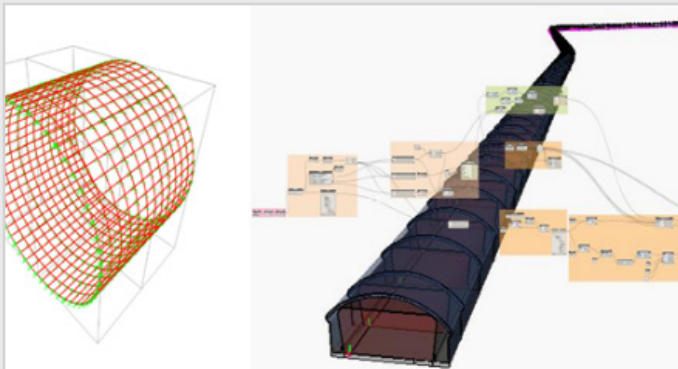
INNOVATION, DIGITAL ENGINEERING AND DESIGN AUTOMATION

Our Global Solutions Centre continues to push boundaries with an innovation culture that delivers US\$2.5B in certified client savings globally. Some of our critical solutions creating value in new ways are outlined below.

Experienced technical directors and digital innovators in Asia combine to create value adding tools and services that reduce design production times, increase focus on quality and help understand key risk mitigations. When we consider solutions delivered by our local leaders that will create value for our clients, a selection of these solutions include:

- Design automation
- Digital design tools
- Big data driven transport planning
- Value Engineering
- Building Information Management

Big Data Transport Planning drives new insights into multi-modal responses to demand changes. From Malaysia's Integrated Transport Plan and MRT3's detailed model, to a selected assessment on the Orange Line Corridor, we are working in new ways to manage risk and create opportunity.



Our in-house automated tunnel design tools, TunLin, TunDRA and Space Wombat provide rapid 3D model generation and design visualization, which can identify optimal solutions with minimal effort.

SUSTAINABILITY AND RESILIENCE

Reducing global transportation sector emissions is a top priority, and the greening of public and private vehicle fleets is one way for entire populations to take steps towards reducing their carbon footprint and environmental impacts. Fleet owners worldwide are under pressure to decarbonize their operations, and shifting to zero-emissions vehicles is a key element of this effort.

The Brisbane Metro Bus Rapid Transit (BRT) plan will introduce new battery electric, bi-articulated vehicles (the first of their kind in Australia) that have zero tailpipe emissions and involves a redesign of the public transport network. Twenty-one kilometers (13 miles) of existing busway system will be modified, including a new inner-city tunnel and upgrading an existing station in Brisbane's cultural heartland.

Jacobs team of more than 260 architects, transport planners, environmental professionals, and engineers (including civil, structural, mechanical, electrical, fire and life safety, intelligent transportation systems, systems and geotechnical) undertook a range of services for the project.



California Department of Transportation – Jacobs is supporting zero-emission train projects including a multiple unit trainset powered by hydrogen fuel cells, and development and procurement of a zero-emission passenger locomotive. Jacobs manages stakeholders, researches tunnel safety risk mitigations, examines vehicle design options, develops safety hazard analyses, models fuel use, as well as writing technical specifications and managing project delivery.

Irish Rail – Jacobs developed the overall Rail Fleet Strategy with a focus on DART services in the Dublin area.

We analyzed passenger flows, solutions for capacity increase and trade-offs between rolling stock and infrastructure to give the best electrified rail outcome. We developed requirements, supported procurement, and are supporting the implementation of a fleet of Battery Electric Multiple Units, using intermittent on-route charging.

JACOBS TECHNICAL CAPABILITIES



Please visit the link in the QR code to learn more about our capabilities or contact railandtransitinfo@jacobs.com

- Environmental
- Track and Civil
- Stations
- Maintenance Facilities
- Rail Systems
- Payment Systems
- Systems Assurance and Security
- Vehicle Engineering
- Operations
- Bus and Bus Rapid Transit Systems
- High Speed Rail
- Management Consulting
- Intermodal facilities

