



Source: Mott MacDonald

TRANSPORT CASE STUDY: AUSTRALIA

Melbourne Metro Rail Tunnel

Location

Melbourne – Australia

Owner

Rail Projects Victoria (RPV) (previously named Melbourne Metro Rail Authority)

Private Partner

Cross Yarra Partnership (Lendlease Engineering, John Holland, Bouygues Construction and Capella Capital)

PPP Model

Design-Build-Finance-Maintain (DBFM)

Operating Term

25 years

Contract Value

AUD 11 billion

Asset Class

Transport (Urban Rail)

With the target of freeing up space in the city loop to run more trains to and from the suburbs with a less crowded and more reliable train network, Rail Projects Victoria (RPV) (established by the State Government) took charge of the Metro Tunnel project.

The project includes the construction of twin nine-kilometre (km) rail tunnels with five new underground stations. The project will allow for the operational separation of various existing lines and increase the capacity of the rail network to metro-style frequencies. The project is part of the Public Transport Victoria (PTV) Network Development Plan.

Some of Melbourne's busiest metropolitan train lines – Sunbury, Cranbourne and Pakenham – will run exclusively through the new tunnel. By taking these lines out of the City Loop, other lines will be able to run more services. As a result, capacity will be created on the network to enable 504,000 more passengers to use the rail system during each peak period. The Metro Tunnel is the first step towards a 'metro style' rail network for Melbourne with the 'turn up and go' train services that are the hallmark of the world's great cities such as London, New York, Hong Kong and Singapore, and the largest investment in Melbourne's CBD rail capacity since the City Loop was completed 30 years ago.

The project comprises of:

- Twin 9km rail tunnels from the west of the city to the south-east as part of a new Sunbury to Cranbourne/Pakenham line;
- New underground stations at Arden, Parkville, Domain and two new CBD stations directly connected to the City Loop at Flinders Street and Melbourne Central stations;
- Train/tram interchange at Domain;
- High capacity signalling to maximise the efficiency of the new fleet of High Capacity Metro Trains; and
- Wider network enhancements with a range of works, including infrastructure to facilitate access to sidings¹, train turn backs, signalling headway improvements, other works to support service frequency across the existing network, and some changes to the operation of the tram network.

There are four major works packages associated with the project:

1. An Early Works Managing Contractor arrangement, which includes utility service relocations and works to prepare construction sites;

2. The Tunnel and Stations PPP, which includes the design and construction of the twin 9kmtunnels under the CBD, five underground stations and certain maintenance services;
3. The Rail Systems Alliance (RSA), which includes design (including conventional signalling, high capacity signalling, train and power control systems and operational control systems), installation works, rail systems integration and commissioning along the Metro Tunnel Project alignment; and
4. The Rail Infrastructure Alliance (RIA), which includes works at the eastern and western portals, including cut and cover tunnelling, decline structures, turnbacks and local reconfiguration and realignment of existing lines.

Early enabling works commenced in late 2016. In late 2017, sections of the Melbourne central business district, including City Square and parts of Swanston Street, were closed to enable construction of the tunnel and stations. The project was originally expected to be completed in 2026, but has now been revised to late 2025.

Output Specifications Development Approach Used

Prior to proceeding with procurement, the Owner developed a detailed reference design to provide certainty to the bidders that a solution was achievable. The reference design was then translated into the output specification for the Tunnel and Station Public-Private Partnership (PPP) project.

Scheme development was mature and included the preparation of a detailed reference design to provide certainty to bidders. The output specification² included the main tunnelling works, five underground stations, station fit-out, mechanical and electrical systems and specific maintenance services for the infrastructure delivered by the package, and commercial opportunities at the new stations.

The output specification section structure is consistent the structure of documents from other jurisdiction and sectors:

- Vision: Scheme objectives and Authority requirements;

- Management: General management requirements including quality, environment, sustainability, monitoring
- Protocols and procedures: Implementation requirements including design life, implementation plan, design standards, design management, communication, code of construction practice, testing and communication, and documentation;
- Technical Requirements (systems, buildings and structures, stations, tunnels, urban design);
- Operation and maintenance requirements;
- Interface management: Support to other contract packages;
- Customer feedback;
- Traffic management during construction;
- Environment; and
- Sustainability and climate change.

¹ A short section of track that allows trains to pass or to store rolling stock.

² The project agreement including output specifications is publicly available at: <https://www.tenders.vic.gov.au/tenders/contract/view.do?id=28571&returnUrl=%252Fcontract%252Flist.do%253F%2524%257Brequest.queryString%257D>

Alignment to QI Focus Areas	Mechanisms used to achieve QI alignment	Market Comparison Analysis
<p>Sustainability and longevity of an infrastructure asset</p> <p>Ability of the asset to meet the needs of end users</p> <p>Performance requirements align with end user expectations and include: quality of service; customer service; accessibility and interchange; design quality; safety and security; environment and sustainability; and 'good neighbour'.</p> <ul style="list-style-type: none"> • Good neighbour was given emphasis given the potential scale of construction disruption in Melbourne CBD. One aspect was additional safeguards for the public (safe walking routes) and collision avoidance and mitigation measures applied to construction vehicles. • Designs included specific requirements to demonstrate achievement of minimum standards for passenger circulation/capacity through level of service thresholds. <p>The preferred bidder's proposal become part of the output specification to capture proposed solutions (above minimum requirements) that were used to win the project.</p> <p>For example, the proposed solution included reduction in embedded carbon and a commitment to source at least 20% of energy requirements from sustainable power sources. Other indicators included a 45% reduction in embedded carbon and a 24% reduction in material lifecycle impacts through rainwater capture, LED, solar and use of natural daylighting.</p> <p>The project was required to achieve Green Star and Infrastructure Sustainability Council of Australia (ISCA) ratings. To achieve these ratings, comprehensive sustainability assessments were required. The Owner evaluated the bidder's sustainability assessments to assess whether an ISCA score of over 84 (out of 110) and a 5 Star Green Star rating was achievable.</p>	<p>Bidder proposals became project requirements: The output specification was updated to include proposed solutions from bid stage that exceeded the minimum requirements. The overall project compliance regime (design reviews and completion process) can be used to deliver expected outcomes.</p> <p>Customer surveys: Monthly and annual customer surveys are required including:</p> <ul style="list-style-type: none"> • service reliability and performance; • customer information; • cleanliness and repair; • information provided during disruption; • customer interface; • ease of buying a ticket/ticketing options; • comments and complaints handling; • security (personal security and Park and Ride security); • use of help point equipment; • comfort; • accessibility and interchange; • customer feedback; • overall satisfaction; and • network extensions. <p>The customer surveys are not specifically subject to financial deductions, however the Private Partner is required to self-monitor performance in accordance with the agreed Performance Monitoring Plan (which is subject to quality failures).</p>	<p>The project output specification represents lessons learned from other metro schemes – e.g. Sydney Metro and Crossrail.</p> <p>Customer satisfaction surveys are a standard approach across markets and sectors to measure if the end users' needs are being met.</p>
<p>Ability of the asset to withstand natural and other disasters, including climate change</p> <p>The output specification includes climate resilience requirements that respond to location specific risks. The Private Partner is responsible for delivering a design that <i>"must include measures for all high and extreme climate change risks to ensure the infrastructure, Stations and precincts are resilient to the projected impacts of a changing climate over the relevant asset's Design Life."</i> The Owner has identified and documented projections and scenarios in a <i>Climate Change Risk Assessment and Climate Change Adaptation Plan</i>.</p>	<p>Design Report: The Private Partner is required to produce a Sustainable Design Report at each stage of design that <i>"demonstrates that climate change mitigation and adaptation measures or changes have been implemented in design"</i>.</p>	<p>The extent of the climate resilience requirements on the Melbourne Metro Rail Transit project are significantly more detailed than the other case studies. Best practice is constantly evolving, and as regional governments take increasing leadership to identify and respond to the climate change risks, asset owners will be further enabled to identify project specific risks.</p>
<p>Social impacts and inclusiveness</p> <p>The output specification refers to the standards and codes to define the access and accessibility requirements for mobility impaired people. There is also a requirement for the inclusion of cultural and community identity infrastructure (CCII).</p> <p>CCII requirements include:</p> <ul style="list-style-type: none"> • <i>"Stations and public realm must incorporate cultural and community identity infrastructure and enhancements in the public realm that are tailored to the needs of each local area; are coordinated with local public arts programmes; and offer meaningful additions to the precinct"</i>. 	<p>Standards and certifications: Compliance with the Disability Discrimination Act (DDA) is required. An Infrastructure Sustainability Council of Australia (ISCA) rating is also required, and the requirements specify the credits for social impacts and inclusiveness: <i>"Achieve a minimum of Level 2 for each of the ISCA Community Health, Wellbeing and Safety Credits and the ISCA Stakeholder Participation Credits"</i>.</p> <p>Financial deductions: The minimum service requirements also reflect the importance of accessibility. A failure that affects the lifts or escalators (and which is not considered a risk to health and safety) shall be considered a 'Level B' failure; the second highest level after health and safety. The level of failure is linked to the value of the potential financial deductions. The failure level also informs the time in which the Private Partner has to respond (in this case 15 to 30 minutes, depending on the time of day).</p>	<p>Refer to the Mersin Integrated Health Campus and the Pan Am Games Athletes' Village case studies in the Built Environment Section for other examples where codes and standards have been used to define minimum accessibility requirements.</p>

Alignment to QI Focus Areas	Mechanisms used to achieve QI alignment	Market Comparison Analysis
<p>Environmental impacts</p> <p>Prior to procurement the Owner developed the Living Infrastructure Plan³ for the Metro Tunnel which “sets out design, implementation and applied learning solutions to help ensure the project results in healthy, resilient and biodiverse green urban landscapes to support the future liveability of Melbourne”. The development of the plan included stakeholder engagement and enabled the Owner to clearly articulate their project vision and requirements.</p> <p>The Living Infrastructure Plan was then translated into the output specifications, requiring the Private Partner to:</p> <ul style="list-style-type: none"> • “Demonstrate excellence in the design, construction and management of urban landscapes and ecosystems by applying the principles outlined in the Living Infrastructure Plan to deliver resilient, climate-proof urban landscapes; • deliver a post-construction net increase in vegetated surfaces, whereby Project Co must construct at least one tree plot for every tree removed [...]”. 	<p>Conditions precedent to completion: By incorporating the Living Infrastructure Plan into the output specification and identifying specific measurable requirements, the overall project compliance regime (design reviews and completion process) can be used to deliver expected outcomes.</p> <p>Industry standards/financial deductions: The Private Partner is required to maintain and operate an ISO 14001 certified Environmental Management System. Failure to achieve this at any point throughout the contract term could result in financial deductions through the application of quality failures.</p>	<p>Urban design is a key element in delivering successful urban infrastructure projects, but it is subjective and difficult to define using measurable requirements. Another approach is to include a design guide with the procurement documents and specifications, with the intention of showing what would be acceptable solutions (and why they are considered acceptable) to still allow innovation.</p>

³ Available at: https://metrotunnel.vic.gov.au/_data/assets/pdf_file/0016/111832/Metro-Tunnel-Living-Infrastructure-Plan.pdf