

**Australian Construction
Achievement Awards 2023
Stage 2 Submission**



M80 Upgrade
Sydney Road to
Edgars Road
Technical Paper



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ACKNOWLEDGEMENT OF COUNTRY

CPB Contractors acknowledges traditional custodians of the lands on which we work and live. We recognise their continuing connection to land, sea, and water. We acknowledge and celebrate the inherent strengths of Aboriginal and Torres Strait Islander peoples and communities. We are committed to a positive future as we move forward together on our journey of Reconciliation.

Overview

Project name	M80 Upgrade Sydney Road to Edgars Road
Status	Completed 18 May 2022
Contract	Design and Construct
Contractor	CPB Contractors (a member of the CIMIC Group)
Client	Major Road Projects Victoria (MRPV)
Location	Melbourne, Victoria

THE NEED

The M80 Ring Road is one of Australia's busiest and largest freeways, linking Melbourne's middle and outer suburbs, connecting growing populations with jobs, and providing access to country Victoria, Melbourne Airport, ports and rail freight terminals.

The Sydney Road to Edgar Road section of the M80 was one of the last remaining parts of the Ring Road to be upgraded. With the road regularly suffering breakdowns in traffic flow, the purpose of the project was clear: to improve traffic flow for the travelling public, as measured by improved efficiency and reliability. The project also needed to meet the future needs of Major Road Projects Victoria (MRPV) and the State, including lifting the performance of the broader M80 corridor.

The success of the project has improved safety for over 165,000 drivers who use the freeway each day, by not only providing additional capacity and reducing traffic congestion, but minimising dangerous merging and weaving. The upgrade also provides better access to other freeways and arterial roads, enhancing freight efficiency for the 22,000 trucks that use the freeway daily. The new smart freeway management system and ramp metering technology controls the flow of traffic better, making travel times more reliable and enabling a faster response to traffic incidents.

"CPB Contractors have performed at a superior level throughout the contract, consistently exceeding the minimum requirements of the contract through a collaborative and open approach with the MRPV project team. As a result, the project has been completed more than six months ahead of the Date for Practical Completion while achieving a significant level of innovation in design, sustainability and safety."

Andrew Robilliard
MRPV Project Director & Superintendent

PROJECT DETAILS

The scope included:

- **Widening 5.7km of freeway** between Sydney and Edgars roads
- **A smart freeway lane management system** to better manage traffic flow
- **Extending Sydney Road on and off ramps** to improve merging and storage
- **New on and off ramps at Edgars Road** to improve safety
- **Better access from M31** (Hume Freeway) to the M80 and Edgars Road
- **Ramp metering** to manage traffic flow
- **Extending Blaxland cable-stay pedestrian bridge.**

The team mobilised in April 2020 – just as COVID hit, creating supply chain issues and resource constraints. Construction involved working in an intense brownfield environment, next to and above live traffic, across 24/7 shifts.

Despite these challenges, the team completed the work **6 months ahead of the contractual date**, enabling the project to open more than one year ahead of schedule.

TIME

Completed
6 months ahead
of contractual date

COST

Substantially under
MRPV's contract value
(commercial in confidence)

SAFETY

No lost time injuries

SUSTAINABILITY

Targeting 'Excellent' Design
and 'Leading' As Built ratings

ENVIRONMENT

No Level 1, 2 or high potential
environmental incidents

QUALITY

95%
of completion documentation
closed at Practical Completion
No legacy issues

Creating value

COMPLEXITY AND DIFFICULTY OF CONSTRUCTION

Our approach to providing MRPV and the State with value for money was to improve the design while maintaining the same – or improved – functionality.

With the project including some of Melbourne’s busiest interchanges, the design solution also needed to be constructible, minimise disruption and maximise the amount of work that could be completed ‘off-line’ behind safety barriers.

The design also needed to carefully consider and integrate the existing high quality urban design of the M80 and M31 corridors.

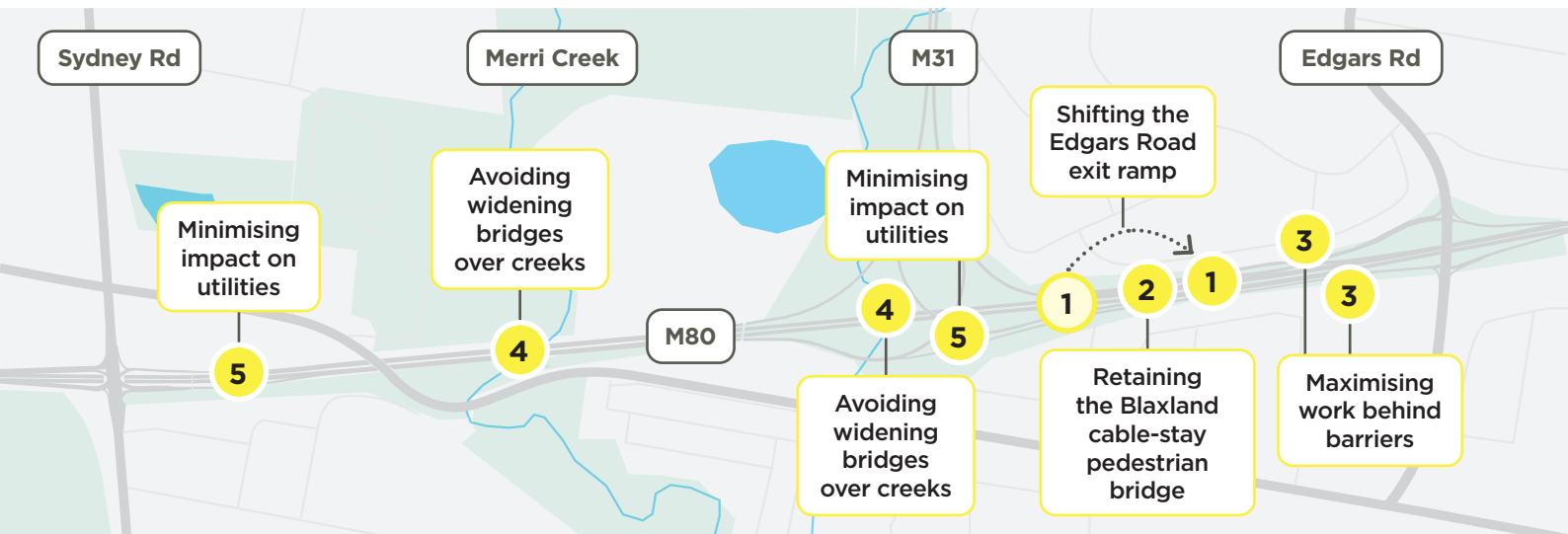
Value through design

During the tender phase, CPB Contractors worked closely with MRPV to better understand their objectives.

As a result, we developed an alternative solution that was cheaper, simplified construction, reduced disruption, improved traffic performance and reduced energy-related greenhouse gas emissions through:

- 1 Shifting the Edgars Road exit ramp
- 2 Retaining and extending the Blaxland cable-stay pedestrian bridge
- 3 Maximising work behind barriers
- 4 Avoiding widening bridges over creeks
- 5 Minimising impact on utilities
- 6 Rationalising and retaining gantries
- 7 Improving Intelligent Transport System
- 8 Maximising ‘campaign style’ works
- 9 Pavement design

Below: Improving the Reference Design



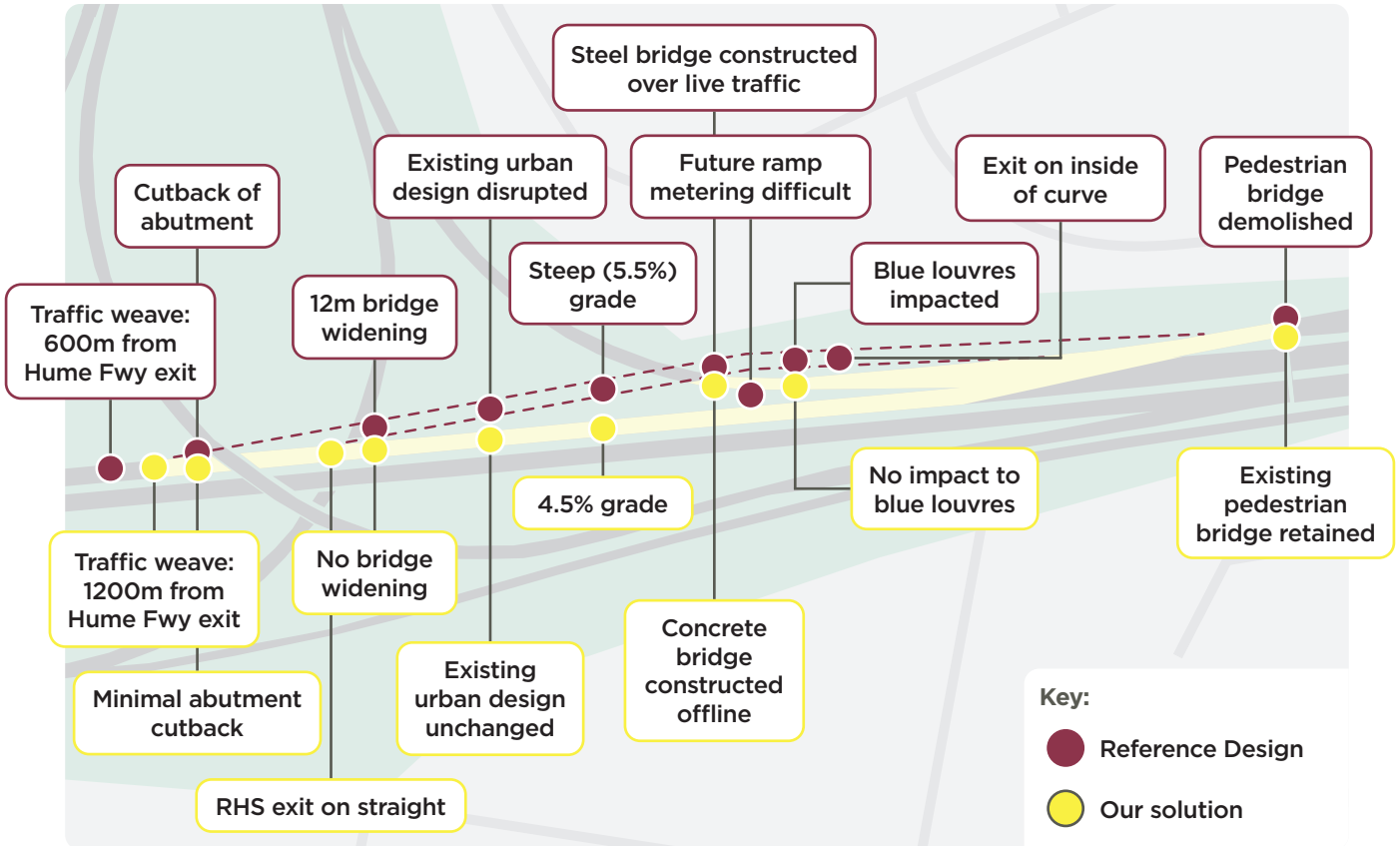
Project-wide initiatives

- 6 Rationalising and retaining gantries
- 7 Improving Intelligent Transport System
- 8 Maximising ‘campaign style’ works
- 9 Pavement design

Shifting the Edgars Road exit ramp (Ramp J)

The Reference Design had Ramp J located just beyond the M31 exit ramp (Hume Freeway), benefitting Edgars Road traffic but exacerbating the Sydney Road to M31 traffic weave problem.

Our solution to shift Ramp J 700m east doubled the distance between the M31 exit and Edgars Road exit, reducing traffic weave and maintaining the functionality of the Edgars Road exit ramp.



Above: Our solution for Ramp J

The solution also generated many other benefits:

- Allowing the braided exit ramp to be constructed in a greenfield area with no disruption to the M80 or M31, instead of over live freeway traffic
- Saving MRPV \$10m
- Enabling the Blaxland cable-stay pedestrian bridge to be retained rather than demolished
- Preserving the acclaimed Craigieburn Bypass urban design by eliminating tall retaining walls and avoiding the 'blue louvres'
- Eliminating the need for a new bridge over the M31 and related approach structures
- Avoiding widening the M80 bridge over the M31 off ramp
- Eliminating complex abutment cutback works under the M31 fly over ramp
- Eliminating the need for major earthworks in and around Central Creek's growling grass frog habitat
- Avoiding 60–70 single lane closure events compared to the Reference Design
- Enabling future ramp-to-ramp metering to be installed cheaply, safely and with minimum disruption.

Following contract award, we further refined the alignment of Ramp J and reduced the shoulder width, avoiding the need to remove trees, noise walls and established community gardens. In addition, we redesigned Ramp J's bridge girder in concrete rather than steel, maximising the cost efficiency of span lengths while achieving a more attractive urban design.

Achieving the desired span for Ramp J's pre-cast concrete Super-T bridges posed a significant challenge. While we considered increasing the depth of the beams from 1500mm to 1800mm, this created vertical clearance and grade issues. Instead we stitched the Super-T beams into the portal crosshead, overcoming site constraints and improving urban design.

Below: The Blaxland cable-stay bridge was retained and extended instead of being demolished



Retaining and extending the Blaxland cable-stay pedestrian bridge

One of our most creative initiatives was to retain and extend the Blaxland cable-stay pedestrian bridge (pictured above and right) spanning the freeway rather than demolishing and replacing the structure with a steel truss bridge, as in the Reference Design.

Numerous advantages flowed from this design improvement, including:

- Saving MRPV around \$1m
- Cutting the freeway closure time associated with the bridge works from over 36 hours to under 24 hours
- Retaining a major original urban design feature of the M80 Ring Road
- Reducing the need for concrete and steel, saving approximately 120 tonnes of structural steel in the main truss and 50m³ of structural concrete for the bridge deck
- Accommodating future ramp metering requirements on Ramp J
- Allowing new shared use path ramps to be constructed parallel to the existing ramps, reducing disruption during commissioning.

Extending the bridge involved a series of complex engineering challenges, requiring exhaustive planning, extensive temporary works and specialist knowhow.

The bridge’s existing cable-loading capacity was confirmed on-site and new anchor blocks constructed. A delicate operation was launched to retain the cables supporting the middle of the bridge while the ends of the structure were demolished.

New modules to extend the bridge were delivered on-site – complete with the final running surface and handrails – and bolted together, minimising temporary works and working near live traffic, and shaving over 4 weeks from the program. The new modules were lifted into place and the old and new structures stitched together, while the old cables supporting the bridge were de-stressed and new cables tightened to take up the load. This intricate engineering feat was completed with no safety incidents and minimal disruption to traffic.



Above: Blaxland cable-stay bridge – temporary works

Below: Working off-line on ramps J and H while freeway traffic continues



Maximising work behind barriers

Every aspect of our solution was developed with safety in mind – for drivers, the community and the workforce. With safety paramount, we maximised the work that could be constructed during the day behind safety barriers (**pictured above**), including Ramp J and the Ramp H bridge.

Ways in which we maximised the work undertaken behind barriers included:

- Eliminating bridge widening works for the Merri Creek and M31 while enabling bridge strengthening works – including drainage – to be completed off-line
- Designing out centre median work areas for cross-freeway infrared traffic logger bores (TIRTL), avoiding additional traffic stages and excavation within traffic lanes while improving safety and quality
- Redesigning Edgars Road west-bound ramp (Ramp H) to allow construction off-line behind barriers with minimal impact on ramp users
- Design improvements to create larger working zones behind barriers, maximising productivity, particularly for paving
- Relocating entry and exit ramps onto temporary ramps, opening up larger work areas and reducing the need for traffic management
- Installing steel barriers on ramps so run-off passed underneath to the outer ramp shoulder drainage system, avoiding the need to construct additional pits and drainage lines in traffic, and reducing future maintenance.

Avoiding widening bridges over creeks

The Merri Creek intersected the project area, a Melbourne Water asset with high ecological value, including known habitat for the nationally significant growling grass frog.

To avoid work near the sensitive waterway, CPB Contractors requested and received a specification departure from the Department of Transport to reduce the shoulder width required for the Merri Creek bridge. Reducing the shoulder width from 3m to 1m eliminated the need for bridge widening, avoiding major work in or around the sensitive waterway.

Minimising impact on utilities

CPB Contractors and MRPV recognised the importance of avoiding disruption to utilities along the M80 corridor, particularly the Ausnet 66kV overhead powerlines spanning the freeway.

To avoid and minimise disruption we:

- Altered road design geometry to avoid critical assets
- Moved the Sydney to Edgars west-bound ramp exit ramp to reduce impacts on 220kV power assets
- Realigned Ramp H to reduce impacts on 220kV power assets
- Kept all utility design, approval and relocation off the critical path
- Relocated the 66KV overhead powerline within 7 months of contract award, enabling the Sydney Road off ramp to commence 2 months ahead of the original schedule
- Identified poles as a potential procurement risk due to the intense demand after the 2020 bushfires. Early engagement with suppliers secured the poles, avoiding delays
- Programmed key utility activities for early works, including activities known to have long durations
- Reduced the number of utility relocations from 55 in the Reference Design to just three. This delivered an 88% saving on the MRPV's provisional sum allowance, equating to \$5.7m.

Rationalising and retaining gantries

With sustainability front of mind, the team reused six gantries over the freeway instead of demolishing and rebuilding them as in the Reference Design. Four gantries only needed the design of the signs adjusted to accommodate the signage, while two other gantries needed strengthening to support the new layout.

Keeping the gantries saved approximately 180 tonnes of steel and avoided the need for new work zones and significant traffic disruption.

Improving Intelligent Transport System

The project's Intelligent Transport System (ITS) (pictured below) consisted of a new freeway management system, involving overhead electronic signs, cameras, vehicle detection and variable message signage to communicate speed limits, manage traffic flow and respond to incidents.

The freeway's existing communications fibre and power services were relocated and maintained during construction before being seamlessly integrated into the new system. The new system provides real-time monitoring of the entire alignment, allowing the Department of Transport to immediately respond to traffic-flow issues or incidents.

A major challenge was retrofitting ITS infrastructure onto the existing freeway, especially new infrared traffic loggers. The loggers required cross-freeway bores, involving working in the freeway's centre median to connect conduits to the centre median barrier. In several locations there was insufficient space or access to safely undertake the work.

CPB Contractors and MRPV collaborated on an alternate solution which used existing centre median conduit paths to eliminate the need for new cross-freeway bores. This initiative removed a traffic stage, improved safety and created program savings.

ITS infrastructure was constructed progressively to align with civil construction. The project team worked closely with MRPV and the Department of Transport to achieve accelerated handover with minimal defects. ITS completions and handover occurred about a month ahead of the initial tender program.

Below: Campaign style works allowed faster, safer and higher quality asphaltting



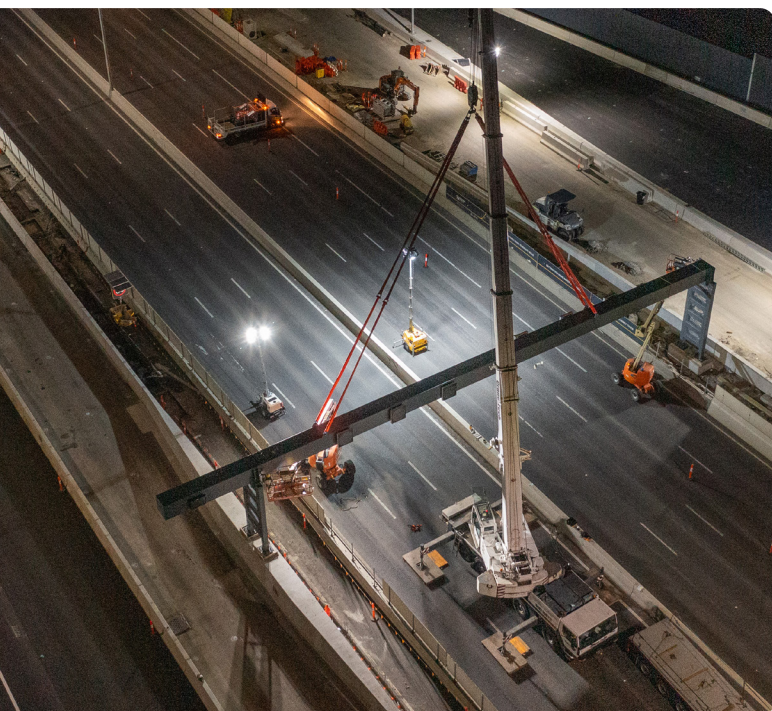
Maximising 'campaign style' works

CPB Contractors identified opportunities for short-term intensive campaigns to maximise continuous working time on the freeway (pictured above). This avoided the need to set up, open and close traffic management and construction each night, improving worker safety and productivity while reducing overall lane closure times and de-risking the program.

A stretch target program aimed to complete all open grade asphalt by March 2022, further de-risking the program by avoiding the inclement winter months. Initiatives such as re-sheeting the entire freeway over two weekends rather than lane by lane closures saw the target achieved, while also increasing quality by eliminating cold joints between paving runs and improving worker safety.

Pavement design

MRPV and CPB Contractors worked with VicRoads to amend the pavement specification, changing intermediate asphalt layers from Type 'S' to Type 'SI'. This change allowed reclaimed asphalt to be used, increasing the recycled content in the asphalt and saving MRPV \$1m.



Above: Gantries were installed complete with ITS already attached

TIME, COST, QUALITY AND SAFETY

Completed
6 months ahead
of contractual date

Delivered
substantially under
MRPV's contract value

95%
of completion documentation
closed at Practical Completion

Time

Despite COVID challenges, an industry-wide two-week closure, worker shortages and supply chain constraints the project was completed 6 months ahead of contractual date, enabling the project to open more than one year ahead of schedule.

A major part of this success was MRPV and CPB Contractors maintaining an 'open book' approach to programming, clearly showing contingencies, critical paths, time chainage, and potential risks and opportunities. This included issuing MRPV additional program monitoring tools such 6-week lookaheads, hourly campaign programs and time-scaled logic diagrams, allowing the program to be assessed at a macro and micro level.

This transparency gave MRPV the detail needed to gain buy-in of senior management and key stakeholders, unlocking win-win opportunities such as changing the strategy at Edgars Road from rolling road closures over a 6-week period to a single productive 2-week closure. This 2-week closure also allowed piling, drainage and pavement works to be bought forward by up to 12 months, saving additional time at the back end of the program.

Cost

Exceptional program management and shared commercial savings saw MRPV rate CPB Contractors' cost management as '10/10' across all categories in MRPV's Contractor Performance Report.

Proactive and collaborative commercial management was at the heart this success, with potential commercial issues flagged early and both parties working together to minimise the cost impact, regardless of contractual liability. Commercial meetings were open and transparent, quickly building commercial trust.

Shared commercial outcomes also added to the alignment between CPB Contractors and MRPV. This included post-award design refinements which returned over \$2m to MRPV.

CPB Contractors also delivered significant savings to MRPV through finishing the project early (avoiding staff and client overheads), minimising variations and reducing provisional sum works.

No legacy issues

Quality

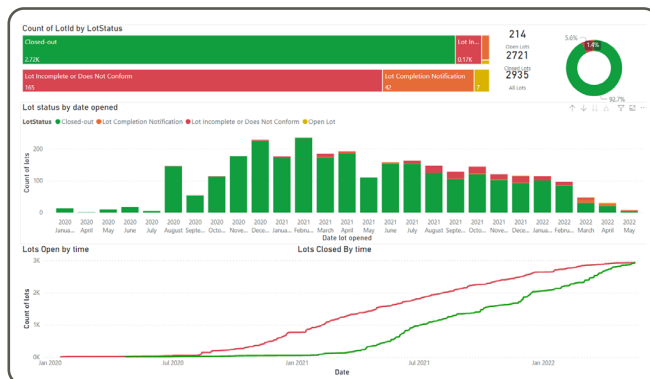
Minimising staging and creating large work areas

played an important role in delivering a quality final product. Asphalt milling and resurfacing works were completed during full carriageway closures, achieving higher quality and improved whole of life, including full width paving to minimise cold joints.

The quality team performed 16 audits of subcontractors, suppliers and CPB Contractors management systems during the project. Internal audits were also undertaken by CPB Contractors' Victorian Business Unit and CIMIC's governance team. No significant non-conformances were identified, with all minor issues resolved within the specified timeframes.

From the project's inception CPB Contractors and MRPV recognised that the handover of the asset to the ultimate owner and maintainer (the Department of Transport) would be a key risk. To minimise this risk, we progressively handed over works and verified construction activities, complemented by a transparent completion process.

At Practical Completion, 95% of completion documentation was closed and maintenance was handed over to the Department of Transport. The remaining items were finished just 10 weeks later, achieving final project close-out.



Left: A completions focus from the start with progressive acceptance of the work ensured no delays to handover at Practical Completion

0

lost time injuries

Safety

Visible safety leadership and a proactive safety culture contributed to total recordable injury frequency rate of 3.57, with no lost time injuries, fatalities or serious injuries in over 1.4 million hours worked. The most significant contribution to safety was achieved in the design stage, where design improvements maximised work behind safety barriers.

The team's safety commitment was recognised with three Major Transport Infrastructure Authority (MTIA) safety awards, including a Director General's Health and Safety Innovation Award and two high commendations (pictured below).



Above: M80 at MTIA's Annual Health and Safety Awards. Left to right: Kelvin Doyle (MRPV), James Williams (CPB Contractors), Sarah Krausas (MRPV) Raph Touzel (CPB Contractors), Steve Anderson (CPB Contractors), Sam Witteveen (MRPV), Lea Ea (Arrows)

Safety innovation - 'Matey' the Tiny Surveyor Robot

This initiative was Highly Commended at the 2021 MTIA Program-wide Award Health and Safety Awards.

The traditional process for line marking roads is labour-intensive, with line marking set out points manually surveyed and marked out by a surveyor on the road. The surveyor traditionally works ahead of the line marking crews by at least one shift to complete line marking set out works. The process is slow and impacts long stretches of road, and is potentially dangerous when working adjacent to traffic or near operating equipment.

The team needed a solution that would improve worker safety, create cost efficiencies, save time and ensure accurate line marking set out.

The team adopted the autonomous Tiny Surveyor Robot 'Matey' (M80y) (pictured below-left). Matey is a tablet-controlled robot programmed to complete line marking set out with spray paint. Engineers create the road line marking design which is uploaded to a tablet.

Using Matey, set out works can be completed in the same shift as line marking. Due to the speed of operation, our survey crews were able to complete the set out works for each traffic switch of each area within 1-2 hours and then clear the work area for the line marking crews.

In addition, the Tiny Surveyor could place set out marks at any space interval without reducing travel speed. Decreasing space between set out marks to two metres for standard lane lines eliminated the need for a spotting vehicle to place additional set out marks.

On the M80 project, the Tiny Surveyor was used during multiple traffic switches and asphalt works, with the technology completing tasks 4-5 times faster than traditional field survey methods and with better accuracy, while eliminating surveyors being exposed to live traffic and preventing worker fatigue.

Safety innovation - 'blue beacons'

This initiative was Highly Commended at the 2022 MTIA Program-wide Award Health and Safety Awards.

Currently 45% of all 'high potential' incidents on MRPV projects involve mobile plant, with 10% involving people-plant interactions.

As a brownfield project with limited space and confined work zones, the M80 had an increased risk of interaction between people and plant.

Traditionally, to enter the Plant Operating Zone (POZ) personnel communicate with the plant operator, wait for the operator to lower the bucket, visibly remove their hands from the controls and authorise them to enter. Miscommunication, complacency or inexperience can lead to personnel entering the POZ while the excavator is in operation, increasing the risk of incident or injury.

The project team responded to this problem by fitting 'blue beacons' to excavators, essentially an electrical connection from a dead-man switch to a blue beacon on the cab roof. The beacon was connected to the engagement lever and would flash when the excavator was disengaged, indicating it was safe to approach within the POZ. Installing blue beacons contributed to the project experiencing no plant-people incidents or non-compliances. The system was inexpensive and easy to understand and implement.



Above: 'Matey' the Tiny Surveyor Robot in action

Below: Trialling the Automated Cone Truck



Safety innovation – the Automated Cone Truck

This initiative won the 2022 MTIA Director General's Health and Safety Innovation Award.

Jointly funded by MRPV and CPB Contractors, the team trialled an Automated Cone Truck (ACT) (pictured above) to reduce the need for traffic controllers to enter high risk zones to set up freeway lane and ramp closures. Developed by Arrowes Rooding Safety, the ACT removed the need for workers to manually lift and retrieve traffic cones near live traffic. It also reduced the risk of long-term injury from lifting cones, which are heavy and require repetitive movement, as well as eliminating the risk of fatigue.

The ACT only required a single operator to safely deploy and retrieve cones on-site and could be operated on both sides (left or right) as well as forward or reverse, so traffic workers were not exposed to unpredictable traffic and could do their jobs from a safe distance.

As one of the busiest freeways in Melbourne, the M80 provided a unique opportunity to trial the new technology. Using the ACT for the first time on an Australian freeway involved:

- Conducting a plant risk assessment to check and onboard the equipment from the controlled factory environment to a major operational freeway
- Providing two weeks' training for staff and two traffic controllers in CPB Contractors' M80 yard
- Trialling the truck for a week on a local road
- Trialling the truck on the M80 under full traffic management, putting out and packing up a lane closure under protection.

This trial discovered that - while more work was needed to refine the technology - the ACT had the capacity to reduce traffic set up times and manual handling. Trial feedback helped Arrowes address issues with system, enabling the trucks to become commercially available in October 2022. To date three units have been sold and deployed on other Australian road projects.

Other safety strategies

Some of the other strategies we used to maintain safety included:

- Using a spray nozzle attachment to suppress jackhammer silica dust when breaking back concrete (pictured below)
- Employing a full-time COVID Marshall and three deputy marshals to navigate changing pandemic requirements and ensure the project remained COVID safe
- Integrating Damstra infrared temperature testing cameras with Damstra kiosks as part of the daily sign-in process, enabling real-time contact tracing
- Introducing the ChekRite plant onboarding system to induct over 1300 items of plant
- MRPV and CPB Contractors holding joint weekly safety walks to quickly close-out corrective actions and maintain incident reporting
- Using the Enablon Inspection app to streamline safety reporting, allowing inspections and observations to be entered directly into the Synergy SHEQ database, instantaneously issuing action plans to the team
- Setting a monthly safety KPI target of two workplace inspections and two task observations for every member of the delivery team
- Assigning senior leadership team members critical risk reviews to assess specific construction risks.



Above: A spray nozzle attachment suppressing jackhammer silica dust

SUPPORTING LOCAL SUPPLIERS

MAJOR PROJECT SKILLS GUARANTEE

77,134 hours achieved
(52,844 hours target)

LOCAL CONTENT

97.50% achieved
(95.76% target)

LOCAL JOBS

184 jobs created
(23 jobs created target)

512 jobs retained
(66 jobs retained target)

CPB Contractors leveraged its relationships with industry bodies such as the Industry Capability Network, Social Traders, Supply Nation and Kinaway to maximise support for local suppliers.

The team engaged early with the local steel market to ensure the design matched capability and capacity, especially for the long-run plate elements for the project's gantries (pictured below). This resulted in all structural steel on the project being locally milled and fabricated, ensuring a high quality product.

The team also ensured the designs for materials and architecture were tailored for local businesses, avoiding the need to rely on overseas suppliers, reducing supply chain issues and building local industry capability.

The procurement team used Felix software to streamline vendor management and procurement. The software recorded and assessed all local partners CPB Contractors had previously used to successfully deliver similar scopes, providing these companies with tender invitations and delivery opportunities.



Above: Local steel fabricator Coslee supplied 70% of the project's gantries

COMMUNITY ENGAGEMENT

Despite the COVID-19 pandemic limiting opportunities for face-to-face engagement, CPB Contractors and MRPV connected with businesses, residents and stakeholder groups through phone calls, online engagement and digital information packs. This enabled strong, trusted relationships to be established early in the project.

Engaging businesses

The community relations team engaged with over 500 businesses, spanning retail, industrial and manufacturing. The team met these businesses face-to-face, as pandemic restrictions allowed, and also conducted business surveys to better understand their operations, concerns and customer needs. These meetings and phone calls also ensured the businesses understood construction impacts, detours and the support available.

To show further support to the highly impacted businesses, retail vouchers for fuel, food and car wash were purchased and distributed to residents as a gesture to thank them for their patience during intense construction periods. These vouchers were also given to workforce and staff as part of the project's reward and recognition program. The team's intense engagement effort ahead of the high profile Edgars Road works resulted in just one complaint during construction despite the close proximity of dozens of businesses.

Engaging the community

Ensuring residents remained well-informed about the project was critical for the program remaining on schedule. Over 80% of community enquiries or complaints were resolved the day they were received, with 97% closed-out within three business days and the remaining 3% resolved within a timeline agreed with the stakeholder.

To meet program timelines for the installation of asphalt on the north side of the freeway the team needed to work double shifts over two weeks. With the work area near local residents, double-stacked shipping containers were installed between the construction zone and residents to provide a sound buffer. The community relations team also undertook extensive engagement to explain the proposed works and offer temporary alternative accommodation for any residents who needed it.

With the residents preferring not to relocate, the team instead collaborated with them on an acceptable finish time for the work, which was agreed at 11pm. The residents appreciated the opportunity to influence work times and the pavements were installed quickly with minimal disruption.

At the conclusion of the project CPB Contractors distributed 566 thank you cards to the most directly affected residents, each enclosing a \$30 food delivery voucher.

Below: Project team members and cyclists celebrate the opening of a new bike repair and pump station



"Your communication with Whittlesea BUG and on-site signage since the project started has been fantastic. The level of detail provided was really good and your information is fluid and makes it easy for us to update our members. You've set the bar high in comparison to other projects in how you communicate with BUGs."

Whittlesea BUG

Shared use paths

The community relations team worked extensively with Bicycle Network Victoria and the bicycle user groups (BUGs) from the Whittlesea, Hume, Darebin and Moreland, particularly on the closure of the shared use path between the Blaxland cable-stay bridge and Edgars Road.

Members of the Whittlesea BUG raised concerns about the proposed design of the intersection of the Blaxland bridge ramp with the M80 Trail. The BUG believed the turning circle would be too tight for cyclists and initiated a user-group survey on the issue.

CPB Contractors and MRPV reviewed this feedback, revisited the design and agreed to address the group's concerns, providing a wider concrete area at the base of the ramp. Whittlesea BUG was appreciative of the redesign and the team's willingness to and address their concerns.

As a further legacy CPB Contractors and MRPV, in close consultation with the City of Whittlesea, installed a bike pump and repair station along the bike path.

Blaxland overpass colour consultation

To provide an opportunity for the community to participate in the project, CPB Contractors and MRPV asked the local community and the travelling public to choose the new colour of the Blaxland cable-stay bridge towers. This was promoted through the project's monthly construction updates, local paper *The Northern Star Weekly* and the Victorian Government's Engage Victoria online platform, with over 1,100 people voting for kikuyu (a bright green) from a choice of three vibrant colour options.

Cultural heritage

CPB Contractors and MRPV worked with the Wurundjeri Indigenous Council on an interpretive sign recognising important cultural heritage near the Merri Creek (pictured right). Team members engaged with Wurundjeri representatives to develop, produce and install an interpretive sign recognising the role, values and contribution of the Wurundjeri Woi Wurrung people to the area.

Community donations

The team donated 600m³ of mulch and habitat logs to community groups, local councils and Zoos Victoria, as well as \$5000 worth of equipment to the Merri Creek Management Committee. These donations were greatly appreciated by the groups, who used them for habitat restoration projects.



Above: The Wurundjeri Indigenous Council collaborated on an interpretive sign

Capacity, capability and skills

DRIVING PRODUCTIVITY

Innovation

Part of the success of the project was the spirit of innovation shared by MRPV and CPB Contractors.

This allowed us to collectively generate, trial and implement many genuine 'firsts' to increase productivity.

Below: Project Director Raph Touzel with some plastic bags, one of the key ingredients in Reconophalt recycled asphalt



AUSTRALIAN-FIRST INNOVATIONS

1st

freeway to use recycled content in every pavement layer, including:

- **820** car tyres
- **Reconophalt asphalt (a Victorian first)**, diverting 22 million glass bottles, 35.5 million plastic bags and 800,000 toner cartridges from landfill
- **49,000 tonnes** of crushed Class 3 and 4 concrete
- **62,000 tonnes** of recycled capping

1st

to join the Engagement for Plastic-free innovation and Change program

1st

to trial a cone truck to automatically deploy and retrieve traffic cones

1st

to use solar powered SiteHive security tower lights

1st

to use an electric excavator for site works

STATE-FIRST INNOVATIONS verified in IS Design

An autonomous robot surveyor for line marking and barrier set up

Reconophalt asphalt on a freeway

Reusable road anchors used a gravity bar system to pin down steel road barriers

Precast barriers containing 50% supplementary cementitious material

100% recycled glass-sand mix as backfill

eMesh, a recycled plastic material, replacing steel reinforcement

OTHER INNOVATIVE PRACTICES now being adopted on other projects

High-resolution colour LED Variable Message Sign - a Victorian-first

Recycling 820 tyres in an Olexocumb binder trial - a Victorian-first

Intelligent compaction trials of asphalt layers

'Blue beacons' on excavators, reducing people-plant risk

TRAINING AND DEVELOPMENT

Up-skilling staff

Training was provided for all staff looking to expand their skills and take on further opportunities within CPB Contractors and the broader construction industry. Working with Kangan and Swinburne TAFEs we up-skilled 19 team members with a range of qualifications, including Diploma of Building & Construction Management and Cert IV Leadership & Management.

Apprentices, trainees, graduates and undergraduates

CPB Contractors directly employed eight graduates and 15 undergraduates on the project, with six undergraduates entering CPB Contractors' graduate program.

The success of our graduates is demonstrated by Tim Whiting. Tim was a Bachelor of Business student with RMIT before taking up a one-year work placement with CPB Contractors in third year and joining the company's Graduate Program on the M80 in 2020. After being nominated by the M80 project team, he won the 2022 CIMIC Commercial Finance Graduate of the Year. Now a Procurement Advisor on North East Link, Tim continues to speak to graduates about the many opportunities available in the construction industry.

Indigenous employment

ABORIGINAL EMPLOYMENT TARGET

3.1% achieved
(2.5% target)

CPB Contractors adopted the **Real Construction Career Program** to create long-term employment opportunities for First Nations jobseekers. Partnering with MatchWorks, we provided ongoing individual support, mentoring and flexible working hours for participants, allowing them to experience a range of roles, such as COVID Marshall, Quality Administrator, Labourer, Accounts Payable Clerk, Safety Administrator and Human Resources Administrator.

Surpassing our initial target of employing two Indigenous candidates, we employed and retained four Indigenous people in undergraduate, graduate and traineeship roles. This included Dharma Rogers, a communications undergraduate who joined the team as a Stakeholder and Communications Undergraduate through Ngara Wilim, RMIT's support service for Aboriginal and Torres Strait Islander students. With mentoring, on the job coaching and external training, Dharma progressed from a junior support role to taking responsibility for local community engagement.

To provide opportunities for apprentices, trainees and undergraduates our Major Projects Skills Guarantee target was 52,844 hours

We delivered 77,134 hours, exceeding the target by 146%

Subcontractors

CPB Contractors' subcontractors were provided with **training opportunities**, including attending refresher courses, gaining tickets and up-skilling. Details on training and competencies were captured in the Damstra system, ensuring each individual had the skills and training needed to safely undertake their role.

During procurement, subcontractors were assessed and supported to up-skill their workforce, resulting in:

- Applied ITS gaining VicRoads prequalification accreditation for major projects
- Two companies, Civil 5000 and CK Formwork, working with CPB Contractors to develop their skills on the M80 – their first ever Tier 1 civil experience – leading to both companies winning contracts on other major projects
- MacFab employing two new starters to the industry. Identified with green coloured safety vests, CPB Contractors' leadership team mentored the individuals, discussing safety and risk.

Subcontractor opportunities for First Nations people

CPB Contractors also worked with subcontractors to maximise opportunities for First Nations people on the project, including:

- Indiya Geospatial, a majority owned Indigenous business and our main surveyor contractor, employing an Indigenous trainee surveyor
- An ongoing full-time employee at the local spoil disposal facility
- Over 10,000 hours of traffic management
- An ongoing full-time piling employee
- A full-time position at the Ballarat precast supplier's facility
- Apprentices working on the Merri Creek underslung drainage and light pole installation works.

INDUSTRIAL RELATIONS

Despite COVID posing many challenges for the industry, including additional controls and consultation, our collaborative relationship with unions ensured there were no IR incidents or disruptions on the project.

A positive culture

WORKPLACE HEALTH AND WELLBEING

Flexible working in a safe, inclusive environment

The team mobilised in April 2020 – just as COVID hit Victoria.

To support safe, flexible working conditions during the pandemic the project team was rostered into two groups, each working two days from home and three on-site. This reduced isolation, increased collaboration and supported mental health.

Some of the other initiatives to support workplace health and wellbeing included:

- Supporting flexible working arrangements to fulfil family commitments, both during and after the pandemic
- Virtual team exercises during COVID lockdowns, including trivia, fun facts night, poetry slam, games nights and step challenges
- Celebrating NAIDOC Week, including a visit by Uncle Ringo, smoking ceremonies and opportunities to paint
- Supporting Reconciliation Week, including rolling out cultural competency training
- Bring your dog to work days
- Using social enterprise Kinfolk to deliver lunches to employees, reducing exposure risk from adjacent shopping precincts
- Reducing COVID fatigue through rotating rosters for night shifts, campaign works and Saturday works
- Stopping all work over the Christmas period – allowing staff and workers to recharge
- Supporting six team members to complete Mental Health First Aid training
- R U OK Day psychologist presentation on how to initiate conversations
- Toolbox talks on mental health, including on the support available to the team.

SOCIAL PROCUREMENT

5.6% of spend achieved
(1.12% of spend target)

Combined

\$16.9m spend
on Aboriginal and social enterprises

DIVERSITY AND REMOVING BARRIERS

Workforce diversity

CPB Contractors and MRPV engaged 20 social enterprises, 25 Aboriginal businesses, six Australian disability enterprises and four businesses in regions of entrenched disadvantage on the project.

Social and economic outcomes included:

- Employing 199 disadvantaged Victorians, far exceeding the 26 target
- Two full-time site staff were former offenders
- Full-time employment for a Veteran
- Engaging Indigenous-owned businesses for significant contracts, including Bunji Hire for light vehicles and Indiya Geospatial for surveying
- Using Sovereign Concrete Products from Ballarat for the majority of precast barriers. Sovereign is not only based in an area of disadvantage, but provided additional social benefits including employing a full-time First Nations worker for the project and purchasing consumables from McCallum Disability Support Services
- Using eMesh, a recycled plastic material sourced from an Australian disability enterprise
- Spending \$750,000 with Social Outcomes Security who provided ethical security services supporting disadvantaged Victorians.

Supporting Indigenous businesses

On the M80 project nearly \$17m was spent with Indigenous businesses and social enterprises.

A significant portion went to majority owned Indigenous company **Indiya Geospatial (pictured right)**, the project's main survey contractor. Indiya provides opportunities for young Indigenous people to develop careers in the construction industry, providing the on-the-job training, accreditation and mentoring needed to become fully qualified surveyors.

Bunji Hire, another Indigenous-owned business, also took on major contracts, supplying four hybrid electric cars and 11 other site vehicles.



Jessica Leach, ITS Project Manager



"Working on the M80 in a project-based leadership role in a part-time capacity, while managing family commitments as the primary carer of a young child, was only possible with the support of the project team, both my direct reports and the project leadership team."

Women on the M80

About 30% of staff on the M80 project were female – with nearly 40% of the project leadership team women. These leaders included ITS Project Manager Jessica Leach (pictured above) who worked part-time on the project while fulfilling family commitments. The project team also supported Jessica on her successful application for a Roads Australia Fellowship.

Project leadership team member Delwyn Thompson, Communications and Stakeholder Manager, was supported to complete a Diploma of Building and Construction Management, enabling her to better mentor two female blue collar workers new to the industry.

Additional initiatives to support women on the M80 included:

- Creating a clear career pathway into the industry through our Women in Construction program
- Running an Emerging Female Leaders program and providing mentoring
- Ongoing pay equity reviews to address the gender pay gap
- Embedding flexibility in the way we work
- Celebrating female focused events such as International Women's Day
- Maintaining an active partnership with the National Association of Women in Construction (NAWIC).



Above: New entrant to construction, Brittney Gray, quickly progressed through mentoring and support

Below: The positive relationship between CPB Contractors and MRPV was fundamental to the success of the project



BUILDING RELATIONSHIPS

MRPV

The relationship between CPB Contractors and MRPV was positive from the start. Although a D&C contract, CPB Contractors and MRPV instilled an 'alliance-like' collaborative environment. MRPV effectively cleared potential barriers, freeing CPB Contractors to get the work done.

MRPV was determined to be an 'informed and active' client, resulting in a strong client-side team with clear reporting channels, fully aligned with the project team's structure and ethos. A pivotal moment was when MRPV's Project Director Andrew Robilliard and CPB Contractors' Project Director Raph Touzel were preparing to launch the project. Instead of gathering as client and contractor, in two separate teams, they decided to launch the project as one team, together. This allowed the integrated group to discuss why MRPV chose CPB Contractors, MRPV and CPB Contractors' drivers for the project, and what shared success on the project would look like. This detail was then collected and reflected in the values that guided project delivery.

Shared commercial outcomes also added to the alignment between CPB Contractors and MRPV. This included post-award design refinements which returned over \$2m to MRPV.

Suppliers and subcontractors

The project's supportive environment extended to the supply chain, with subcontractors guided through procurement and hands-on support provided on reporting and meeting government policy.

Delivering the project during COVID lockdowns introduced additional constraints on the supply chain. To mitigate this risk, the team worked with the supply chain to establish secondary facilities to fabricate materials if interstate and international transport became problematic, particularly for conduits and pit materials.

Each month subcontractors and the workforce were recognised for excellent work at Values in Action awards.

REDUCING ENVIRONMENTAL AND SUSTAINABILITY IMPACTS

Our sustained efforts to use environmentally friendly materials saw greenhouse gas emissions reduced by over 40%, avoiding 18,530 T of CO₂-e

Embedding sustainability advisors into the engineering team early helped identify, execute and track sustainability related opportunities. This included challenging suppliers to step up their use of sustainable materials.

Environmental and cultural heritage considerations were also fundamental to design development, informed by the environmental team’s thorough understanding of environmental investigations and assessments.

We committed to surpassing MRPV’s minimum IS ‘Excellent’ rating (a minimum score of 65), targeting a ‘Leading’ IS As Built rating of 78.

Environmental and sustainability initiatives

SiteHive

The team used SiteHive environmental monitoring devices (pictured below). These compact, cutting-edge noise and dust monitoring devices stream real-time environmental data to a portal for 24/7 remote environmental oversight. The system had many benefits over traditional monitoring systems, including:

- Having all data and alarms in the same place, including for vibration
- Instantly sending real-time warnings or alarms to personnel, reducing the risk of contractual or regulatory exceedances
- Easily creating reports, making monthly and final reporting seamless
- Linking to mobile devices, allowing high impact activities to be monitored in real-time.

In a world first, a SiteHive environmental monitoring device was mounted on a solar tower, allowing continuous environmental monitoring.



Above: The SiteHive environmental monitoring system had many benefits over traditional systems

Below: The M80 was the first Australian freeway to include recycled content in every pavement layer

Layer	Material	Sustainable initiative
A Surfacing	10mm OGA	Olexocrumb
B Wearing Course	14mm Type H	Reconophalt 20% RAP
C Intermediate Course 1	20mm Type SI	Reconophalt 30% RAP
D Intermediate Course 2		
E Base Course	20mm Type SF	Recycled glass
F Upper Subbase	20mm Class 3 CTCC	Recycled crushed concrete
G Lower Subbase	Class 4 Crushed Concrete	Mixture of fully recycled concrete, brick & asphalt
H Capping	Type A	Mixture of fully recycled aggregates, clay & rock fragments

Pavements and Reconophalt

One of the enduring collaborations developed during the project was the relationship developed between MRPV, CPB Contractors and State Government entity ecologiQ. The three groups worked together with the Department of Transport and Downer to amend the project specification, allowing Reconophalt recycled road surfacing material to be used for the first time on a Victorian freeway.

Reconophalt incorporates soft plastics, glass and toner that would otherwise be sent to landfill or stockpiled. The alternate pavement design we adopted incorporated:

- 14,000 tonnes of reclaimed asphalt
- 820 recycled tyres, as part of an Olexocrumb binder trial
- 22 million glass bottles
- 35.5 million plastic bags
- 800,000 toner cartridges
- 49,000 tonnes of crushed Class 3 and 4 concrete
- 62,000 tonnes of recycled capping.

The collaboration between MRPV, CPB Contractors and ecologiQ lifted the bar for reusing materials within road pavements, paving the way for similar initiatives on other MRPV projects such as the Monash Freeway Upgrade Stage 2. CPB Contractors’ M80 Project Director continues to be a spokesperson for these sustainability initiatives, recently as a featured speaker at the EcologiQ Greener Infrastructure Conference.

The M80 Upgrade – Sydney Road to Edgars Road was the first Australian freeway to incorporate recycled content in every pavement layer

Engagement for Plastic-Free Innovation and Change

The M80 was the first construction project in Australia to join the Engagement for Plastic-Free Innovation and Change (EPIC) program, facilitated by Plastic Oceans Australasia. Using data analysis and audits, CPB Contractors measured plastic use on the project, leading to an informed analysis of the supply of plastic free alternatives and allowing the industry to confidently reduce single-use plastic on future projects.

CPB Contractors continues to sit on a sustainability advisory panel providing technical advice to Plastics Oceans Australasia. Being an ongoing part of the EPIC program is part of CPB Contractors' commitment to make construction more sustainable.

eMesh

In a Victorian first we used eMesh (pictured below), a recycled plastic material, to replace steel reinforced mesh in shared use paths, pit surrounds and median concrete pavements. The initiative cut the project's carbon footprint by 38 tonnes of CO₂-e and pioneered the way for the product to be used more commonly in the industry.

Additional environmental and sustainability design initiatives

Some significant environmental and sustainability wins were achieved through design:

- Saving over 500 trees compared to the Reference Design through refining the road alignment, reducing shoulder widening and retaining batters
- Retaining the Blaxland cable-stay pedestrian bridge, saving an estimated 120 tonnes of structural steel and 50m³ of structural concrete
- Redesigning Ramp J to preserve the blue louvres and the adjacent concrete noise walls instead of demolition
- Reducing environmental impact by avoiding working at-grade in creeks – minimising impacts on flora and fauna, including the endangered growling grass frog
- Adjusting the alignment of the Sydney Road off ramp to reduce the overall project footprint, reducing impacts to native vegetation on the embankments
- Utilising glass reinforced plastic soil nails instead of traditional steel nails, which produces one-third the amount of CO₂ in production compared to steel.



Above: Using eMesh, a recycled plastic material, to replace steel reinforced mesh – a Victorian first

Below: Charging one of the project's hybrid electric vehicles



Other environmental and sustainability initiatives

Other environmental and sustainability initiatives pioneered on the project include:

- Working with suppliers to develop a 100% recycled stabilised glass-sand mix to use as backfill, replacing the traditional virgin stabilised sand – a State first
- Precast barriers contained 50% supplementary cementitious material – another State first
- Using four plug-in hybrid electric vehicles (pictured above), with three charging points on-site
- Using B20 biodiesel for generators, a solar hybrid generator for the project's secondary compound and solar lighting towers
- Providing end of trip facilities to enable people to cycle to work
- Recycling coffee grounds from all site facilities.

Environmental and sustainability outcomes

The project was completed with no Level 1, 2 or high potential environmental incidents

Lean design, low carbon materials and high recycled alternatives reduced environmental impact by 51% compared to the business as usual baseline

Efficient lighting and ITS reduced whole of life energy greenhouse gas emissions by over 20%

The result

The CPB Contractors and MRPV team are proud of their work on the M80 Upgrade – Sydney Road to Edgars Road project.

With one world-first, five Australian-firsts and 10 State-firsts, we are confident our project will provide a lasting legacy to the Australian construction industry.





M80 Upgrade – Sydney Road to Edgars Road
Technical Paper

Australian Construction Achievement Awards 2023
Stage 2 Submission