ACAA Submission Stage 2 R2P Alliance

Technical Paper

R2P ALLIANCE

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Government of South Australia
Department for Infrastructure and Transport

McCONNELL DOWELL
CREATIVE CONSTRUCTION™

MOTT MACDONALD

ARUP

Project Name:	R2P Alliance
Role of Company:	Design & Construct in Alliance Contract Form
Roles and names of Consultants and the Principal:	Department for Infrastructure and Transport - Project Owner McConnell Dowell - Construction Non-Owner Participant Mott MacDonald - Design Non-Owner Participant Arup - Design Non-Owner Participant

Contents

Executive Summary

The R2P Alliance, consisting of members from McConnell Dowell, Mott MacDonald, Arup and the Department for Infrastructure and Transport (DIT) were awarded the design and construction of a 1.8km section of the motorway along South Road on the North South Corridor, between Regency Road and Pym Street.

The North-South Corridor is one of South Australia's most important transport corridors, connecting the southern, central and northern metropolitan suburbs of Adelaide.

When complete this 78km road runs through a number of different urban environments, each with their own complexity and challenges.

The Regency to Pym (R2P) project is the penultimate section of the corridor development, a 1.8km non-stop motorway that crosses inner city suburbs and business precincts to unlock a range of social and economic benefits.

The project faced a range of challenges including:

- Traffic management on South Australia's busiest road, compounded by completing upgrades across the rest of the corridor
- Operations in a dense suburban environment with a broad range of stakeholders, and
- COVID uncertainty across the project

The R2P Alliance focused on delivering a legacy project, unlocking the potential of the corridor, but also understanding the crucial importance to the local community, the regional and city connections and all South Australians.

The team's vision, values, dedication and resilience delivered an unprecedented outcome and pride for all involved in the project.

The project was delivered

- At the highest quality
- Significantly under budget
- Ahead of schedule
- With a range of other project benefits.

Traffic disruption, one of the biggest challenges, was minimised so that traffic flow across the important corridor was maintained at a minimum of pre-project levels throughout construction.

The community, suppliers, stakeholders and business were all partners in the process, leading to positive relationships that enhanced the project outcomes, every step of the way.

The project ultimately provided strategic, free-flowing road links that connect the expanding industrial and residential areas in the north and south, providing new opportunities for economic development.

Delivered to the highest quality the result is an integrated engineered solution that stitches the North-South Motorway Corridor into the adjacent communities within which it sits.

Reason for the Project

The 1.8km section of South Road between Regency Road and Pym Street, is located approximately five kilometres to the north-west of Adelaide's CBD and was originally two-lanes in each direction with a 60km per hour speed limit and two signalised intersections.

The North South Corridor is one of Adelaide's most important transport corridors as it is the major route for north and south bound traffic including freight running between Gawler and Old Noarlunga, a distance of 78km's.

The original portion of the road was not capable of handling projected growth and the number of vehicles that needed to use the road nor the size of freight carriers travelling along it.

In response, the South Australian and Australian governments committed to construct the Regency Road to Pym Street project as part of their overall commitment to build a non-stop North-South Corridor.

The Regency Road to Pym Street motorway connects the previously completed motorway sections to the north of Regency Road (South Road Superway) to the completed motorway section (Torrens Road to River Torrens Project) terminating north of Torrens Road.

This will result in a 47 kilometre non-stop motorway between Gawler and the River Torrens.

Results

Now completed, the project significantly improves travel for north south traffic and completes a non-stop 47km motorway section, enabling more efficient access to and from key freight areas of the National Land Transport Network, the Port of Adelaide, the industrial north-west sector of Adelaide and Adelaide Airport.

The section also improved road network reliability, efficiency and accessibility for business, maximised efficient access to some of Adelaide's key employment areas along its northern extent, improved safety for road users by reducing the potential for conflict at existing intersections, improved cycling and walking facilities, enabled involvement of locally based industry/companies during construction and helped achieve strategic policy outcomes and objectives for the Australian and South Australian governments.

Contract Model

The contract to design and construct the R2P project was awarded to McConnell Dowell Constructors (Aust) Pty Ltd, Mott MacDonald Australia Pty Ltd and Arup Group Pty Ltd. Working in partnership with the Department for Infrastructure and Transport (DIT), the project team formed the R2P Alliance.

The attributes that contributed to the successful Alliance model included integrated collaborative teamwork with a focus on best for project outcomes. Other key features also included risk sharing, a no blame culture, operating in good faith, transparency, and joint management.

Scope of Works

The scope of works included the following:

- Construction of a 1.8km section of non-stop motorway providing three lanes in each direction (at grade), and two lanes in each direction on the South Road surface roads
- Overpass over Regency Road
- Signalised intersection upgrade at Regency Road and South Road surface roads
- Separate pedestrian and cycle path on both sides of the corridor
- Grade separated pedestrian and cycle overpass over South Road in the vicinity of Pym Street
- Landscaping and Noise Barriers
- Traffic Management
- Signage and Intelligent Transport Systems (ITS)
- Relocation of utility services away from the non-stop motorway
- Construction of a heavy vehicle bypass road connecting Exeter Terrace and Pedder Crescent
- Installation of Intelligent Transport System (ITS) infrastructure on Regency Road

Project Management and Collaboration

Collaboration was one of the key success elements throughout the project. The Project Team consisting of members from DIT, McConnell Dowell, Mott MacDonald and Arup had been working together for several years across multiple projects so were already aligned on collaborative behaviour and core values which assisted in facilitating a high level of communications and the management of expectations for both design and construction.

The construction delivery team had also been working together on previous projects which created a synergy between the high performing team members. Any new team members that joined the project were onboarded in the Alliance expectations, ensuring there was alignment with the wider project team with the same outcomes in mind.

The project encouraged open lines of communication across the entire project team, ensuring all Managers were accessible by each team member which created an environment of trust and further allowed the early identification of any issues and implementation of appropriate corrective measures.

Subcontractors were a very important element to the success of the project and the project team worked in a collaborative manner with all subcontractors, assisting them with the successful delivery of their respective work packages.

Members from DIT were embedded in the project team in strategic roles which was fundamental to project success, allowing for better communications with the various Government entities and service providers.

This approach allowed even better collaboration, ensuring external parties were positively engaged and working as per the project requirements.

All the above factors combined as part of a complex and synchronised team working in collaboration and aligned with the same project goal – “Project Success”.

All participant organisations of the R2P Alliance worked collaboratively, ensuring a ‘no surprises’ approach, with positive functional relationships established with internal and external stakeholders.

The Alliance implemented a fully functional Alliance Leadership Team (ALT), Alliance Management Team (AMT) who reported to the Alliance General Manager (AGM) and a Wider Project Team (WPT) with DIT nominees for the AMT and WPT fully integrated into the Alliance.

From the outset, an office was created to bring together all members and maximise the relationship building and collaboration on design solutions. This approach continued on-site with an open plan office to promote openness and shared priorities across the whole team.

Absolute transparency was an essential part of the R2P Alliance delivery strategy with progress and performance reporting open to everyone including non-owner participants (NOPs), the owner participant, and client representatives outside the Alliance.

Championed by the ALT and AMT, the Alliance Principles, Purpose and Objectives were an integral input into all decision-making and communications. This meant that these important tenets were understood and embraced by all project staff and helped sustain the strong and unified Alliance culture.

Complexity, Difficulty and Optimisation of the Construction Task

Design

The solution for the project recognised the interaction between the Non-Owner Participants, DIT and other key stakeholders during the tender process, and considered the work that had already been undertaken by DIT. With a 'fresh pair of eyes' approach, the Alliance focused on the overall project objectives with consideration of the Project Scope and Business Requirements.

Whilst investigating a number of options for the design and construction staging of the Regency Road overpass, road alignment, Pym Street pedestrian and cyclist overpass plus the Pedder Crescent Heavy Vehicle Bypass, the Alliance considered a range of factors including safety, integrated infrastructure, accessibility, constructability and impact to the customer and local businesses. In addition, other influences were taken into account including sustainability, whole of life requirements and operations and maintenance.

During design, the alignment was optimised and straightened during the tender phase with further risk mitigation in detailed design. Land acquisition plans were established early, and the Alliance undertook design risk reviews on any constrained locations, ensuring they were appropriately space proofed.

The Design team prioritised specific sections of the Common Services Trench (CST) allowing construction to start three months earlier than planned. This provided the opportunity for utility service providers to commence their works earlier in the project, decommission existing services and commence other civil works required for completion of the Stage 1 traffic switch.

Drainage was designed to maximise above ground solutions which reduced costs and improved the integration with the Open Space and Shared Path strategy, whilst being coordinated with existing DIT and Council infrastructure. This also minimised the environmental impact through the reduction of excavation and haulage.

The pavement design strategy achieved the specified design life whilst also optimising material re-use to improve sustainability outcomes.

The Regency Road overpass was optimised by reducing the length of bridge spans and the depth and height of the approach ramps. This also reduced the carbon footprint by 25% in comparison to the reference design and reduced whole of life costs. Other optimisations included:

- Efficient foundation design reduced the environmental impact
- The structural form was selected to maximise offsite working, minimising road occupation times and associated disruption
- Integration of the urban design approach, providing pier and abutment locations and shapes that improve integration with the public realm and amenity.

The pedestrian and cyclist overpass was optimised with clear sight lines which improved safety and amenity outcomes through the elimination of blind spots with an openness of the structure. Material selection was also mindful of the opportunities to maximise local industry participation.

All elements of the design were developed with a focus on the Alliance's approach to construction, providing a solution that maximised offsite prefabrication which in turn minimised disruption to road users and the surrounding community.

The final design solution provided a high performing road network, coupled with bridge structures that are integrated with both the landscape of the corridor and the urban design requirements.

Staging Strategy

The tender methodology and staging was well developed and largely implemented during construction. The tender strategy was principally based on:

- **Stage 1:** Completing the new surface roads to gain access to the motorway alignment
- **Stage 2:** Switching traffic onto the new surface roads north of Regency Road (Traffic Switch 1) to enable commencement of the overpass approaches and overpass pre-assembly
- **Stage 3:** Switching traffic onto the new surface roads south of Regency Road (Traffic Switch 2) once the southbound surface road carriageway was complete
- **Stage 4:** Switching traffic onto the new motorway over Regency Road overpass (Traffic Switch 3) to complete surface road works including the tie-ins to Superway and Torrens to Torrens projects

The original program included two concurrent critical paths, that converged at the time of bridge construction over the South/Regency Road intersection.

The first critical path involved the relocation of existing utility services clearing the way for construction of the new offline arterial surface roads. Once complete, this allowed Traffic Switch 1 to occur, splitting the traffic through the extent of the project and providing access to construct the north ramp structure, bridge foundations, piers and abutments, and commence pre-assembly of the bridge structure.

The second concurrent critical path involved finalisation of overpass design, and shop drawing, fabrication of the steel overpass girders, offline pre-assembly of the centre bridge span, and installation of the pre-assembled structure.

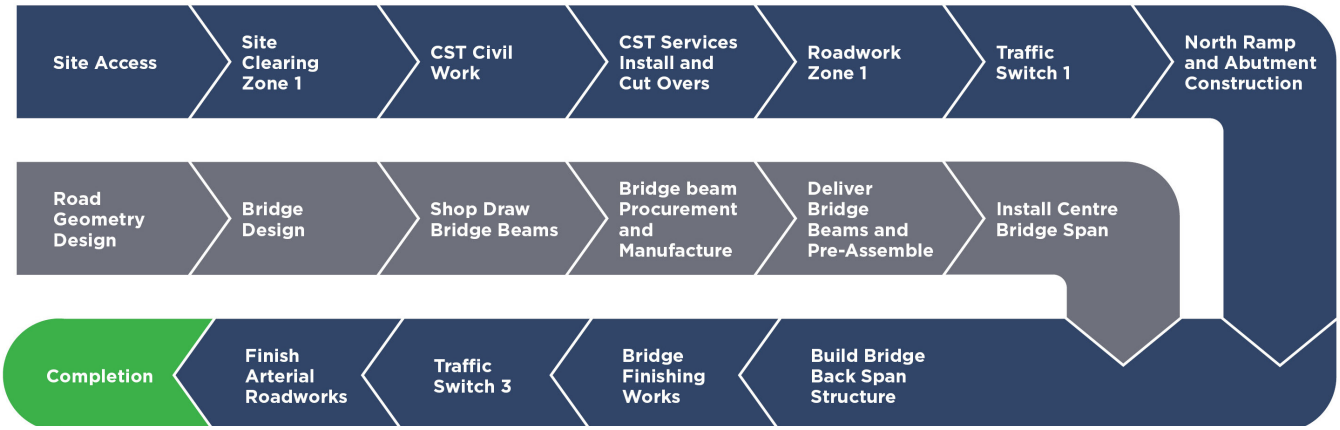
The project critical path then converged with the construction of the overpass back-spans and other associated bridgeworks.

Having completed the Regency Road overpass, approach ramps and motorway pavements, traffic was transferred onto the new motorway over the new Regency Road overpass, and the critical path continued through completion of the arterial surface road rehabilitation and tie-ins to the adjacent Superway and T2T projects.

Focus on program monitoring, review and adjustment was essential to identify issues and maximise opportunities. This process was implemented at the early stages of the project by experienced team members, with high level communications maintained with the delivery team to ensure target dates were achieved or improved. It also included a separate weekly review session between the AGM, AMT and Planning Manager to ensure there was a strategic focus on identifying key program risks and opportunities, and accountability between the various project disciplines for meeting their commitments.

During project delivery there were some modifications to the staging strategy that were endorsed by the ALT. Some of these items included:

- CST construction works commenced three months earlier than planned from non-IFC documentation
- Changing the pre-assembly location for the Regency Road overpass to Polonia Oval
- Removing the Stage 2 traffic switch
- Installation of the pedestrian and cyclist overpass in a single section



Roadworks

Traffic Management

Construction work began off-line from the original South Road alignment, reducing the interaction with the road users, thereby minimising disruption and increasing safety. These construction areas were physically separated from the trafficable areas with road barriers, with construction areas well demarcated with clear access and egress allowing efficient construction offline, unimpeded by traffic interaction, resulting in higher productivities.

Whilst this optimised the safety of the workforce, drivers, pedestrians and cyclists, it needed to be well managed by ensuring all works were planned in advance, with an appropriate traffic guidance scheme developed and reviewed prior to the works being undertaken. Closures and detours needed to be communicated well in advance so that drivers, residents, emergency services, public transport or other stakeholders were not unnecessarily impacted.

The project relied on trailer mounted Variable Message Signs (VMS) for advance notice in the field with the project communications team notifying impacted stakeholders as appropriate.

Strict processes and procedures for consultation between the Community and Stakeholder Engagement and Construction teams were paramount for success, ensuring there were no surprises as the work was delivered and last-minute changes were minimised.

Traffic staging needed to be carefully considered and reviewed by the construction team whilst in the design phase.

Temporary road alignments needed to be assessed to ensure sufficient clearance for all works to be constructed, and temporary road safety barriers were designed appropriately so they were only placed once and not moved until the subsequent traffic stage.

Utility Services

The early completion of utility service relations was critical to completing the new arterial surface roads leading to the Stage 1 traffic switch. Critical work during this stage was the completion of the common services trench (CST) and cutover of utility services (in particular communications and power) allowing for the removal of existing utility infrastructure in advance of construction for the new surface roads.

Careful management of this work was crucial – in-particular the interaction with the utility providers during the design and construction phases. The project also benefited from significant utility relocation work carried out by DIT prior to contract award.

This was made possible by a high quality reference design which allowed this work to proceed without significantly constraining the Alliance design options.

Noise Walls and Property Treatments

The noise walls on the project were prioritised early to separate the public from the construction activities and shield them from any construction noise created.

The structural design for noise walls was optimised based on lessons learned on previous DIT projects where residents were unhappy with the significant structural elements visible on their property. This resulted in a simple “post and panel” type arrangement with the supporting structure incorporated into the wall alignment. Noise wall colouring was matched to the adjacent T2T project for consistency given the relatively short length of the R2P project, however a striking moiré (wavy) pattern was incorporated into the precast panels giving an exceptional urban design outcome.

Another lesson learned from previous DIT projects was to expedite the removal and reinstatement of existing residential fences to reduce the impact to residents and removing maintenance difficulties due to limited access.

Removal of existing fences and rehabilitation of residential properties typically commenced within one week and was completed within one month of noise wall installation, leading to improved stakeholder outcomes.

It was identified early in the project that 37 houses along the alignment were eligible for noise treatment upgrades to their properties This work was closely managed by the Alliance to mitigate health and safety concerns relating to accessing residential properties during the Covid pandemic.

Gantries

Construction of gantry foundations had to be prioritised to enable completion prior to road construction. Bored pier foundations were typically used, however CFA piled foundations were used where there was a risk of ground collapse due to groundwater. Gantry foundations typically required an insitu concrete pile cap which was poured prior kerbing and pavement construction.

Assembly of the beams for the portal gantries was completed at ground level, allowing pre-assembly of the Lane Use Management System (LUMS) and smaller components at the same point of time. Once assembled, the entire beam was installed atop the mating columns.

Erection of each of the 19 gantry structures was completed in a single shift.

Erection of portal gantry beam

Noise walls

Asphalt

In total, 38 different pavement types were constructed on the project varying from full depth asphalt (FDA) on new or existing granular subbases, to resurfacing/ overlays of existing flexible pavements.

A shuttle buggy asphalt transfer system was employed by the subcontractor when laying motorway levelling and wearing course asphalt to provide the optimal rideability outcome. Whilst increasing cost, this approach resulted in an excellent quality outcome for the motorway pavements.

Asphalt work was completed by a subcontractor engaged under an innovative risk sharing approach where the risk on average daily tonnage and the number of mobilisations was shared between the subcontractor and Alliance. This incentivised the Alliance to minimise the frequency of required visits to site and provide optimal areas so maximum productivity could be achieved.

Whilst relying on a significant level of trust, this resulted in a win-win outcome for both the Alliance and the subcontractor with great value for money outcomes achieved.

Intelligent Transport Systems (ITS)

Construction works commenced in November 2019 with full, onsite correlation of existing assets on the adjacent T2T and Superway projects, allowing a complete understanding of cable routes and other existing infrastructure.

All ITS equipment was fully factory tested with key members of DIT and the Alliance in attendance, including late at night using MS Teams to fully validate all functionality. Working on Teams ensured the factory testing was available to all the ITS team and was used for factory testing completed in Melbourne, Sydney and outside Australia and became a necessity due to ongoing COVID restrictions.

The ITS scope included:

- Modifications within the DIT Traffic Management Operations Centre
- Relocation of the DIT Rail Operations Optic Fibre
- Installation of VMS, LUMS, PTZ and TIDS cameras on each gantry
- Installation of Vehicle Detection Loops
- Factory Acceptance Testing (FAT), Site Acceptance Testing (SAT), Site Integration Testing (SIAT), Operational Scenario Testing (OST) and 1000-hour defect free running

ITS work was completed with the successful end to the 1000-hour defect free running period in August 2021 with no issues reported.

Landscaping and Urban Realm

Due to the 'outside-in' staging of the project with the construction of the surface roads and subsequent traffic switch onto them, it was desirable to commence landscaping works early as practicable to avoid completing work adjacent live traffic. This facilitated the early commencement on site of the landscaping subcontractor, in turn enabling the following:

- securing supply of advanced trees, and
- prior to the project's first major milestone of the late August 20 traffic switch:
  - placement of nearly 1.3km of concrete footpaths
  - installation of over 1.0km of irrigation main line

Bringing the landscape works forward contributed to the reduction of the overall project duration. Other similar projects have employed a more traditional approach to the landscaping construction program, often requiring extensive full-time lane closures on the surface roads to enable verge, footpath and soft landscaping works behind the kerbs.

Another benefit was that planting early allowed vegetation to become established, mitigating dust issues and improving amenity for local residents and businesses early in the project.

A key element of this success was the award of both hard and soft landscaping scope to a single subcontractor, reducing interface risks across the whole site from both a safety and program perspective.

The quality of the finished landscape has also been a strong focus of the project, with DIT imparting lessons-learned from previous projects stressing the importance of key components of the landscape construction to ensure flora longevity and minimal maintenance.

The project achieved this by early and continual involvement of DIT and Council representatives, use of a specialist landscape consultant through the project Construction Verifier, and engagement of a single subcontractor to be responsible for the groundworks, planting, and maintenance.

Regency Road Overpass

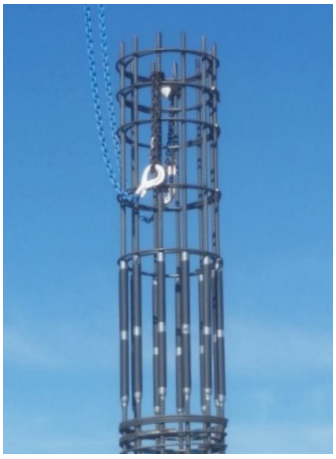
Overpass Substructure

Piling

Construction for the Regency Road overpass included 38No. 900mm diameter CFA piles to support the two abutments and four piers. Piling started on the southern side of Regency Road and involved piling at the southern abutment and southern piers, on a compacted rubble hardstand that was constructed to encapsulate the entire area between these two locations.

Piles were completed in a 'hit and miss' method, meaning that the piling rig alternated between piles to ensure sufficient distance was maintained between pile locations. The piling rig was then moved to the northern side, where a similar process was undertaken.

Lifting the reinforcement cage prior to installation



Foam lagging shown on top of the reinforcement where the pile will later be de-headed

Bridge Abutments and Piers

Following completion of the piling works, detailed excavation was completed to expose pile cut-off level at all pile locations. All piles were de-headed using the ringbarking method.

A nominal 50mm deep saw-cut around the outside of the pile was made at final cut-off level, then the pile was cored so that a hydraulic splitter could 'pop' the pile head off the debonded reinforcement.

Prefabricated reinforcement cages for the abutment columns were lifted onto the pile starter bars and tack welded into position. An 'Ezytube' formwork liner was then placed over the column reinforcement.

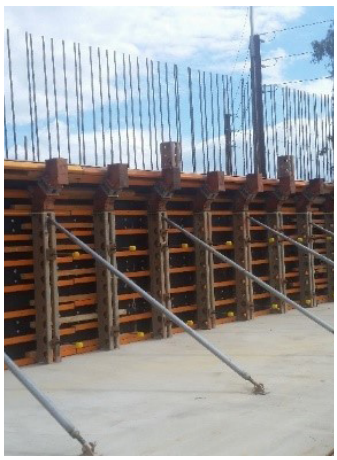
Concrete was pumped into each column and cured. Once cured, a 'Enviroculvert' sleeve was placed over the column to provide separation from the column to the ramp backfill, allowing the ramp to settle without loading the columns.

Once the approach ramp was built up to the underside of abutment headstock level, the base of the headstock was poured followed by the fender wall. This process was the same at both abutments.

Once the abutments were stripped, hot dip galvanised 'T-section' pieces were bolted into the back of the abutment (into cast-in ferrules), so that the RE straps for the ramp backfill could be connected to the headstock.

Concrete blade wall piers were constructed to support the centre span of the overpass. These utilised steel formwork incorporating an insulation blanket to manage thermal effects during curing and were reused at each pier location having been repurposed from the Pym Street pedestrian bridge piers.

Formwork on the back of the northern abutment



General view of the Regency Road Bridge site

Off-line construction

Polonia Oval

Two 82m long x 15m wide sections of the Regency Road Bridge were pre-assembled offline in the nearby redundant Polonia soccer field. In order to prepare the old sports ground for the pre-assembly of the overpass structure, a temporary works design was completed requiring the topsoil to be removed, and engineered material imported and placed to create a level handstand of 300 KPa capacity.

This provided a safe surface for temporary supports upon which the overpass would be pre-assembled, along with a suitable surface to support crane outrigger loading.

Temporary supports and bridge pre-assembly

Twelve temporary supports were constructed within the Polonia Oval to support the two bridge sections. The supports were fabricated from material and components salvaged from the previous O'Bahn Bus City Access, Darlington Motorway and Flinders Link projects. In targeting the reuse of these components only 80T of a required 380T was required to be purchased as new material.

Height and shape control was critical within the yard, at exit points to the road network and for the temporary works supports, so a super TIN model was created by the Survey team incorporating shop models, road network information, in-situ survey pick-ups and the permanent design.

This information was also used to create the travel boundary and travel strings that form the basis of the Self-Propelled Modular Transport (SPMT) travel path.

The yard was arranged to allow multiple work fronts and simple crane set ups while maintaining access and sufficient storage for all delivery types (standard semi trainer, dolly and jinkers, large rigid, etc.).

Turning radius and positions of cranes were carefully managed to ensure there were no issues while delivering the large steel girders.

Dual crane lifts were completed within the yard to provide finite adjustment and positioning. The girders were delivered in pairs under police escort and a welded diaphragm was used to join each pair of girders over the pier, with a bolted splice used to connect segments longitudinally.

Precast concrete deck slabs were used to provide sacrificial formwork and an architectural finish along the outside parapet. The deck slabs had a very tight tolerance and were manufactured offsite by a local precast supplier. The insitu deck was cast directly onto the precast deck slabs and then the parapet was cast insitu shortly after.

Once construction in the yard had finished, the bridge was then inspected and handed over to the SPMT subcontractor for transport to the overpass site.

Governance and risk management

To provide management oversight of the critical SPMT relocation, a steering committee was established involving the Alliance General Manager, Engineering and Design Managers, Delivery Manager and McConnell Dowell Group Operations Manager.

This committee independently reviewed the planning process and operational readiness to ensure this critical element of the project was delivered safely and effectively, significantly minimising risk.

The Committee reviewed and endorsed all Construction Execution Plans, Quality Assurance Plans, Risk Management Plans and Emergency Response Plans to ensure all necessary processes were in place to deliver the work safely and efficiently, however respond effectively in the event of a significant issue during delivery of this critical task.

On-line construction

SPMT installation

Once pre-assembled, each bridge section was moved into position using SPMT's over four days during a 7-day road closure.

Each bridge section was lifted off the temporary supports by the SPMTs then moved to the exit of the yard. From there, the SPMTs traversed the kerblines and moved onto the road. The SPMTs then travelled north along the south bound carriageway to Regency Road intersection.

Having reached the intersection, the bridge was shifted transversely into position and lowered to final level and then held overnight.

During each nightshift, the bearing plinths were cast and cured to allow the SPMTs to release the load and return to the Polonia Oval the following morning.

To avoid any further road closures the stitch pour between the completed centre spans was completed before Regency Road was re-opened.

Post SPMT installation

During the weeklong closure, the back spans were also constructed in situ whilst the southbound carriageway remained closed, however traffic was allowed to use both Regency Road and the western carriageway of South Road under contraflow conditions to minimise disruption.

The remaining two deck pours and parapets were all completed offline with the final works involving casting the expansion joints and bearing plinths on the abutments.

Approach Ramps

RE Walls

The RE panels were fabricated offsite using steel moulds supplied by Reinforced Earth Pty Ltd. The moulds used for the faceted panels were custom made for the project.

Once cast and stripped, the panels were cured under plastic for a minimum of 7 days prior to being transported to site.

The panels were cast in the order of installation and were stored in stacks of four which correlated to the panel installation sequence.

When landed in place, the panels were secured in place using either;

- Temporary push pull props fixed to concrete footings or temporary concrete traffic barriers from the outside of the panel, or;
- Sacrificial props fixed to a temporary concrete footing poured inside of the retaining wall due to traffic constraints

Friction Slabs

The friction slab bases supported the ramp precast barriers and had the reinforcement tied in place and used a standard form ply and timber formwork system.

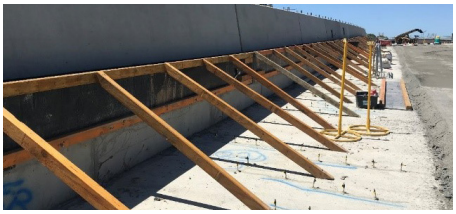
The friction slab upstand walls used a 'Novatec' formwork system with z-bar ties that screwed into ferrules which had been cast-in to the RE panel to ensure no load was transferred onto the RE panel when pouring the concrete.

When placing the hold-down bolts in the friction slab upstands, it was vital to ensure that they were in the exact correct position to prevent the precast barrier which had tight tolerances not aligning with the bolt.

Additionally, the starter bars coming up from the base slab had to be positionally correct to prevent a clash of reinforcement.

L-Wall base slab pour

Abutments and piers



Stitch pour formwork

Precast Barriers

The precast barriers that line the edges of the overpass approach ramps were cast offsite with nine different types of barriers ranging in length. All the precast barriers had conduits cast into them for the ITS, Communications and LV lighting that was required throughout the site.

Additional items that were cast-in included the levelling brackets, the crash rail hold down bolts, and the dowels and bolts for the light poles.

Pym Street Pedestrian and Cyclist Overpass

The Pym Street pedestrian and cyclist overpass was designed to allow the free flow of pedestrians above the motorway via access ramps and an elevated portal structure.

The design provided the structural strength to span the motorway whilst maintaining the openness for passive surveillance.

The structure was manufactured offsite and took approximately four months to manufacture and around 6,000 labour hours to fabricate. The overpass bridge fitout including throw screening was completed prior to delivery to minimise onsite work.

The 65m long overpass truss had a total load length of 80m, weighed over 100T and was the largest volumetric structure to be transported in South Australia. This required custom turntables to be designed, fabricated and fitted to the jinkers to enable articulation of the 75m long load around corners.

The transport equipment had a total of 116 tyres to be able to safely carry the load and took three days to deliver to site.

Substructure works

25No. 900mm diameter CFA piles support the ramp columns and bridge piers. Piling started on the east side of South Road, on a compacted rubble hardstand that was constructed to encapsulate the entire area. The piling rig was then moved on night shift west side to complete the works.

Steel formwork was used for the piers. Only one set was fabricated, which was reused for both piers.

At completion, the side form panels were replaced with a larger set and then utilised for the Regency Road overpass piers.

Thermocouples recording temperature differentials across each of the elements were placed in all concrete pours for the sub-structure components.

All formwork was stripped in accordance with the specification and after review of the thermocouple data.

To allow early stripping of the formwork, plastic was wrapped around the concrete pier to maintain the correct curing processes.

Pedestrian and cyclist overpass pier and columns west side

Installation

For the installation of the Pedestrian overpass a dual crane lift was required utilising the largest mobile cranes available in Adelaide. The installation required three separate lifts resulting in the structure being placed on temporary supports while the cranes relocated to their next position. The location for each of the outriggers and temporary supports were modelled in CAD and marked on the ground (colour coded per stage) by survey.

This approached identified potential interference with newly constructed concrete barriers, and de-risked adjustment/relocation of temporary supports during the lift.

COVID

COVID created a unique restriction on project delivery that required new operating practices to allow work to continue at minimal risk.

The Alliance created a Pandemic Response Plan that implemented social distancing on site and used technology to avoid contact with third parties.

During the initial few months of COVID, some personnel were impacted through restrictions to travel, with the project's Delivery Manager in Brisbane where he continued to work remotely.

In response, one of the project team was elevated to Construction Manager on site to alleviate the day-to-day input required for construction, whilst the Delivery Manager was able to concentrate on the longer-term construction strategy and governance remotely.

The project was divided into separate compounds which reduced the risk of widespread contamination on the project, and greater communication between teams implemented to avoid disconnection.

Travel restrictions and requirements for crossing between state borders also impacted the mobilisation of key subcontractors to site, including Keller for CFA piling at Regency Road.

Controls were implemented to minimise the risks including early mobilisation of work crews to site and separation interstate crews from the remainder of the site team whilst undertaking their scope of work.

Time, cost and quality outcomes

Program Achievements

Utility Services

In the early stages of the project an opportunity to improve on the scheduled commencement of underground utility service works was identified. The team reacted and prioritised design for work packages including the CST backbone, stormwater drainage and SA Water works.

Procurement for those packages was also brought forward and delivery achieved by multiple crews spread along the project.

This strategy created float against activities carried out by utility service providers to ensure these works did not delay surface road construction. This proved to be critical when Telstra resources needed to be reprioritised away from the project in early 2020 to reconstruct infrastructure destroyed by the catastrophic Cudlee Creek and Kangaroo Island bushfires.

As a result, access was provided to a larger area to start building the new surface roads earlier in the project, driving the critical first traffic switch.

Change in Overpass Pre-assembly Location

The Alliance identified an opportunity to change the proposed pre-assembly location for the centre spans of the Regency Road overpass from the motorway corridor north of the overpass location to Polonia Oval.

A rigorous process to review risks and opportunities associated with this change was implemented to consider:

- The additional cost to construct hard standing suitable to support the weight of the overpass sections during pre-assembly at Polonia
- The risk of overlooking into residential properties during overpass pre-assembly
- Additional SPMT travel time and the risk of extending occupations of South Road whilst moving the overpass into position
- Safety and efficiency benefits resulting from working in a less constrained area away from live traffic
- Significant time savings on the project critical path by allowing construction of the motorway and overpass approach ramp to continue concurrently with pre-assembly of the overpass

This assessment concluded that the benefits significantly outweighed the additional costs and the ALT ultimately endorsed the recommendation to change the overpass pre-assembly location, resulting in a six-week improvement to the construction completion date.

Christmas Closure

The Alliance established a Traffic Leadership Team which included senior representatives from the Alliance and DIT Traffic Management Centre (TMC).

This group was created to provide a communications and issue escalation framework to ensure that traffic disruption was minimised to the maximum extent possible during construction.

During early interactions, the TMC suggested that a two-week full closure of South Road and Regency Road was possible during the Christmas school holiday period to shift the Regency Road overpass into position due to significant reductions in traffic volumes.

This required the scheduled dates for the SPMT bridge move to be brought forward from the originally scheduled two weekend closures in mid-February to the first week of January 2021.

The Alliance immediately commenced investigating options to take advantage of this opportunity including:

- Reprioritising fabrication of overpass girders at the expense of the Pym Street pedestrian and cyclist overpass steelwork which were both supplied by the same contractor
- Assessing productivity improvement opportunities due to the change in pre-assembly location
- Early mobilisation of SPMT equipment from interstate and overseas

Having overcome significant challenges to accelerate the preassembly of the overpass and mobilise specialised SPMT resources despite the impact of the COVID pandemic, the Alliance took advantage of the extended closure window and within a period of one week:

- Relocated and installed the Regency overpass central bridge spans for the northbound and southbound carriageways
- Installed the steel girders and precast concrete deck slabs for the overpass back spans
- Complete pouring of the insitu concrete work to stitch the centre deck spans together prior to opening Regency Road to traffic underneath

Completing this work with full access to the southbound carriageway of South Road for craneage allowed construction to be carried out more safely and efficiently, whilst allowing work to continue on the overpass approach ramps which were now on the project critical path.

Motorway Asphalt

Having brought forward the overpass construction, the Alliance identified one final key program opportunity which was to complete the placement of asphalt wearing course prior to the onset of cooler weather at the end of April 2021.

The original tender program required the motorway to be opened with traffic temporarily travelling on the asphalt levelling course due to the onset of winter, with resources remobilised to complete the wearing course asphalt under live traffic once ambient temperatures increased in September.

Not only was this disruptive and inefficient, but it also risked producing suboptimal ride characteristics for the new motorway pavement.

The focus of the Alliance now changed to coordinating the erection of the Pym Street pedestrian and cyclist overpass, which had been delayed to facilitate the early completion of the Regency Road overpass, with completion of the motorway.

The Pym Street pedestrian and cyclist overpass was closely linked to the completion of the motorway as it provided the only link for pedestrians and cyclists to cross the new motorway south of Regency Road once the temporary at-grade crossings were severed by the construction of motorway barriers.

An innovative strategy was employed to enable motorway barriers and asphalt pavement to continue without compromising the erection of the pedestrian bridge including:

- Delivery of the 65m long overpass structure in a single section to avoid on-site splicing of the structure. This resulted in the largest volumetric load ever delivered into Adelaide, requiring a journey of 233km over three days from the fabricator to site.
- Continuing with asphalt pavement construction without barriers installed at strategic locations to allow for delivery of the pedestrian structure and maintenance of pedestrian access. This required limited sections of previously installed asphalt to be removed to key-in median barriers after the overpass was open to the public.
- A multi-stage dual crane lift of the bridge with temporary works supporting the structure whilst the cranes relocated for subsequent lifts, due to limitations on crane positioning caused by the completed motorway barriers.

This strategy was successfully executed and combined with the other program improvements noted above, resulted in the motorway being completed with traffic operating at full speed in early July 2021, four months ahead of schedule.

Cost

Through a combination of efficient design, innovative construction, good discipline and leveraging strong supply chain relationships, the project delivered 14% savings against the Target Outturn Cost. These savings were primarily as a result of:

- Optimisation of the design resulting in savings of approximately 5% of the associated TOC budget
- Procurement savings totalling approximately 3% of budget by leveraging strong local relationships with the supply chain
- Procuring significant quantities of plant and operators at better than market rates through an innovative commercial arrangement with local Tier 2 contractor Bardavcol
- Significant savings on time related costs by completing construction four months ahead of schedule
- Minimising project overhead costs by ensuring quality assurance and completions documentation was compiled and approved progressively during construction enabling the early release of staff resources

These savings were achieved without compromising the manner in which the project was delivered, or the quality and functionality of the completed asset. This enabled $28m to be reinvested in other critical infrastructure for South Australia.

The project's financial position was reliably forecast and transparent communicated to DIT representatives outside the Alliance to enable DIT to accurately forecast their future funding requirements.

Quality

The Alliance ensured that planning for completion commenced from the very inception of the project. This resulted in the Quality Assurance process playing a fundamental part through out project delivery.

For the quality process to be effective, it relies on contributions from a number of project disciplines including QA, Design/Engineering, Construction, the Independent Design Verifier and Construction Verifier.

The Alliance leveraged open and trusting relationships developed over previous projects to align on expectations and accountabilities. This presented a unified approach amongst all disciplines to the wider project team that enabled everyone to clearly understand their role and responsibilities in the process.

Closure of lot packages for works completed in the field was driven by the Construction Manager in weekly team meetings to ensure necessary priority was given to this task by construction engineers.

Constructive relationships between the Alliance Design and Engineering teams, along with client technical specialists and the Independent Design Verifier ensured that proposed rectifications to non-conformances were agreed and implemented in a timely manner.

Collaboration between the Alliance Quality Team and Independent Construction Verifier allowed the lot closure process to proceed in an efficient and effective manner.

These strategies combined to result in 92% of lot packages being submitted to the construction verifier within 30 days of work being completed in the field and closed by the Construction Verifier within 15 days on average.

Quality completion documentation was closely monitored by the Management Team to ensure it was not left behind. Weekly progress reports were reviewed by the management team, where progress against targets were monitored as well as any issues with potential delays.

Driving this from the top down, assisted with the reporting of progress and allowed for early identification and intervention to ensure project completion progressed as planned.

Industry Participation

The South Australian market had a high level of capacity to support this project and procurement occurred in a manner that supported the local industry.

At the completion of the project, 138 South Australian companies were engaged on the project, equating to 95% of the total value procured from SA business against a targeted baseline of 93.8%.

Industry Participation Committee (IPC)

The Alliance established an Industry Participation Committee early in 2020 when construction began. This committee included members from the Office of Industry Advocate, Civil Contractors Federation and other industry bodies that added value to the committee.

This forum was used to identify opportunities for market upskilling, monitor progress against the Alliance's IPP commitments and consideration of ways to further promote local industry participation. This Committee was deemed a success in influencing how industry could best support the outcomes of the project and in turn, providing growth opportunities for small local businesses.

Partnership with Bardavcol

The Alliance entered into an agreement with Bardavcol Pty Ltd, a 100% South Australian owned and operated Civil Construction company with 45 years' experience, to be an integrated part of the project team from the early tender stage through procurement and delivery.

The innovative commercial model employed allowed the Alliance to draw on Bardavcol's resources and local knowledge to focus on best for project outcomes and keep major project risks with the party best positioned to manage them, whilst avoiding division within the project.

Bardavcol also bought several strong relationships with other smaller subcontractors and suppliers in delivering the civil scope, ensuring a large number of local businesses were sharing in the opportunities and contributing to the successful delivery of the project.

Local upskilling of smaller contractors & suppliers

The approach the Alliance took for construction was to ensure that there were significant opportunities for local suppliers to participate in smaller, less complex and lower risk work packages.

This enabled these suppliers and subcontractors to upskill their systems and process by working with a Tier 1 contractor, without the risk that is inherent on large scale infrastructure projects.

The project let 22 packages each with a value less than $250,000 to local businesses, along with utilising a further circa 200 local companies for material supply and works, providing them with the opportunity to participate in this landmark project.

Aboriginal participation

The Alliance team approach was early identification of particular work packages where Aboriginal businesses or businesses with a high percentage of Aboriginal workforce were available to provide the skills and expertise to deliver the work, and then encouraging these businesses to participate

RAW Traffic Management and NIS Security, both locally owned indigenous businesses played a significant role in achieving a 6.3% Aboriginal participation outcome, 2.3% above the 4% planned target.

Outcomes achieved against building Industry Capacity, Capability and Skills

Innovation

Digital Tools

Incorporating major temporary works design and constructability into the permanent design models enabled safe and efficient construction practices in the delivery of the Pym Street pedestrian and cyclist overpass and the Regency Road overpass. Both structures overcame substantial logistics and delivery method obstacles to ultimately deliver a well-planned outcome.

Live updates to the 3D services model utilising as built survey were incorporated into the online live design portal which was accessible to the whole project team enabling more accurate planning and utilisation for excavation permits and identification of potential design clashes.

A 12d Model was adopted for as-constructed surveys of underground drainage and utilities, providing intelligent functionality and better collaboration with the client and utility providers for improved whole of life maintenance outcomes.

Certifi

Certifi is a fully digital system which was utilised to assist in managing the design review process and improve transparency and collaboration.

Personnel were able to monitor design comments, actions, risk and iterations in real time with a suite of reports supporting full visibility. This enabled efficiency in design comment management and focused the team's attention on issues impacting the critial path, reducing risk to the program.

Drone Technology

Challenged with costly, less reliable and inefficient weekly GPS-based surveying and manual daily material tracking sheets associated with traditional worksite progress tracking, Propeller Drone survey aerial imagery, was deployed and staff upskilled to utilise this technology.

With the aerial imagery fully aligned with the design information, this continually updated dataset enabled the dynamic adaptation of design process in real time and added to the continual development of the engineering tools on the project.

Weekly drone imaging of the site during construction and providing an online portal to overlay the construction progress against permanent design models allowed weekly reviews of the progress against the design for discussion and planning, using up to date site conditions as the backdrop to the design model.

This was critical when the Alliance Delivery Manager was isolated in Queensland due to COVID travel restrictions and played a significant role in keeping construction on track.

Trimble Site Vision

Trimble Site Vision was utilised for visualisation of works in the field prior to construction.

This outdoor augmented reality system which visualises complex construction, enabled the project team to improve planning and space proofing, and avoid costly rework.

Site Podium

Site Podium, an Application that anyone can access on their Smart phones, was used as an alternative engagement tool on a social media style platform. This was verified by the Infrastructure Sustainably Council of Australia (ISCA) as a South Australia first for construction projects.

This App was used for information sharing and obtaining feedback from stakeholders. The result was an increased responsiveness from the local stakeholders, which allowed the project team to conduct regular 'pulse checks' on the stakeholder health of the project through the use of quick polls on overall community satisfaction.

This platform proved to be a key in maintaining contact with the community when the onset of the Covid pandemic made conventional face to face communication impossible.

Training and Development

Civil Construction Apprentices in SA were only declared a trade on 20 July 2020. To support the future sustainability of Civil Construction skills in SA, more than 17 Civil Contruction Apprentices were appointed on the project, providing an opportunity for these apprentices to gain required skills.

This initiative was deemed a South Australian first by the Sustainability Infrastructure Council.

Additionally, 90+ trainees and apprentices were engaged in other areas on the project, undertaking more than 20 different types of qualifications, gaining relevant skills and training on a major infrastucture project. This represented a total of 14% apprentice/ trainee hours achieved for the project, 7% above the project target.

Two civil construction apprentices were engaged through the labour hire provider and embedded within the Alliance. These were rotated through several the subcontractors engaged by the Alliance to provide them with exposure to a number of different scopes of work.

Significant investment was made in the training and upskilling of directly employed, labour hire and subcontractor personnel.

Other initiatives and outcomes include:

- Dedicated Upskilling and Training Advisor providing professional support for both external and internal training initiatives and creating internal training and VOC packages
- Over 1500 hours/month provided in upskilling (accredited and task specific) with the project achieving 6.3% upskillsing, 2.3% above the project target.
- Young and Novice Worker Program designed to provide new employees aged 24 years and under or less than 6 months experience in the industry with a thorough on-the-job induction covering risks, safe working arrangements and expected work behaviours and practices to prevent incidents and injuries. Throughout the project 150+ personnel undertook this program.
- Minimum qualification standard introduced for all Alliance Supervisors on the project to have either completed or be working towards a Certificate IV Civil Construction Supervision
- Supervisor Onboarding Training
- Subcontrator Supervisor Onboarding Training – Tier 2, 3 & 4 subcontractors trained to a Tier 1 project level.

Apprentices and Trainees

The Alliance worked with Labour Hire providers and registered training groups to ensure that a significant number of personnel engaged by the Alliance were in training for certification as Civil Industry workers.

The Alliance committed to achieving a 7% target and subcontractors were also encouraged to maximise opportunities to strengthen the final result.

The Alliance achieved a final result of 13.03% of project workforce hours delivered by trainees and apprentices which nearly doubled the target.

Upskilling

To ensure a target outcome of 4% was achieved the Alliance utilised the following approach:

- The inclusion of a dedicated training coordinator in the project team across all phases of the project
- A detailed training needs analysis was undertaken at the commencement of the project, ensuring that required competencies for each Alliance role were identified.
- Identifying training, workforce development gaps and obtaining or developing the required training materials.

With this approach the project achieved 9.92%, well in excess of the 4% planned target and provided 1500 hours of training and upskilling per month throughout the project duration.

Project Culture and Working Environment

The Alliance understood that the most effective way to attract and retain productive staff and workers was to ensure a healthy and safe work environment for all. The creation of an inclusive workplace which offered non-discriminatory practices, resulted in a high performance, cohesive project team with safety, collaboration and looking out for each other front of mind.

One of the key components to the success of creating a flexible, safe and inclusive work environment was leadership from the top down with commitment from the ALT, Alliance General Manager and AMT down to the project team.

Success on the project was celebrated with regular events, which enabled greater staff loyalty and pride and generated positive views on the project from the entire team including subcontractors and suppliers. Staff demonstrating outstanding behaviours and safety practices were also publicy recognised

With the onset of COVID, the Alliance recognised and adapted quickly to the new normal and uncertainty that came with a pandemic situation and believed that supporting the workforce's wellbeing would ensure project and business continuity.

Controls were implemented to redeploy office based staff to work from home 50/50, with the Alliance providing the measures to effectively work from home and facilitating a better work life balance.

Support for training and professional development also provided a positive baseline culture which made the project team feel valued, encouraging high performance and continual improvement in all project aspects including WHS, collaboration and quality.

The project culture was continually assessed through quarterly surveys with suggestions provided by project staff on how culture could be improved which were reviewed and actioned through the Wellness Committee.

The project achieved an average Alliance Health score of 74.7%, where 75% represented that the Alliance values were present most of the time.

Outcomes achieved against building a Positive Industry Culture

Workplace Health and Safety and Wellbeing

The R2P Alliance undertook a reflective, inclusive and flexible approach to Workplace Health and Safety and Wellbeing Management. Equipping leadership and employees with the knowledge, skills, resources and management support, the overarching aim of 'Home without Harm' was able to be achieved with no LTI's in over 701,000 project hours.

Through its Safety Leadership Team, the Alliance developed, implemented and measured a range of safety initiatives including regular SafeWork visits and DIT safety walks.

Other safety initiatives included:

- Supervisor Onboarding Program
- Subcontractor Supervisor Onboarding Program
- Check for Change Campaign
- Home without Harm Campaign
- Stay Safe Campaign
- Language Literacy & Numeracy Support Program
- Finish Strong Campaign
- Invigour Wellness Training

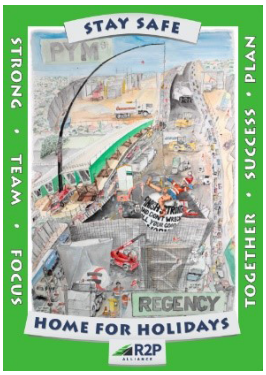
Wellness Committee

An initiative to support social sustainability, the Alliance Wellness Committee was implemented from project start to completion, who focused on a sustainable workforce.

This scope of the Wellness Committee included topics such as health and wellbeing for which suicide prevention and mental health awareness, drug and alcohol awareness, skin cancer awareness and skin cancer screenings were conducted through independent institutions on the R2P project site.

The Wellness Committee also assisted with successful onboarding and making new starters feel welcome. Celebration and social events were planned to improve the culture on the project, and recognise achievements obtained.

The Wellness Committee further assisted by driving initiatives to ensure that the project was giving back to the local community.



Diversity

Dedicated Diversity and Inclusion Awareness Training was implemented for all site personnel with the objective of creating a positive working environment, allowing for a diverse workforce to function optimally through inclusion and collaboration.

Workforce management and training was managed through a number of KRA;s that were either achieved or bettered throughout the life of the project.

Over 28% of staff roles on the project were filled with women with the workforce comprising of more than 6.9% women (significantly higher than the national average of 1%), with a retention rate of over 97%.

The project identified a gap within the project on-boarding process where individuals with Language, Literacy or Numeracy (LLN) challenges were entering the project and potentially being put into situations where the understanding of written or verbal information/direction was not understood.

A basic LLN challenge was incorporated as part of the project induction process and completed by all inductees unassisted. Results were forwarded to the relevant Supervisors and the project Superintendents, which allowed for the identification of workers who had LLN challenges.

The Superintendent/Supervisor then provided support and a LLN Core Skills Assist Action plan was established where required to assist further.

After the implementation of the LLN program, Civil Train, a subsidy of the CCF, developed resources that could be used to support the literacy and numeracy needs of the civil sector which were shared with the Industry Training Advisory Committee.

Project Relationships

Relationships within the team and the supply chain

Members of the Alliance were already familiar with working together after completing several successful major infrastructure projects. This team continuity, including DIT team members and local subcontractors/suppliers, provided the opportunity to retain and enhance the integrated and collaborative culture that already existed.

DIT personnel were embedded into the project team in strategic roles which were fundamental to project success, enabling effective communications with various Government entities and utility service providers.

New and younger team members were paired with experienced members, creating an environment of learning and one which encouraged and fostered idea sharing.

Subcontractors/suppliers, a crucial element to the success were part of the team and included in our ‘one team’ approach. They were informed regularly on project performance and assistance was provided with the successful delivery of their packages providing increased ownership and accountability.

Alliance training was delivered to all personnel, subcontractors and suppliers, aimed at providing an understanding of the importance of integration with team members to drive a high-performance culture.

All the above combined were part of a complex and synchronised team working in collaboration and aligned with the same project goal – **“Project Success”.**

Relationships with the local community

As the project was situated in a dense residential area with numerous local businesses along South Road and Regency Road, early stakeholder and community engagement was key to the success of the project.

The Alliance implemented a number of strategies to build and maintain excellent relationships with the local community which resulted in the project receiving no justifiable complaints from local small businesses, and only 1 complaint every 2 months on average from the general community.

Quarterly satisfaction survey results averaged 84.4% and 76.6% for local small business and the general community respectively, with a score of 80% representing that stakeholders were very satisfied.

Local Business Program

The project team worked closely with local businesses helping manage construction impacts by providing timely information on upcoming works, business promotions and other business support strategies.

The project was the first DIT construction project to appoint an Independent Business Advisor who met with businesses directly adjacent to major works to discuss and understand their concerns and provide more specific advice.

Information Sessions and Community Events

In November 2019, two Community Information sessions were held to meet the local community, provide design information, discuss project staging and understand community concerns and priorities.

After the initial formal Community sessions, informal smaller events were implemented when the project team mobilised to site. Local residents were invited to join the project team for breakfast in the site compound to discuss the project in a more casual environment and meet the team.

Other events to thank the community and celebrate milestones were also organised for the local community including an outdoor Movie Night and an Overpass Walking Tour which received excellent attendance and feedback.

Public Artwork

Public artwork was identified as a community priority early in the project at the Community Information Sessions and through the quarterly Community Satisfaction and Business Satisfaction surveys.

In July 2020, the R2P Alliance worked with local residents, the City of Port Adelaide Enfield and a local artist to deliver stobie pole artwork along Packard Avenue, Croydon Park.

In addition, the Alliance created an Artist Brief for murals on the Pym Street pedestrian and cyclist overpass.

In December 2020, the R2P Project commissioned local artist Sam Songailo to create an interconnecting public artwork mural on the precast concrete retaining walls and under-stair walls at the base of the Pym Street pedestrian and cyclist overpass.

The objective of delivering artwork to this high activity area was to create a vibrant, welcoming and distinctive place for the community that serves to enhance quality of life, public experience and community pride for residents and visitors.

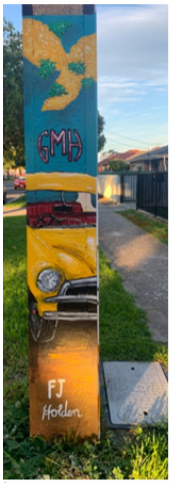
Public Viewing Areas

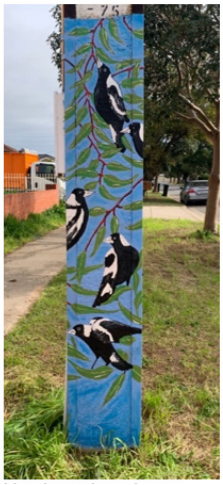
During the major works where the Alliance installed the Regency Road overpass and associated infrastructure over a week, public viewing areas were established.

These works required significant traffic restrictions, including a full closure of South Road and partial closure of the South Road and Regency Road intersection for one week. 24/7 works were undertaken during this time, which meant the local community also faced noise and light spill impacts.

To help the local community to understand the depth of work and be involved, viewing areas were provided on the eastern and western sides of the intersection for key works.

Having these dedicated areas allowed the local residents and interested stakeholders to be a part of this significant milestone.





Environment and Sustainability

Promoting a reflective and resourceful approach to environmental management, the Alliance treated this project with the future in mind.

The project delivered sustainability objectives with pedestrian and cycle path upgrades, encouraging walking and cycling in a previously vehicle focused precinct.

R2P is the first project in Australasia to undertake an Infrastructure Sustainably Council of Australia (ISCA) 2.0 version and has received a gold star rating for the Design and As-built phases, far exceeding the project target of bronze.

Other Environmental and Sustainability initiatives undertaken on R2P included:

Use of increased recycled material in asphalt

- first for South Australia to apply soft plastics in asphalt on an arterial road, through the application of a product from Downer, named Reconophalt
- 100% recycled asphalt for a temporary carpark
- use recycled materials in asphalt in shared user paths.

This initiative resulted in improved circular economy outcomes through the use of recycled materials, and a reduction in equivalent carbon dioxide emissions in comparison to the use of traditional hot mix, as summarised below:

	Recycled Asphalt Plannings (ton)	Recycled canola oil (kg)	Waste toner cartridges	Plastic bags	Equivalent of carbon dioxide saving in comparison to traditional hot mix (ton)
South Australian first application on an arterial road	90	470	7,500	372,105	13.6
Temporary carpark	205	324	2,500	110,000	9.4
Shared user paths	114	0	9,230	316,000	4.6
Total	409	794	19,230	798,105	27.6

To ensure that the sustainability benefits of an asphalt mix containing recycled soft plastics were better understood, an Environmental Product Declaration (EPD) was developed.

The Alliance worked with Downer and Green Industries South Australia to identify and obtain suitable funding under the Circular Economy Market Development program to assist with the development of the EPD.

Both the EPD, and its inclusion in the ISCA materials calculator, will allow Reconophalt to be compared to a range of existing generic asphalt types already present in the Materials Calculator.

This was verified by ISCA as a first initiative of its kind in Australia.

Recycled Glass

A trial of 5% recycled glass in PM2/20 was implemented at the Pedder Crescent Heavy Vehicle Bypass works, which was the first time that recycled glass was used in the road base in South Australia, providing circular economy outcomes through reusing recycled glass on site, instead of potentially ending up in landfill for disposal.

This initiative also resulted in the approval of using recycled glass in road base by a major road authority in South Australia. This paves the way for potential future use of recycled glass and other recycled materials in road base on other projects in SA.

Resource Efficiently Action Plan

As part of Resource Management, a Resource Efficiently Action Plan (REAP) was developed. This plan was noted by the ISCA V 2.0 Verifiers as 'an excellent outcome for the project'. The REAP includes the application of the waste management hierarchy for all resource streams (incoming and outgoing), to set targets to achieve improved circular outcomes.

It further targeted reductions in greenhouse gas emissions. The REAP includes specific actions required and responsibilities allocated in set timeframes, to drive successful implementation.

Examples of targets set and achieved or exceeded are:

- 99% (130,000 t) of waste material was diverted from landfill
- Reuse of Polonia Reserve hardstand PM2/20 on approach ramps (4000 t)
- Reuse an 80m pre-existing section of noise wall on the project
- Reduction in more than 20% embodied greenhouse gas emissions for the Regency Road overpass from base case to final design
- Reuse of ITS, VMS gantries and light poles that complied with the structural requirements
- Reuse of site offices and water tanks from a previous project
- More than 2% of materials used have sustainable labels to better understand circular economy and greenhouse gas impacts.

Initiatives implemented included lower wattage road lighting, methods for upgrading motorway pavements requiring less construction fuel and the use of Greenpower at the Polonia site office, design optimisation reducing materials use (retaining and rehabilitating existing pavement) and materials substitution (use of recycled asphalt pavement, reduced Portland cement concrete, recycled aggregates in kerbing).

Sustainability in the Community

Money raised through recycling of onsite pallets and 10 cent recyclables was donated to designated charities. This initiative supported local charities and provided the Alliance with a way to give back to local communities.

The charities were selected by the workforce, who are mostly from the local community, to ensure that these charities are selected with the help of local influence. Other initiatives included:

- Second-hand clothing donations to Hutt Street Shelter and Carrington Cottages
- Bags prepared and donated to women in need through the Share the Dignity Program

- Fundraising efforts for saving koalas after the devastating bushfires in 2020
- Polymers were used to assist with dust suppression and reduce water use on site during construction
- Bottle top lids were also collected for recycling, submitted as a separate recycled plastic stream which allows the reproduction of new plastic products
- A total of 24% of power used on site was Green Power instead of traditional power. This reduced greenhouse gas emissions as a result of electricity consumption on site
- 266,000 ltr of recycled water was used on site collected from rainwater tanks that were connected to the site compound roofs to capture rainwater run-off. This water was connected to the amenities to provide water for flushing of toilets
- Business Clean-Up Australia Day was celebrated in 2020 and again in 2021 with the team raising awareness during prestarts with refuse bags of waste collected over the two events from outside the project boundary, leaving a much cleaner environment behind.
- The project left a positive legacy behind through constructing native gardens that provide a food source for native butterflies, in an urban area where suitable habitat for wildlife is under pressure.

Biodiversity

In conjunction, biodiversity awareness was rolled out as part of a Science, Technology, Engineering Mathematics (STEM) program at local schools.

This specifically included awareness on native butterflies, and the planting of butterfly gardens to further increase suitable habitat in an urban area in the vicinity of the R2P project.

Multi-Criteria Analysis Tool

As part of an assessment process to ensure that sustainable outcomes (i.e. social, economic and environmental aspects) are considered in important project decision making processes, a Multi-Criteria Analysis tool was developed and implemented, eliminating project decisions being made on technical and financial considerations only.

Successful outcomes include the reuse of site won spoil onsite where the material met engineering requirements through direct cut and fill, or alternatively, stockpiling the material within 2km from the project site to reuse when space was available.

This reduced greenhouse gas emissions through preventing transport to a local disposal site which is approximately 10 km from the project; and increased circular economy outcomes for spoil won from and reused on site.

Conclusion

From the outset, the R2P Alliance was focused on delivering a legacy project that unlocked the potential of the greater North-South Corridor, but also understood the crucial importance to the local community.

The team's vision, values, dedication, and resilience delivered an unprecedented outcome for which everyone involved in the project is exceedingly proud. The community, suppliers, stakeholders and local business were all partners in the process, leading to positive relationships that enhanced the outcomes through each phase of the project.

Despite the numerous challenges the project faced, including traffic management on Adelaide's busiest road, operations in a dense urban environment with a broad range of stakeholders, and COVID uncertainty throughout the delivery, the project was delivered at the highest quality, significantly under budget and well ahead of schedule, with a range of other project benefits.

This outcome was achieved by instilling a culture of "no compromises" throughout the project team, resulting in the R2P project setting a new benchmark for Alliance delivery excellence, and shows what is possible with a shared vision, values and a focus on relationships.

R2P ALLIANCE