

RUSSLEY ROAD SH1 UPGRADE PART OF THE WESTERN CORRIDOR



AECOM

**MCCONNELL
DOWELL**
CREATIVE CONSTRUCTION™

Downer

THE GATEWAY TO CHRISTCHURCH

Completed in May 2018, the Russley Road upgrade provides a number of key benefits to the travelling public and wider Christchurch community alike. These include:

- A new four lane median separated expressway.
- Reduced congestion and improved travel time predictability on the Western Corridor.
- Improved safety from the new expressway-standard design, including a raised central median, side and central barriers and three new intersections.
- Improved cycle and pedestrian facilities making it safer and easier to walk and bike around the region.
- Improved storm water management and landscaping.
- An iconic arch structure for the gateway to Christchurch.

OVERVIEW

- One of three Roads of National Significance (Rons) forming the western bypass west of the city from Hornby to the Northern Motorway.
- The project team comprised: Client - New Zealand Transport Agency (NZTA), Principal's advisor - AECOM, Principal contractor - McConnell Dowell-Downer Joint, Designer - AECOM.
- The new 4-lane highway is approximately 3.5 km long and has been delivered at a cost of \$112 million as an Early Contractor Involvement (ECI) project.
- Two new grade separated interchanges have been constructed at Memorial Avenue and South of Avonhead Road where the new Southern Airport Access has been created.
- Harewood Road roundabout has been increased in size along with the addition of a newly built 150 m pedestrian and cyclist underpass.
- A new gateway bridge with twin 400 t arches allows for uninterrupted traffic flow over the signalised intersection for airport traffic below.
- All completed while 60,844,000 vehicles travelled through the upgrade.
- Completed 8 months ahead of schedule, the project took a total of 3 years to complete.



UPGRADE HISTORY

- 2008 / 2009** Russley Road Upgrade scheme developed and design completed for Early Contractor Involvement (ECI).
- 2010** ECI awarded and open day for public consultation held.
- 2011** ECI completed.
- 2013** Revised design completed and presented for further public consultation.
- 2014** Pricing completed and consents negotiated.
- 2015** Enabling works completed and construction underway after blessing and sod turning in April.
- 2016** Harewood Underpass completed providing cyclists and pedestrians safe access across Russley Road to both the Christchurch International Airport precinct and McClean's Island recreational area.
- 2017** Southern Airport Access (SAA) intersection opened improving access for freight, allowing the airport precinct to function more safely and efficiently. Memorial bridge opened allowing uninterrupted traffic flow to State Highway 1 providing a long term solution to congestion and delays.
- May 2018** Final surfacing completed and contractors off site.

INTERESTING FACTS AND FIGURES

When the Project team arrived on site in April 2015, the first task to address was the removal of tress, vegetation, marking out new boundaries and erecting of boundary fencing. In strategic areas and with the consent of land owners, the team were able to start this work earlier than planned.

Relocation of services was part of the enabling works which meant an earlier start for the project.

2.5 km of skin plate welding and 1 km of welding make up the gateway arches

Gateway arches are lit up by **50 lights**

Over **50 truckloads of steel, 400 t** in total transported from Napier to Christchurch to construct the arches

Approximately **3,575 m³ of concrete** used for the project's 4 major structures equalling **1.5 Olympic sized swimming pools & weighing 8,580,000 kg** - about the same as **80 blue whales**

Implemented **NZ's largest temporary roundabout** at 500 m long

Trees were recycled as either firewood given to residents or chipped for use in replacing the central medians or on the new bridge embankments

30 km of cable and **20 km of ducting** has been laid on this **3.5 km road length**

Approximately **10,000 t** of contaminated fill was removed to landfill

During the project, around **140,000 plants** planted

Over **9,500 m** of flexible wire rope barrier installed

HAREWOOD ROAD ROUNDABOUT AND UNDERPASS

As part of improvements to walking and biking facilities the Harewood Underpass was built to provide safe passage for pedestrians and cyclists under the highway. Live traffic was maintained throughout the build.

- The architectural philosophy for the 150 m long underpass was the creation of a piece of beautiful architecture that has a contextual story line – the Southern Alps. The faceted forms and colour, references the mountainous backdrop and the colour inter-panels represent the various sky tones from west to east.
- Cast by local producer Cancast using concrete moulds following an innovative 3D CAD modelling process, the 6 m long precast units weighed up to 40 t. The Joint Venture invested considerable time into redeveloping Cancast’s quality management systems to ensure that the highest quality of precast unit would be achieved and would be safe to install.
- In the centre of the roundabout 25,500 mm diameter pipes channel natural light into the underpass below.
- The existing roundabout was replaced with a larger one and an additional lane for vehicles turning left onto Russley Road (SH1) from both the airport side and the city side of Harewood Road.
- Sustainability of materials was linked throughout the system build via: reuse of the temporary work system throughout the length enabling 2 m of completed construction per day, recycling of material from the excavation and the road area within the roundabout . The design encouraged the use of recycled secondary aggregates in all the concrete mixes and the precast form of construction provided for an efficient use of manufactured panel moulds and a very productive construction method, minimising disruption to the local residents. Concrete additives were used to assist in delivering the quality of relief pattern finish and meet the tight delivery program.





“Underpasses, when required, represent a significant design challenge to ensure that matters of personal safety, amenity, connectivity, and integration with the surrounding built environment are addressed. The Harewood underpass represents a quality outcome in relation to how these facilities are detailed and constructed. This facility adds to making cycling (and walking) an attractive transport choice within this part of Christchurch City.”

Sam Bourne, Principal Advisor: Urban design and landscapes, NZ Transport Agency



“Hi Steve, just a note of thanks re: the work and effort on the Interchange Project. From CTOC’s perspective, to my knowledge the project has gone very smoothly. I think a key part of that was the open discussion and collaborative effort with all parties around the Traffic Management aspects, staged opening etc. Cheers Bev”

“Thanks Bev and I second that thought – compared to many other major projects that have been delivered during the 5 years I’ve been at CTOC, the Memorial/Russley interchange project has distinguished itself through its quality of planning, communications and operational delivery. I haven’t been directly involved and haven’t needed to get involved because all parties appear to have collaborated extremely effectively to deliver the project with the minimum of disruption to the transport network – a credit to everyone who contributed to managing the challenges involved. My hat is off to you all. Regards Simon.”

“I’ll jump on this band wagon also! The project has been an exemplar for Christchurch Major projects. As we all know there have been two key outcomes from the efforts of you all, a smooth project and great customer experience during its delivery. I am very aware of the efforts you have all gone to, which have been extensive, however I know that many people have been able to take a lot of comfort from this. Thank you all. Keep up the good work! Ryan”

CTOC – Bevan Wilmhurst, Simon Harty and Ryan Cooney

RUSSLEY ROAD(SH1)/MEMORIAL AVENUE INTERCHANGE TRAFFIC MANAGEMENT

Comprising 30 sections and weighing 400 t, construction of the arch and flyover underneath provided the greatest challenge for planning and traffic control.

- With an estimated 33,000 vehicles per day using Russley Road and key stakeholders such as the Christchurch International Airport wanting to ensure there were minimal delays for their passengers, the Project team worked tirelessly to deliver to high standards across safety, quality, and stakeholder management.
- An example of a significant project investment to provide a higher quality service, was the creation of an alternative traffic management system for Memorial Roundabout. See across.
- At 500 m long, it was the largest temporary roundabout - or ovalabout - in the Southern Hemisphere. It provided a clear space for the construction of the fly-over and significantly enhanced the safety of the road user during construction avoiding the use of some 15 traffic management changes.
- The oval-about was in place for 17 months and worked so well in terms of traffic flow that the public considered that it might prove better than the final intersection design and commented on Facebook: “The temporary roundabout is so much more efficient than the old one; do you really need to build the bridge?”



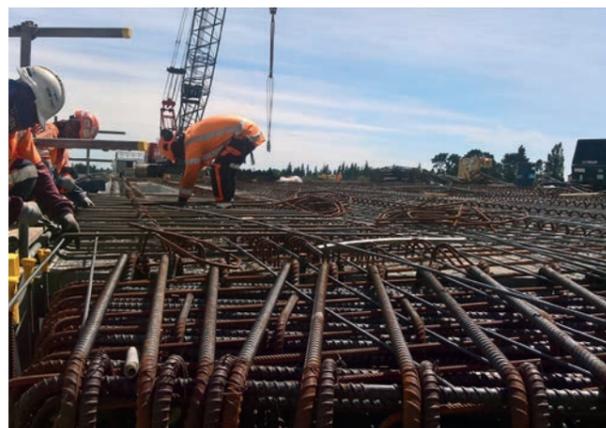
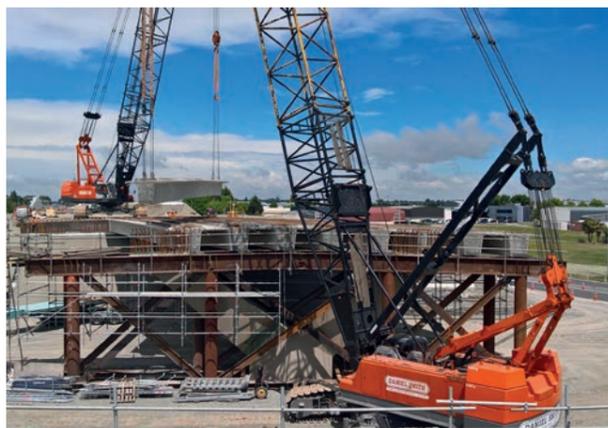
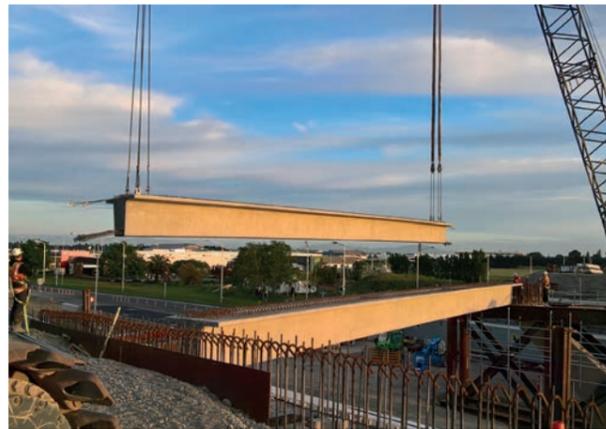
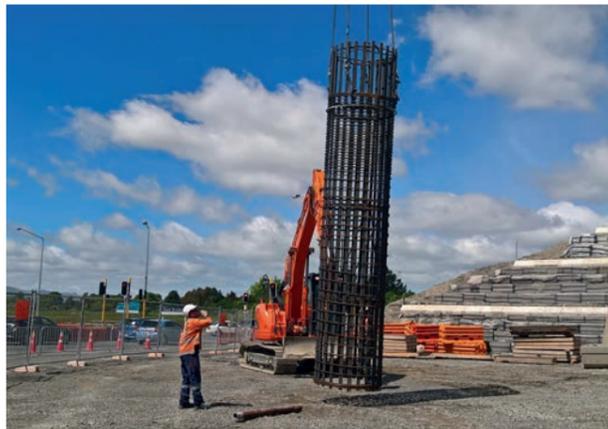
BUILDING THE BRIDGE AND FABRICATION OF THE ARCH

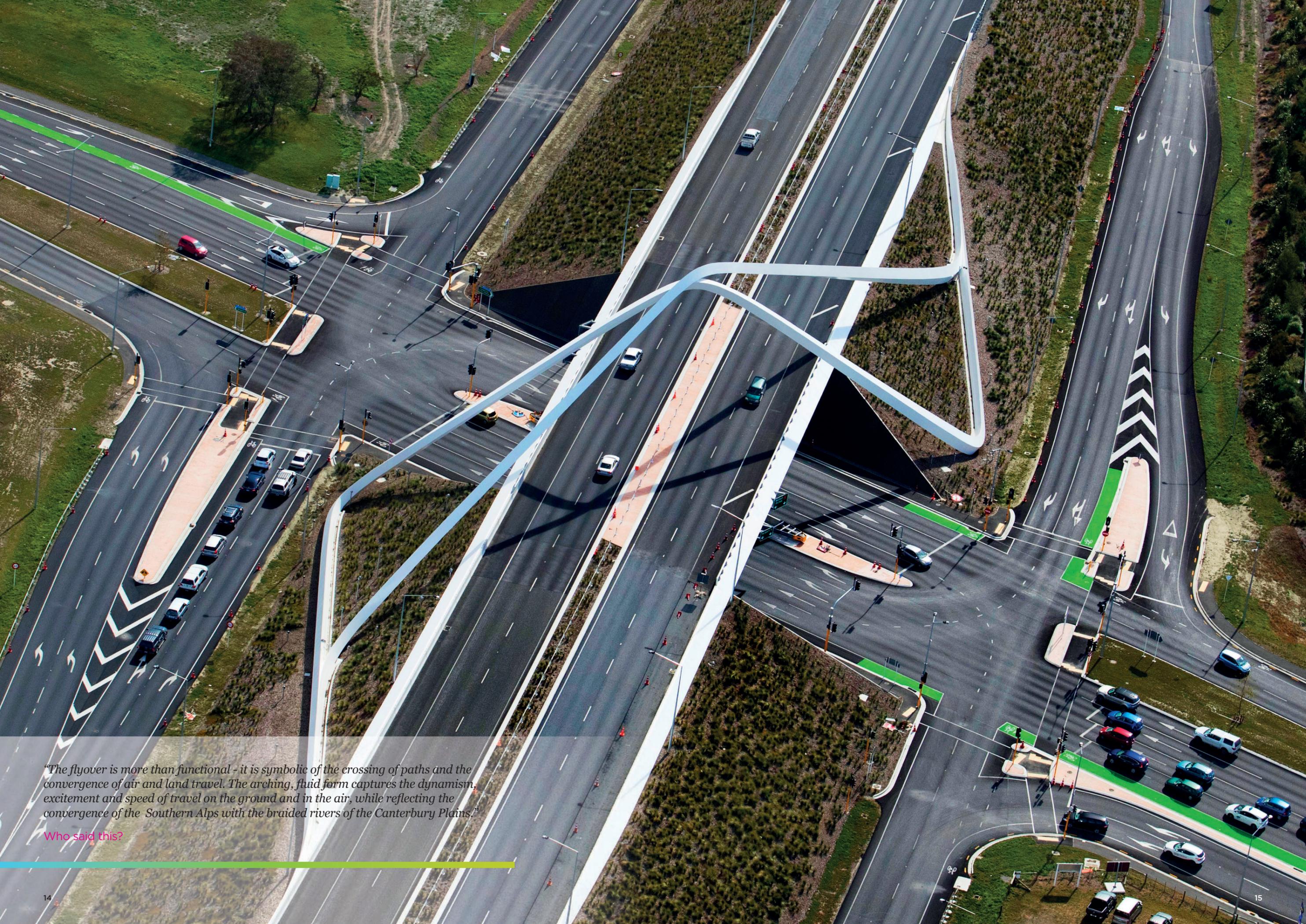
The centrepiece of the project is the Gateway Memorial Avenue flyover and arch structure.

- The flyover, connecting Christchurch to its airport at the Memorial Avenue/Russley Road intersection, features a four-legged arch, curving gracefully 27 m above ground level, with its two main beams crossing directly above the carriageway.
- A robust process was followed through the design and value engineering of final solutions for the Memorial Avenue bridge and arch. The resultant design was thoroughly reviewed at every stage. It provided a cost saving to the NZ Transport Agency (of \$1.8 M), for the deleted ground improvements.
This solution will require minimal maintenance and that has taken into account current risk factors around earthquakes, structural and geotechnical design parameters.

“Constructing the arches: a challenging and unique puzzle.”

- Constructing the gateway arches was the most challenging aspect of the Russley Road Upgrade. The arches weigh 400 t in total and are made up of 30 separate sections. Each section had to be welded together piece by piece.
- Nineteen metre high towers were used as a base for the welding and steel work to be completed.
- Arch sections, fabricated by Eastbridge, began arriving on-site in December 2016 and in January 2017 the project team began locking a 23-tonne ‘knuckle’ into place, the first of four.
- The knuckles are the most vital parts of the structure, creating the curve and intersections for both of the arches and connecting them with the supporting piles in the ground.
- The arches were finished in September, with the final coat of paint put on in October. They are lit up at night-time, the bright colours welcoming travellers to the Canterbury region.





"The flyover is more than functional - it is symbolic of the crossing of paths and the convergence of air and land travel. The arching, fluid form captures the dynamism, excitement and speed of travel on the ground and in the air, while reflecting the convergence of the Southern Alps with the braided rivers of the Canterbury Plains."

Who said this?



SOUTHERN AIRPORT ACCESS

- The NZTA received feedback from Christchurch airport, the Christchurch City Council, emergency organisations, businesses and the general public voicing concerns about reduced access to the airport with the closure of Avonhead Road and the changes at Wairakei Road. For this reason, and the expected increase in commercial business around the airport, a third access point to the airport south of Avonhead Road was constructed.
- The grade separated intersection includes on and off ramps giving traffic the ability to enter and exit the airport area from the north and the south. Traffic turning right into or out of the airport area can drive under Russley Road via an underpass, making it possible to separate much of the heavy freight traffic from tourist and commuter traffic and allowing the airport precinct to function more safely and efficiently.

INTERESTING FACTS

- The hollow core beam structure is 30 m long.
- The 20,000 m³ bulk excavation works were required to create the portal cuts to the new bridge.
- The extracted gravel was used to form the Memorial embankment.
- The precast wing walls weigh 40 t.



BUILDING PARTNERSHIPS

The meaningful discussion and agreement at the start of the project to develop the Stakeholder Charter gave clarity on 'who we are'. This became a founding document that the culture was built off.

Focusing on 'doing what we said we were going to do' clearly demonstrated that the aspirational values of the project were the same as the practical (visible) values, with no gap between the two there was no 'disengagement divide'.

"Quote on value of partnership—Chris Collins—NZ Transport Agency"

PROJECT CHARTER FOR SH1 RUSSELY ROAD UPGRADE

Our Vision Statement

"We will work as a coordinated team, to complete the project on time, within budget and without health, safety or environment incidents, while respecting the needs and requirements of the local businesses and community, and building a positive legacy."

Our Mission Shared Objectives

In working as a coordinated team we will collectively strive to deliver all of the following objectives which we consider are important to us all:

Health and Safety

- Maintain an exceptional level of health and safety performance
- Recognise and comply with aviation requirements

Public Relations

- Ensure construction activities have minimal effect on road users and the local community
- Maintain critical access, utilities and airport operations

Partner Relations

- Align stakeholder objectives to achieve our common goals
- Establish and maintain effective collaboration with all stakeholders
- Provide detailed work planning to ensure disruption to stakeholders is minimised
- Resolve all project related and owner issues in a timely fashion

Communications

- Deliver effective, meaningful, accurate and timely communication between all parties
- Conduct periodic pulse checks to ensure the project team is walking the talk
- Ensure timely communication with the community

Quality

- Establish and maintain a comprehensive and integrated plan for project delivery
- Achieve agreed and specified quality objectives

Environmental

- Ensure compliance with all consents and regulations
- Successfully manage risks, consents process and effects of contamination
- Comply with the environmental and social requirements

Time

- Maximise programme efficiency
- Deliver on agreed construction programme

Financial

- Maximise value for money
- Achieve commercially successful outcomes for all parties

Innovation

- Foster, deliver and recognise beneficial innovation



STAKEHOLDER COMMUNICATION AND ENGAGEMENT

The Project Charter for stakeholder engagement drove the nature of the approach to all engagement and communication across the project.

The team maintained the focus of advanced traffic management planning, risk mitigation planning and excellent public communications throughout the project, creating a 'no surprises', informed environment for all stakeholders. The liaison carried out with the Christchurch Traffic operations team, Christchurch City Council and the Christchurch Airport set a new standard for how these projects can be managed with buy in from stakeholders. The project achieved a compliments to complaints ratio of 7:1.

"I have been incredibly impressed with the support the team has given the school around safety issues and being around at school arrival and leaving times to adjust the signage. [They have] been wonderful at keeping us informed. I cannot fault the support and communication."

- Harewood Primary School Principal

AIRPORT ROAD ARCHES

"Well done team. From the group who put the original concepts together, to those who refined the design, to those who manufactured the components, to those who painstakingly put them all in place, well done. It's a superb outcome. Makes me proud to be a Cantabrian."

- Russel Gifford Burnside, The Press

"I just wanted to email and say thank you for such a wonderful day. The atmosphere was electric, so much excitement, and all of the staff were helpful and friendly. The information in the tent was interesting. I learnt so much about our city's newest art work. Thank you for making this happen and for having the foresight to build the arches. They are stunning."

- Lisa Avery

"The Arches look Brilliant. Well done today - awesome milestone. Keep up the terrific work."

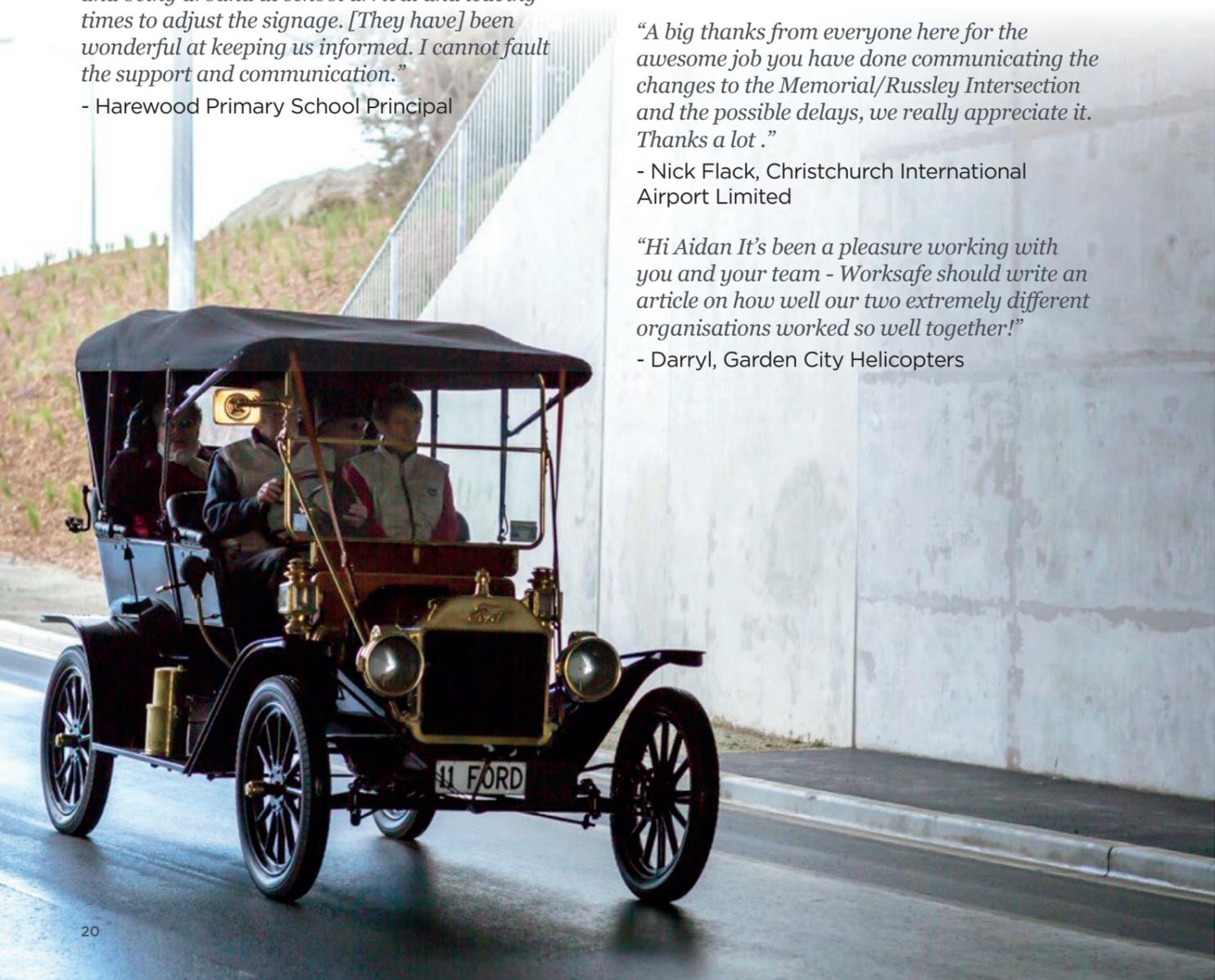
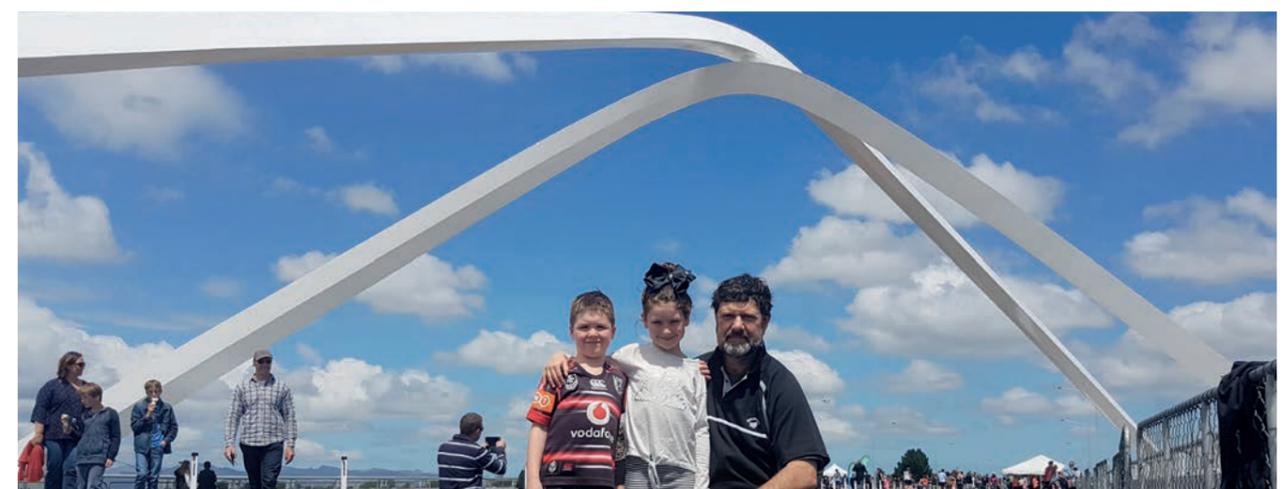
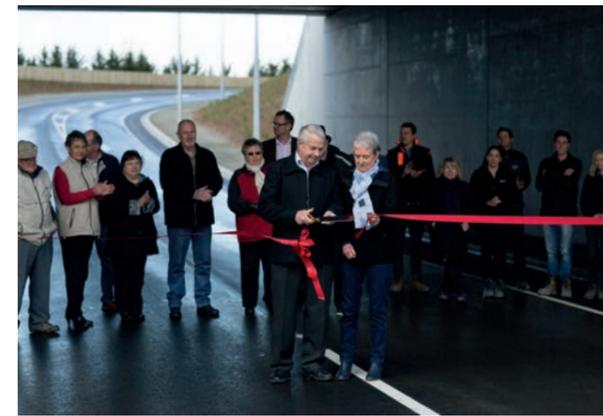
- Nigel Chivers, Air New Zealand

"A big thanks from everyone here for the awesome job you have done communicating the changes to the Memorial/Russley Intersection and the possible delays, we really appreciate it. Thanks a lot."

- Nick Flack, Christchurch International Airport Limited

"Hi Aidan It's been a pleasure working with you and your team - Worksafe should write an article on how well our two extremely different organisations worked so well together!"

- Darryl, Garden City Helicopters



2017

Designers Institute of New Zealand Best Design Award for Spatial, Public and Institutional Spaces
Harewood Underpass

Silver

MAESTRO Nightingale Award & Resene Total Colour Commercial Exterior Award
Harewood Underpass

Winner

Designers Institute of New Zealand Best Design Award for Spatial Colour
Harewood Underpass

Silver



Site Safe Construction Health and Safety Awards
Vertical Horizons Safety Innovation Award - Large Business for Russley Road Upgrade

Finalist

2016

NZTA Gem Award
Memorial Roundabout Alternative Traffic Management Scheme
"Going the extra mile keeping customers moving"

Winner



Downer Person of the Year
Russley Road Project Team, for excellence in delivery

Winner



Resene NZILA Pride of Place Infrastructure Award,
for Harewood Underpass

Winner

Concrete Sustainability Award
Excellence in Civil Construction Award Harewood Underpass

Winner

REMEMBERING SOME OF OUR FIRSTS AT MEMORIAL AVENUE BRIDGE AND EMBANKMENT AND HAREWOOD ROUNDABOUT AND UNDERPASS

