

# BRIDGING SUCCESS

DEVELOPER : Transport for NSW  
MAIN CONSTRUCTION COMPANY : Georgiou  
CONSTRUCTION VALUE : \$134 million



The Bolivia Hill Bridge project will improve road safety and transport productivity with the upgrade of 2.2km of the New England Highway and the construction of a bridge approximately 320m long. Including the widening and realigning the existing two-lane highway, and the regrading of temporary access tracks to provide permanent 4WD drive access, the project will improve road safety and road transport productivity.

**Located 35km south of Tenterfield, the major upgrade of the New England Highway at Bolivia Hill was undertaken by Georgiou as principal contractor in a joint venture with SRG Global.**

The \$134million project, funded by the Federal and NSW Governments, will improve road safety and road transport productivity, minimising the impact on the natural environment.

An outstanding feature of the Bolivia Hill upgrade is the construction of a 320m long balanced cantilever bridge poured insitu which, on completion, will be the longest bridge of its kind in Australia. It is also unique because of the steep topography which required an 8.2% grade on the bridge.

The scope of the project covered the 320m long bridge, 2.2km of road widening and realignment with a minimum shoulder width of 2m, with early works requiring the building of temporary access

roads and a temporary compound site with a concrete batching plant, a site office, and stockpile areas. Retaining walls also had to be cut and filled.

The project has required over 11,000m<sup>3</sup> of concrete and 80,000m<sup>3</sup> of earthworks. “Geotechnical issues were challenging, with some of the site zones composed of class 1 granite, the hardest rock in Australia,” said Gareth Davie, Georgiou Project Manager. “In other areas there were weaker zones of weathered alluvial material. The adjacent steep hill was also very unstable with a significant number of rock floaters so we had to stabilise the top surface and secure individual boulders with rock anchors.”

A one in a hundred year drought during construction created issues for the supply of water for concrete batching and potable water for onsite teams. The Tenterfield Council was experiencing their own water shortage so water had to be sourced over 100kms away.



A large bushfire in the region also impacted the site, but the Rural Fire Service successfully saved the compound assets and bridgeworks.

The location of the project, nearly four hours from metropolitan Brisbane, created logistical challenges for sourcing personnel and materials. The site also experienced extreme temperature ranges from over 40°C in summer to a winter low recorded at -12°C requiring special processes to cool concrete batches in summer and warm them in winter to achieve correct temperature hydration levels.

The project involved more than 80 subcontractors and around 1,050 site inductions were carried out. “Georgiou had up to 60 people on the project at any stage with 40 SRG Global employees involved. There was a high level of teamwork and cooperation by everyone on the job, despite the challenges posed by the remoteness of the location and the environmental conditions,” said Gareth.

Formed in 1977, Georgiou is an established building and civil construction company which continues to deliver a diverse range



of civil engineering and construction services to government and private clients across Australia from their offices in Perth, Brisbane and Sydney.

In the civil sector, the company provides services in road and rail transport, urban development, oil and gas, mining, defence and water. In the building sector, Georgiou works in residential, commercial, health, retirement and aged care, education, industrial, mining, public infrastructure, and defence.

Georgiou recently completed the Green Bridge between Chevron Island and Surfers Paradise in a JV with Brady Marine and Civil. In New South Wales, Georgiou has completed the replacement of the Windsor Bridge and in another JV with Brady Marine and Civil the new wharf reconstruction at Garden Island Naval base.

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**Below** CQT Services provided tender support for concrete and quarry materials, mix design optimisation and site pumping plan.

**Below** Geoforce Solutions provides turnkey solutions for rockfall mitigation and slope stabilisation for the civil, mining and rail sectors.



**CQT Services provides high quality, professional advice as a specialist consultant in the field of engineering materials, including concrete and quarry investigation, training, product optimisation and constructibility.**

Working primarily on major civil and construction projects, CQT Services offers their skills from pre-tender stage, through the construction phase to the final quality audit.

CQT Services was involved throughout the whole Bolivia Hill Bridge project. They provided tender support to the Georgiou SRG Joint Venture Team, advice on concrete and quarry materials, onsite batch plant establishment and review, mix design optimisation, the pumping plan, Transport for NSW B80 training, constructibility advice, durability concrete plan, hot and cold weather plans and Selected Material Zone (SMZ) design using quarried materials won from site.

The Bolivia Hill Bridge project presented a number of unique challenges. “The location has an extreme temperature range between summer and winter (-10°C to 45°C), making concrete batching difficult. We had to use ice and chilled water in the mix during hot summer days and warm water during winter to meet the tight hydration temperature limits.”

“It was essential to achieve early age strength in the large bridge sections to meet the specified time frame for construction and optimisation of the concrete performance reduced the construction cycle, of each segment, by an entire day which led to a large time and cost saving across the whole project,” explained Michael van Koeverden, Owner and Managing Director of CQT Services.

During the project, CQT Services provided consistent and regular support to Georgiou SRG which involved meeting with Transport for NSW and conducting two independent audits on the aggregate quarries and site concrete plant. Audits are one of a range of expert professional services the company offers, which also include troubleshooting, site investigation and dispute resolution.

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**GeoForce Solutions has a unique skill set, providing professional design and construction services for rockfall mitigation and slope stabilisation for the civil, mining and rail sectors.** Collaborating with experienced geologists and geotechnical engineers, GeoForce provides turnkey solutions for projects of any size.

The Bolivia Hill Bridge project has been one of GeoForce’s latest assignments. The complex and challenging project located between Glen Innes and Tenterfield on the New England Highway has seen a 320m cantilever bridge built 35m above ground level to span a steep gully, with over 2km of new roadwork.

GeoForce used rope access and specialised drilling equipment to manage a large amount of geotechnical and access issues. The work involved installation of tower crane ground anchors, removal of formwork from under the bridge on ropes, removal and stabilisation of large boulders and assistance in slope assessments. Where necessary, expanding grout was used for rock removal.

Founder and Managing Director of GeoForce Solutions, James Rutledge, has had over 10 years experience in the civil and mining sectors. His areas of expertise include rockfall prevention systems

using draped or pinned mesh, catch fence installation, slope stability systems, scaling slope hazards, industrial abseiling and using explosives underground.

Having served four years in the Australian Army, James is committed to providing employment opportunities for ex-Defence Force personnel and to assist them to settle back into a meaningful life after their military service. “We have two veterans on our small team at present and we will grow that number as our business expands,” James said. “Veterans make excellent team members because their training gives them a attention to detail and a commitment to the culture of the business.”

GeoForce Solutions is currently engaged on the Warwick water treatment plant for Southern Downs Regional Council and The Gold Coast M1 Motorway upgrade plus many smaller projects.

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**EXEGEN is one of the most experienced survey consulting firms specialising in construction, engineering, mining and marine infrastructure projects on Australia's east coast.** Since their establishment in 2007, EXEGEN has compiled an impressive portfolio of large developments through the delivery of accurate technical survey solutions from early tender support through to post-construction handover and follow up.

EXEGEN was contracted as the survey manager on the construction of the Bolivia Hill Bridge. The challenging project required the building of a 320m concrete balanced cantilever bridge cast in situ 35m above the valley floor. EXEGEN provided a detailed and precise survey for the set out of the bridge formwork including tendon ducting for the top and bottom of the bridge.

The extreme variation in climatic conditions provided a significant challenge throughout project. "In winter, the morning survey taken in frost could produce a large variation in measurement compared to the afternoon. We checked differentials throughout the day, reporting findings to the engineers so that they could make any required adjustments on the cantilever formwork traveller," said Nelson Harch, EXEGEN Survey Manager. "The same applied on the next set of

piers which were built in the summer heat, requiring close monitoring as each segment was built."

The company's approach at Bolivia Hill Bridge mirrored the surveying standards, quality processes, technology and understanding of project specific methodologies employed on all their assignments. "Our aim is to always deliver accurate, holistic and simple survey solutions throughout the project lifecycle," explained Scott Smith, EXEGEN Director. "We understand that incomplete or inaccurate design information can potentially lead to inefficiency, delays and errors, adding extra time and cost to any project."

EXEGEN's extensive portfolio includes the Brisbane International Cruise Terminal, Queensland Rail's stabling project, a new wharf for the RAN at Garden Island in Sydney and the construction of Dyrandra Drive component of the parallel runway upgrade at Brisbane Airport.

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