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BRIDGE ENGINEERING



GHD IS AN INTERNATIONAL PROFESSIONAL SERVICES COMPANY. OUR PEOPLE DELIVER INNOVATIVE SOLUTIONS BY COMBINING TECHNICAL SKILL AND EXPERIENCE WITH AN UNDERSTANDING OF OUR CLIENTS' OBJECTIVES AND ASPIRATIONS.

Our reputation for excellence in bridge design and our close working relationship with clients enable us to produce innovative, cost-effective bridging solutions from simple single span structures to major landmark bridges. Clients benefit from access to a full range of bridge engineering skills covering the entire lifecycle of bridges – from planning and design through to construction, rehabilitation, and ultimately replacement.

OUR COMMITMENT

GHD's bridge engineers have over 30 years' experience in both major and minor projects including studies and investigations, tender and final designs, proof checking, construction engineering, contract administration, bridge inspection and remedial engineering. Our breadth of skills allows us to provide associated services, including transport planning, traffic and road design, waterway analysis, geotechnical and environmental investigations and survey.

GHD's bridge specialists have worked on many large bridge projects, including the Anzac Bridge in Sydney and Green Bridge in Brisbane, as well as projects throughout New Zealand and Asia. Our engineers are members of many national committees such as the Standards Australia Bridge Design Code Committee.

OUR CAPABILITIES

BRIDGE DESIGN

Supported by a suite of software programs and in-house design aids, we are continually developing new, efficient and innovative designs, tailored to meet the needs of our clients. Designs are carried out in close consultation with clients to achieve objectives and deliver structures that are both durable and easily constructed.

Our bridge specialists have designed bridges for major and minor roads, railways, pedestrians, bicycles and pipelines. Designs are carried out in close consultation with clients so that objectives are achieved and structures are both durable and easily constructed.

CONSTRUCTION ENGINEERING

We provide construction engineering services for segmental, pretensioned and incremental launching construction, including the design of launching girders, heavy jacking systems and pretensioning beds. Our bridge specialists have taken leading roles in the construction of prestressed concrete segmental bridges throughout Australia and South East Asia.

BRIDGE STUDIES

Feasibility studies are undertaken considering all forms of bridges from complex cable-stayed bridges to standard reinforced and prestressed concrete and composite structures. Other studies cover design checking and overall project reviews.

BRIDGE INVESTIGATIONS

Our experience is of fundamental importance in our bridge investigations as the causes of damage must be properly identified. We inspect and investigate the condition and capacity of all forms of bridges and prepare designs for remedial or strengthening works. This may include selecting repair material, identifying structural problems, or preparation of structural strengthening proposals.

OUR SOLUTIONS

M2 MOTORWAY, SYDNEY

We provided design services for the M2 Motorway which serves as a major transport link between Sydney's inner city and its north-west suburbs. This included the design of six bridges, ranging from prestressed concrete Super-T girders to a curved post-tensioned voided slab bridge.



Moorabool rail viaduct, assessed for long-term maintenance requirements



M2 Motorway, linking Sydney's inner city with the north-west suburbs



Construction of Welshpool Road Bridge Roe Highway, Sections 4 & 5, Perth



ROE HIGHWAY – SECTIONS 4 AND 5, PERTH

Tender and final designs were prepared for ten bridges within Sections 4 & 5 of this highway. The six major road bridges used prestressed concrete Tee-Roof girders supported on Y-shaped piers. The largest were 41-metre long, weighing 150 tonnes, and were used in the twin bridges across the Canning River.

SOUTHERN EXPRESSWAY – STAGE 1, ADELAIDE

The design of five steel composite bridges for Stage 1 of Adelaide's southern expressway allowed for future modification of the bridges. Two of the bridges were designed for future widening and three were designed to accommodate extension and support by a new pier when the expressway is reconfigured.

GEELONG ROAD UPGRADE, VICTORIA

For the Corio Interchange, we prepared final designs of three new bridges and three bridge widenings. The feature bridge is a portal frame structure using two post-tensioned concrete box girders, with an overall length of 60 metres on a 60 degree skew. Other structures utilise Super-T beams in varying configurations.

TE IRIRANGI DRIVE, NEW ZEALAND

Te Irirangi Drive is a 7.8-kilometre four-lane arterial road linking the Manukau city centre with eastern suburbs. Three structures were designed and constructed at strategic points along the arterial route. The Dannemora Underpass allows cyclists and pedestrians to cross beneath double road bridges. The two pedestrian bridges are set above the route with access by means of steps and ramps.

SORELL CAUSEWAY BRIDGE, TASMANIA

For this unique, prestressed concrete segmental channel girder bridge we prepared the tender and final designs. The two-lane highway is supported by two girders, which also act as traffic barriers. Erection used span-by-span methods with segments located on a launching girder and post-tensioned together. The substructure was also constructed using precast elements for ease of erection and enhanced durability.

RAILWAY BRIDGE STRENGTHENING, QUEENSLAND

Queensland Railways required a unique system of bridge strengthening to increase the capacity of standard 15-metre span bridges from M160 to M260 without closing the bridges to rail traffic. Our design used precast, prestressed concrete sections, epoxy glued to the bottom of the existing bridge beams and joined with external prestressing. Transverse prestressing was also used to enhance the transverse strength of the bridges.

WESTERN LINK VIADUCT, MELBOURNE

Throughout the construction of the Western Link viaduct, we provided construction engineering assistance to Baulderstone Hornibrook. This included advice on the design, operation and strengthening of overhead and underslung erection trusses as well as pier brackets and other supporting equipment.

SPENCER STREET RAILYARD BRIDGES, MELBOURNE

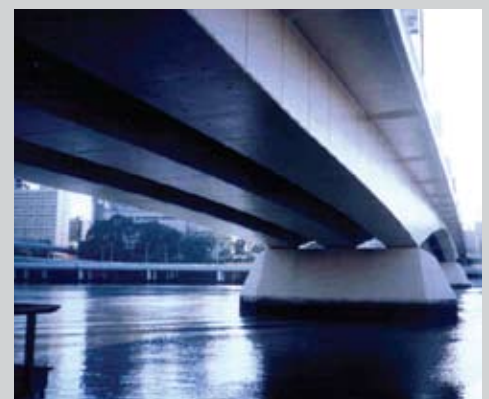
As part of the Docklands expansion, we provided construction engineering support to Transfield Constructions for the erection of two steel composite bridges across the Spencer Street Railyards. The Bourke Street Footbridge was launched above the station without disrupting rail passengers.



Tamsines Expressway, Singapore



Ramp erection using overhead gantries, Western Link Viaduct



Victoria Bridge, investigation and design of strengthening for light rail

DEMOLITION OF GLENELG RIVER BRIDGE, VICTORIA

When York Civil had to demolish the old bridge, we designed the heavy lift system required to lower it. The bridge was supported on prestressing bars, the main truss chords were cut and the truss lowered onto a barge in the river.

PORT RIVER, PORT ADELAIDE

Preliminary designs and cost estimates were prepared for movable road and rail bridges across the Port River. Different types of single-leaf bascule bridges were recommended for the 40-metre span road bridge and parallel rail bridge to optimise cost, access for road, rail and ship transport and aesthetics.

CAMBODIA-AUSTRALIA BRIDGES PROJECT

To re-establish Cambodia's National Highway network, we provided ongoing advice to AusAID. As a result, the project scope was revised and twelve bridges were successfully constructed.

RAIL BRIDGE VIADUCT INSPECTIONS, VICTORIA

The Australian Rail Track Corporation required investigations of three major Victorian viaducts to define their long-term maintenance requirements. Our experience enabled us to identify and define damage resulting from overloading, foundation movements and material deterioration.

RED BRIDGE – CAMPBELL TOWN, TASMANIA

We assisted the Tasmanian Government in assessing the ability of the Red Bridge at Campbell Town (Australia's oldest brick arch bridge) to carry modern highway loadings. We developed a strengthening scheme, prepared tender documents and provided advice during the remedial contract.



ABOUT GHD

GHD is an international professional services company. Our people deliver innovative solutions by combining technical skill and experience with an understanding of our clients' objectives and aspirations.

With more than 6000 people in a network of 100-plus offices throughout Australia, New Zealand, Asia, the Middle East, the Americas and Europe, we serve clients in the global market sectors of infrastructure, mining and industry, defence, property and buildings and the environment.

Central to our clients' prosperity and GHD's success are forward-thinking engineers, architects, planners, scientists, drafters, project managers, economists and supporting staff. Our people embrace the core values that have sustained the company since inception – **Teamwork, Respect and Integrity.**

Established in 1928, GHD is ranked as one of the world's leading engineering, architecture and consultancy firms. We are dedicated to our clients and their stakeholders, to being a responsible corporate citizen and to improving the quality of life around the world.

We contribute to the goals of sustainable development and are committed to managing the social, economic and environmental impacts of our operations and assisting our clients to manage theirs in the provision of our technical consulting services. We recognise innovation as the key to realising this objective.

As a member of the World Business Council for Sustainable Development (WBCSD), GHD actively participates in the public debate on the role business has to play in managing climate change, energy, development and ecosystems.

GHD operates under a Practice Quality Management System that is certified to AS/NZS ISO 9001:2000 and our Environmental Management System (EMS) is accredited to international standard ISO 14001 by NATA Certification Services International (NCSI).

For more information, visit www.ghd.com.au



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