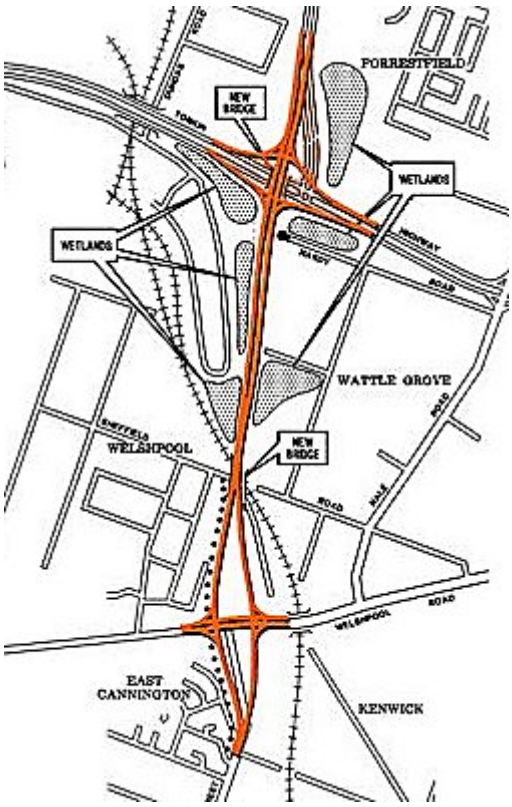
Roe Highway

Tonkin Highway to Welshpool Road



The Roe Highway is part of the Perth metropolitan area outer ring road system. When the highway is finally complete, it will link the north-east suburbs with the port of Fremantle.

A key link in the development of Roe Highway was the section between Tonkin Highway and Welshpool Road. This section connects two important industrial arterial roads and provides a quick and convenient route between the Forrestfield and Welshpool industrial zones. The section also provides for a more direct route between the north-east and south-west suburbs of Perth.

The GHD Perth office, under project manager Paul Fisher, provided design, documentation and construction-phase services for this first-stage project. The work covered:

- wetlands features and major compensating basins/lakes;
- lighting and drainage;
- two major bridge structures;
- preliminary design for the ultimate development of Roe Highway to freeway standard, including a complex interchange at Tonkin Highway and grade separations at Hale and Welshpool roads;
- first stage diamond interchange at Tonkin Highway and at-grade intersections at Welshpool Road;
- a cycleway network;
- extensive bunding to minimise noise.

Attention to environmental matters was a major feature of the highway extension. GHD engineers designed a series of wetland features and two major compensating basins/lakes to replace fauna and flora habitat given up to construction.

Careful inundation control, combined with replacement of nutrient-rich topsoil, will ensure wetland features regenerate a habitat very close to the original. Storm water entering each of the two major lakes will also pass through an interceptor basin to strip nutrients and trap gross pollutants, hydrocarbons or chemical run-off from the highway.

During the 18-month construction period, GHD also provided on-going assistance to Main Roads' project manager, including design and construction advice, design amendments, updating and control of construction drawings, and preparation of "as constructed" drawings.

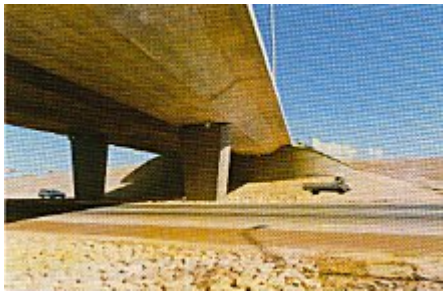
Unique construction methods used on Roe Highway bridges

Various unique engineering techniques were developed by GHD in order to construct two major bridge structures across the Kewdale-Kwinana railway and the Tonkin Highway.

The first bridge, a 60-metre-long and 20-metre-wide structure, has three unequal spans at a severe 52-degree skew to cross the four existing railway tracks. The most practical and economical superstructure consisted of fabricated steel girders with a reinforced concrete slab. Reinforced concrete diaphragms at the abutment and pier supports allowed live-load continuity for the deck and prevented uplift at the acute corners of the end spans.

An interesting feature was the state's first use of VSL's hexagonally shaped precast concrete wall panels. This reinforced soil method of abutment construction reduced the cost of the very long support structures which resulted from the large bridge skew. Wall panels were finished with a special exposed aggregate texture in alternating coloured strips to break the monotony of the expansive wall areas.

Because the pier footings were built beside the railway tracks, a temporary retention system consisting of soil anchors on the excavation faces was required to maintain track integrity during construction.



The second crossing over the Tonkin Highway was a 70-metre-long, two-equal-span bridge at a moderate skew of 17 degrees. The overall deck width of 26 metres was achieved by an in-situ, dual-spine, multi-cell, partially prestressed concrete box girder constructed in two stages. Each four-cell girder is connected to the other by a reinforced concrete top slab. This type of superstructure, with a continuous flat soffit, was an aesthetically pleasing solution to the unusually wide deck.

An unusual foundation feature was enhanced ground-bearing capacity achieved by the "vibroflotation" technique which consolidates the ground with a grid of stone columns. A cost benefit analysis found this to be more economical than conventional piles.

Both bridge structures will be duplicated when the Roe Highway is further developed as part of a Main Roads' master plan to ring Perth with a series of safe, convenient and fast highways.