**Title:** Load Rating of Timber Bridges in Western Australia

Main Roads Western Australia (MRWA) inspects, load rates, and maintains (repairs, upgrades or replaces) all bridges for which it is responsible. In addition, MRWA also inspects, load rates and gives advice for other road bridges throughout the State as part of the statutory responsibility given under the Road Traffic Act 1974 to load post all bridges on public roads and through a long standing arrangement with Local Government Authorities.

Many timber bridges were built in the past owing to the easy availability of hardwood trees. Although no new timber bridges have been built in the State by MRWA for the last 30 years the majority of Western Australia’s road bridges are still timber. The condition assessment and maintenance of existing timber bridges will continue until their eventual replacement with non-timber bridges. The present MRWA policy is to inspect these bridges in detail once every five years. Last year approximately 300 timber bridges were inspected and 140 load rated.

The load rating of this many bridges is a considerable task and has been greatly facilitated by use of a suite of in-house developed programs. The main program is TIMBAR. TIMBAR develops a grillage model using ACES as its analysis engine to assess the load effects for a variety of vehicles or the various bridge elements (stringers and piles). Load rating of timber bridges is carried out based on the working stress design methodology of the now superseded Australian timber structures design standard AS 1720.1-1988 and not to the ultimate limit state design methodology of AS 1720.1-1997 as the ultimate limit state methodology has been found to give overly conservative results for MRWA type standard timber bridges. The working stress methodology has been used successfully by MRWA over many years to load rate these bridges. Several additional spreadsheet-based programs have been developed to automate the rating of other elements, halfcap bearing, deck planks and wingwall piles. This paper describes the suite of programs and their roles in strength assessment and load rating of key components of existing timber bridges.
The Australian Transport Council agreed to an Inter-Governmental Agreement for Rail Uniformity in November 1999. As a result of this agreement the Australian Rail Operations Unit was established in 2000 to work with the rail industry to finalise and implement a National Code of Practice (NCoP) for the Defined Interstate Rail Network (DIRN). The work was sponsored by the rail industry, the Australasian Railway Association, State, Northern Territory and Commonwealth Governments.

The NCoP was developed specifically to meet the requirements of the DIRN. Australian Rail Track Corporation (ARTC) updated the Track and Civil (T&C) section of the Code to include the requirements for the Coal Heavy Haul and the Country Rail Networks and has introduced it as the ARTC T&C Code of Practice (ARTC CoP).

ARTC currently has responsibility for the management of over 10,000 route kilometres of standard gauge interstate track, in South Australia, Victoria, Western Australia, and New South Wales. ARTC also manages the Hunter Valley Coal Rail network in New South Wales (500km) and other regional rail links in New South Wales (3,388km). Included in these responsibilities is the management of approximately 2,200 railway bridges and over 22,000 other structures. Different track and civil standards applied in Victoria, the Western Jurisdiction (SA/WA) and NSW. The introduction of the ARTC T&C CoP - Structures into NSW is a major step towards realising ARTC's objective of having uniform standards across its network.

ARTC recognised a need to implement a structures management tool across all regions of operation to support the new standards. Following an extensive review process, ARTC selected pitt&sherry bridge management system, BridgeAsyst®, to form the basis for the system. The paper deliberates on benefits including standardising interfaces with consultants, contractors, suppliers, and research and development organisations. The benefits also include the implementation of a single Bridge Management System (BMS), simplified training, and simple transfer of staff between states.
Speaker Abstract

Dr David TRAYNER

**Session**  S011  **Room**  New Zealand Room 2

**Date**  27/05/2009  **Presentation Time**  1150 to 1215

Type:  Paper Presentation  

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**Title:**  Solving the Construction Of Waiwera Bridge Using Balanced Cantilever Method and Matched Precast Segmental Erection Via Overhead Gantry

The construction of the bridge over the Waiwera River, north of Auckland, formed a vital part of the Alpurt B2 motorway extension. The bridge structure comprises two carriageways of approximately 540m each, with 9 spans and was delivered in New Zealand’s first Alliance partnering model. The bridge not only showcases the project but also is an outstanding structure, with maximum spans of 76m and a deck height from ground of over 30m. This paper describes the construction aspects of the country’s first Matched Pre-cast Segmental Balanced Cantilever Bridge by over-head gantry.

The paper investigates how the construction methodology provided a number of significant advantages such as minimal adverse weather exposure and solutions to access issues. Also reviewed is the deck segmentation and how this delivered improved aesthetics and pre-cast efficiencies in production. In addition the utilisation of state-of-the-art pre-stressing techniques with optimised grouting increased productivity, safety and enduring quality aspects for the works.

Of particular interest in the presentation is the mechanics of producing and erecting over 350 65t segments, using wet joints, with 480t of internal cantilever and continuity pre-stressing, utilising monolithic pier / deck interfaces with a 700t 140m long over head gantry, safely and with minimal environmental impact.
Title: Prediction of Bridge Load Carrying Capacity from Overall Condition Rating

Thailand Department of Highways (DOH) is currently developing the bridge inventory system. The system is a web-based application, in which users can access to the system from everywhere. In the system, all bridges’ information is recorded including their overall condition ratings representing the service conditions. In order to predict the safe truck load capacity for a concerning bridge, the relationship between overall condition rating and safe load carrying capacity is established. The relationship is shown in this paper. The safe load carrying capacity is obtained from bridge full load test. Up to present, 26 bridges were tested and the relationship was obtained. This relationship is temporarily used in our bridge inventory system. However, the study will be continued for 2 more years and more data from 80 bridge load tests will be gathered. These additional data will be used to update the predicting model. At the end of the study, the more accurate model is expected and will be used in the bridge inventory system.