行政院所屬各機關因公出國人員報告書

（出國類別：出席國際會議）

出席第二屆亞澳地區運輸主管機關首長聯席會議暨第二十一屆澳洲道路運輸研究及第十一屆亞澳道路協會會議報告書

服務機關：交通部臺灣區國道高速公路局

出 國 人　職　　稱：局長

姓　　名：梁樾

出國地區：澳洲

[illegible]間：九十二年五月十八日至五月二十三日

[illegible]年七月二十八日

系統視別號：C09202049

公 務 出 國 報 告 提 要

頁數：73　含附件：無

報告名稱：

「第二屆亞澳地區運輸主管機關首長聯席會議暨第二十一屆澳洲道路運輸研究及第十一屆亞澳道路協會會議」出席報告

主辦單位：交通部臺灣區國道高速公路局

聯絡人／電話：

出國人員：交通部台灣區國道高速公路局　局長　梁樾

出國類別：考察

出國地區：澳洲

出國期間：民國九十二年五月十八日至五月二十三日

報告日期：民國九十二年七月十五日

分類號／目：H0／綜合（交通類） H0／綜合（交通類）

關鍵詞：

紐西蘭運輸管理 － 公路機構統籌之方法"Highway Management, The Highway Highlanders Way"，公路管理維護服務計畫"Highway Maintenance Services"，維修績效合約"PSMC，Performance Specified Maintenance Contracts"，綜合合約計畫 "Hybrid Contracts"，專業服務"Professional Services"，實體設施"Physical Works"，日本道路安全計畫"Road Safety Planning in Japan"，交通安全政策"Traffic Society Policies"，智慧型運輸系統"ITS，Intelligent Transport System"，電子收費系統"ETC，Electronic Toll Collection System"，導航系統"CAHS，Cruise-Assist Highway System"，車輛通訊系統"VICS，Vehicle Information & Communication System"，日本排水鋪面耐久性研

究"Durability Study of Drainage Pavement"，平整度"Surface Smoothness"，抗滑係數"Skid Resistance Coefficient"，車轍"Rutting"，知識管理原則之應用－－執行於澳洲西部主要公路道路資訊系統"Applying Knowledge Management Principles for Implementing a Road Information System at Main Roads Western Australia "，紐西蘭 Fijis 橋之橋樑維修管理系統"A Bridge Maintenance Management System For FIJI"，橋樑維修管理系統"BMMS, Bridge Maintenance Management System"，道路維修管理系統和道路資產管理系統"RMMS-RAMS, Road Maintenance Management System and Road Asset Management System"，混凝土橋樑板"Concrete Deck"，鋼樑"Steel Beam"，倒 T 型樑"Inverted T Beam"，木製橋面板"Timber Deck"，預力混凝土樑"PC Concrete Log Beam"，倍力橋"Bailey"，箱涵"Box Culvert"，防波堤"Jetties"

內容摘要：

近年來國內高快速公路陸續完工通車，雖然工程水準不斷提昇，在設計理念、施工材料、施工技術、自動化系統化等皆有長足之進步；同時隨著各式先進橋樑施工技術與設計理念的不斷移入，先進國家路網橋樑維護管理系統之操作心得經驗均是本局未來施政將借鑑之重要項目之一。

鑒於本局業正進行「中山高速公路員林至高雄段拓寬工程」之設計、施工，電子（ETC）收費及籌畫台灣地區高快速整體路網交控管理等計畫，以及面臨整體高速公路涵蓋中山高、北二高、中南二高、機場支線、環線等公路路網管理之挑戰，因此，相關之理論、基礎研究報告，和國外維護、設計和管理之觀念經驗，勢需借鑑以爲未來本局之應用。

本文電子檔以上傳至出國報告資訊網

出席第二屆亞澳地區運輸主管機關首長聯席會議暨第二十一屆澳洲道路運輸研究及第十一屆亞澳道路協會會議

報告書目錄

出席

第二屆亞澳地區運輸主管機關首長聯席會議暨第二十一屆澳洲道路運輸研究及第十一屆亞澳道路協會會議

"邁向永續未來之路"

報告書

壹、 行程紀要

澳洲昆士蘭市公路局（QDMR，Queensland Department of Main Roads）、澳洲運輸研究所（ARRB， Australasian Roads Planning Bodies Transport Research ）及亞澳道路協會（REAAA， The Road Engineering Association of Asia and Australasian）於民國九十二年五月十八日至五月二十三日假澳洲昆士蘭市（Queensland），聯合舉辦「第二屆亞澳地區運輸主管機關首長聯席會議暨第二十一屆澳洲道路運輸研究及第十一屆亞澳道路協會會議」"邁向永續未來之路" HORA（Second Heads of Road Authorities） 21st ARRB and 11 th REAAA Conference; "Transport—Our Highway to a Sustainable Future"。

高速公路局於今（九十二）年二月十四日接獲本次會議主辦國澳洲暨主辦單位「亞澳道路協會」邀請函，出席「交通主管機關首長聯席會議暨第二十一屆澳洲公路計畫及第十一屆亞澳道路協

會會議」。各出席國之主管交通運輸單位首長，可藉此機會彼此交換區域性決策資訊與經驗，並共同討論運輸需求、道路養護與管理以及公路安全等方面之研究議題（詳如附件）。

鑒於本局業正進行「中山高速公路員林至高雄段拓寬工程」之設計、施工，電子（ETC）收費，籌畫台灣地區高快速整體路網交控管理等計畫，以及整體高速公路涵蓋中山高、北二高、中南二高、機場支線、環線等路網公路管理系統之規劃。因此，相關之理論、基礎研究報告，和國外維護、設計和管理之觀念、經驗，勢將為未來本局發展之參考與借鑑。

本次會議，除將國內經驗心得與成效於會中提出、交換意見，並了解先進國家之技術發展供本局未來交通管理、道路維修與養護、興建計畫規劃及設計、路網管理與橋樑檢測與維護管理系統之業務推動，經函報交通部轉行政院核准後，於五月十八日，由台北出發前往會議地點澳洲昆士蘭市，出席五月十八日至五月二十三日之大會。

議程包括五月十九日之開幕、專題演講、運輸主管機關首長聯席會議、貴賓歡迎儀式、學術會議與區域性報導、研討會議。

五月二十日之大會、澳洲道路運輸研究暨亞澳道路協會會議、設施需求管理會議、道路安全與維修管理會議、首長聯席會議、區域性報導與討論。

五月二十一日之專家會議、路網管理會議、安全工程會議、技術研討與研習、亞澳道路協會會員代表大會、委員會議、會員

大會、新任委員會議。

五月二十二日之專家會議、路網管理會議、安全工程會議、技術研討與研習。

並於五月二十三日參加技術觀摩參訪活動，實地參訪澳洲之重大交通建設，於結束全部會議活動後搭機返國。

Queensland Government

Department of Main Roads

14 FEB 2003

Mr Yueh-Liang
Director General
Taiwan Area National Freeway Bureau
PO Box 75 Shinjuang
Taipei 243
Taiwan

Dear Sir

Second Heads of Road Authorities (HORA) meeting in conjunction with 21st ARRB/11th REAAA Conference – 18 to 23 May 2003 in Cairns

The Inaugural Meeting of the Heads of Road Authorities (HORA) in Kuala Lumpur in April 2002 was highly successful and delegates unanimously expressed their support for further such meetings. At its meeting in Brunei on 2 and 3 October 2002, the REAAA Governing Council decided to convene a second meeting of HORA on Monday and Tuesday, 19 and 20 May 2003 to coincide with the joint ARRB Transport Research/REAAA International Conference, in Cairns, Australia.

It is our great pleasure to extend a formal invitation to you to attend both events.

This second HORA meeting will provide an opportunity for a detailed exchange of information between the most senior decision makers in the region. Based on the conclusions from the inaugural HORA meeting three major themes are proposed for the Heads meeting:

- Theme 1 – Managing the growth in demand for road infrastructure
  主題 1：公路設施需求成長管理
- Theme 2 – Managing the maintenance demands
  主題 2：維護需求管理
- Theme 3 – Coping with road safety.
  主題 3：道路安全管理之妥善處理

As with the inaugural meeting the second HORA meeting is by invitation only. There is, of course, no charge to attend the HORA meeting and spouses are invited to the social functions.

You are cordially invited to attend the ARRB/REAAA Conference, as well as the HORA meeting. The conference program will include several sessions and workshops focussing on issues in the Asian and Australasian region, a technical tour, as well as social functions. Conference registration fees will be waived for you and one aide (and for spouses for the accompanying persons program). However, you will appreciate that while we hope you will lead a delegation to the conference, we cannot waive registration fees for all who might wish to attend.

Unfortunately, REAAA is not able to cover airfare, accommodation, or incidental costs for either the HORA meeting or the conference. Please call Ms Yvonne Lam at the REAAA Secretariat in Kuala Lumpur, on +60 3 5513 6380 should you need special consideration in this regard or if you require further information.

The purpose of the joint ARRB/REAAA Conference is to create insight and bring clarity to the range of strategic actions that will enable sustainable transport futures. The conference will be the major transport and road research conference for the Asian and Australasian region in 2003. We would greatly appreciate it if you could promote the conference in your country and encourage participation by government, private industry and academia. We sincerely hope you will be able to lead a delegation.

Registration for the HORA Meeting and accommodation will be co-ordinated by Ms Lam, Executive Secretary, REAAA Secretariat, 46B Jln Bola Tampar 13/14, 40100 Shah Alam Selangor, Malaysia (email reaaa@po.jaring.my). Please address your response and any questions to Ms Lam.

Registrations for the ARRB/REAAA Conference will be handled separately and should be directed to Ms Irene Taylor at ARRB Transport Research.

Enclosed is a preliminary outline of the program for the week.

We would appreciate if you could respond before 21 February 2003 and look forward to seeing you in Cairns.

Yours sincerely

(Steve Golding)
Director-General
Queensland Department of Main Roads

(Ian Johnston)
President
REAAA

(Neil Doyle)
Chairman
ARRB Transport Researcl

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14 February 2003

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Monday 19 May	**HORA Delegates to attend Conference Opening**
五月十九日	開幕
0930 – 1030	ARRB/REAAA Conference Keynote Address 專題演講
	HORA Delegates to attend Private HORA Meeting
1030 - 1100	*Morning Tea* 運輸主管機關首長聯席會議
1100 - 1230	Welcome and Introductions. 貴賓歡迎 Brief opening statements by participants
1230 - 1400	*Lunch*
1400 - 1530	Theme 1 – opening paper and country statements 學術會議與區域性報導
1530 - 1600	*Afternoon Tea*
1600 - 1730	Theme 1 – debate and summary 會議研討
	HORA Delegates to attend private HORA Dinner
	Guests of Mr Steve Golding, Director-General of the Queensland Department of Main Roads

Tuesday 20 May	**HORA Delegates to attend morning REAAA/ ARRB Conference Plenary Sessions** 澳洲公路計畫暨亞澳道路協會會議
五月二十日	大會
0900 - 1030	Invited Speakers on managing demand for Infrastructure 設施需求管理會議
1030 - 1100	*Morning Tea*
1100 - 1230	Invited Speakers on Managing Maintenance and Road Safety Launch of REAAA website 道路安全與維修管理會議
1230 - 1400	*Lunch*
	HORA Delegates to attend Private HORA Meeting 首長聯席會議
1400 - 1530	Theme 2 - Country statements and debate 區域性報導與討論
1530 - 1600	*Afternoon tea*
1600 - 1730	Theme 3 - Country statements and debate 區域性報導與討論
1730 - 1800	Closing Summary
	HORA Delegates to attend Conference Dinner
	Guests of ARRB Transport Research

Wednesday 21 May	**Registered Conference Delegates Only**	
五月二十一日	專家會議	
0900 - 1700	Concurrent Plenary - Network Management	路網管理會議
	Concurrent Plenary - Safety Engineering	安全工程會議
	Concurrent Technical Sessions and Workshops	技術研討與研習
	REAAA Members to attend REAAA Meetings	亞澳道路協會會員代表大會
1030 – 1300	REAAA Council meeting including Morning Tea	委員會議
1400 – 1600	REAAA General Meeting including Afternoon Tea	會員大會
1600 - 1730	REAAA New Council meeting	新任委員會議
Cocktail Party	Guests of ARRB Transport Research	
Thursday 22 May	**Conference Delegates Only**	
五月二十二日	專家會議	
0900 - 1700	Concurrent Plenary - Network Management	路網管理會議
	Concurrent Plenary - Safety Engineering	安全工程會議
	Concurrent Technical Sessions and Workshops	技術研討與研習
Friday 23 May	**Both HORA Delegates and Conference Delegates to attend Technical Tour**	
五月二十三日	技術觀摩參訪活動	
	Innovation and Environment in Sync - Guests of Queensland Department of Main Roads	

貳、 會議行程

本次會議行程列如下表請參考。

Program Summary

21st ARRB and 11th REAAA Conference	MONDAY 19/5					
9.30-10.30am	Keynote Address (Halls A& B): Traditional Owners Sir Ninian Stephen					
11.00am-12.30pm	Plenary: Road Network Asset Management (Halls A & B): George George, Malaysian Highway Authority Steve Golding, Queensland Department of Main Roads Paul Forward, Roads & Traffic Authority					
	LUNCH					
2.00-3.30pm	Plenary: Heavy Vehicle Safety Strategy in Australia and New Zealand (Halls A & B): David Wright, Land Transport Safety Authority, New Zealand Stuart Hicks, National Road Transport Commission Ray Taylor, ARRB Transport Research					
4.00-5.30pm	Plenary: Heavy Vehicles & Infrastructure (Halls A & B): Fiona Calvert, National Road Transport Commission Ian Reeves, Queensland Department of Main Roads Kieran Sharp, ARRB Transport Research Peter Leyden, National Road Transport Commission			Plenary: Sustainability in Transport(Hall D): Ray Brindle, Consultant, Neil Houghton, ARRB Transport Research Graeme Marshall, Environment Australia		
	TUESDAY 20/5					
9.00-10.30am	Opening Ceremony (Halls A & B): The Hon Steve Bredhauer, Queensland Minister for Transport & Minister for Main Roads Presentation of Kalahira Awards					
11.00am-12.30pm	Plenary: Regional Forum (Halls A & B): Bill Paterson, World Bank Charles Meshulam, Asian Development Bank Dinesh Mohan, Indian Institute of Technology, Delhi REAAA Website Launch					
	LUNCH					
2.00-3.30pm	Predicting Crashes and Developing Countermeasures (S1) (Room 2)	Pavement Modelling (S2) (Hall D)	Traffic Modelling I (S3) (Room 1)	Asphalt Mix Design (S4) (Halls A & B)	Intelligent Transport Systems I (S5) (Rooms 3 & 4)	Workshop: Road Management Systems and Local Roads – the Way Forward (W1) (Rooms 5 & 6)
4.00-5.30pm	Cycling Solutions (S6) (Room 1)	Pavement Drainage (S7) (Room 2)	Knowledge, Policy and Partnerships (S8) (Halls A & B)	Network Data Collection (S9) (Hall D)	Workshop: Asset Sustainability – Flexible Pavement (W2) (Rooms 3 & 4)	Workshop: Quantifying Road Investment (W3) (Rooms 5 & 6)
	WEDNESDAY 21/5					
9.00-10.30am	Plenary: Sustainable Solutions to Road Safety Problems (Halls A & B): Prof Masaki Koshi, Japan Mary Sheehan, Queensland University of Technology, Australia Peter Croft, Land Transport Safety Authority, New Zealand Lori Mooren, Consultant				Workshop: Road Network Asset Management (W4) (Room 2)	Workshop: Assessment of Stabilisation (W5) (Rooms 5 & 6)
11.00am-12.30pm	Heavy Vehicles (S10) (Room 2)	Advances in Asphalt (S11) (Halls A & B)	Planning for Sustainability (S12) (Room 1)	Concrete & Structures I (S13) (Room 4)	Intelligent Transport Systems II (S14) (Room 3)	Granular Pavements (S22) (Hall D)	Workshop Triple-Bottom Line Performance (W6) (Rooms 5 & 6)
	LUNCH						
2.00-3.30pm	Road Geometry (S16) (Room 3)	Stabilisation I (S17) (Hall D)	Sustainable Transport (S18) (Room 1)	Safe Road Surfaces (S19) (Room 2)	Traffic Modelling II (S20) (Room 4)	HDM Applications (S21) (Halls A & B)	Workshop: Freight & Logistics (W7) (Rooms 5 & 6)
4.00-5.30pm	Traffic Engineering (S22) (Room 4)	Transport Policy (S23) (Hall D)	Stabilisation II (S24) (Room 2)	Traffic Noise (S25) (Room 3)	Local Roads (S26) (Room 1)	Workshop: HDM-4 (W8) (Halls A & B)	Workshop: Rural and Remote Road Safety (W9) (Rooms 5 & 6)
Thursday 22/5							
9.00-10.30am	Plenary: Intelligent Transport Systems (Halls A & B): Chris Koniditsiotis, Austroads James Luk, ARRB Transport Research Kian Keong Chin, Land Transp ort Authority, Singapore David Bennett, ARRB Transport Research				Bridge Management (S27) (Room 2)	Workshop: Austroads Pavement Design Guide (W10) (Rooms 5 & 6)	
11.00am-12.30pm	Roadside Hazards (S28) (Room 1)	Performance Specifications (S29) (Halls A& B)	Transport Planning (S30) (Room 3)	Concrete & Structures II (S31) (Room 4)	Pavement Design (S32) (Hall D)	Environmental Civil Engineering (S33) (Room 2)	Workshop: Mining Seminar (W11) (Hall C)	Workshop: ITS in Rural and Remote Areas (W12) (Rooms 5 & 6)
	LUNCH							
2.00-3.30pm	Safety of Road Users (S34) (Room 1)	Pavement Management (S35) (Halls A & B)	Concrete & Structures III (S36) (Room 4)	Impact of Roads on Water (S37) (Room 2)	Pavement Performance I (S38) (Hall D)	Workshop: Mining Seminar (W11) (Hall C)	Workshop: Road Safety Risk Manager (W13) (Room 3)	Workshop: Integrated Transport (W14) (Rooms 5 & 6)
4.00-5.30pm	Intelligent Transport Systems III (S39) (Room 3)	Maintenance Management (S40) (Halls A & B)	Traffic Modelling III (S41) (Room 4)	Managing the Environment (S42) (Room 2)	Pavement Performance II (S43) (Hall D)	Road Safety Initiatives (S44) (Room 1)	Workshop: Mining Seminar (W11) (Hall C)	Workshop: Community Road Safety (W15) (Rooms 5 & 6)
Friday 23/5								
8:00 am	Technical Tours							

參、 研討會概述

亞澳道路協會係每兩年召開乙次，上次會議在馬來西亞舉行。該協會之會議宗旨係邀請各國學者專家發表學術論文，經此交換研究成果、資訊，並加強各國同業間之聯繫溝通。

由於道路管理內容廣泛，相關研究心得看法豐富。大會第一天採六個主題分六個不同場次同時進行，第二天採七個主題分七個場次，第三天採八個主題分八個場次。每個主題均有五至六篇不等論文發表，基於業務及專業相關屬性，擇定數個重要主題全程參與。

本次會議討論議題概分為十七項主題、綜合如下：

一、 交通工程。

二、 交通噪音。

三、 環境工程。

四、 運輸規劃。

五、 道路幾何線型。

六、 肇事預測與基本對策。

七、 公路投資效益。

八、 智慧運輸系統（ITS）。

九、 鋪面設計。

十、 水對路面影響。

十一、 粒狀鋪面。

十二、 路面穩定評估。

十三、 混凝土及結構。

十四、 鋪面管理。

十五、 鋪面績效。

十六、 維護管理。

十七、 橋樑管理。

大會所安排之會議時程及議題臚列如附錄。

肆、 論文摘要

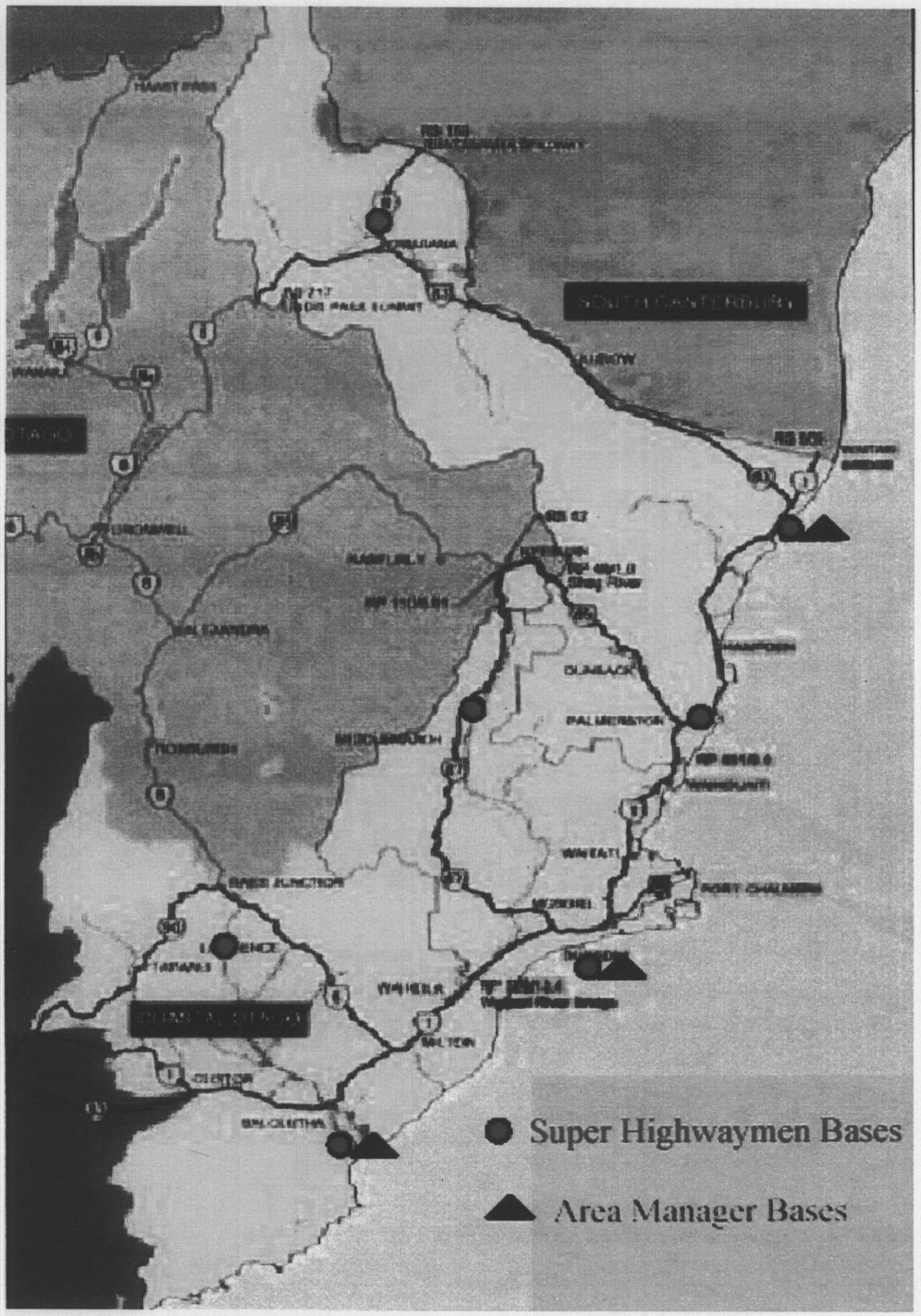
本次研討會發表論文總計兩百一十三篇，涵蓋有理論性基礎研究報告，以及應用性問題探討。茲選就其中五篇與國道高速公路局業務推動相關摘述如下：

一、「紐西蘭運輸管理 — 公路機構統籌之方法」

"Highway Management, The Highway Highlanders Way"

紐西蘭政府的運輸部門從一九九一年到一九九九年計十年時間持續執行公路管理維護服務計畫（Highway Maintenance Services），該系統共分為兩大部份，第一部份規劃為十年期維修績效合約（PSMC，Performance Specified Maintenance Contracts），另一為五年期的綜合合約計畫 "Hybrid Contracts"，並選擇紐西蘭 Otago 海岸地區州際路網長 750Km 之維修道路作為公路管理範例（請參考附圖一）。另採統包計價法之委託方式，在實體設施方面，經費為 3,620 萬紐元；路網管理方面為 320 萬紐元，總計 3,940 萬紐元。

二〇〇〇年紐西蘭運輸部以合約方式將該公路以專業服務和實體設施兩大項分別委交顧問公司和承包廠商辦理，並選自澳洲不同背景、文化工作之 50 人組成一個



圖一：*Coastal Otago State Highway Network*

工作團隊，相互協調、技術支援、接受該委任工作之挑戰。

所謂專業服務（Professional Services）（十年期，資產管理計畫，經費 320 萬紐元）：

- 專家建議。
- 考核廠商績效。
- 獨立查帳人員。
- 工程人員對於工程合約之認定。
- 開發與維護管理業務委由雇主與廠商協議之。
- 公路管理方面經由開發和人員培訓完成。

實體設施（Physical Works）（五年期，經費 3,620 萬紐元）係為：

- 一般維修服務。
- 交通管理服務。
- 薄加層改善。
- 路面修復。

因為文化和工作態度不同之本位主義，且彼此缺乏信任，缺乏領導者及設置委員會，以及知識交換等等障礙，執行初期，工作不太順利，惟經由二年政策性執行，現已滿足用路人，道路所有權人，公路兩側財產擁有者與該計畫各相關機構，困難已被完全克服，遂達成共同目標。

成功的將三個（3C）機構——專業顧問公司、營建廠商、行政部門（Consultant、Contractor、Client）統籌為單一之

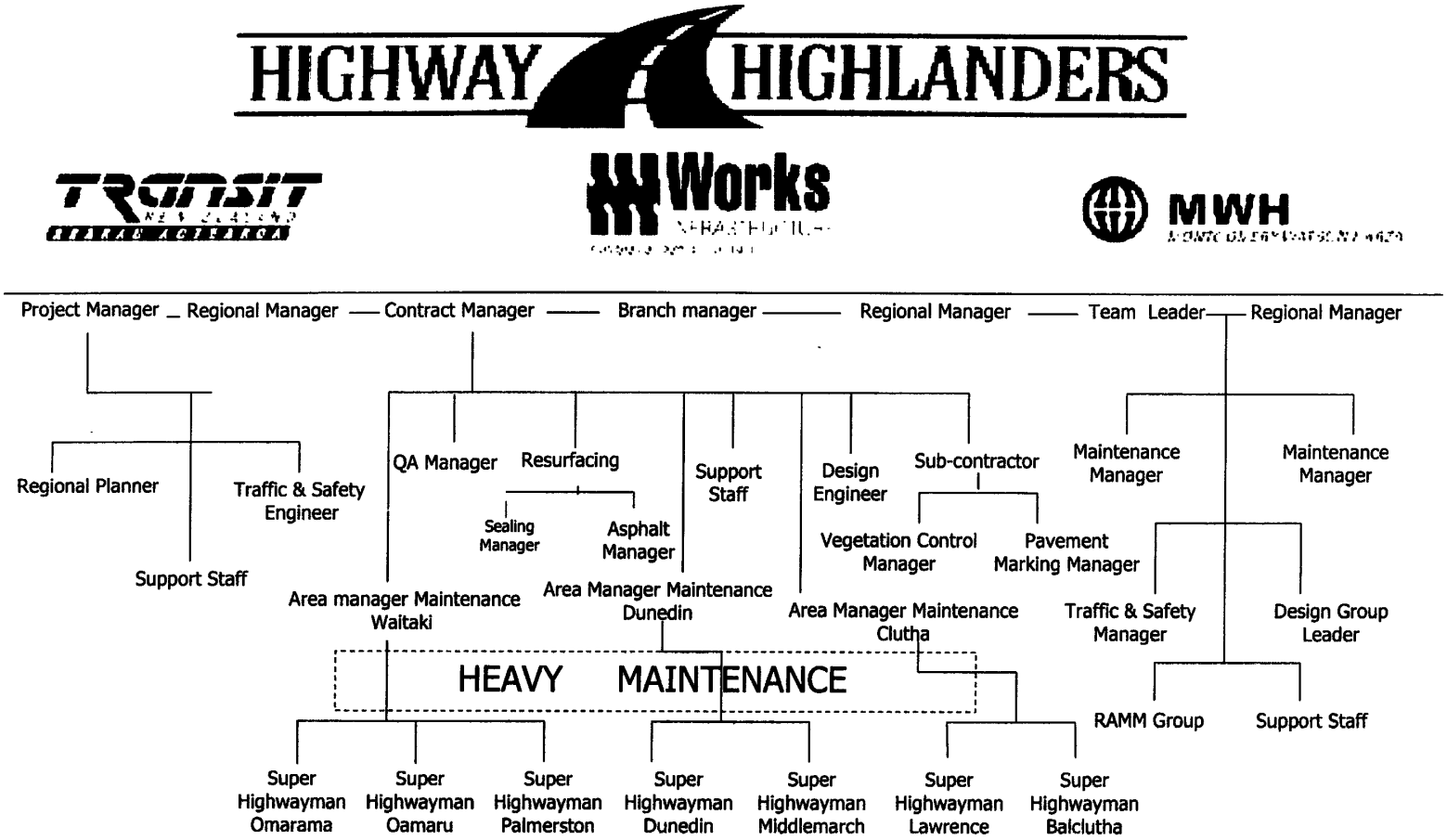
“Highway highlanders”（請參考附圖二），三個機構的知識及經驗聚合與服務效率，並已達至傳統合約之同等功能。

紐西蘭當局認定“Highway highlanders”是極佳模式之一，其可創造雙贏局面，其運作絕大關鍵在於整合各個不同族群。經此工作環境自然而然可降低成本支出，其團隊中已具備來自各種專業背景人才（請參考附圖三），不需再支付聘雇及相關費用支出，並可產值出最大之工作效能。

又因為一起工作，顧問公司觀念、施工單位施作方法、政府制定政策，經由相互討論，瞭解融合，提出優質、實用的規劃及設計；另不再需要將資料往返層報，節省時間，亦得到滿意之規劃、設計及建造成果。

“Highway highlanders”名字係來自紐西蘭 Otago 當地很著名橄欖球（Rugby）隊名——“Otago Highlanders”。

“Highway highlanders”觀念為未來紐西蘭發展趨勢。



圖二：***The Highway Highlanders Team***

圖三： **"Working together for you"** . *Works Infrastruchure's Super Highwayman, Alan Barbara. Transil's Regional Asset Manager and Project Manager. Murray Clarke, and Montgomery Watson Harza's Team Leader, Callum Wood.*

二、「日本道路安全計畫」

"Road Safety Planning in Japan"

日本一九七零年統計顯示每年偶發交通意外事故死亡約 16,765 人，為能降低該死亡率，日本政府頒布交通安全政策（Traffic Society Policies），於一九七一年實施五年交通安全計畫（經費及規模請參考附表一），分屬道路管理者與縣公共安全委員會兩者使用；再將經費編列方式分為特定用途基金（牌照費）與一般用途基金（公務預算）來執行，分別為 26,900 億日元與 25,800 億日元，總計 52,700 億日元。

表一：**Scale of Traffic Safety Program**

(Unit: 100million yen)

Breakdown	Earmarked Funds	General Account Funds (Ref.)	Total (For ref.)
Road management operator	(3,500) 24,800	19,500	44,300
Prefectural Public Safety Committee	(200) 2,100	6,300	8,400
Total	(3,700) 26,900	25,800	52,700

Note: Figures in parentheses ( ) at the top of Specified Traffic Safety are internal figures relating to cost adjustments for the plan.

為落實嚴格執行該計畫（請參考附表二意外資料庫統計分析），於二零零一年交通意外事故受傷或死亡約940,000人，而全日本擁有駕駛執照者約7,500萬人；車輛有註冊登記——計有車籍牌照登記者9,000萬輛；而日本全國道路總長度為190,000公里。

表二：Database for Accident Analytical Works

Database	Description
Traffic accident data (National Police Agency)	Accidents resulting in injuries or deaths (about 940,000 cases in 2001)
Driving license data (National Police Agency)	Database of about 75 million driving license holders
Car registration data (Ministry of Land, Infrastructure and Transport)	Database of about 90 million registered automobiles
Road traffic censuses (Ministry of Land, Infrastructure and Transport)	Road environment data, (traffic and road) of 190,000km of national and prefectural roads

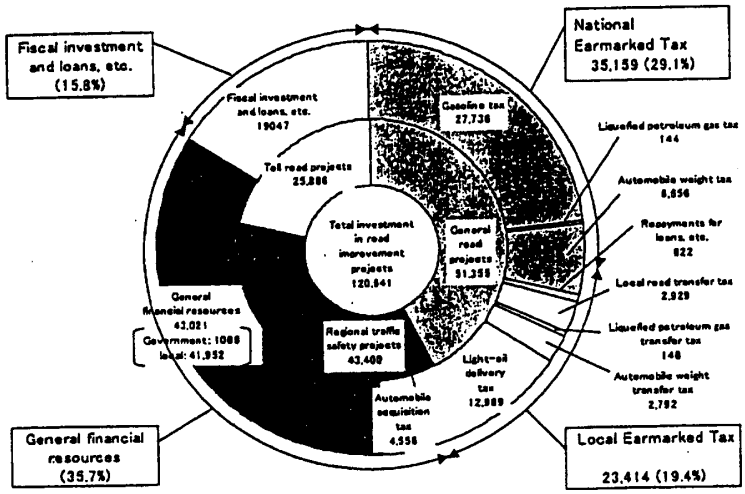
惟改善交通問題仍然是很嚴肅課題（請參考附表三意外事故前後之變化），在死亡事故方面，之前為9,571人，改善後為8,681人，降低8.8%；就死亡事故發生位置而言，之前有74處，減少到48處，減少幅度達35.1%之多；一般事故方面，改善前有771,084件，改善後反而增加到

850,363 件，增加 10.3% ，不過事故發生位置反而降低，由原先 7,345 降低到 7,335，減少 0.1% 。

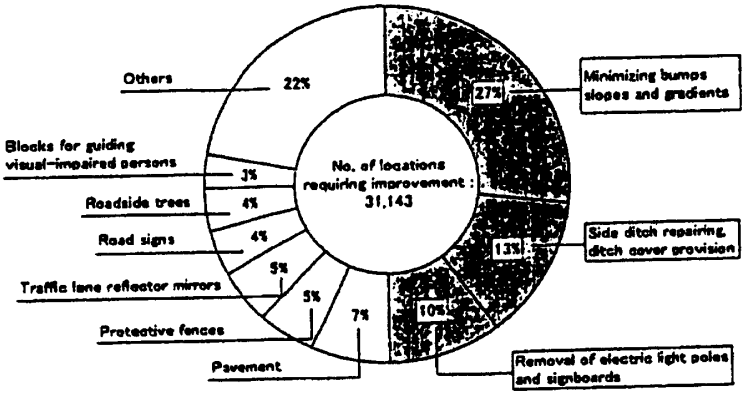
表三：**Before and After Change of Accidents**

		Before	After	Rate %
No. of fatal accidents	Nation	9,571	8,681	-8.8
	Black spots	74	48	-35.1
No. of accidents	Nation	771,084	850,363	+10.3
	Black spots	7,345	7,335	-0.1

於一九九六至二〇〇二年執行七年交通安全設施方案，針對有問題之道路設施進行改善，而其經費分配及來源請參考附圖四，日本在道路改善計畫投資 12, 064, 100 萬日元，其中收費公路改善計畫投資 2,588,600 萬日元，一般道路改善計畫預算編列 5,135,500 萬日元，區域性交通安全計畫為 43,400 萬日元，而些支付之經費分別來自一般財政收入佔 35.7% ，投資與借貸佔 15% ，固定國庫稅收佔 29.1% 以及地區性稅收佔 19.4% 。



圖四：**Composition of financial resoures for road improvement projects (2000)**
Source: Road Administration.



圖五：**Problems Pointed Out in Safety Checks**

又今年（二〇〇三）執行新五年道路改善計畫依附圖五所示，需要改善位置計有 31,143 件，其中在縱坡、坡度、顛簸之降低改善佔 27% ；邊溝加蓋佔 13% ，電線桿

及招牌遷移佔 10% ；其他改善佔 50% ，分別為路面、圍籬、標誌及車道反光標線、照明等等改善。

有問題之道路設施改善概況如下：

1. 智慧型運輸系統（ITS，Intelligent Transport System）：

該設備提供圖、視障字體和聲音之服務，供輪椅殘障人士找到最佳無障礙空間之路線，對視障而言，他們可知目前其所在之位置，及其欲前往的定點。

2. 電子收費系統(ETC，Electronic Toll Collection System)：

該系統可降低雇用行政人員及人事費支出，且便利駕駛人員進出收費亭，日本政府選擇 Tomei and Meishin Expressway 快速道路在二零零一年設置 600ETC 系統，二零零二年 ETC 設置增加到 900 處。

3. 導航系統（CASH，Cruise-Assist Highway System）：

該系統可將危險訊息、岔路、障礙物、人行穿越、路況維修等等資訊事先顯示於導航系統視訊螢幕通知駕駛人，便於駕駛人事先掌控，避免碰撞及走錯路之事件產生。

4. 車輛資訊及通訊系統（VICS，Vehicle Information & Communication System）：

本系統於一九九六年開始使用於東京大都會區一般道路，由於成效良好，在一九九八年擴及遍佈到日本

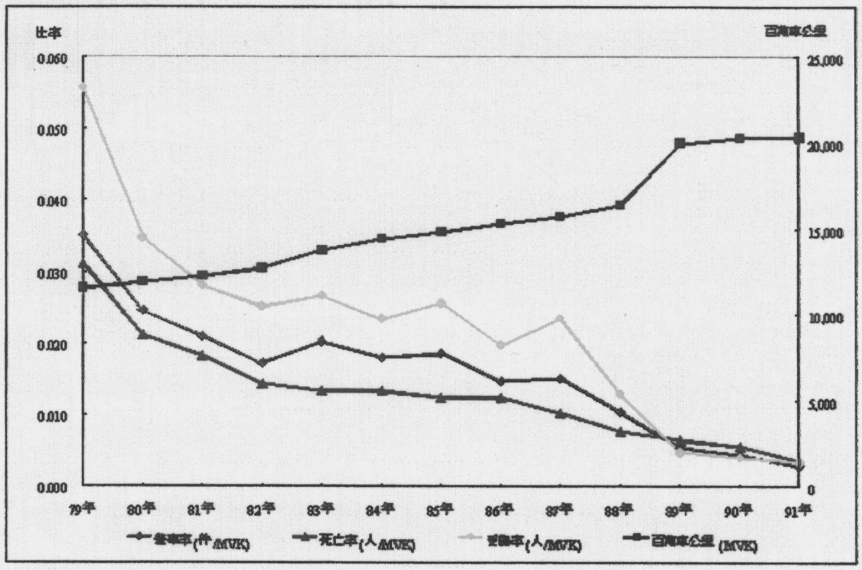
各重要道路。

日本政府預計於2008年編列高達50億日元預算，在高速公路設置ITS系統。

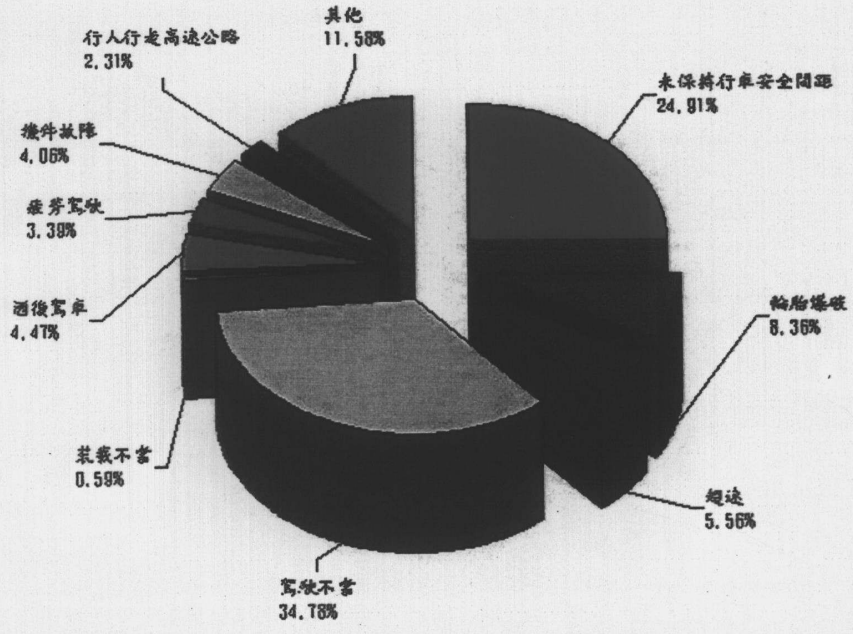
相較於國內情況，同樣由於經濟的日益繁榮，國民財富增加迅速，車輛持有率增加，行駛於中山高速公路、北二高、中南二高之高速公路之車輛大幅增加，使得高速公路在平常尖峰時間，部分路段即已超過負荷，每遇例假日更因湧入過多的車輛，造成高速公路愈加壅塞。

為了紓解該車流以及為社會大眾提供最完善、便捷之交通服務，讓用路人平安和迅速抵達目的地，維護行車秩序，確保高速公路全線行車安全與順暢，本局依據不同時日的交通特性研擬各種配套方案，例如：交流道入口匝道儀控管制、高乘載車輛專用通行時段、部分入口匝道封閉等措施。

同時本局強調人性關懷，以行車安全為出發點，不斷地研訂各種改善方案，針對肇事原因、違規行為特性，並以加強執法、宣導與提供路況諮詢等服務方式，提昇行車之舒適與順暢，雖然高速公路交通流量每年巨幅成長，但是肇事總數、肇事率等各項指標均相對的不升反減，顯示本局對於行車秩序與行車安全之維護，績效顯著（參考附圖六、七）。



圖六：歷年交通成長肇事率比較

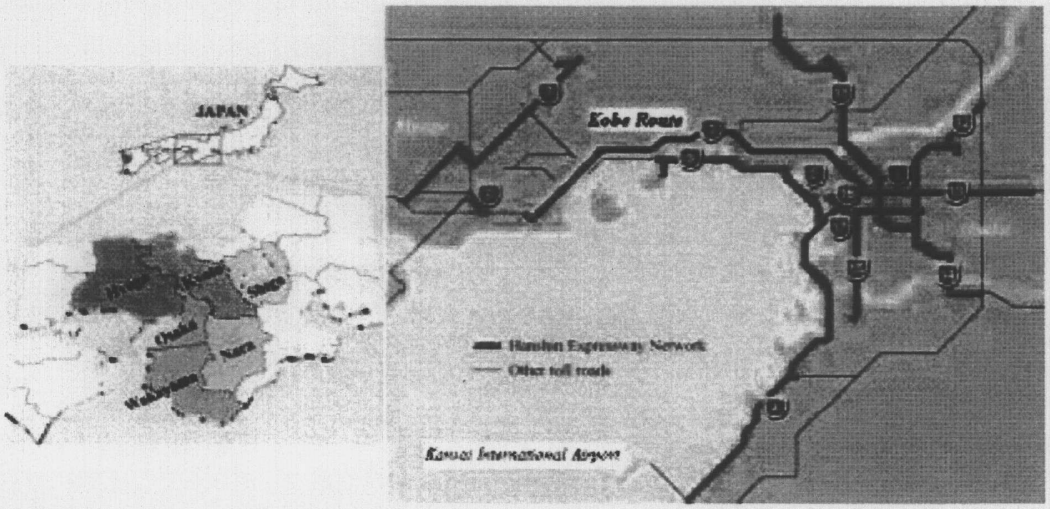


圖七：肇事原因分析

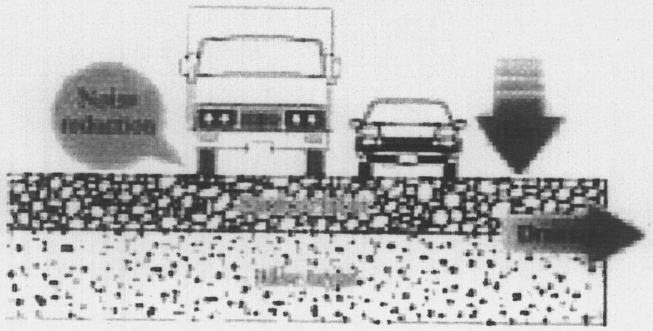
三、「日本排水鋪面耐久性研究」

"Durability study of Drainage Pavement"

一九九五年日本遭受到強烈的日本阪神大地震，Kobe 大都會地區受到嚴重損害，Hanshin 快速公路亦無法倖免。日本當局為修復該快速公路（附圖八），並從修復後結構體高程一致觀點，以選擇排水鋪面（附圖九）作為路面修復方案。排水鋪面於一九九五年以前日本少有用於日本橋樑結構面層上，即於橋樑面板上塗灑膠結物後，再鋪築排水瀝青混凝土，其粗骨材含量為 80% ，最大粒徑 13 mm，空隙比 20% 。

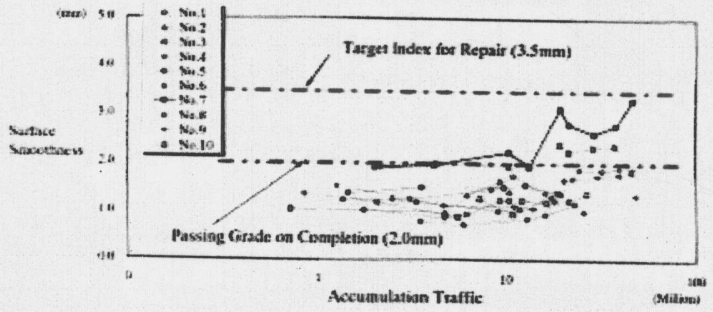


圖八：***Map Showing the Hanshin Expressway Kobe Route***



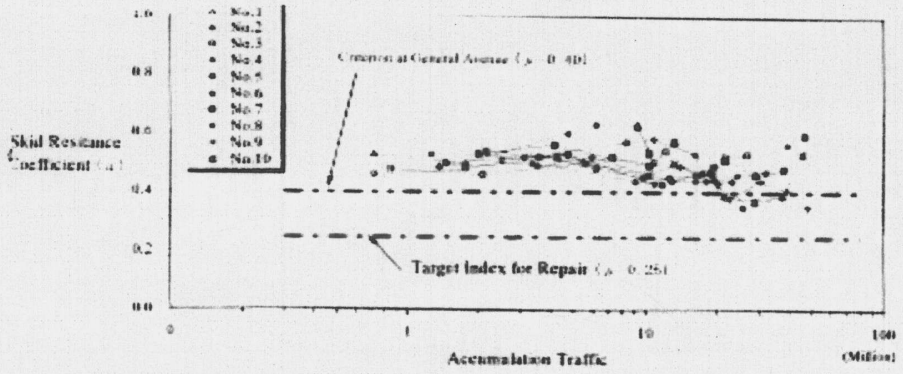
圖九：***Illustration of Drainage Pavement***

由於過去所蒐集的基本資料甚少，以及當時日本以排水路面鋪築於橋樑結構物上作為維修計畫案例不多。故於一九九六年日本政府執行橋樑排水鋪面調查工作，俾掌控該路面服務品質變化情形（附圖十），由該圖得知當累積交通量達 5,000 萬車次時，路面平整度(Surface Smoothness)不得超過 3.5 mm，倘超過該值，則該道路路面須編列預算進行維修工作，又藉以分析過去六年損壞資料，建立排水路面服務性和功能性指標。



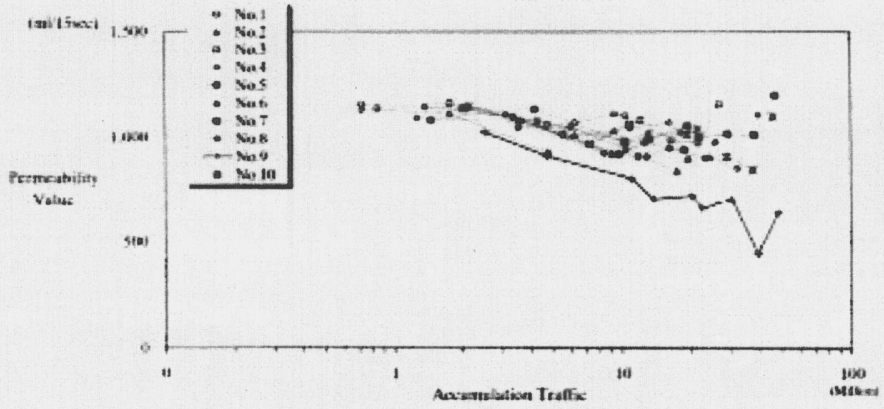
圖十：***Transition of Surface Smoothness***

當累積交通量達5,000萬車次時，路表抗滑係數（Skid Resistance Coefficient）不得低於標準值0.25，倘低於該值，則需進行修復工作，而該道路自鋪築完成六年後，經由車輛行駛於該路段累積交通量已超過一仟萬車次，其路面抗滑係數（請參考附圖十一），仍維持0.35，比一般瀝青路面平均值μ＝0.4稍微小，顯示抗滑值改變不多，又排水路面透水性和排水性質仍保持良好的功能（圖十二滲透試驗），亦即鋪面上的水可經由其孔隙迅速排除（圖十三），惟當累積交通重達5,000萬車次時，顯示該路面滲透率變化頗大。



圖十一：***Transition of Skid Resistance Coefficient***

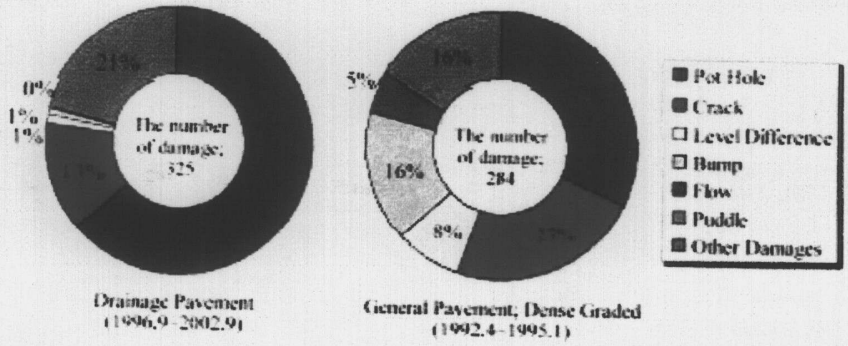
圖十二：***State of In-siru Permeability Test***



圖十三：***Transition of Permenbility***

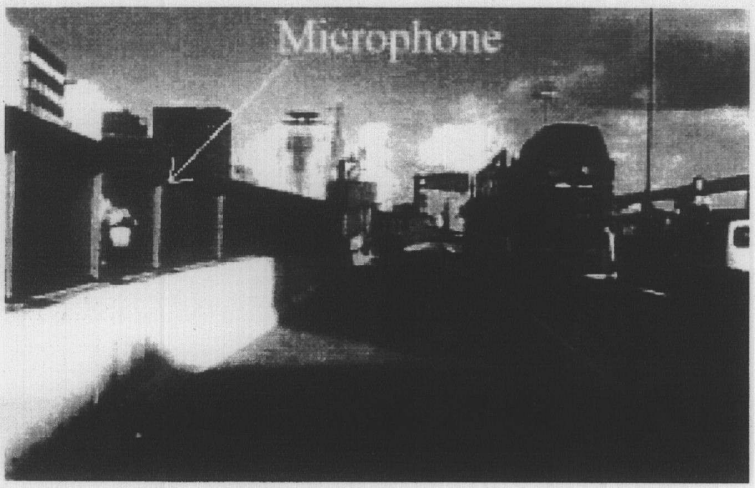
再以多孔隙排水路面與密級配路面之路面損壞情形加以比較，如圖十四。一九九二年四月至一九九五年一月鋪築之密級配路面，使用時間約四年，損壞有 284 處；一

九九六年九月至二〇〇二年九月選擇鋪築多孔隙排水路面，使用六年的時間，損壞有 325 處；附圖顯示密級配路面坑洞損壞佔 32% ，龜裂佔 23% ，反觀多孔隙排水路面坑洞損壞佔 64% ，龜裂佔 13% ，顯示兩種路面損壞類型相異。

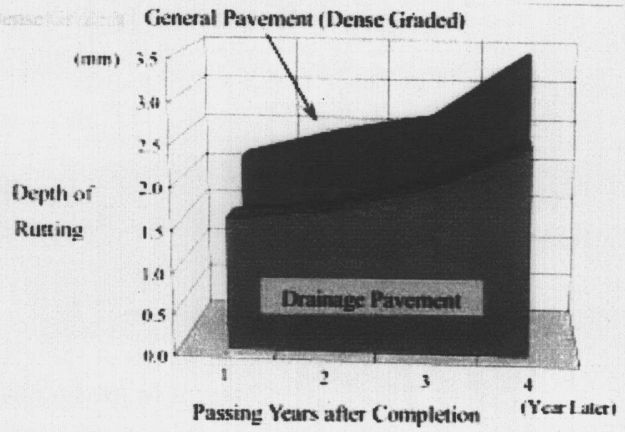


圖十四：***Damages of Each Pavement***

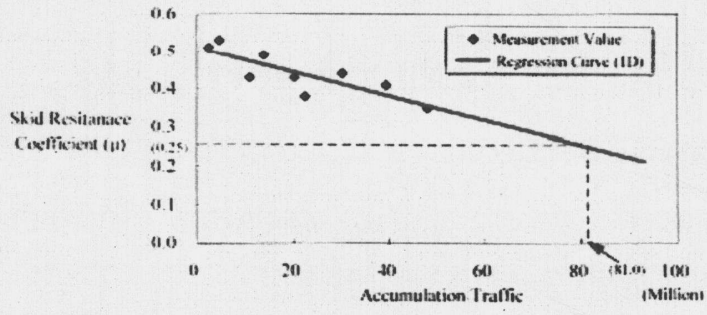
選擇鋪設多孔隙排水性路面當作道路面層，於噪音監測結果顯示可有效降低交通噪音（如附圖十五）。以鋪路完成開放通車四年後之車轍（Rutting）加以比較，多孔隙排水路面為 2.2 ㎜，而密級配路面為 3.4 ㎜，顯示排水路面對於車轍的抵抗能力較佳（圖十六）。上述結果顯示選擇排水路面作為路面面層有較佳的耐久性(如附圖十七)。



圖十五：***Mensurement State of Noise Reduction Efficient***



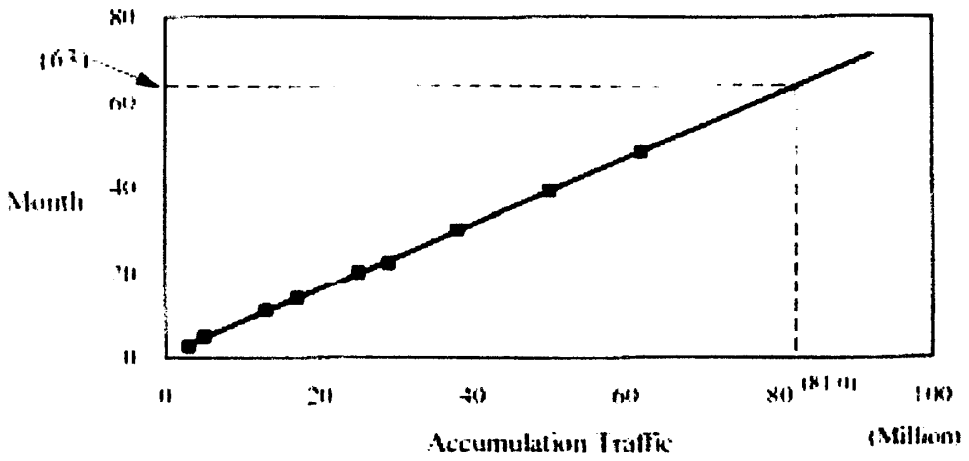
圖十六：***Campare of Rutting Transition***



圖十七：***Relations between Skid Resistance and Traffic***

以回歸分析抗滑係數與交通量之關係，顯示累積交通量達 81,000 萬車次，防滑係數仍可達到 0.25，此時該道路已使用六十三個月，相當於通車達五年之久，路面使用壽齡確較長（見附圖十八）。

選擇多孔隙排水鋪面當作路面面層可確保路面的抗滑能力，降低水珠飛濺現象，亦可有效的降低車行中所產生的噪音音量，確保行車的安全。



圖十八：***Relations between Ages and Traffic***

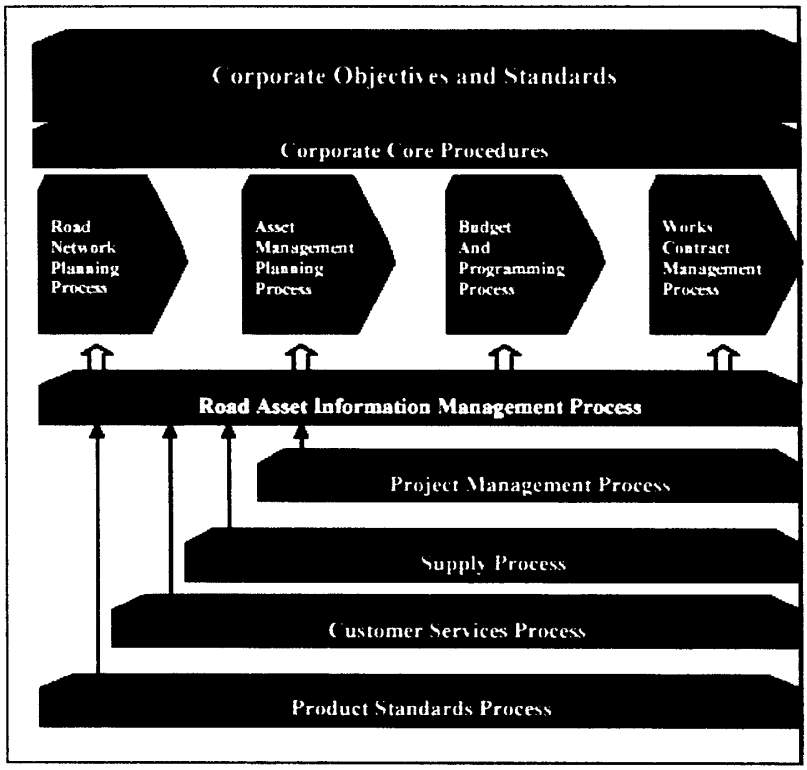
反觀國內高速公路路面面層，於選擇試鋪多孔隙排水鋪面時，除配合研究計畫，比較分析各國資料，並以不同斷面厚度進行，不僅評估本省粒料之基本物理性質試驗外，如硫酸鈉健度損失、洛杉磯磨損試驗、含沙當量、扁

長率等等，亦考量到多孔隙瀝青混泥土孔隙率高，瀝青與空氣接觸面積增加，受水分與空氣作用易於老化，而選用改質瀝青及纖維之添加物加以配合以改善瀝青之感溫性，油膜厚度偏低現象、與穩定性不足之問題，增加瀝青之韌性與黏結力，俾使該路表排水性能增加及其使用之耐久性。在試鋪計畫中亦尋求經濟鋪設厚度，以為後續計畫推動之決策參考。

四、「知識管理原則之應用－－執行於澳洲西部主要公路道路資訊系統」

"Applying Knowledge Management Principles for Implementing a Road Information System at Main Roads Western Australia "

澳州西部主要公路今年執行一整套應用知識管理之道路資訊系統（請參考附圖十九），替換舊有構架道路管理資訊系統。



圖十九：***Main Roads Western Australia Corporate Processes***

新的道路資訊系統內容如下：

- 多面向改進該系統，俾增加系統適應性。
- 更多屬性可進入該系統。
- 聯結現場狀況與邏輯網路。
- 納入舊有功能。
- 地圖配置。
- 新的用辭與商業規則。
- 提供道路網路維修。
- 在系統外部完成資料更新工作。

執行新的資訊系統，不僅意味著開發軟體的成功，更有助於處理與管理大量文件，可多樣性使用。在網路系統控制下利用不同軟體程式，將座標與線型、維修資料載入NRC 軟體（NRC，Network Referencing Catalogue），藉以分析、執行後，可得知道路概況。

為使得該系統達到預期之效果，以及新知識與技術之間開發和應用，獲得良好結果和普及率，該國政府執行人員培訓計畫，根據其擔任角色工作調整其訓練課程內容，如附表四。

知識應用之具體化，是將新知傳授與知識接受者，很有默契加以整合後，擴充為單一知識，而創造價值是使用者和機構團體，將新的知識綜合應用在團體和團體核心程序中。

表四：*IRIS Users and Training Requirements*

TYPE OF USER	ROLE	REQUIRED IRIS KNOWLEDGE
NON-UPDATE USERS		
Regional Key Users	IRIS expert in Region. First point of call for regional queries/requests.	Good knowledge of all modules and creating queries. Discoverer, GIS.
Regional Users	General enquiry. Some reporting.	Basic enquiring/reporting across all modules.
Metro Key Users	IRIS expert in Branch. First point of call for Branch queries requests.	Good knowledge of all modules, creating queries. Discoverer, GIS.
General Users	General enquiry. Some reporting.	Basic enquire and reporting across all modules.
UPDATE USERS		
Inventory Updates/TNCs	Data enter all inventory details.	Inventory data entry.
Crash Statistics/MRWA	Data enter crash details.	Crash Module data entry functions only.
Traffic/MRWA	Maintain traffic details.	Traffic details linked to network details
Structures/ MRWA	Data entry structures details.	Data entry and analysis in Structures, also Inventory and Network Modules
Network Control System/MRWA IRIS NCS Team	All network changes	NCS and GIS knowledge
IRIS SUPPORT		
IRIS Support Team	Support and administration	All modules and administrative functions

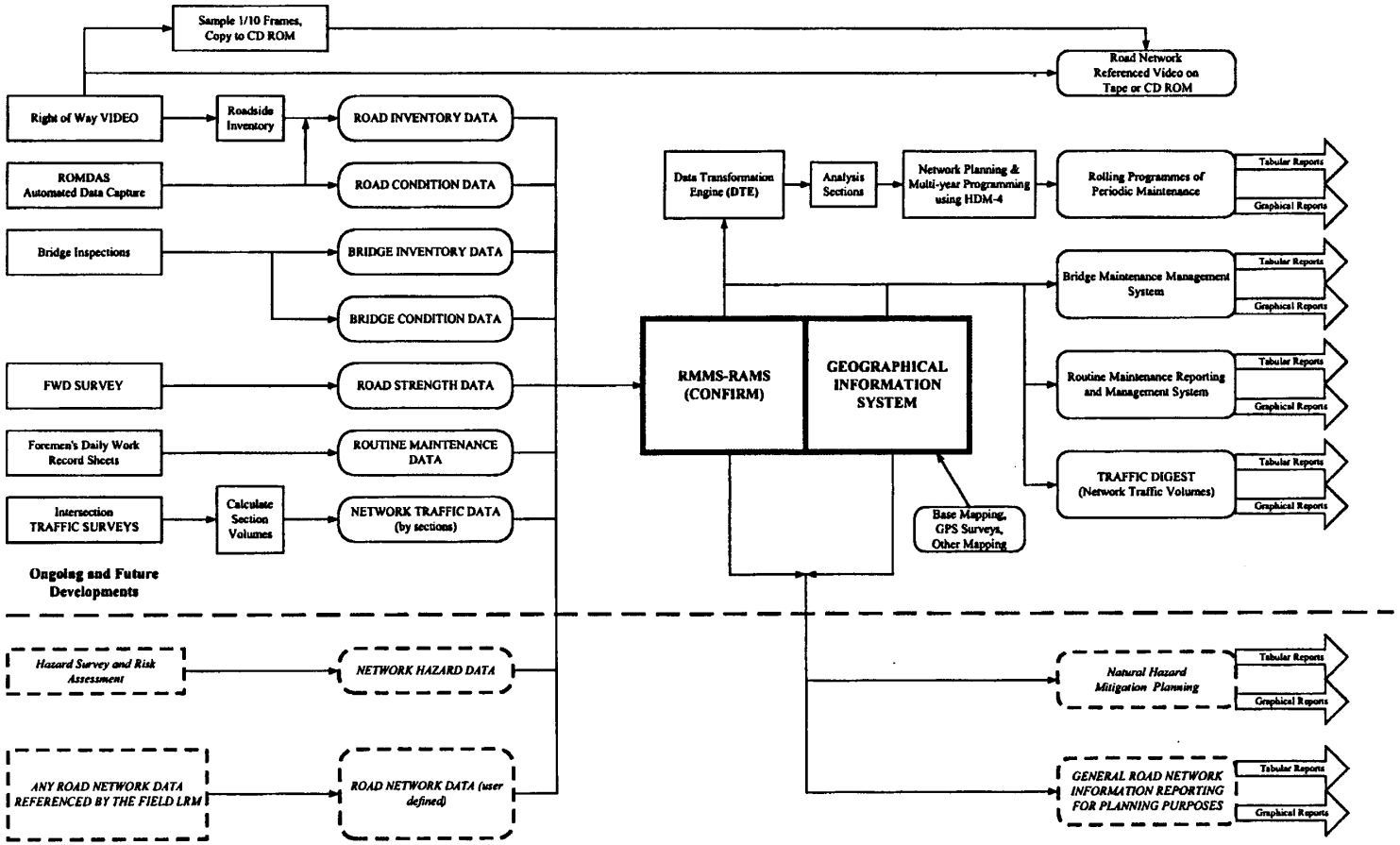
五、「紐西蘭 Fijis 橋之橋樑維修管理系統」

"A Bridge Maintenance Management System For FIJI"

紐西蘭勞工暨能源部於一九九九年三月至二零零一年五月間執行橋樑維修管理系統（BMMS, Bridge Maintenance Management System）該系統係在道路維修管理系統和道路資產管理系統（RMMS-RAMS, Road Maintenance Management System and Road Asset Management System）之下（請參考附圖二十），一個管理次系統，而 RMMS-RAMS 又以英國開發之 CONFIRM 資產管理軟體系統下運作。CONFIRM 資料庫儲存道路和橋樑各項資料、道路和橋樑狀況資料、交通資料以及道路和橋樑日常維修資料。

Fijis 橋因各橋樑構件於外在環境之作用下不堪長期使用，且部份構造物中某些區位，經應力分析顯示在標準值之下，紐西蘭當局為確保行車安全，並經由該國專業人員評估研判後，採取適當的補強與維修處理措施，雖然作了某些主構件替換與維修，惟小部份次構件無法配合拆除更換情況下繼續使用。

紐西蘭政府在橋樑安全以及長期維修管理問題上，以前較少注意既有系統的管理措施，以及借助橋樑檢測程序與監測系統適時提供預警，使管理人員在異常情況發生前，可依資料與結構行為做一立即反應與判讀，俾幫助釐清及增長橋樑結構物使用年限。



圖二十：***Schematic of RMMS-RAMS***

一九九九年紐西蘭政府為了確保該國橋樑安全，實施橋樑維護管理系統資料建檔及安全檢測工作，以 BMMS 管理程式分析 Fijis 橋樑及其附屬設施，蒐集項目計有：

- 混凝土橋樑板（Concrete Deck）。
- 鋼樑（Steel Beam）。
- 倒 T 型樑（Inverted T Beam）。
- 木製橋面板（Timber Deck）。
- 預力混凝土樑（PC Concrete Log Beam）。
- 倍力橋（Bailey）。
- 箱涵（Box Culvert）。
- 防波堤（Jetties）。

BMMS 管理系統使用先進方法蒐集每座橋樑數位影像，並運用 VISIO 繪圖軟體，繪製草圖，又於該圖中記錄關鍵性檢視結果（如附表五），如：河床沖刷深度等等。

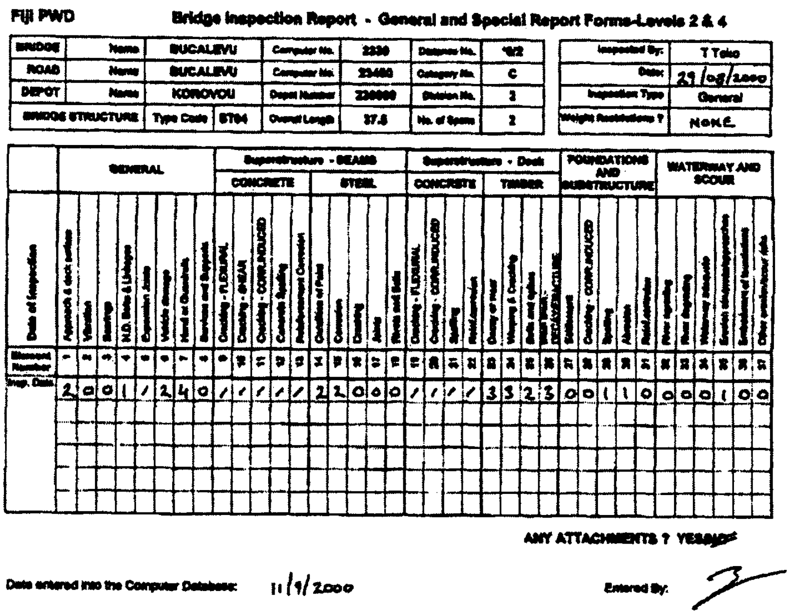
表五：*Multi-tiered Bridge Inspection Procedure*

	Inspection Type			
	Level 1 **Routine Inspections**	**Level 2** **General Inspections**	**Level 3** **Detailed Inspections**	**Level 4** **Special Inspections**
Interval	1 - 3 months	1 - 2 years	6 years	1 year
Inspection by	Depot Road Supervisors	Bridge Maintenance Engineer	Bridge Maintenance Engineer / Specialist Bridge Design Engineer as required	Bridge Maintenance Engineer
Inspection Procedure	The Routine Inspections identify any **obvious** defects and items requiring urgent attention such as: • vehicle impact damage • build-up of flood debris • adequacy & clarity of bridge signs & road markings • erosion to the bridge embankments, piles & abutments • bridge deck drainage • approach road & bridge deck surface • expansion joints	The General Inspections check for: • settlement of the approach roads • excessive vibration or deflection • beam support bearings & hold down bolts • damage to the handrails & kerbs • condition of the expansion joints • deck drainage and debris build-up • concrete cracking, spalling & reinforcement corrosion • steel beam paint condition & corrosion • bolted & riveted connections • timber plank wear, warping, cracking & decay • abutment settlement & cracking • waterway aggradation, degradation & debris build-up • erosion at abutments & piers • colour photographs of the bridge are taken	The Detailed Inspections consist of a **detailed visual** inspection at close quarters of **all** external surfaces and components above water level and where appropriate, all internal surfaces. • in waterways where abrasion or impact damage to the substructure is possible, underwater inspections or probing should be carried out; • inspection items listed for the General Inspections would be checked. • the use of temporary scaffolding, ladders, travelling platforms etc will be necessary; alternatively a mobile bridge inspection unit can be purchased or hired, (a truck mounted articulated hydraulic boom with inspection platform to carry one or two inspectors). • Includes taking detailed measurements for assessing the load ratings of each bridge	Special inspections are required for the following bridge structures or special circumstances: • bridges with load restrictions; • Bailey bridges; • large or complex bridge structures, such as the Sigatoka, Rewa and Ba River bridges, perhaps bridges which provide important access; • after an extreme events such as a cyclone, earthquake or flood; All the inspection items listed for the General Inspections would be checked.
Comments	The most basic level of inspection.	General Inspections may carried out at 2 yearly intervals. An **initial** round of yearly inspections was scheduled in light of the lack of inspections in recent years.	The requirement for **close quarter visual** inspections will significantly increase the costs for multi-span and high level bridges over waterways. These inspections are only required once every 6 years.	Special Inspections are basically General Inspections triggered by special conditions for bridges and structures with important access/safety considerations.

橋樑檢查種類計有：一般檢查、定期檢測、臨時檢測、追蹤調查以及特殊檢測。檢測目的係在儘早發現結構物之缺陷，可及時提出適當之維修養護措施，俾預防橋樑潰壞之發生及防範意外事故。一般檢查：清理橋樑排水溝異物、橋樑面版清掃、年度中橋樑檢查以及蒐集橋樑變化情況資料。

定期橋樑檢測：每年均需執行，以發掘橋樑老化、銹蝕、地質異動、設計標準不足需求、運輸量增加及施工品質等潛在之安全問題，且持續執行三年，直到橋樑構件材料均符合規定為原則。

一般檢查項目如附圖二十一。


Fiji PWD　Bridge Inspection Report - General and Special Report Forms-Levels 2 & 4

BRIDGE	Name	BUCALEVU	Computer No.	2230	Database No.	92
ROAD	Name	BUCALEVU	Computer No.	23480	Category No.	C
DEPOT	Name	KOROVOU	Depot Number	230000	Division No.	2
BRIDGE STRUCTURE	Type Code	ST04	Overall Length	37.5	No. of Spans	2

Inspected By:	T Toko
Date:	29/08/2000
Inspection Type	General
Weight Restrictions ?	NONE

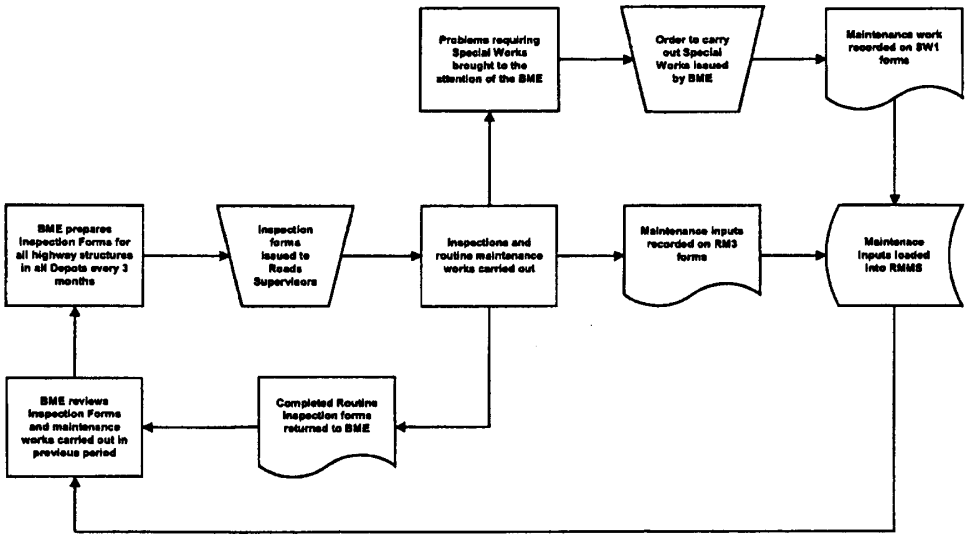
GENERAL | Superstructure - BEAMS (CONCRETE, STEEL) | Superstructure - Deck (CONCRETE, TIMBER) | FOUNDATIONS AND SUBSTRUCTURE | WATERWAY AND SCOUR

ANY ATTACHMENTS ? YES/NO

Date entered into the Computer Database: 11/9/2000　Entered By:

圖二十一：***General Inspection Form***

將各座橋樑維護保養資料予以分類整理，作有系統納入電腦資訊檔案，流程如附圖二十二。



圖二十二：***Routine Maintenance Process***

利用目視及各式儀器作橋樑檢測及評估，報告如附圖二十三。

Fiji PWD **Bridge Inspection Report-Routine-Level 1**

BRIDGE	Name	BUCALEVU		Computer No.	2330	Distance No.	'0/2
ROAD	Name	BUCALEVU		Computer No.	23400	Category No.	C
DEPOT	Name	KOROVOU	Number	230008	DIVISION	Central/Eastern	
STRUCTURE		Type Code	ST04	Overall Length	37.5	No. of Spans	2
Inspected By:	A Jitoko	Date:	8 / 3 / 2002				

Check List *Tick appropriate box below* ✓

Item No.	Item Description	Inspected no work required	Inspected minor work required	Inspected Special Inspection required
1	Approaches	✓		
2	Deck surface	✓		
3	Signs & road markings		✓	
4	Expansion joints	✓		
5	Vehicle damage			Guardrail damaged
6	Deck drainage & debris	✓		
7	Services	✓		
8	Abutment silt debris	✓		
9	Abutments/approaches scour	✓		
10	Other erosion/scour risks		✓	
11	Other defects			

Provide RMS Job No. for items which required minor work

Item No.	Job No.	Brief description of fault and repairs executed
1	10004506	Warning road signs cleaned
2	10004513	Palms cleared, jobs cleared
		Continue over if required

Inform the Bridge Maintenance Engineer a Special Inspection is required

Date	Person informed	Method (Telephone/Fax/Letter)
11/3/02	Tony Toko - BME	Fax.

Signed: Road Supervisor A. Jitoko

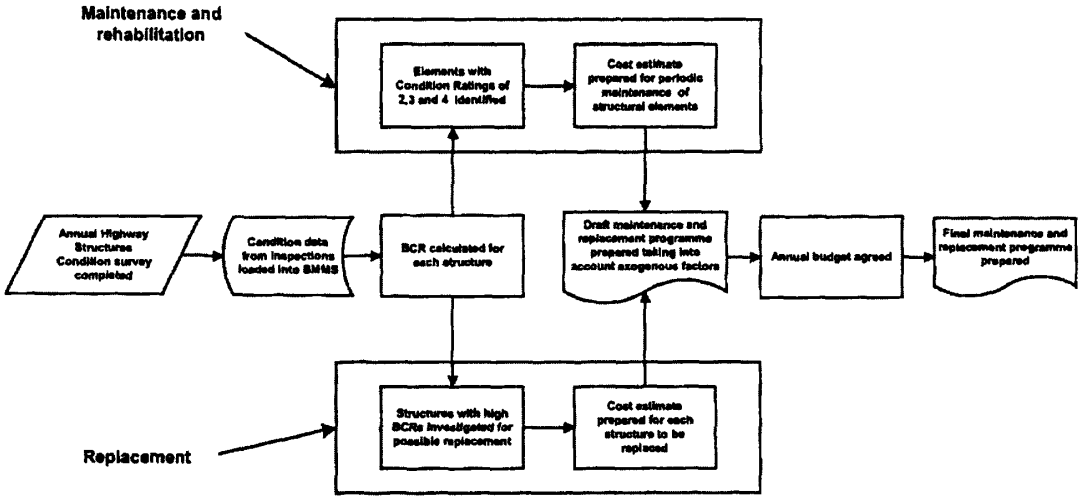
圖二十三：*Combined Routine Inspection and Maintenance Report*

一般維修管理系統與定期維修管理系統所蒐集各構件情況加以分級（如附表六）。本評等法將判定等級分成1～4級予以評等，但若「無此項目」或「無法檢測」或「無法判定」時，則以0予以記錄。對於構件維修的等級（G）為1時表示例行性維護即可；G值等於2時則表示1年內進行維護即可；G值等於3時，表示6個月內應進行維護；G值等於4時，表示需緊急維修處理。

表六：***Element Condition Grading Guide***

Element Condition Gradings	**Element Condition Description**
4	**Serious condition with severe damage. The element or component not functioning as designed. *Immediate attention required. Urgent Work Order generated.***
3	**Poor condition. The element or component shows numerous significant defects, which may soon prevent it from functioning as designed. *Attention required within 6 months. Work Order generated.***
2	**Below average. The element or component shows local defects but functions as designed. *Attention required within 12 months. Work order generated.***
1	**Fair condition. The element or component shows a few minor defects. *Non-urgent. Attention required within two years.***
0	**Good condition with no significant defects. *No time limit for action.***

定期維修程序：執行五年期之特殊檢測，利用電子儀器作橋樑耐震檢測及評估，對於橋樑構件、材質劣化、不適用材料等訂定維護計畫逐年替換補強，定期維修流程如附圖二十四。



圖二十四：***Periodic Maintenance Process***

近年來國內建設水準不斷提昇，惟用地取得日漸困難，新建橋樑工程遂逐漸朝向大跨度、機械化施工的方式發展，而且在設計理念、施工材料、施工技術、自動化系統化等皆有長足之進步；同時隨著各式先進橋樑施工技術與設計理念的不斷移入，先進國家研發之橋樑管理系統亦是本局未來施政將借鑑之重要項目之一。

國內橋樑檢測與維護管理體系，大致分成三個層級，總局、工程處以及工務段，個就執司，分工合作。總局負責系統開發，使用及後續軟硬體之維護以及網路管理；工程處擔負資料庫建置、資料傳輸方式與管理（資料庫伺服端與使用端之設立）；而工務段負責橋樑資料搜集、登錄以及建檔。

橋樑係有許多構件所組成，而各構材使用及維修情況良窳，關係到橋樑結構安全及交通維持。為維持國內橋樑的服務功能與結構安全，加強橋樑之維護與管理係為本局重要工作項目之一，且藉助於橋樑管理維護系統，針對不同橋樑，選用不同維護方針及系統架構，作更詳實分析維護與管理。再依據本局年度維修編列預算，針對整體性優選指標順序及急迫性，辦理發包、維修工作。

伍、 心得與建議

經實地參訪澳洲建設，並在會議中與各國主管、首長經驗意見交流，值得國內注意及有關心得如下：

一、 在國道路網、東西向濱海快速公路次第完成，臺灣地區道路運輸骨幹亦趨完整，在地狹人稠環境條件下，各項設施使用頻率高出許多外亦較依賴，各項設施如何維持營運情況下，研長壽齡提升功能度為努力課題，方能提供理想的設施服務能力。道路資源管理運用，將容量調配發揮極致，滿足用路人空間移動、時間掌握需求，藉此資訊、通訊影音技術，各國皆因時、地及用路人需求發展自己的解決問題的策略及做法的 ITS 系統，國內雖以起步，其步伐有待加快，硬體的維護與交通管理成效是相輔相成的。

二、 紐西蘭有橋樑維護管理系統故不足為奇，澳洲主要道路資訊系統之知識管理觀念導入，令人耳目一新亦值國內主管單位借鑑，如何將各項作業過程、成果、經驗經過系統化的蒐集、整理、分析、歸納成各單位營運智識（know how），再經有計畫累積、傳遞、回饋提升成為專家資料，利於作業決策，應是各單位努力目標之一，亦是因應組織人力大幅精簡，人員更迭趨勢，而仍需維持營運系統作業效率之道。

三、 大會永續發展目標的追求，亦意謂道路工程建設追求的境

界，不單就滿足以往強調環境保護訴求即可，而是希望做到與環境的和諧，工程開發資源利用須更深層思考、計畫，如何生生不息、源源不絕的發展運用，有待各主管單位、產業、學術共同開發努力。

四、 日本對於排水性瀝青混凝土鋪面使用增加甚速，台灣多雨炎熱之地區，採用排水性瀝青混凝土鋪面可收迅速排水功效，並增加車輛抗滑能力，減低噪音、改善雨天行車視線，提升行車安全功能。惟日本採行成功有其環境條件，遵守交通法規、行車秩序井然，卡車依規定載重，車身清潔落塵少，排水孔隙能長久維持等等。反觀國內，卡車超載時有所聞，落塵量大。推廣採用之前對超載、孔隙有效時間、瀝青效質劑價格等宜先評估清楚，擇定優先次序辦理。

陸、 附錄

Sunday, 18 May 2003

Delegates' Welcome

Registration Foyer **03:00 PM - 06:00 PM**

Delegates are invited to attend the Delegates Welcome at the Cairns Convention Centre between 3:00 and 6:00 p.m. Light refreshments will be available.

Monday, 19 May 2003

Registration & Welcoming Coffee

Registration Foyer **08:00 AM - 09:30 AM**

Tea & coffee stations to be situated around the foyer

Keynote Address

Keynote M1 HALL A & B **09:30 AM - 10:30 AM**

Chaired by Ian Johnston, President REAAA

Welcome by the Tradtional Owners
Keynote Speaker – Sir Ninian Stephen

Morning Tea - Monday

Outdoor Plaza **10:30 AM - 11:00 AM**

P1 Road Network Asset Management

Plenary P1 HALL A & B **11:00 AM - 12:30 PM**

Chaired by Neil Doyle, Queensland Department of Main Roads and Chairman, ARRB Transport Research

SPONSORED BY 6th International Conference on Managing Pavements

George George, Malaysian Highways Authority
Steve Golding, Queensland Department of Main Roads
Paul Forward, Roads and Traffic, News South Wales

Lunch - Monday

Outdoor Plaza **12:30 PM - 02:00 PM**

P2 Heavy Vehicle Safety Strategies in Australia and New Zealand

Plenary P2 HALL A & B **02:00 PM - 03:30 PM**

Chaired by Don Muir, Queensland Department of Main Roads

Stuart Hicks, National Road Transport Commission
David Wright, Land Transport Safety Authority, New Zealand
Ray Taylor, ARRB Transport Research

Afternoon Tea - Monday

Outdoor Plaza **03:30 PM - 04:00 PM**

P3 Heavy Vehicle & Infrastructure

Plenary P3 HALL A & B **04:00 PM - 05:30 PM**

Chaired by Ulf Fraser, Roads & Traffic Authority and
Director, ARRB Transport Research

Fiona Calvert, National Road Transport Commission
Ian Reeves, Queensland Department of Main Roads
Kieran Sharp, ARRB Transport Research
Peter Leyden, National Road Transport Commission

P4 Sustainability in Transport

Plenary P4 HALL D **04:00 PM - 05:30 PM**

Chaired by Tony Slatyer, Department of Transport & Regional Services and
Director, ARRB Transport Research

Ray Brindle, Consultant
Neil Houghton, ARRB Transport Research
Kathleen Mackie, Environment Australia

Happy Hour

Outdoor Plaza **05:30 PM - 06:30 PM**

Tuesday, 20 May 2003

Welcoming Coffee & Tea -Tuesday

Registration Foyer **08:30 AM - 09:00 AM**

Opening Ceremony

Ceremony T1 HALL A & B **09:00 AM - 10:30 AM**

Chaired by Neil Doyle, Queensland Departemtn of Main Roads and Chairman, ARRB Transport Research

The Hon Steve Bredhauer, Queensland Minister for Transport and Minister for Main Roads
Dato Samy Vely, Malaysian Minister for Transport
Presentation of Katahira Awards

Morning Tea - Tuesday

Outdoor Plaza **10:30 AM - 11:00 AM**

P5 Regional Forum

Plenary P5 HALL A & B **11:00 AM - 12:30 PM**

Chaired by David Anderson, VicRoads

Dinesh Mohan, Indian Institute of Technology Delhi
Charles Melhuish, Asian Development Bank
Bill Paterson, World Bank
REAAA Website Launch - David Anderson, REAAA Council

Lunch - Tuesday

Outdoor Plaza **12:30 PM - 02:00 PM**

S1 Predicting Crashes & Developing Countermeasures

Session.S1 Room 2 **02:00 PM - 03:30 PM**

Chaired by John Cunningham, VicRoads
(Presenters have been allocated 15 minutes each for this session)

New Zealand Accident Prediction Models and their Applications - PEER REVIEWED
Shane Turner, Paul Durdin, Ian Bone and Mike Jackett

Development of a Crash Prediction Model for Rural Roads in NSW
Bert Prinsloo and Chris Goudanas

Development of Road Assessment Protocols
Peter Daly, John Metcalfe and John McLean

GIS for Traffic Accident Application in Universiti Putra Malaysia
Lim Yu Liang, Law Teik Hua and Dadang Mohamad Ma'some

Towards a Countermeasure Device to Detect Fatigue in Drivers - PEER REVIEWED
Saroj Lal and Ashley Craig

S2 Pavement Modelling

Session S2 HALL D **02:00 PM - 03:30 PM**

Chaired by Bob Hogarth, Director, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

Modelling Unpaved Sandy Roads on Fraser Island
G. Nord, A Goonetilleke, K. Wake-Dyster and N. Gurung

Validation of Three Dimensional Nonlinear Finite Element Model Using Canterbury Accelerated Pavement Test Track (CAPTIF) - PEER REVIEWED
Mofreh Saleh and Bruce Steven

A Design Chart for the Design of Flexible Pavements Based on Finite Elements
B. C. Bodhinayake and Muhammad Hadi

Using a Shakedown Approach as a Simple Means of Predicting Rutting in Unsealed and Chip-Sealed Pavements
Andrew Dawson, Greg Arnold, Sabine Werkmeister, David Hughes and Des Robinson

Risk Management of Highway Embankments Constructed over Soft Ground
Jeff Hsi

S3 Traffic Modelling I

Session S3 Room 1 **02:00 PM - 03:30 PM**

Chaired by William Young, Monash University
(Presenters have been allocated 20 minutes each for this session)

Microsimulation Modelling of Traffic Flow on Two-way Two-lane Rural Roads: Past, Present and Future - PEER REVIEWED
John C Fry, Michael AP Taylor and Jeremy E Woolley

Scenario Analysis: A Simulation-Based Tool for Regional Strategic Traffic Management
Jaime Barcelo, David Garcia and Heribert Kirschfink

An Introduction of Microsimulation Software in Australia - PEER REVIEWED
Rod Tudge, Gareth Millar and Christopher Wilson

S4 Asphalt Mix Design

Session S4 HALL A & B **02:00 PM - 03:30 PM**

Chaired by John Bethune, Australian Asphalt Pavement Association
(Presenters have been allocated 15 minutes each for this session)

Laboratory Fatigue Studies on Bituminous Concrete Mixes Utilising Waste Shredded Plastic
PEER REVIEWED
VS Punith and A Veeraragavan

Fatigue Characterisation of Asphalt Concrete using the Dissipated Energy Approach
Mansour Fakhri and Brian Shackel

Fatigue Testing of Asphalt to Improve the Discrimination of Moisture Sensitivity in Aggregate and Bitumen Systems
Ian Rickards and Tom Gabrawy

The Use of Gyratory Compaction for Asphalt Mix Design in Australia
John Oliver

Creep and Fatigue Performance of Polymer Modified and Fibre Reinforced Bituminous Mixtures
Madzlan Napiah and Ibrahim Kamaruddin

S5 Intelligent Transport Systems I

Session S5 Room 3 & 4 **02:00 PM - 03:30 PM**

Chaired by Edward Chung, University of Tokyo
(Presenters have been allocated 20 minutes each for this session)

Examination of the Variation of Value of Travel Time Saving
Mei-Lan Jiang and Takayuki Morikawa

The Relationship between Car and Bus Travel Times
MG Smith and Tai Tuck Leong

Melbourne's Variable Speed Limit System
Darryn Paterson

Development of a Predictive Travel Time Model for Singapore Based on GLIDES - PEER REVIEWED
Charles Karl, Trevor Powell and James Luk

W1 Road Management Systems and Local Roads - the Way Forward

Workshop W1 Room 5 & 6 **02:00 PM - 03:30 PM**

Afternoon Tea - Tuesday

Outdoor Plaza **03:30 PM - 04:00 PM**

S6 Cycling Solutions

Session S6 Room 1 **04:00 PM - 05:30 PM**

Chaired by Allan Richmond, Queensland Department of Main Roads
(Presenters have been allocated 15 minutes each for this session)

Integrating Cycleways into a Challenging Cityscape
Noel Nancekivell and Coralie McDonald

Forecasting Demand for Bicycle Facilities
Rod Katz

User Acceptability as the Basis for Performance-based Specifications for a Major Cycling Facility
Peter Cairney

Riding on the Edge : An Experience of Engineering for Cyclists in Adelaide
Fay Patterson and Philip Hewitt

Low Cost Infrastructure Solutions for Bicycle Safety - PEER REVIEWED
Lal Wadhwa

S7 Pavement Drainage

Session S7 Room 2 **04:00 PM - 05:30 PM**

Chaired by Lindsay Enright, Local Government Association of QLD
(Presenters have been allocated 25 minutes each for this session)

Accelerated Trafficking Tests of Concrete Flag Paving
Brian Shackel and Richard Yeo

The Performance of Pavement over Flexible Pipes
Peter Nixey, Paul Robinson and Bruce Clayton

Permeable Concrete Eco-Paving as Best Management Practice in Australian Urban Road Engineering
Brian Shackel and Alan Pearson

S8 Knowledge Policy & Partnerships

Session S8 HALL A & B **04:00 PM - 05:30 PM**

Chaired by Brian Hickman, Director, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

Balancing the Forces : Building Infrastructure through Partnerships
Peter Dutaillis

Knowledge Flows in Road Industry Development - Queensland's Experience
Karen Manley and Steve McFallan

Promoting the Sustainability of Rural Transport Infrastructure - PEER REVIEWED
Kate Czuczman

Applying Knowledge Management Principles for Implementing a Road Information System at Main Roads Western Australia
Florentina Mihai and John Robertson

Transport Infrastructure Public Private Partnerships (PPPs) in the Queensland Context
Neil Doyle and Ken Beattie

S9 Network Data Collection

Session S9 HALL D **04:00 PM - 05:30 PM**

Chaired by David Atkinson, Queensland Department of Main Roads
(Presenters have been allocated 15 minutes each for this session)

Collecting Data Using a High-Speed Road Surface Measurement Vehicle
Shinzo Kanehira, Nobunori Koda, Terutake Kijima and Tatsuya Koizumi

The Data Mining of New Zealand Highway Condition Data, by Data Preprocessing and Search for Association Rules
Ewan Hunter

How to Make Your Road Network Operate Beter: The Importance of Traditional Approaches
Bob Peters

Verification and Repeatability of Pavement Condition Data Collected in Western Australia
Wesley Soet, Florentina Mihai and Robert Barnsley

Ride Quality Specifications - Smoothing Out Pavements
Richard Wix

W2 Asset Sust Threats Challenges & Options for Flexible Pavemts

Workshop W2 Room 3 & 4 **04:00 PM - 05:30 PM**

W3 Quantifying the Benefits of Road Investment

Workshop W3 Room 5 & 6 **04:00 PM - 05:30 PM**

CONFERENCE DINNER

HALL 2 - Dinner **06:30 PM - 10:30 PM**

Hosted by Gerard Waldron, ARRB Transport Research
Sponsored by Cement & Concrete Association of Australia. Presentation of 'Public Domain' awards.

Wednesday, 21 May 2003

Welcoming Coffee & Tea - Wednesday

Registration Foyer — **08:30 AM - 09:00 AM**

P6 Sustainable Solutions to Road Safety Problems

Plenary P6 HALL A & B — **09:00 AM - 10:30 AM**

Chaired by Joe Motha, Australian Transport Safety Bureau

Masaki Koshi, Japan
Mary Sheehan, Queensland University of Technology
Peter Croft, Land Transport Safety Authority, New Zealand
Lori Mooren, Consultant

W4 Road Network Asset Management

Workshop W4 Room 2 — **09:00 AM - 10:30 AM**

W5 Assessment of Pavement Stabilisation

Workshop W5 Room 5 & 6 — **09:00 AM - 10:30 AM**

Morning Tea - Wednesday

Outdoor Plaza — **10:30 AM - 11:00 AM**

S10 Heavy Vehicles

Session S10 Room 2 — **11:00 AM - 12:30 PM**

Chaired by Fiona Calvert, Main Roads Western Australia
(Presenters have been allocated 15 minutes each for this session)

Transit New Zealand's Truck Ride Improvement Initiative
Mark Owen, Peter Cenek and Neil Jamieson

Dynamic Modelling and Simulation of a Heavy Vehicle Trailing Arm Air Suspension
Bohao Li and Arnold G. McLean

Heavy Vehicle Control System in Abu Dhabi Emirate
Khaled J. El-Qutob and Ahmad M. Sharif

Evaluation of Tracking Ability of Multi-Combination Vehicles - PEER REVIEWED
Sandra Lennie, Mandy Haldane and Jonathon Bunker

Heavy Vehicle Compliance with Speed and Mass Limits : Evidence from Weigh-in-Motion Devices
Rod George

S11 Advances in Asphalt

Session S11 HALL A & B **11:00 AM - 12:30 PM**

Chaired by John Oliver, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

Stone Mastic Asphalt - a Decade of Australian Experience
John Rebbechi, David Mangan, Marissa Nicolls and John Bethune

Deformation Resistance of Victorian Asphalt Mixes - PEER REVIEWED
Ross Paul

The 'Original' Stone Mastic Asphalt : "The German Experience"
Michael Kreide, Mick Budija and Jim Carswell

Aging and Rheological Properties of Carbon Black Modified Asphalt Binders
Iwao Sasaki, Katsuyuki Yamaguchi and Seishi Meiarashi

Viscosity in High Performance Binders and it's Contribution to Asphalt Deformation Control
Peter Tredrea

S12 Planning for Sustainability

Session S12 Room 1 **11:00 AM - 12:30 PM**

Chaired by Trudi Meakins, Department of Transport & Regional Services
(Presenters have been allocated 10 minutes for this session)

Valuing Environmental Externalities
Dimitris Tsolakis and Neil Houghton

Getting It Right the First Time - Main Roads Byerstown Range Project in Far North Queensland
Michael J Frankcombe

Objective-based Assessment of Environmental Effects of New Road Projects in Victoria
Clive Mottram

Strategies for Sustainable Roads
Tom D Wilmot and Stuart D Wilmot

Evaluation of Alternative Alignments for an Expressway Corridor Based on the Concept of 'Sustainability'. - PEER REVIEWED
Swati Agrawal and P K Sarkar

Planning for Sustainability - Experience of the Ipswich Motorway Project
Doug Robinson and Des Low

S13 Concrete and Structures I

Session S13 Room 4 **11:00 AM - 12:30 PM**

Chaired by Ahmad Shayan, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

Recent Development of Composite Structures for Expressway Bridges in Japan
Kazuaki Yokoyama and Keiichi Aoki

An Investigation into Debonding of FRP in Flexural Strengthening
H. B. Pham and R. Al-Mahaid

Fatigue Cracking in Steel Bridge Piers and Orthotropic Steel Decks of Tokyo Metropolitan Expressway
Yasuaki Hirabayashi, Takuyo Konishi, Fumitaka Machida, Hideo Tokida and Tetsuhiro Shimozato

Fatigue Test of Concrete Decks Reinforced With Carbon Fiber Sheets - PEER REVIEWED
Masasumi Okada, Hiroshi Kojima, Daisuke Miyama, Shigeyuki Matsui, Hiroshi Onishi and Akira Kobayashi

Permanent Ground Anchor System Adopted in Urban Highway Structure in Metro Manila
Takashi Okumura

S14 Intelligent Transport Systems II

Session S14 Room 3 **11:00 AM - 12:30 PM**

Chaired by James Luk, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

A Case Study from the Introduction of Electronic Tolling
Mark Le Pla

Intelligent Transport Systems Evaluation : From Theory to Practice
Raechelle Newman-Askins, Luis Ferreira and Jonathan Bunker

Modelling Congestion - Refinement of the HDM-4 Model
Ian Greenwood, Roger Dunn and Robert Raine

A Travel Time Prediction Method Based on Pattern Matching Technique - PEER REVIEWED
Shamas ul Islam Bajwa, Edward Chung and Masao Kuwahara

S15 Granular Pavements

Session S15 HALL D **11:00 AM - 12:30 PM**

Chaired by Steve Brown, VicRoads
(Presenters have been allocated 15 minutes each for this session)

Design and Assessment of Unsurfaced and Aggregate-Surfaced Roadways in the US Army Corps of Engineers - PEER REVIEWED
Reed Freeman, Travis Mann and Carlos Gonzalez

Tropical Pavement Materials
Raymond S Rollings, Marian P Rollings and Kieran G Sharp

Improving Road Quality and User Satisfaction while Lowering Road Maintenance Costs by using Opti-Grade
Steve Mercier, Mark Brown, Yves Provencher, and Robert A Douglas

Design Concept of Unbound Granular Layers in Pavement Construction - PEER REVIEWED
Sabine Werkmeister, Andrew R Dawson and Frohmut Wellner

Paving Low Volume Roads with Weathered Volcanic Rocks : From APT to Practice
Washington Peres Nunez, Jorge Augusto Ceratti, Gilnei Pestano Arnold, Jose Augusto de Oliveira and Joel Silveira

W6 Triple-Bottom Line Performance

Workshop W6 Room 5 & 6 **11:00 AM - 12:30 PM**

Lunch - Wednesday

Outdoor Plaza **12:30 PM - 02:00 PM**

S16 Road Geometry

Session S16 Room 3 **02:00 PM - 03:30 PM**

Chaired by Bruce Ollason, Queensland Department of Main Roads
(Presenters have been allocated 15 minutes each for this session)

US Experience with Centerline Rumble Strips on Two-Lane Roads
Eugene Russell, Margaret Rys and Troy Brin

Effect of Roadside Obstruction on Speed and Placement of Vehicles on Two Lane Roads
Satish Chandra

Public Perception of Rest Areas in Victoria
Thanuja Gunatillake and Peter Daly

Reduced Sight Distance on Existing Roads, What Can We Defend?
Ricky Cox

The Economic Viability of Producing Geometric Design for Trucks
John Cunningham and John McLean

S17 Stabilisation I

Session S21 HALL D **02:00 PM - 03:30 PM**

Chaired by Tom Wilmot, Stabilised Pavement Group
Sponosred by Stabilised Pavement Group
(Presenters have been allocated 15 minutes each for this session)

Mechanical Stabilisation of Unpaved Sand Roads on Fraser Island - PEER REVIEWED
Kevin Wake-Dyster, Andreas Nataatmadja and Ashantha Goonetilleke

Detailed Investigation of the Performance of GB Cements in Pavement Stabilisation Works
Warren Smith and Bruce Hansen

Performance of Bitumen Treated Bases
Mark Dykman, J.M Ramanujam and A. Nataatmadja

The Development of a Research Protocol and Fit-for-Purpose Certification for Road Additives - PEER REVIEWED
Dave Jones

Engineering Behaviour of Rice Husk Ash Blended Soil and its Potential for Road Base Construction
Agus Setyo Muntohar

S18 Sustainable Transport

Session S18 Room 1 **02:00 PM - 03:30 PM**

Chaired by Greg Steele, Parsons Brinckerhoff Australia
Sponosred by Parsons Brinckerhoff Australia
(Presenters have been allocated 15 minutes each for this session)

Ishtar Project : Building a Model Suite for Urban Sustainability
Emanuele Negrenti

A Brief History of the Future of Sustainable Transport
Mike Shackleton and Neil Houghton

Integrated Appraisal for Transport - Delivering Sustainability?
Chris Fry and Paul Tomlinson

Sustainable Transport Initiatives and Barriers to Implementing Them: A Comparison of Oxford, UK and Fremantle, Western Australia - PEER REVIEWED
Carey Curtis and David Nicholson

Using Scenarios in Regional Transport Planning
Johan Louw and Michael Mailloux

S19 Safe Road Surfaces

Session S19 Room 2 **02:00 PM - 03:30 PM**

Chaired by Ron Gordon, Queensland Department of Main Roads
(Presenters have been allocated 15 minutes each for this session)

Towards a Wet-Night Visibility Requirement for Roadmarkings
Alister Harlow

Treatment of Black Ice on a Major Freeway - PEER REVIEWED
Andrew White, Richard Warwick and John Baldock

Six Years of Calcined Bauxite
Ken Hudson and Peter Mumm

Cost-Effective Performance-Driven Improved Safety Benefits from Horizontal Painted Pavement Marking Systems
Bob Carnaby

Performance Based Strategic Management of Pavement Marking - Better Delineation at a Lower Cost
Dennis Richards

S20 Traffic Modelling II

Session S20 Room 4 **02:00 PM - 03:30 PM**

Chaired by Poitr Olszewski, Nanyang Technological University
(Presenters have been allocated 15 minutes each for this session)

Developing Lane and Non-Lane Changing Models in Urban Areas
Amiruddin Ismail, Kasmiran Jumari and Ahmad Farhan Mohd. Sadullah

Evaluating Queuing Characteristics of an Interstate Bus Terminus, Kashmere Gate
D Mukhopadhyay and S. Gangopadhyay

Modelling of Delay Induced by Downstream Traffic Disturbances at Signalised Intersections - PEER REVIEWED
Kamran Ahmed and Ghassan Abu-Lebdeh

Saturation Flow Characteristics at Signalised Junctions
Mashkur Ahmad, Sewa Ram, P K Sarkar

The Efficient Design of Traffic and Parking Systems in Multi-Storey Parking Facilities - PEER
Yan Weng Tan and William Young

S21 HDM Applications

Session S21 HALL A & B **02:00 PM - 03:30 PM**

Chaired by Bruce Van Every, VicRoads
(Presenters have been allocated 15 minutes each for this session)

Pavement Deterioration Modelling in Long Term Performance Based Contracts: How Far does it Mitigate the Risk for Client and Contractor? - PEER REVIEWED
Chris Parkman, John Hallett, Theuns Henning and Mike Tapper

Calibration of HDM-4 Bituminous Road Deterioration Models for Indian Conditions - PEER REVIEWED
Sanjiv Aggarwal, SS Jain and M Parida conditions.

The Use of Pavement Deterioration Models in Pavement Design
John Patrick and Rosslyn Bailey

The Economic Effectiveness of Maintenance Treatments in Urban Areas - PEER REVIEWED
John Cox and Jamie Favaloro

Asset Management System : RHD Perspective
Nurul Huda and Jalaluddin Al-Quaderi

W7 Freight & Logistics

Workshop W7 Room 5 & 6 **02:00 PM - 03:30 PM**

Afternoon Tea - Wednesday

Outdoor Plaza **03:30 PM - 04:00 PM**

S22 Traffic Engineering

Session S22 Room 4 **04:00 PM - 05:30 PM**

Chaired by Roger Dunn, The University of Auckland
(Presenters have been allocated 10 minutes for this session)

Hj Zakaria Bin Ahmad and Mohd Yusof Bin Abdul Rahanan
Traffic Calming Approaches to Road Safety

Roundabout Growth in the USA: Studies in Kansas
Eugene Russell, Margaret Rys and Greg Luttrell

Evaluation of Alternatives for Planning of Bridge Approaches - PEER REVIEWED
Syed Aqeel Ahmad and P K Sarkar

Win-win Outcomes for Pedestrians and Drivers by Optimising Traffic Signal Timing - PEER REVIEWED
John Catchpole

Recent Experiences, Successes and Failures with Local Area Traffic Management in Australasia
Peter Damen

Expressway Safety and Services for Sustainable Expressway Future
Ismail Md Salleh, Azmee Nin and Awariah Idris

S23 Transport Policy

Session S23 HALL D **04:00 PM - 05:30 PM**

Chaired by Clive Mottram, VicRoads
(Presenters have been allocated 15 minutes each for this session)

Analysing Telecommuting as an Urban Transport Policy for Developing Countries
Dilum Dissanayake and Takayuki Morikawa

Regional Transport Infrastructure Co-ordination - Roads 2020 to Transport 2025
Debbie Terelinck

Freight Transport in Singapore - Current Status and Future Research
Poitr Olszewski, Yiik-Diew Wong and James Luk

Myths and Realities in Walkable Catchments: The Case of Walking and Transit - PEER REVIEWED
Ian Ker and Simon Ginn

East Coast Passenger Travel to 2050
David Gargett and Quentin Reynolds

S24 Stabilisation II

Session S24 Room 2 **04:00 PM - 05:30 PM**

Chaired by Richard Yeo, ARRB Transport Research
Sponosred by Stabilised Pavements Group
(Presenters have been allocated 10 minutes each for this session)

Variablity in Unconfined Compression Strength of Pavement Materials Stabilised with Cementitious Binders - PEER REVIEWED
Greg White and Carthigesu T (Rajah) Gnanendran

Sand-Clay Pindan Material in Pavements as a Structural Layer
Stephen Emery, Michael Caplehorn and Stuart Masterton

Laboratory Assessment of Capillary Rise in Stabilised Pavement Materials - PEER REVIEWED
Jayantha Kodikara, Kok Yun Lee and Srijib Chakrabarti

Effects of Additives on Soft Clay Behaviour
A S Balasubramaniam, Kamal Uddin, K Sanmugarasa, Y-H. Lee, Y-N. Oh, Netra Gurung and D T Bergado

Recycled Aggregate for Pavement Construction and the Influence of Stabilisation - PEER REVIEWED
Carthigesu T (Rajah) Gnanendran and Louise J Woodburn

Influence of Reactive Fine-Grained Soil on Stabilisation of Basaltic Crushed Rock - PEER REVIEWED
Jayantha Kodikara & Srijib Chakrabarti

S25 Traffic Noise

Session S25 Room 3 **04:00 PM - 05:30 PM**

Chaired by Jill Earnshaw, VicRoads
(Presenters have been allocated 15 minutes each for this session)

Decreasing Noise with Twin Layered Porous Asphalt Pavement
Masaya Tsukamoto, Takashi Matsumura and Hisao Ishii

A Novel Technique of Allowing for the Effects of Pavement Surface Type in the Prediction of Road Traffic Noise - PEER REVIEWED
Stephen Samuels and Jeffrey Pamell

Effects of Road Texture on Traffic Noise and Annoyance at Urban Driving Speeds
Vince Dravitzki and CWB (Bill) Wood

Alternative Modelling Approaches for Urban Traffic Noise - PEER REVIEWED
M Parida, SS Jain and Namita Mittal

Community Response to Changes in Noise from Resurfaced Roads
Darren Walton and Vince Dravitzki

S26 Local Roads

Session S26 Room 1 **04:00 PM - 05:30 PM**
Chaired by Suzannah Barnes-Gillard, Institute of Public Works Engineering Australia
(Presenters have been allocated 15 minutes each for this session)

Strategic Pavement Management - The Corangamite Shire Experience
Paul Samaratunge and Ashay Prabhu

The Queensland Asset Management Partnership - PEER REVIEWED
Simone Talbot and Alex Pelevin

Cairns Foreshore Redevelopment
John Hawkes

The Role of Digital Imaging in Road Asset Management - a Blue Mountain City Council Experience - PEER REVIEWED
Ian Thomson and Dominic O'Brien

Development of a Roughometer for Unsealed Roads
George Giummarra and Roland Leschinski

W9 Rural and Remote Road Safety

Workshop W9 Room 5 & 6 **04:00 PM - 05:30 PM**

ARRB/REAAA Cocktail Party

Hilton Cairns **05:30 PM - 07:00 PM**
The Mayor, Councillor Kevin Byrne, to welcome Delegates to Cocktail Party and Cairns.

Thursday, 22 May 2003

Welcoming Coffee & Tea - Thursday

Outdoor Plaza **08:30 AM - 09:00 AM**

P7 Intelligent Transport Systems

Plenary P7 HALL A & B **09:00 AM - 10:30 AM**

Chaired by Peter Balfe, VicRoads and Director, ARRB Transport Research

Chris Koniditsiotis, Austroads
James Luk, ARRB Transport Research
Kian Keong Chin, Land Transport Authority, Singapore
David Bennett, ARRB Transport Research

S27 Bridge Management

Session S27 Room 2 **09:00 AM - 10:30 AM**

Chaired by Garry Clotz, ARRB Transport Research
(Presenters have been allocated 20 minutes for this session)

Project Evaluation Method of the Study on Improvement of Roads in the Southern Region in Lao
Kunio Yasui, Sommad Pholsena, Rinko Jogo and Masami Fukuda

Evaluation of Bridge Coating Life for the Development of an Expressway Asset Management System
Taku Okamoto, Kazuhisa Hadano and Ryuushi Kubo

A Bridge Maintenance Management System for Fiji
Christopher J Tolley

The Implementation of a Bridge Management System to Ensure the Sustainability of Bridge Infrastructure in the Philippines
Linda S. Templo, Luz Lagunzad, Malcolm Pound and Peter Knee

W10 Austroads Pavement Design Guide

Workshop W10 Room 5 & 6 **09:00 AM - 10:30 AM**

Morning Tea - Thursday

Outdoor Plaza **10:30 AM - 11:00 AM**

S28 Roadside Hazards

Session S28 Room 1 **11:00 AM - 12:30 PM**

Chaired by Rob McInerney, ARRB Transport Research
Sponsored by Land Transport Safety Authority, New Zealand
(Presenters have been allocated 15 minutes each for this session)

Fatal and Injury Crashes Resulting from Roadside Hazards
Pichai Taneerananon and Weeradej Cheewapattananuwong

Initiatives Arising from the Road Safety Audits of Expressways Program in Singapore
Neal Cooke, Canute Nicholapillai, Ho Seng Tim and David K. Wanty

Development of a Buffer Fence to Protect Cars from Direct Collisions with Supports
Kazuhiko Ando and Nozomu Mori

An Analysis of Crashes Involving Median Encroachments on High-Speed Roads - PEER REVIEWED
Bruce Corben, Anna Tingvall, Michael Fitzharris, Stuart Newstead and Ian Johnston

Revision of the Austroads Crash Barriers Guidelines
Philip Roper, Fiona Green, Michael Tziotis and Gary Veith

S29 Performance Specifications

Session S29 HALL A & B **11:00 AM - 12:30 PM**

Chaired by Ian Reeves, Queensland Department of Main Roads
(Presenters have been allocated 20 minutes each for this session)

The Hybrid Performance Based Pavement Management Strategy
Travis Gilbertson

Underestimating Project Costs : Error or Culture? - A Queensland Department of Main Roads
Derek Skinner and John Worrall

New Zealand's Performance-Based Pavement Design and Construction Specifications: Case Studies
Bryan Pidwerbesky, David Alabaster and Jules Fulton

Performance Specifications and Contracts : The State of the Art
Allan Armistead

S30 Transport Planning

Session S30 Room 3 **11:00 AM - 12:30 PM**

Chaired by Peter Damen, ARRB Transport Research
(Presenters have been allocated 15 minutes for this session)

Jakarta Mass Rapid Transit Project : An Economic Review - PEER REVIEWED
Wimpy Santosa and Tri Basuki

Integrated Transport Planning - The Dreams and Realities: A Regional City Perspective from Bunbury
Anthony Brun and Peter Johnstone

Tourism Themed Routes
Noel Dwyer

Monte Carlo Simulation of Household Travel Survey Data with Bayesian Updating - PEER REVIEWED
Peter Stopher and Graham Pointer

Planning for the Upgrade of the Kuranda Range Road – The Integrated Transport Study and the Use of Advanced Technology to overcome alignment difficulties
Paul Jones

S31 Concrete & Structures II

Session S31 Room 4 **11:00 AM - 12:30 PM**

Chaired by Scott Matthews, Cement & Concrete Association of Australia
(Presenters have been allocated 25 minutes each for this session)

Condition Assessment Of St Kilda Street Bridge Over Elwood Canal, Its Load Capacity And Maintenance Strategy
Ahmad Shayan, Aimin Xu, George Giummarra, Riadh Almahidi and Fred Andrews-Phaedonos

Evolution of Bridge, Flyover and Viaduct Construction Methodologies in Urbanised Singapore
Chong Teik Lim, Lim Ee Lee, Yap Boon Leong and Yap Cheng Chwee

Assessment of the Effects of Underground Structures on Groundwater Flow, and Corrective Measures.
Takeichi Sekiguchi and Yasuo Hozaki

S32 Pavement Design

Session S32 HALL D **11:00 AM - 12:30 PM**

Chaired by Ralph Haas, University of Waterloo
(Presenters have been allocated 15 minutes each for this session)

A New Approach to Pavement Design Using Lime Stabilised Subgrades
George Vorobieff and Greg Murphy

Development of a Subgrade Failure Criterion Using Accelerated Pavement Testing
Vincent Janoo and Edel Cortez

The Influence of Pavement Temperatures on Predicted Pavement Performance - PEER REVIEWED
Janet Jackson, Ross Peploe and John Vercoe

Equivalent Load for a Quad Axle
Binh Vuong and Geoff Jameson

Current Issues for Mechanistic Pavement Design
Leigh Wardle, Geoff Youdale and Bruce Rodway

S33 Environmental Civil Engineering

Session S33 Room 2 **11:00 AM - 12:30 PM**

Chaired by Carrick Stokoe, Queensland Department of Main Roads
(Presenters have been allocated 25 minutes each for this session)

Monitoring Road Reserves for Sustainability - PEER REVIEWED
Steve Fox and Rhonda Baldock tool for those endeavouring to achieve sustainability.

Fauna Sensitive Road Design - PEER REVIEWED
Norman Scott

Dilemma of Constructing Forest Roads in Gorontalo : Should We Stop the Development for the Sake of Sustainability?
IGW Samsi Gunarta and Amirudin Tumulo

W11 Mining Industry Seminar

Workshop W11 HALL C **11:00 AM - 05:30 PM**

W12 ITS in Rural and Remote Areas

Workshop W12 Room 5 & 6 **11:00 AM - 12:30 PM**

Lunch - Thursday

Outdoor Plaza **12:30 PM - 02:00 PM**

S34 Safety of Road Users

Session S34 Room 1 **02:00 PM - 03:30 PM**

Chaired by Peter Croft, Land Transport Safety Authority
(Presenters have been allocated 15 minutes each for this session)

The Challenges of Managing Traffic During Construction for the One-Way System Maarof - Semantan Interchange of Western Kuala Lumpur Traffic Dispersal Scheme Project
Shukor Mohamed and Yeoh Hin Kok

An Investigation of Seat Belt and Mobile Use Impacts in Youth Road Accidents in Kuwait
Mahmood Al-Bustan and Parviz A Koushki

The Safety of Small Workgroups on or Near the Roadway - PEER REVIEWED
Narelle Haworth, Mark Symmons and Christine Mulvihill

Transport Research Among Non-Driving Older People
Anne Harris

Drug Driving : Knowledge, Attitudes and Behaviours of Queensland Motorists
Kirsten Richards and Sussan Bacon

S35 Pavement Management

Session S35 HALL A & B **02:00 PM - 03:30 PM**

Chaired by Neil Robertson, Queensland Department of Main Roads
(Presenters have been allocated 15 minutes each for this session)

Contrasting Road Asset Information Management System Deployments in Asia Pacific and Europe
Chris Megan, Southbank Systems plc

PLATO:A Cutting Edge Implementation of HDM Technology for Road Infrastructure Investment Analysis
Jon Roberts, Ron Roper and Andreas Loizos

Dynamic Segmentation : Breaking up the Road
Simon Crank

The Queensland Main Roads Experience - Utilising Support Tools and Expertise for an Effective Asset Management Outcome - PEER REVIEWED
Andrew D McIntyre and Edwina J Bryans

Performance Indicators for Properly Functioning Asset Management Systems
Ralph Haas, Lynne Cowe Falls and Susan Tighe

S36 Concrete & Structures III

Session S36 Room 4 **02:00 PM - 03:30 PM**

Chaired by Riadh Al-Mahaidi, Monash University
(Presenters have been allocated 20 minutes each for this session)

Non Destructive Inspection of the Suspender Ropes in a Suspension Bridge
Akira Moriyama, Kazuya Ogawa and Yoshitaka Yoshida

Material Influences on the Performance of Controlled Permeability Formwork (CPF) Concrete
Choon Heng Leow

Case Study on Deterioration of Concrete in Structures Due to Alkali-Silica Reaction (ASR) in Salt Environment and its Evaluation Methods - PEER REVIEWED
Masahiro Nomura, Tetsuo Matsuda, Minobu Aoyama and Kazuyuki Torii

Durability Investigation of Deep Creek Bridge, Northern NSW
Ahmad Shayan and Howard Morris

S37 Impact of Roads on Water

Session S37 Room 2 **02:00 PM - 03:30 PM**

Chaired by Marian Rollings, US Army Engineering Research & Development
(Presenters have been allocated 20 minutes each for this session)

Stormwater Quality and Water Quantity: Meeting the Challenges on the Port of Brisbane Motorway
David Rankin, Dean Toomey, Bill Johnson and Brad Tite

Environmental Sustainability through Water Sensitive Design - Converting Theory to Innovative Reality
Kate Smolenska, Nicholas Somes and Chris Papadopoulos

Salinity Impacts and Roads - Now and the Future
Jencie McRobert, Neil Houghton and Evan Styles

Road Maintenance Code of Practice for the Wet Tropics World Heritage Area - PEER REVIEWED
Karen Oakley

S38 Pavement Performance I

Session S38 HALL D **02:00 PM - 03:30 PM**

Chaired by Kieran Sharp, ARRB Transport Research
(Presenters have been allocated 15 minutes for this session)

Functional Durability of Open Graded Asphalt in Melbourne, Australia - PEER REVIEWED
Jamie Favaloro, Richard Yeo and Peter Mousley

An Analysis of Causes of Premature Failure of Bituminous Pavements in National Highways of Tamilnadu State in India
V Shanmugasundaram, D Thirunakkarasu and R. Murugasan

Innovative Asphalt Mix Design and Construction : Case Studies on Cape Town International Airport and Kromboom Parkway - PEER REVIEWED
Derick Pretorius, K.J Jenkins, F Hugo and D Vietze

Analysis of a Thirteen Year Old RAP Site in South Australia - PEER REVIEWED
Hugo Van Loon and M.J. Butcher

The Impact of Risk on Whole of Life Costing
Geoff Youdale, Rob Vos, Gabriel Tooma and Colin Richmond

W13 Road Safety Risk Manager

Workshop W14 Room 3 **02:00 PM - 03:30 PM**

W14 Integrated Transport for Local Communities

Workshop W14 Room 5 & 6 **02:00 PM - 03:30 PM**

Afternoon Tea - Thursday

Outdoor Plaza **03:30 PM - 04:00 PM**

S39 Intelligent Transport Systems III

Session S39 Room 3 **04:00 PM - 05:30 PM**

Chaired by Chris Koniditstiotis, Austroads
(Presenters have been allocated 25 minutes each for this session)

Road User Information Data Exchange (RIDE) - Making Traffic Information Available Over the Internet
Alan Hogan, Kristina Sikich and Ke Qi Feng

Deployment and Utilisation of Smart Infrastructure Performance Analyser (SIPA)-Verification of Replicability In Intricate Intersections
Hiroshi Kobayshi, Shigenobu Kawasaki and Yukihiro Fukuda

Using Virtual Reality Models to Better Communicate How Transit Infrastructure can Interface and Interact with the Built Urban Environment. - PEER REVIEWED
Sam Bucolo and Simon Ginn

S40 Maintenance Management

Session S40 HALL A & B **04:00 PM - 05:30 PM**

Chaired by Kerry McManus, Swinburne University of Technology
(Presenters have been allocated 15 minutes each for this session)

Highway Management, the Highway Highlanders Way
Murray Clarke

Modelling and Developing Road Maintenance Policies and Strategies
Peter Kadar and John Statton

Maintenance Management of Federal Roads in the State of Selangor, Malaysia
Khin Onn Lai

The Roads Department's Quality Improvement Journey
Fong Sien Chong, Rafitra HA Razak, Hjh Jamilah HM Tahir

Term Maintenance Contracts in Western Australia - Lessons Learnt
Brian Noble, Graeme Gillies and Tom Mc Hugh

S41 Traffic Modelling III

Session S41 Room 4 **04:00 PM - 05:30 PM**

Chaired by Ian Greenwood, Opus International Consultants
(Presenters have been allocated 15 minutes each for this session)

Introduction of Virtual Evaluation System for Road Space (VERS III) : A New Tool for Improvement of Expressway Design and Operation
Yasuo Mori, Katsuhiro Iida, Akio Iida and Shihyoung An

Development of an Intelligent Traffic Simulation Model (INSIM) for Evaluating the Effectiveness of Multimodal Traveller Information. - PEER REVIEWED
Soi Hoi Lam and Abdul Ahad Memon

Insights on Driving Behaviour : What Can Global Positioning System (GPS) Data Tell Us? - PEER REVIEWED
Stephen Greaves and Andrew Somers

Cleansing of Probe Car Data to Determine Trip OD - PEER REVIEWED
Edward Chung, Majid Sarvi, Yasunori Murakami, Ryota Horiguchi and Masao Kuwahara

S42 Managing the Environment

Session S42 Room 2 **04:00 PM - 05:30 PM**

Chaired by Robin Stone, Queensland Department of Main Roads
(Presenters have been allocated 20 minutes each for this session)

A Method of Estimating Sub-Micrometer Particle Concentrations from Roadside Measurements in an Urban Environment.
Fraser McGregor, Luis Ferreira and Lidia Morawska

Managing Heritage and Environment Issues on Bridgeworks in North Central Victoria
Greg Mariager and Peter Woods

Road Traffic Impact on Air Quality near Major Intersections in Bangalore City, India - PEER REVIEWED
SP Mahendra and Krishnamurthy

Effective Environmental Management on Civil Engineering Work - PEER REVIEWED
Ritchie Scofield and Roger CM Dunn

S43 Pavement Performance II

Session S43 HALL D **04:00 PM - 05:30 PM**

Chaired by Raymond Rollings, US Army Engineering Research & Development
(Presenters have been allocated 15 minutes each for this session)

Flexible Pavements - Results of VicRoads Pavement Performance Monitoring - PEER REVIEWED
Andrew Papacostas and Allan Bowman

Benefits of Composite Pavements
Gavin Donald

High Performance Gravel Roads : The Application of Gravel Road Specifications in South Africa and their Impact
Gerhardt D van Zyl, M.G. Henderson and H.G. Fourie

A Study of Pavement Failure and its Rehabilitation on Concrete Slab on an Expressway
Hiroshi Ueda, Takaki Onodera & Katsumi Nagabuchi

Performance Evaluation of Cement Stabilised Road Base Using Falling Weight Deflectometer
Gary Chai and Asmaniza Asnan

S44 Road Safety Initiatives

Session S44 Room 1 **04:00 PM - 05:30 PM**

Chaired by Michael Tziotis, ARRB Transport Research
(Presenters have been allocated 15 minutes each for this session)

Project Safety Review for Singapore Road Projects
Derek Robert Stolz and Lim Poo Yam

Every K over is a Killer : Behind the Scene
Leanne Kirby, Kerrie Tregenza, Kirsten Richards

Study of Safety of Roads Based on Frightening Experiences of Road Users
Takeshi Ikeda, Nozomu Mori, Susumu Takamiya, Hideki Furuya and Hidekatsu Hamaoka

SAFE Eyes for a Safer Community
Samantha Taylor and Peter Damen

Road Safety Issues and Initiatives in Bangladesh : The Context of Regional Significance
Mazharul Hoque, Jobair Bin Alam and K.M. Nurul Habib

W15 Community Road Safety

Workshop W15 Room 5 & 6 **04:00 PM - 05:30 PM**