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出國報告(出國類別:其他)

參加 2009 年美國運輸研究委員會第 88 屆年會報告

服務機關:交通部運輸研究所
姓名職稱:張瓊文研究員
派赴國家:美國
出國期間:98 年 01 月 9 日至 01 月 18 日
報告日期:98 年 03 月 18 日

參加 2009 年美國運輸研究委員會第 88 屆年會
出國報告

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關 鍵 詞：美國運輸研究委員會（TRB）、運輸研究發展主軸

內容摘要：

本所為美國運輸研究委員會(Transportation Research Board)團體會員，該委員會年會每年於華府特區舉辦之研討會為全世界最大規模之學術與運輸實務經驗交流會議，本所每年派員出席該委員會年會研討會吸取新知並與各界交流。今年第88屆年會估計有近7,000人由全世界各地參加，總共有600場次超過3,500篇論文發表，為各界吸收運輸研究及實務經驗資訊之最佳場合。

本次參加美國運輸研究委員會第88屆年會，除了了解美國運輸領域產、官、學、研過去一年的研究成果外，也獲知未來發展之主軸方向，可以作為國內進行相關研究之參考，俾能保持與國際接軌。今年年會焦點議題(Spotlight Theme)為「運輸、能源、氣候變遷」(Transportation, Energy, and Climate Change)，對於運輸與能源、氣候變遷議題，規劃了議程，邀集各界提出報告，相關推動經驗有助於國內未來相關議題之借鏡。

本文電子檔已上傳至公務出國報告資

目錄

一、前言

美國運輸研究委員會(Transportation Research Board, TRB)是國家研究會(National Research Council)下的一個部門，為國家科學學院(National Academy of Science)及國家工程學院(National Academy of Engineering)提供服務。

美國運輸研究委員會成立於 1974 年，其前身分別為 1920 年成立的 National Advisory Board on Highway Research 及 1925 年改制的 Highway Research Board。該委員會的任務是藉由研究及有關從業人員的互動及進行的研究，促進運輸界研究之創新與進步並鼓勵研究結果的實施。除了在美國國會及政府單位要求下，主導運輸政策的特別研究以及維運網路上的運輸研究資訊外，並且負責舉辦每年吸引數千位美國國內外運輸專業人士參加的年會。本次年會即為第 88 屆年會，仍依慣例於嚴冬旅遊淡季的一月中舉辦;由於有 3,500 篇的論文發表，因此，會議地點一如往例，分別於 Marriott Wardman Park Hotel (2660 Woodley Road，如照片一)、Omni Shoreham Hotel (2500 Calvert Street) 以及 Hilton Washington Hotel (1919 Connecticut Avenue)3 處舉行，以便容納約 600 場次之研討。

交通部運輸研究所是國內負責運輸領域相關議題的主要政府研究單位之一，為充分了解國外相關議題的近期研究成果與最新研究發展趨勢並參與各項運輸學術研究之互動，每年均於奉准後編列預算由運輸計畫、工程、安全、經營管理、資訊及綜合技術等 6 個不同研究領域的組中指派同仁參與此一盛會。

二、行程概要

美國運輸研究委員會第 88 屆年會依往例於美國華府舉行，會議期間為民國 96 年 1 月 11 日〔週日〕至 1 月 15 日〔週四〕，為期 5 天，主要之展示及會議於 1 月 14 日前辦理。

本次出國安排自 1 月 9 日下午由台北出發，並因無直飛華盛頓 DC 班機乃安排直飛舊金山班機，於晚上飛抵舊金山，第 2 天再由舊金山搭乘美國國內線班機抵華盛頓 DC。回程順道參觀舊金山地區大眾運輸及地鐵系統之運作，以供國內相關案例推動之參考，1 月 17 日出發返國於 1 月 18 日凌晨返抵國門。相關行程安排如表 2.1。

表 2.1 行程概要表

預 計 日 期	起 訖 地 點	工 作 項 目
98 年 1 月 9 日(五)	台北→舊金山	啟程
98 年 1 月 10 日	舊金山→華盛頓 DC	抵華盛頓 DC
98 年 1 月 11 日~1 月 15 日	華盛頓 DC	出席研討會、蒐集及購買書籍與報告
98 年 1 月 15 日	華盛頓 DC→舊金山	1. 出席 TFHRC 交流會 2. 傍晚飛舊金山
98 年 1 月 16 日	舊金山	考察當地運輸系統
98 年 1 月 17 日(六)~1 月 28 日(日)(凌晨至桃園國際機場)	舊金山→台北	返國

三、年會活動

本次年會共接受約 3,500 篇的論文，分別於 3 處會場的超過 600 個會場中舉行；其中包含特別為年會主辦單位標示了屬於本次會議的特色議題(**Spotlight Theme**)：「運輸、能源、氣候變遷」（Transportation, Energy, and Climate Change）。

此外，包括相當多場次之講習會(workshops)、研討會(seminars)、與作者面對面討論的海報會議(meet-the-author poster sessions)、各學門執行小組會議(executive panel meetings)、各小組委員會主席會議 (committee chairpersons meetings)及相當多的攤位及成果展示區 (Exhibitions)，內容相當多，一般均選擇有興趣了解或參與討論之場次參加，因為場次高達 600 分佈於 3 大旅館會場，為利眾多參與者規劃及搜尋場次，TRB 設計了一套相當好用的搜尋程式供與會者使用並有免費巴士接送往返各會場。其中**海報會議(Poster Session)**部分，由獲選論文之作者將其論文重點，以海報方式張貼於規定地點，並於年會安排的特定時段於張貼地點親自解說，以與聽眾達成面對面的溝通；因為聽眾可以直接與作者作充分的討論與雙向交流，因此互動效果極為良好，已成為年會重要的辦理型式之一。

3.1 主要議題與會議地點

本年度主要議題與會議地點分配如下：

A. Marriott Wardman Park Hotel
   1. 瀝青混凝土材料 Bituminous Materials
   2. 水泥混凝土材料 Concrete Materials
   3. 施工 Construction
   4. 設計 Design
   5. 土壤及地工材料 Geology and Earth Materials
   6. 法律資源 Legal Resources
   7. 養護 Maintenance and Preservation
   8. 維運 Operations and Preservation
   9. 鋪面管理 Pavement Management
   10. 行人及騎士 Pedestrian and Cycles
   11. 鐵路 Rail
   12. 鋪面保育 Roadway Pavement Preservation
   13. 安全 Safety

14. 土壤力學 Soil Mechanics
15. 結構 Structures
16. 用路人相關議題 Users Performance

B. Omni Shoreham Hotel
1. 航空 Aviation
2. 設計 Design
3. 貨運系統 Freight Systems
4. 土壤及地工材料 Geology and Earth Materials
5. 海運 Marine
6. 鋪面管理 Pavement Management
7. 軌道 Rail
8. 結構 Structures
9. 運輸政策 Transportation Policy
10. 卡車運輸 Trucking

C. Hilton Washington Hotel
1. 資料資訊系統 Data and Information Systems
2. 環境與能源 Environment and Energy
3. 國際活動 International Activities
4. 環境與公共運輸法律資源 Legal Resources: Environmental, Transit
5. 管理與領導 Management and Leadership
6. 行人 Pedestrian
7. 公共運輸與渡輪 Public Transportation and Ferries
8. 研究與教育 Research and Education
9. 社經與文化議題 Social, Economic, and Cultural Issues
10. 系統政策、規劃與程序 Transportation System Policy, Planning, and Process
11. 稅制與財政 Taxation and Finance
12. 運輸政策 Transportation Policy
13. 旅次分析方法 Travel Analysis Methods

D. All Hotels
「運輸、能源、氣候變遷」(Transportation, Energy, and Climate Change)

與往年類似，道路與公路工程方面主要集中於 Marriot，軌道、海空運、貨運等議題集中於 Shoreham，政策、分析方法、社經議題則集中於 Hilton，可以分別稍微集中與會者可能有意參與之領域，減少往來各會場之奔波；

而本年度重點議題：「運輸、能源、氣候變遷」，則在 3 個會場中均有相關之主題進行。各類別研習會議(workshop)場次及相關論文發表統計如表 3.1 所示，由表知，除今年度的焦點議題場次外，最熱門的議題包括營運及安全等大議題，分別有 388 及 400 有關的文章。

表 3.1 各類別研習會議場次及論文發表統計

類別	研習會場次	論文發表篇數
1.Aviation	3	43
2.Bituminous Materials	1	105
3.Concrete Materials	1	71
4.Construction	2	47
5.Data and Information Systems	14	137
6.Design	5	75
7.Environment and Energy	6	122
8.Freight Systems	1	80
9.Geology and Earth Materials		25
10.Infrastructure Preservation	2	54
11.International Activities		44
12.Legal Resources	1	
13.Maintenance		108
14.Management and Leadership	3	22
15. Marine		42
16.Operations	2	400
17.Pavement Management	7	190
18.Pedestrians and Cycles	4	54
19.Public Transportation and Ferries	1	158
20.Rail	2	78
21.Research and Education	5	39
22.Safety	6	388
23.Security		15
24.Social, Economic, and Cultural Issues	1	90
25.Soil Mechanics		83
26.Structures		86
27.Systems Planning, Policy and Process	1	126
28.Taxation and Finance	3	50

表 3.1 各類別研習會議場次及論文發表統計（續）

類別	研習會場次	論文篇數
29.Transportation, Energy, and Climate Change	6	128
30.Transportation Policy	2	106
31.Travel Analysis Methods	4	343
32.Trucking		68
33.Users	5	47

圖 3.1 Poster 會場

3.2 年會展覽

TRB 的展覽，一向即甚為壯觀與多樣化，此次的展覽亦不例外。能夠參展之單位必須為 TRB 的贊助者或資助會員。此次參展者主要，包括：

- Active Imaging Systems, LLC
- Advitam

- AgileAssets, Inc.
- AIS Construction Company
- Alcatel-Lucent
- American Association of State Highway and Transportation Officials (AASHTO)
- American Concrete Pipes Association
- American Friends of the Alexander von Humboldt Foundation
- American Galvanizers Association
- American Society of Civil Engineers
- American Transportation Research Institute (ATRI)
- Applanix
- Applied Research Associates, Inc.
- ASCE Publications
- ATSSA: American Traffic Safety Services Association
- Autodesk
- Barrier Systems, Inc.
- BASF Construction Chemicals
- Boulderscape, Inc.
- Brentwood Industries
- Bridge Diagnostics, Inc.
- California PATH
- Caliper Corporation
- Campbell Scientific, Inc.
- Cardinal Systems, LLC
- Cargill SafeLane Surface Overlay
- CHEMTREC
- Citilabs

- Collins Engineers, Inc.
- ConSysTec Corp.
- Coval Systems, Inc.
- Crafco, Inc.
- CRSI Epoxy Interest Group
- DeAngelo Brothers, Inc.
- Decagon Devices, Inc.
- Deighton Associates Limited
- Dewberry
- District Department of Transportation
- Dynatest Consulting, Inc.
- Ecology & Environment, Inc.
- Econolite
- ECOPATH Industries, LLC
- EDR Group
- Elsevier
- Emerald Group Publishing
- Energy Absorption Systems, Inc.
- ERDAS
- Federal Aviation Administration (FAA)
- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Railroad Administration (FRA)
- Federal Transit Administration (FTA)
- FEHRL
- Foundation for Pavement Preservation
- Freyssinet

- Fugro Roadware, Inc.
- Geophysical Survey Systems
- Germann Instruments, Inc.
- Gibraltar Cable Barrier Systems
- Gilson Company, Inc.
- Gregory Highway Products
- Handy Geotechnical Instruments, Inc.
- Hilti
- Hon Yee Group
- Huesker, Inc.
- Humboldt Manufacturing Co.
- Image Sensing Systems Canada/EIS
- Innovative Scheduling
- INO
- INRO
- Institute of Transportation Engineers
- Insulfoam, LLC
- Integrated Paving Concepts
- Intelligent Devices, Inc.
- International Municipal Signal Association
- ITEM Ltd.
- Iteris, Inc.
- J. Ross Publishing
- Kessler Soils Engineering Products, Inc.
- KLD Associates, Inc.
- KOR-IT, Inc.
- Keik Bond Polymers

- Leotek Electronics USA Corp.
- Loadtest, Inc.
- LUSAS
- MACTEC
- Mala GeoScience USA, Inc.
- Mandil Communications, Inc.
- MATECH
- McTrans Center
- MetroCount
- Michigan Tech Transportation Institute
- Midwestern Softwares Solutions
- Missouri Transportation Partners
- Mobilitat
- NACE International
- The National Academies
- National Advanced Driving Simulator
- National Transportation Safety Board (NTSB)
- Newlands & Company, Inc.
- NX Infrasturcture
- Oak Ridge National Laboratory
- Olson Engineering, Inc.
- Optech
- Parsons Brinckerhoff
- Pathway Services, Inc.
- Pavement Technology, Inc.
- Pile Dynamics, Inc.
- Pine Instrument II, Inc.

- Plastic Safety Systems, Inc.
- Potters Industries
- Proto Manufacturing, Inc.
- PTV America, Inc.
- Quality Counts
- Quantm Pty Ltd.
- Regional Economic Models, Inc.
- The Reinforced Earth Company
- Research and Innovative Technology Administration (RITA)
- RideShark
- Roadtec
- Roctest Ltd.
- Rubber Pavement Association
- Schnabel Foundation Company
- SINAK Corporation
- Skycomp, Inc.
- Stirling Lloys Products, Inc.
- Surface Systems & Instruments, LLC
- TAPCO
- Taylor & Franscis
- TenCate Geosynthetics
- Tensar International Corporation
- Tetra Tech
- TRACC-Argonne National Lab
- The Traffic Group, Inc.
- TrafFix Devices, Inc.
- Transpo Industries, Inc.

- TransTech Academy, Cardozo High School
- Trimble GeoSpatial
- Trinity Industries, Inc.
- Troxler Electronic Laboratories, Inc.
- TSS: Transport Simulation Systems
- US Army Corps of Engineers (USACE)
- Underground Imaging Technologies, Inc.
- Unitex
- Virginia Transportation of　Transportation (VDOT)
- Vector Corrosion Technologies
- Wilbur Smith Associates
- World Road Association: AIPCR/PIARC

藉由參觀各個參展單位的攤位以及收集其所提供的書面資料，可以充分了解美國政府運輸部門最新之研究成果與未來研究領域走向，對於國內研究單位欲與國際同步或接軌時之一手資訊獲得極為重要。

3.3 學術委員會活動

學會所屬的各個學術委員會亦於年會期間同時舉辦其各自獨立的委員會議(Committee Meetings)，除了該學術委員會的委員得以參加外，與會人員亦可以蒞場旁聽，以了解該委員會一年來的主要活動以及未來一年擬進行研究的方向。學會下之各種委員會數量極多，幾乎重要或有趣的運輸議題都成立了相對的學術委員會加以主導，主要技術活動(Technical Activities)分為下列幾群：

1.運輸政策與組織(Policy and Organization Group)
(1)管理與領導(Management and Leadership Section)
(2)運輸政策(Transportation Policy)
(3)研究與教育(Research and Education Section)
(4)資料與資訊系統(Data and Information Systems Section)
2.規劃與環境(Planning and Environment)

(1)運輸系統政策、規劃與程序(Management System Policy, Planning and Process Section)
(2)旅運分析方法(Travel Analysis Methods Section)
(3)環境與能源(Environment and Energy Section)
(4)社會、經濟與文化議題(Social, Economic, and Culture Issues Section)

3.設計與施工(Design and Construction)
(1)設計(Design Section)
(2)鋪面管理(Pavement Management Section)
(3)結構物(Structures Section)
(4)施工(Construction Section)
(5)瀝青(Bituminous Materials Section)
(6)混凝土(Concrete Section)
(7)地質與土壤特性(Geology and Properties of Earth Materials Section)
(8)土壤力學(Soil Mechanics Section)

4.運輸設施之營運、安全與維護(Operation and Maintenance)
(1) 營運(Operation Section)
(2) 維護(Maintenance and Preservation Section)

5.法律資源(Legal Resources)

6.系統使用者(System Users)
(1)安全(Safety Section)
(2)使用者績效(Users Performance Section)
(3)行人與腳踏車(Pedestrians and Cycles Section)

7.公共運輸(Public Transportation)

8.軌道(Rail)

9.貨運系統(Freight Systems)

10.空運(Aviation)

11.海運(Marine)

3.4 焦點議題研習會議及論文研討重點

本次有關焦點議題，「運輸、能源、氣候變遷」共計有 6 場研習會(workshop)及 63 場相關論文發表/張貼會，各場次討論內容分別說明如下：

- 研習會

1. 氣候 101：氣候變化的基礎 (Basics of Climate Change)

討論子題包括:

(1) Introduction: Basics of Climate Change

(2) Climate 101

(3) Climate Impacts on Ecosystems

(4) Climate, Transportation and Planning

(5) Climate Change Sources and Solutions: Transportation in Context

內容：這場研習會為運輸永續委員會(Transportation and Sustainability Committee)及能源委員會的氣候變遷聯合小組(Climate Change Joint Subcommittee of the Energy and Alternative Fuels Committee)所贊助。主要針對氣候變遷的基本狀況與意義加以介紹，同時說明其如何牽涉到運輸及土地使用，以提供交通界相關產、官、學了解背後之意義。

2. 因應氣候變遷的整合運輸需求管理方法 (Communication and Partnership Approaches to Integrate Transportation Demand Management in Tacking Climate Change)

討論子題包括:

(1) Potential for Greenhouse Gas Reductions from Travel Behavior Changes: Short-Term and Long-Term TDM Strategy Opportunities to Reduce Vehicle Miles of Travel

(2) Review of State Climate Plans and Efforts to Integrate Climate Change Considerations in Transportation Planning

(3) Contribution of Integrated TDM and Transport Strategies to Environmental Policy: U.K. Experience

(4) European Partnerships to Integrate Transportation in Addressing Climate Change

(5) NGO Perspective on TDM and Climate Action

(6) MPO Role: Coordination of Comprehensive Transportation Planning for Reduction of Vehicle Miles of Travel and Regional Climate Action

(7) Facilitator¡s View of Partnership Success: Spotlight on Washington

State¡s Climate Action Planning

(8) Cities and Businesses: Implementing TDM for Climate Action with Economic Development Benefits

(9) Climate Action Messages That Resonate: Developing and Delivering Persuasive Evidence

內容：這場研習會為運輸需求管理委員會(Transportation Demand Management Committee)所贊助。由於運輸需求管理為一藉由改變旅運行為，可有效降低能源消耗及車公里規模的方法，主要針對運輸需求管理在因應氣候變遷議題上的機會，同時也說明將運輸需求管理納入因應氣候變遷的行動方案規劃，並提出既有的案例。

3. 整合都市溫氣氣體排放模式與政策分析 (Integrated Urban Modeling of Greenhouse Gas Emissions and Policy Analysis)

討論子題包括:

(1) What We Don¡t Know Will Hurt Us Badly: Knowledge Needs About Automobility in a Climate-Constrained World

(2) Adapting Travel Models and Urban Models to Forecast Greenhouse Gases in California

(3) Greenhouse Gas Emissions from Transportation Sources using an Integrated Urban Model In Puget Sound

(4) Modeling Transportation Policy Effects on Point-Source Greenhouse Gas Emissions Using Spatial Input-Output Models

(5) Modeling Greenhouse Gas Emissions Starting with Small ¡GreenSTEP¡s

(6) Cities and the Energy Transportation : Can We Model Fundamental Change?

內容：這場研習會為運輸需求預測委員會(Transportation Demand Forecasting Committee)及運輸與土地發展委員會(Transportation and Land Development Committee)所贊助。由於應用運輸與土地使用整合模式，可以對溫室氣體排放及其對運輸系統廣泛的影響，及重要政策進行一全面性的評估，所本研習會主要針對所有聽眾說明運輸與土地使用整合模式在溫室氣體排放之相關政策分析上

之應用。

4. 氣候變遷與運輸 101 (Climate Change and Transportation 101)

討論子題包括:

(1) Potential Greenhouse Gas Reductions from Transportation

(2) Consequences of Climate Change for U.S. Transportation and Adaptation Strategies

(3) Summary of White Papers on Climate Change and Transportation Modes

(4) Panel Discussion: What Can Transportation Agencies Do to Help Meet the Climate Change Challenges?

(5) Panel Discussion: What Can Private Transportation organizations Do to Help Meet Climate Change Challenges?

內容：這場研習會為氣候變遷任務小組(Climate Change and Energy Task Force)、TRB 執行委員會(TRB Executive Committee)、運輸與空氣品質委員會(Transportation and Air Quality Committee) 及能源委員會的氣候變遷聯合小組(Climate Change Joint Subcommittee of the Energy and Alternative Fuels Committee)所贊助。主要探討各類運具與氣候變遷的關聯，包括各運具必須面臨氣候變遷所造成之影響及其對氣候變遷之衝擊兩方面。希望提供給參與者對於此方面的議題有一廣泛的了解。

5. 永續的鋪面：溫融瀝青 (Warm-mix Asphalt: A Sustainable Pavement)

討論子題包括:

(1) Warm-Mix in Europe: Present and Future

(2) France¡s Perspective on Warm Mix: Research and Practice

(3) Environmentally Friendly Alternative to Hot-Mix Asphalt

(4) Outstanding Pavement Performance and Carbon Credits: Italian Case Study in Sustainability

(5) Mix Design Procedures for Warm-Mix Asphalt

(6) Warm-Mix Asphalt Projects and Performance at FHWA Mobile Asphalt Testing Laboratory

(7) Field Performance of Warm-Mix Asphalt

(8) Implementation of Warm-Mix Asphalt in Texas

(9) Impacts and Benefits of Warm-Mix Asphalt on Contractor¡s Operations

內容：這場研習會為瀝青鋪面委員會(Characteristics of Nonbituminous Components of Bituminous Paving Mixtures Committee)所贊助。主要提供溫融瀝青之績效與效益的相關資訊給有關的人員。由於這種技術可以在較低的溫度下生產或放置瀝青，因此可以減少能源的消耗、溫室氣體的排放及濃煙的產生。本研習會著重在產業、管理機構與相關團體的實績或實地經驗的交流。

6. 降低航空之碳足跡 (Reducing Your Aviation Carbon Footprint)

討論子題包括:

(1) What Are the Major Source Contributors?

(2) Practical and Innovative Ways to Reduce Greenhouse Gases at Airports

(3) How Are Airlines Managing Their Fleets to Reduce Greenhouse Gases?

(4) What Are Manufacturers Incorporating in New Technology?

(5) Changes in Air Traffic Control to Reduce Greenhouse Gases

內容：這場研習會為航空環境衝擊委員會(Environmental Impacts of Aviation Committee)所贊助。主要是提供關於整體航空產業，包括如機場、航空公司、政府部門及製造商等部門，如何減少碳足跡的一些作法或創新的想法。所討論的議題包括，(a)發展機場內的替代能源，(b)航空公司對於碳足跡相關行為的反應，(c)發展最低排放的流量管制程序及(d)降低排放的飛機及其引擎的最新設計等。

- 論文研討會

1. 因應氣候變遷的運輸設施 (Adapting Transportation Infrastructure to Accommodate Climate Change)

討論子題包括:

(1) Designing Flexibility into the U.S. Transportation System: Adapting to the Challenges of Climate Change

(2) Risk Mitigation and Management Practices for Winter Roads Relation on Ice Cover in Northern Canada

(3) Rail Network Management Strategies Dealing with Weather- or Climate-Related Changes

(4) Iowa¡s 2008 Flood Experience

2. 鐵路貨運於能源成本增加方面的看法 (Freight Railroad Perspectives on Energy Cost Increases)

討論子題包括:

(1) Alternative Fuels for Rail Transportation: Realistic Options

(2) Technologies to Address Rising Fuel Impacts

(3) Railroad Ramifications from the Impact of Oil Prices on Supply Chain Strategies

(4) Addressing Fuel Cost Increases in Railway Pricing

3. 氣候變遷與地面運輸的再認可：答案是什麼？ (Climate Change and Surface Transportation Reauthorization: What Are the Answers?)

討論子題包括:

(1) Linking Climate Change and Reauthorization Policies

(2) Federal Perspective: How Can Reauthorization Support Effective Climate Change Action?

(3) State Perspective: How Can Climate Change and Reauthorization Policies Work for State Departments of Transportation

4. 氣候變遷的偵測與設計上的意涵 (Climate Change Detection and Implications for Design)

討論子題包括:

(1) Climate Change Basics and ASCE Activities

(2) Hydrologic Changes in Northeastern United States During the Last Century and potential Impacts on Hydraulic Structures

(3) Vulnerability Assessment of Civil Infrastructure to a Changing Climate: Case Study of Quesnell Bridge, Edmonton, Alberta, Canadan

5. 氣候變遷法 101 (Climate Change Law 101: What¡s in Place and What¡s Pending)

討論子題包括:

(1) Climate Change Law Overview

(2) FHWA and DOT Climate Change Policies

(3) State Climate Change Programs

6. 土地使用、旅運行為及溫室氣體排放 (Lane Use, Travel Behavior, and Greenhouse Gas Emissions: What do We Know and How Do We Know It?)

討論子題包括:

(1) Traffic Generated by Mixed-Use Developments: Six-Region Study Using Consistent Built Environmental Measures

(2) Disaggregate Analysis of Urban Form Relationships with Greenhouse Gas Emissions in Central Puget Sound Region

(3) Integrating Land Use, Transportation Planning and Air Quality Modeling

(4) Projecting Effects of Land Use and Technology Change on Future Air Quality and Greenhouse Gases in the Upper Midwestern United States

(5) Integrated Framework for Estimating Long-Term Mobile Source Emissions Linking Land Use, Transportation and Economic Behavior

7. 運輸部門減少溫室氣體排放的策略 (Strategies to Reduce Greenhouse Gas Emissions from Transportation)

討論子題包括:

(1) Comparing Transportation Technologies in a Greenhouse Gas Supply Curve for the United States

(2) One Percent VMT Growth or Less to meet Greenhouse Gas Emission Reduction Goals

(3) Greenhouse Gas Emission Control Options: Assessing Transportation and Electricity Generation Technologies and Policies to Stabilize Climate Change

(4) climate-Sensitive Transportation Management: Evaluating Alternative Goals for Traffic Growth

8. 軟硬體方法的效益(Effectiveness of ¡Hard Side¡ and ¡Soft Side¡ Approaches to Climate Change Mitigation)

內容：本場次研討會為一專家座談會，在硬體方面主要著重改善車輛、運輸系統設施、設備等之技術；而軟體方面則是在於透過旅運行為的改變及運具的選擇，分別探討其對於緩和氣候變遷的效益。

9. 另類想法：處理環境程序與文件的衝突(On second Thought: Dealing with Conflicts of Interest in the Environmental process and Development of Environmental Documents)

內容：本場次研討會為一專家座談會。

10. 氣候變遷與海運 (Climate Change and Maritime Transportation)

討論子題包括:

(1) Impacts of Speed Reductions on Vessel-Based Emissions for International Shipping

(2) Climate Change and Marine Transportation Activity

(3) Adaption and Change with Global Warming: Emerging Spatial World Structure and Transportation Impacts

(4) Planning for Climate Change Impacts at U.S. Ports

11. 運輸再生能源：風險與準備 (Transportation of Renewable Fuels: Risk and preparedness in a Changing World)

討論子題包括:

(1) Defining the Global Landscape

(2) Emerging Concerns and Issues That May Get Missed in the Rush to Market

(3) What¡s the Risk with Ethanol?

(4) Emergency Response Concerns with Alternative Fuels

12. 石油的供需與價格：未來存量為何? (Petroleum Supply, Demand and Prices: What Is in Store for the Future?)

討論子題包括:

(1) Outlook on Worldwide Petroleum Supply and Demand

(2) Perspective on Petroleum Supply and Demand Forecasts

(3) Implications of Petroleum Prices and Shortages for Transportation Fuel Users: Aviation

(4) Implications of Petroleum Prices and Shortages for Transportation Fuel Users: Rail

13. 能源與環境：鐵路的貢獻 (Energy and Environment: Railroad Contributions)

討論子題包括:

(1) Role of Rail in Tackling Climate Change: Are We on the Right Track?

(2) Evaluating the Creation of a Parallel Nonoil Transportation System in an Oil-Constrained Future

(3) Review of Regional Locomotive Emission Modeling and Constraints Posed by Activity Data

(4) Simulation Analysis of Energy Consumption for Various Train Controls and Track Alignments

14. 我們的責任：關於高生產力車輛在能源與溫室氣體排放的衝擊(Getting Our Bang for the Buck: Impacts of Higher-Productivity Vehicles on Energy and Emissions)

討論子題包括:

(1) Environmental Effects of Allowing Longer and Heavier Goods Vehicles in the United Kingdom

(2) Energy and Emissions Impact of Operating Higher-productivity Vehicles

(3) It Pays to Be Green

(4) Improving Fuel Efficiency and Reducing Environmental Impacts of Freight Transportation

(5) Review of 21st Century Truck Partnership

15. 油價上揚於空運系統規劃的衝擊(Impacts of Escalating Fuel Costs on Aviation System Planning)

討論子題包括:

(1) Effect of Fuel Prices on Comparative Aircraft Costs

(2) Low Fuel- Bad Weather- Diversion?

(3) Fuel Crisis in Aviation

(4) Impact of Escalating Fuel Costs on Flight Management

16. 美國能源危機：符合國家能源需要的答案(The U.S. Energy Crisis: Solutions to Meeting the Nation¡s Energy Needs)

內容：本場次研討會為一專家座談會。

17. 大眾運輸系統的先進動力技術：現況、挑戰與未來(Advanced Clean Propulsion Technologies for Transit: Current Status, Challenges, and Future

Outlook)

討論子題包括:

(1) Advanced Clean Propulsion Technologies for Transit: Current Status, Challenges, and Future Outlook

(2) Transit Agency Perspective on Implementing Advanced Porpulsion buses

(3) Development Efforts on Advanced Hybrid Drive Systems and Ultracapacitors

(4) Evaluation Results of Hybrid Electric and Fuel Cell Demonstration Projects

18. 朝向更綠色的未來(Taxing Our Way to a Greener Future?)

討論子題包括:

(1) Green Taxes and Fees: Politically Acceptable Way to Increase Transportation Revenue?

(2) Gasoline Taxes to Address CO_2 Emissions from Road Transport

(3) Evaluating Carbon Taxes as Energy Conservation and Emission Reduction Strategy

(4) Role of Surface Transportation in U.S. Compliance and Voluntary Greenhouse Gas Emissions Trading Schemes

19. 評估與緩和氣候變遷影響的運輸資料(Transportation Data Needs for Climate Change Evaluation and Mitigation)

討論子題包括:

(1) Data and Analytic Methods Needed to Address GHG Emissions

(2) AASHTO Primer on Transportation and Climate Change

(3) State Department of Transportation Approaches to Climate Change

(4) Transportation Data Input in Climatological Modeling

20. 符合效果的生態工法策略(Geotechnical Engineering Strategies to Meet Effects of Climate Change on Transportation Infrastructure)

討論子題包括:

(1) What Will Happen? Climate Change for Engineering: Evidence of Change and Prediction

(2) What Will It Do? Climate Change Consequences for Infrastructure: Evidence of Change and Prediction

(3) What Can We Do? Balancing Modern Demands of Transportation Infrastructures and Climate Changes

(4) What Is Being Done in Northern Climates? Climate Change: Challenge for Norwegian Roads

(5) How Will We Do It? Managing and Shepherding Strategic Engineering

(6) Panel Discussion

21. 超脫車哩：擴展氣候變遷因應策略評估的工具箱(Beyond Vehicle Miles Traveled: Expanding the Toolbox for Climate Change Measurement Strategies)

討論子題包括:

(1) Measurement Strategies in California

(2) Federal Measurement Perspective

(3) Advanced Measurement Approaches

22. 因應策略的整合(Integration and Co-Benefits of Climate Change Mitigation Policies)

討論子題包括:

(1) Benefits and Unintended Impacts in Benefit-Cost Analysis Accounting

(2) Economic Co-Benefits of Smart Transportation policies

(3) Regional On-Road Vehicle Tailpipe Emissions Modeling and Evaluation for Conventional and Alternative Vehicle Technologies

(4) Win-Win Emission Reduction Strategies: Smart Transportation Strategies Can Achieve Emission Reduction Targets and Provide Other Important Economic, Social and Environmental Benefits

23.Gordon Shunk 的記憶(Memorial for Gordon Shunk)

討論子題包括:

(1) Voorhees/Metropolitan Transportation Commission Years

(2) North Central Texas Council of Governments Years

(3) Texas Transportation Institute Years

(4) Contributions to the Transportation Research Board

(5) Comments from the Audience

24.車輛共乘當作因應策略(Car-sharing as a Climate Change Mitigation Strategy)

討論子題包括:

(1) Assessing Greenhouse Gas Emission Impacts from Carsharing in North America

(2) Carsharing: Urban Climate Strategy in the United States

(3) Role of Carsharing Policy in Greenhouse Gas Emissions

(4) Carsharing in the Twin Cities: Measuring Impacts on Travel Behavior and Automobile Ownership

25. 氣候變遷的效應及其對氣候變遷的影響(Modeling Effects of Climate Change and Things That Affect Climate Change)

討論子題包括:

(1) Review of International Modeling Literature: Transit, Land Use, and Automobile Pricing Strategies to Reduce Vehicle Miles Traveled and Greenhouse Gas Emissions

(2) Application of Activity-Based Model to Evaluate Dynamic Population Exposure to Air Pollution

(3) Adapting Travel Models and Urban Models to Forecast Greenhouse Gases in California

(4) Petrol Consumption and Emissions from Automobiles: Can Policies Make a Difference?

26. 美國 2050 年對應氣候變遷的運輸系統情境(U.S. Transportation System Scenarios Out to 2050 in a World Addressing Climate Change)

討論子題包括:

(1) A 2040 Vision for the I-95 Corridor

(2) Lessons from California¡s Future Transportation Scenarios

(3) How Will We Adapt?

(4) Discussants

27. 貨運的改變：第 1 部分，貨運系統的減碳(Moving Freight Through Global Change, Part1: Hunting for Carbon Reductions in Freight Systems)

討論子題包括:

(1) Evolving Global Maritime Carbon Reduction Contributions

(2) Visualizing a Future Supply Chain with Lower-Carbon Goods Movement

(3) SmartWay Measurement Strategies for Greening the Supply Chain

(4) Carbon Hunting Season Is Open in California: State and Local Perspectives

28.接軌：國際間因應氣候變遷及永續議題的作法(Plugged In: International Approaches to Address Climate Change and Sustainability, Part1)

討論子題包括:

(1) Public Understanding of Climate Change and the Gaps Between Knowledge, Attitudes and Travel Behavior

(2) Better Informed, Better Behaved? Public Attitudes Toward Climate Change and Transport: Empirical Findings from England

(3) Practitioner Concerns Regarding the Implementation of More Sustainable Transport Options in U.K. Cities

29.在因應氣候變遷議題上公共運輸所扮演之角色(Transit¡s Role in Responding to Climate Change)

討論子題包括:

(1) Climate Change and Transit

(2) Quantitative Analysis of Greenhouse Gas Reductions from U.S. Public Transportation

(3) Role of Transit-oriented Development and Planning in Reducing Emissions

(4) Transit Agency Responses: Minimizing the Carbon Footprint of Operations and Construction

(5) Federal Role in Transit¡s Response to Climate Change

30.先進的燃料與車輛(Advances in Alternative Fuels and Vehicles)

討論子題包括:

(1) Early U.S. Market for Plug-in Hybrid Electric Vehicles: Anticipating Consumer Recharge Potential and Design Priorities

(2) Plug-in Hybrid Electric Vehicles¡ potential for Petroleum Use Reduction: Issues Involved in Developing Reliable Estimates

(3) Policies to Promote Plug-in Hybrid Electric Vehicles for Greenhouse Gas Emission Reductions and Oil Displacement

(4) Impact of Battery Weight and Charging Patterns on the Economic and Environmental Benefits of Plug-in Hybrid Vehicles

(5) Effects of Plug-in Hybrid Electric Vehicles on Vermont Electric Transmission System

(6) Integrating Intermittent Renewable Power and Plug-in Hybrid Electric Vehicles in California

(7) Strategies to Achieve California¡s Law Carbon Fuel Standard

(8) Rethinking Hydrogen Fueling: Insights from Delivery Modeling

(9) Use of biodiesel in Railways and Its Impact on Greenhouse Gas Emission and Land Use

(10) Behavioral Response to Hydrogen Fuel Cell Vehicles and Refueling: Comparative Analysis of Short-and Long-Term Exposure

(11) Changes Needed to Enable Use of Hydrogen as Alternative Fuel in Commercial Motor vehicles

31.緩和氣候變遷的評估與政策(Climate Change Mitigation: Measurement and Policies)

(1) Back to Basics: Demand, Supply and Emissions Analysis for Urban Mobility Interventions

(2) Identifying Options for Deep Reductions in Greenhouse Gas Emissions from California Transportation: Meeting 80% Reduction Goal in 2050

(3) Reducing Greenhouse Gas Emissions from Transportation Sources in Minnesota

(4) So You Want to Calculate Your Footprint? Quality of Online Carbon Calculators

32.環境與能源(Environment and Energy)

討論子題包括:

(1) Committee Poster on Environmental Analysis in Transportation

(2) Program-Level Example of Addressing Emerging Issues in Transportation Environmental Analysis: Eastern Corridor Multimodal Project in Ohio

(3) Analysis of PM and NOx Train Emissions in the Alameda Corridor, California

(4) Model for Estimating NOx Emission Reductions After Closing Drive-Through

(5) Multivariate Extreme Value Modeling of Air Pollution Concentrations and Analysis of Traffic and Meteorological Impacts

(6) Energy Use and Emissions Comparison of Idling Reduction Options for Heavy-Duty Diesel Trucks

(7) Investigation of In-Cab Air Quality of Truck at Electrified Truck Stop

(8) Environmental Impact Analysis of Pavement Maintenance Using Life-Cycle Assessment and Micro-simulation

(9) Vehicle Emissions and Level-of-Service Standards: Exploratory Analysis of Effects of Traffic Flow on Vehicle Greenhouse Gas Emissions

(10) Development of Modal Particle Number Emissions Model from Diesel Transit Bus

(11) Predicting Near-Road PM2.5 Concentrations: Comparative Assessment of CALINE4, CAL3QHC, and AERMOD

(12) Evaluation of In-Use Emissions from Refuse Trucks

(13) Energy and Environmental Assessment of High-Speed Roundabouts

(14) Evaluation of the Environment Impacts of Ultrafine and Nano Titanium Dioxide Photocatalyst Coatings for Pavements Using Life-Cycle Assessment

(15) Comparative Study of Diesel Vehicle Emissions Before and After Installation of Diesel Particulate Filter

(16) Practical Approach to Deriving Emissions Factors for China Based on Limited Emissions Data Source

(17) Development and Application of Macroscopic Emissions Model for China

(18) MOVES Versus EMFAC: Comparison of Greenhouse Gas Emissions Using Los Angeles County

(19) Modal Analysis of Vehicle Operation and Particulate Emissions from Connection Transit Buses

(20) Effect of High-Occupancy-Toll Lanes on Mass Vehicle Emissions: Application to I-85 in Atlanta

(21) Development of MOBILE Vehicle Fleet Activity Input Files for Metropolitan Southern Nevada Using Onboard Data Loggers

(22) Environmental Impacts of High-Emitting Vehicles

(23) Effects of Congestion and Road Level of Service on Vehicle Fuel Economy

(24) Improvements to On-Road Emissions Modeling of Freeways with High-Occupancy-Vehicle Facilities

(25) Historic Archaeological Preservation in Transportation Committee

(26) Ranch House Comes of Age: Wisconsin¡s Approach to Surveying the Recent Past

(27) Lemoyne Memorial Park Site: Data Recovery Excavations at a Susquehannock Village

(28) A Very Long TEA Party: Opportunities and Challenges in Using TEA Funds for Roadside Inventory

(29) Mobility and Environmental Responsibility: Caltrans Projects and Resource Stewardship in a Digital Age-GIS, Database, and Management Functions

(30) Cultural Resource Mitigation for Historic Bridge: Spanning the Public Interest Gap

(31) Historic Bridge Practices Nationwide: Inventory, Evaluation, and Management

(32) Meaningful Public Outreach and Involvement in K. K. Kottala, Kurnool District, Andhra Pradesh, India

(33) Delaware Department of Transportation Archaeological Database

(34) Sharing the Past: Public Outreach via Heritage Signage

(35) Wayne Junction Station: Accommodating Project Needs and Historic Preservation Concerns

(36) New York State Department of Transportation and Environmental Sustainability

(37) Development and Use of Emissions Inventories for Construction Vehicles

(38) Forward Path of Construction and Demolition Waste Reuse and Recycling: Market Forces, Regulatory Efforts, and Actions from Construction Stakeholders

(39) Promoting Sustainability Through Educating Undergraduate Students on Applications of Waste Tire Products in Civil Engineering and Transportation

(40) Comparative Life-Cycle Analysis of Brazilian Sugarcane Ethanol and North American Ethanol

(41) Environmental Impacts of a Major Freight Corridor: Study of I-710 in California

(42) Approach to Measure CO2 Emissions of Truck-Only Lanes

(43) Truck Stop Electrification as a Strategy to Reduce Greenhouse Gases, Fuel Consumption, and Pollutant Emissions

(44) Predictive Archaeological Modeling Using GIS-Based Fuzzy Set Estimation: Case Study of Woodford County, Kentucky

(45)Burying the Past: Observations on Unintentional Site Reburial at the Johnson Site, Indiana County, Pennsylvania

33.運輸能源創新(Transportation Energy Innovations)

討論子題包括:

(1) Fuel and CO2 Impacts from Advances Navigation Systems That Account for Road Grade

(2) Automobile Fuel Efficiency Policies with International Innovation Spillovers

(3) Fuel Consumption of Gasoline Vehicles at High Speeds: Field Evaluation and Estimation Method

(4) Estimation of Fuel Efficiency of Road Traffic by Characterization of Vehicle-Specific Power and Speed Based on Floating-Car Data

(5) Diversification in the Driveway: Mean-Variance Optimization for Greenhouse Gas Emission Reduction from Next Generation of Vehicles

(6) Population Density, LDV Miles, Speed, and Time: Implications for Estimation Gasoline Use Versus Density in the United States

(7) Structural Analysis of Vehicle Design Responses to Corporate Average Fuel Economy Policy

(8) Estimating the Effect of urban Density on Fuel Demand

(9) Analysis of Gasoline Demand Elasticity at National and Local Levels in Mexico

34.貨運的改變:第 2 部分,減碳政策(Moving Freight Through Global Change, Part2: Policies to Bag Big Carbon Reductions)

討論子題包括:

(1) Implications of Recent Greenhouse Gas Legislative Proposals on the Highway Freight Industry

(2) Motor Carrier Perspective on Greenhouse Gas Reduction and Sustainability

(3) Assessing the Potential of Carbon Savings in the Freight Transport Sector

(4) Reducing Carbon Emissions in the Transportation Sector: Past Accomplishments, Current Strategies, and Future Challenges

35.在航空規定方面政府部門應有的角色與責任(Roles and Responsibilities of Government Entities on Climate Change Regulations in Aviation)

討論子題包括:

(1) Government Perspective

(2) Airport Perspective

(3) International View

36.接軌：國際間因應氣候變遷及永續議題的作法第 2 部分(Plugged In: International Approaches to Address Climate Change and Sustainability, Part2)

討論子題包括:

(1) Achieving Carbon-Efficient Transportation: Backcasting from London

(2) Implementing Emissions-Based Road User Charging Program: Lessons from London

(3) Grenelle: France¡s Transportation Strategies to Address Climate Change

(4) Sustainable Urban Transport Planning Initiatives in India

37.氣候變遷的適應：我們在嗎?(Climate Change Adaptation: Are We Already There?)

討論子題包括:

(1) Utah¡s Response to Snowmelt Debris Flows in 1983: Climate Change Indicator

(2) Climate Change Mitigation and Adaptation Planning in Rural Alaska

(3) Alaska¡s Climate Change Strategy

(4) Landsides, Rainfall, and Climate Change

38.貨運的改變：第 3 部分，氣候變遷對於實體設施的影響(Moving Freight Through Global Change, Part 3: Effects of Climate Change on the Physical Transportation System-What Are the Risks?)

討論子題包括:

(1) Potential Impacts of Climate Change on Physical Transportation Systems

(2) Canada in a Changing Climate: Adapting to Challenges and Oppunities

(3) Potential Impacts of Global Sea Level Rise on Transportation Infrastructure

(4) Impacts of Climate Change and Variability on Gulf Coast Transportation Systems and Infrastructure

39.氣候變遷與運輸，第 1 部分亞洲的新運輸範例(Climate Change and Transport, Part 1: New Transport Paradigm for Asia)

討論子題包括:

(1) Measuring and Analyzing Transportation to Mitigate Climate Change and Air Pollution

(2) New Development Framework for Dealing with Transport and Climate

(3) Institutional Structures Necessary for Dealing with Transport and Climate Change

(4) Significance of COP Discussions for Transport Financing Under Kyoto Protocol

(5) National Climate Change Plan for India and Transport

40.綜合考量溫室氣體排放的運輸計畫或都會區規劃(Incorporating Greenhouse Gas Consideration into Transportation Project and Metropolitan Planning Requirements)

討論子題包括:

(1) Integrating Climate Change into the Transportation Planning Process

(2) Climate Change and Transportation Strategies in the Metropolitan Washington Region

(3) Addressing Climate Change in the State of Washington

(4) Documenting Climate Change Considerations in National Environmental Policy Act Process for Transportation Projects in Colorado and Utah

41.運輸組織因應氣候變遷的策略(Strategic Response to Climate Change in Transportation Organizations)

討論子題包括:

(1) Challenge of Fragmented Institutions in Addressing Climate Change in the Transportation Planning and Investment Process

(2) Caltrans Response to Climate Change

(3) Framework for Collaborative Decision Making on Additions to Highway Capacity

(4) Climate Change and Transportation: Federal View

42.溫融瀝青(Warm-Mix Asphalt)

討論子題包括:

(1) Field and Laboratory Investigation of Foamed Asphalt with High Recycled Asphalt Pavement Content for Sustainment and Rehabilitation of Asphalt Pavement

(2) Case Study of Warm-Mix Asphalt Moisture Susceptibility in Birmingham, Alabama

(3) Evaluation of Effects of Warm-Mix Asphalt Additives on Properties of Reclaimed Asphalt Pavement Material

(4) Laboratory and Field Evaluations of Foamed Warm-Mix Asphalt Projects

(5) Laboratory Investigation of Moisture Damage in Warm-Mix Asphalt Containing Moist Aggregate

(6) Laboratory Study on CO2 Emission Reductions Through Use of Warm-Mix Asphalt

(7) Influence of Asphalt Mixture Production Temperatures on Surface Properties of Aggregates and Mixture Performance

(8) Field and Laboratory Experience with Warm-Mix Asphalt

(9) Evaluating Effects of Warm-Mix Asphalt Technology Additive Dosages on Workability and Durability of Asphalt Mixtures Containing Recycled Asphalt Pavement

(10) Warm-Mix Asphalt with Low-Dosage Chemical Additives

(11) Laboratory Environmental Assessment of Half-Warm-Mix Asphalt by Factorial Experiment Design Approach

(12) Life-Cycle Assessment of Warm-Mix Asphalt: Environmental and Economic Perspectives

(13) Evaluation of Warm-Mix Asphalt Produced with Double Barrel Green Process

(14) Investigation of Curing Mechanism of Foamed Asphalt Mixes Based on Micro-mechanics Principles

(15) Micromechanics of Effects of Mixing Moisture on Foamed Asphalt Mix Properties

43. 北極海運：挑戰與機會(Arctic Marine Transportation: Challenges and Opportunities)

內容：本場次研討會為一專家座談會。

44. 因應氣候變遷空運設施之衝擊(Impact of Climate Change on Aviation

Infrastructure Adaptation)

討論子題包括:

(1) Overview of TRB Special Report 209: The Potential Impacts of Climate Change on U.S. Transportation

(2) What Does Climate Change Mean for Airport Planning?

(3) What Will Aircraft Look Like Tomorrow and What Will That Mean to an Airport?

(4) Addressing Sustainability in Master Planning Process for Airports: How to Do It and Why

45. 貨運的改變：第 4 部分，供應鍊如何因應油價之遽變(Moving Freight Through Global Change, Part 4: How Supply Chain Respond to Fuel Price Volatility)

討論子題包括:

(1) Design View

(2) Multimodal Carrier View

(3) Site Selection View

46. 氣候變遷與運輸，第 2 部分亞洲的非電動公共運輸(Climate Change and Transport, Part 2: Non-motorized Transport Inclusive Public Transport in Asia)

討論子題包括:

(1) BRT Development in Asia: Moving from Quantity to Quality

(2) Integrating Two-and Three-Wheelers into Urban Transportation systems

(3) Guidelines for Cycling-Inclusive Planning

(4) Improving Pedestrian Facilities and Walkability in Asian Cities

47. 減緩都市熱島效應的鋪面技術與實作(Pavement Technologies and Practices to Mitigate Urban Heat Island Effect)

討論子題包括:

(1) Geospatial Analysis of Remote Sensing Data to Assess Built Environment Impacts on Heat Island Effect, Air Quality, and Global Warming

(2) Strategies for Design and Construction of High-Reflectance Asphalt Pavements

(3) Temperature Behavior of a Pervious Concrete System

(4) Pervious Concrete and Mitigation of the Urban Heat Island Effect

48.發展海、空運部門的溫室氣體清單(Developing Greenhouse Gas Inventories for Aviation and Maritime Sectors)

討論子題包括:

(1) Results of ACRP 02-06: Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories

(2) Port of Seattle Perspective

(3) Climate Registry Protocol for Aviation and Maritime Emissions

(4) Greenhouse Gas Emissions Inventories in Maritime Shipping and Aviation Sectors: Comparative Analysis and Evaluation of Best Practices

49.將氣候變遷因素納入運輸規劃考量：主要議題的反映(Addressing Climate Change Through Transportation Planning: Evolving Responses to a Critical Issue)

討論子題包括:

(1) Integrating Climate Change State and Regional Transportation Plans

(2) Incorporating Climate Change Considerations into the Transportation Planning Process

(3) Cap-and-Trade: Five Implications for Transportation Planners

(4) SB 375: California¡s Response to Climate Change

50.反應油價變化衝擊的旅運行為模式(Reflecting the Impacts of Changing Fuel Prices on Travel Behavior in Travel Models)

討論子題包括:

(1) Challenges of Modeling Travel Behavior Reponses to Rising Fuel Prices in Region of Sacramento, California

(2) Potential User Benefits and Costs of Rising Fuel Prices in the Puget Sound Region

(3) Investigating Impact of Changing Fuel Prices in Maricopa Association of Governments Region and Required Response in Travel Demand Forecasting Procedures

(4) Enhancing Travel Models to Accurately Capture Fuel Price Effects: Challenges, Issues, and Approaches

(5) Discussants

51.道路管理是環境友善嗎?(Are Managed Lanes Environmentally Friendly?)

討論子題包括:

(1) Effects of Managed Lanes on Travel Demand

(2) Investigating Impact of Tolls on High-Occupancy-Vehicle Lanes Using Managed Lanes

(3) Effect of Managed Lanes on Travel Behavior and Greenhouse Gases

(4) Metropolitan Planning Organization Analysis of Managed Lanes and Climate Change

(5) Panel Discussion: Pros and Cons of Managed Lanes for the Environment

52.都會區貨運油料及排碳減量(Freight Fuel and Carbon Reduction in Metropolitan Area)

討論子題包括:

(1) Distribution Operations

(2) Multimodal Operations

(3) Optimizing Drayage in the Urban Environment

(4) Less-Than-Truckload Operations

53.含新車油耗的旅運調查及相關研究(Extending travel Survey Data Utility with Novel Vehicle Fuel Use and Climate Change Research)

討論子題包括:

(1) Opening Remarks: Opportunities and Challenges for Extending Survey Data Utility and Making New Stakeholder Connections

(2) The Blind Cannot Lead the Blind: Data and Analysis Needs on Individual Mobility and Consequences in a Greenhouse-Constrained World

(3) GPS Travel Data: Standard Applications and Considerations for Additional Uses

(4) Applications of Travel Surveys in Vehicle Design

(5) Measuring Real-World Vehicle Activity for Better Estimates of Greenhouse Gas Emissions Under Different Levels of Traffic Congestion

(6) Panel Discussion

54.美國真要管理運輸需求了嗎?(Is American Really Ready to Manage Travel Demand?)

討論子題包括:

(1) What Do We Know About Managing Demand for Urban Travel? What Are the Most Effective Means for Managing Demand?

(2) What Does the Future Hold? Where Should We Be Focusing Our Efforts?

(3) Discussant: View from Street Level- Can We Change Travel Behavior?

(4) What Are the Policy Implications of Managing Demand?

(5) Discussant: Political Perspectives on Managing Demand

(6) Discussant: Overseas View: U.K. Experience and Its Relation to the United States

55.接軌：國際間因應氣候變遷及永續議題的作法第 3 部分(Plugged In: International Approaches to Address Greenhouse Gas Emissions, Part3)

討論子題包括:

(1) Light-Duty Vehicle Fuel Economy, Energy Use, and CO2 Global Trends and Opportunities

(2) Impacts of a CO2 Emission Trading Scheme in German Road Transport: A Microeconomic-Based Analysis

(3) Individual CO2 Emissions and Potential for Reduction in Netherlands and United Kingdom

(4) Determinants of Automobile Use: Comparison of Germany and the United States

56.2030 年的海運(Marine Transportation in 2030)

討論子題包括:

(1) Four Scenarios of Marine Transportation in 2030

(2) Arctic Meltdown

(3) Marine Transportation Governance Challenges

57.大眾運輸扮演的角色：創新的績效評估指標應用(Transit¡s Role in Reducing Greenhouse Gas Emissions: Innovative Applications of Performance Measures)

討論子題包括:

(1) Panel Discussion

(2) Discussants

58.運輸財務與氣候變遷：達環境與財務永續的重要路徑(Transportation Finance and Global Climate Change: Critical Path to Achieving Environmental and Financial Sustainability)

討論子題包括:

(1) Carbon Allowance Auction Revenues: New Funding Stream for Transportation and Greenhouse Gas Reduction Efforts

(2) Authorization, not Reauthorization: Transportation at a Crossroads

(3) Quantifying the Value of Public Transportation in Reducing Greenhouse Gas Emissions in a New Era of Carbon Trading

59.生質燃料，第 1 部分(Biofuels, Part1: The Good, the Bad, and the Ugly)

討論子題包括:

(1) What¡s Good and Bad About Ethanol?

(2) Biodiesel: Opportunities and Challenges

(3) Good or Bad? It¡s All About Land Use

60.氣候變遷對原住民的衝擊(Impacts of Climate Change on Indigenous People)

討論子題包括:

(1) Melting Permafrost and Disappearing Ice Roads: Climate Change Impacts in Alaska Native Communities

(2) How the Tribal Environmental Program Is Working with Climate Change Policies

(3) Climate Change Policies That Affect Indigenous Communities

(4) Climate Change and Its Effects on Freight Transportation Issues

61.愈來愈冷：不同運輸策略在降低溫室氣體排放的有效程度 (Moving Cooler: How Effective Are Different Transportation Strategies in Reducing Greenhouse Gases?)

討論子題包括:

(1) Building Collaboration on Climate Change and Transportation

(2) Moving Cooler: Preliminary Findings

(3) Implications of Moving Cooler for State Departments of Transportation

(4) Moving Cooler: How Can IT and Operations Strategies Move Us Forward?

(5) Federal Perspective: How Does Moving Cooler Inform Federal Policy?

62. 氣候變遷與永續鋪面的管理與設計(Climate Change and Design and Management of Sustainable Pavements)

討論子題包括:

(1) Pavements in a Changed Climate

(2) Greenroads: Sustainability Rating System for Roadways

(3) Rigid Pavement Recycling for Reduced Carbon Footprint

(4) Pavement Recycling and Reuse: Flexible Pavements

(5) Sustainable Pavement Research Programs: Rigid pavements

(6) Sustainable Asphalt Pavements: Research to Build on Our Successes

(7) Pavements and the Urban Heat Island Effect

(8) State Perspective on Pavements and the Environment

(9) International Perspective on Pavements and the Environment

(10) Green Highways Perspective

63. 因應能源價格與氣候變遷的行為因素(Behavioral Considerations in Response to Energy Prices and Global Climate Change)

討論子題包括:

(1) Designing and Implementing Test of Behavioral Response to Personal Carbon Trading and Carbon Taxes

(2) Fuel Costs, Circulation Taxes, and Car Market Shares: Implications for Climate Policy

(3) Shifting Toward Environment-Friendly Modes: Profiling Travelers Using Q-methodology

(4) Psychological Analysis of Acceptance of Pro-environmental use of the Automobile: Cases for Carsharing and Eco-car

(5) Traveled Distance, Stock and Fuel Efficiency of Private Vehicles in Canada: Price Elasticities and Rebound Effect

3.5 技術交流活動

本次參加 TRB 年會較為特殊的是與 TFHRC (Turner-Fairbank Highway Research Center, FHWA)之技術交流活動（Technical Information Exchange between U.S. and Taiwan on Transportation Safety and Traffic Operations），內容包括上午的技術交流會議與下午的 TFHRC 研究中心參訪活動等兩部分，在上午的的技術交流會議中，我方由臺灣大學土木工程學系張學孔教授主講我國 ITS 發展近況，以及成功大學交通管理系胡守任助理教授說明國內運輸安全相關課題，美方則由三位資深研究人員報告該國在交通運作與運輸安全等相關研究課題，雙方進行深入且廣泛的專業知識交換，議程詳表 3.3。下午則分別參訪運輸模擬實驗室、交通運作實驗室、車輛碰撞實驗室、基礎設施實驗室等單位，進一步了解該中心在運輸安全與交通管理相關議題的實驗成果。我方參與人員包括臺灣大學張學孔教授、中央警察大學曾平毅教授、逢甲大學劉霈教授、長榮大學呂錦隆教授，以及兩位碩博士生、三位廠商代表共十位。美方則由 TFHRC 交通運作辦公室主人 Joe Peterson 博士領銜，包括五位資深研究員共同與會。本次活動有賴該中心楊正義博士(Dr. David C.Y. Yang)的悉心安排，使本次活動得以順利完成，具體成果為增進彼此在交通運輸相關研究的瞭解與資訊交流。

圖 3.2 技術交流會後合影

表 3.3 技術交流活動內容

時間	1/15/2009
地點	Marriott Wardman Park Hotel, Room 4300 (Wardman Tower) & Laboratories at Turner-Fairbank Highway Research Center
議　程	
9:00 AM	Technical Information Exchange ▪ Welcome & Introduction ▪ FHWA¡s Research Activities in Traffic Operations & Simulation ▪ FHWA¡s Research Activities in Transportation Safety ▪ Taiwan¡s Transportation Research Activities ▪ Q&A
11:00AM	Break/Individual Lunch Time
11:45AM	Courtesy shuttle to TFHRC
12:15PM	Shuttle arrives TFHRC
12:20PM	Tours of the TFHRC Laboratory ▪ Overview ▪ Human Centered Systems Laboratory ▪ Traffic Research Laboratory ▪ Federal Outdoor Impact Laboratory ▪ Structures Laboratory
2:10PM	Courtesy shuttle back to Marriot Wardman Park Hotel

四、考察紀要

4.1 華府捷運系統

本年會會場之二，Marriott Wardman Park Hotel 及 Omni Shoreham Hotel 剛好位於華盛頓地區捷運系統紅線的「Woodley Park-Zoo」站附近，基本上相當方便。整個華盛頓地區的路網圖如圖 4.1 所示，一共有紅(Shady Grove ~ Glenmont)、橘(Vienna/Fairfax-GMU ~ New Carrolton)、黃(Huntington ~ Gallery Palace/Chinatown)、藍(Franconia-Springfield ~ Addison Road/Seat Pleasant)及綠(Branch Ave. ~Greenbelt)等五線，各路線間設有八個轉運點，可以方便的轉乘於各路線間；路線上亦設有 Park and Ride 的停車場與大眾運輸轉運站(MARC)，其中市區中心的聯合車站(Union Station)為一與區域通勤鐵路銜接之車站，整個路網如圖 4.2 所示。對於搭乘飛機到華盛頓特區的旅客，藍線與黃線均設有雷根國家機場(Ronald Regan National Airport)站，如圖 4.3，圖 4.4 為 TRB 會場進出車站，捷運站與機場間以一空中走廊相連接，相當方便。

圖 4.1 華府捷運系統

圖 4.2 DC 捷運系統之 Park and Ride 停車場與大眾運輸轉運站

圖 4.3 DC 捷運系統 Ronald Regan National Airport 站

圖 4.4 DC 捷運系統 TRB 會場 Woodley Park Zoo 站

4.2 舊金山

舊金山捷運系統（San Francisco Bay Area Rapid Transit District，BART）為舊金山地區最重要之大眾運輸系統，主要解決灣區內各城市間（如舊金山、奧克蘭、柏克萊等）的運輸需求，此外尚有連接舊金山國際機場、奧克蘭國際機場的機場客運（AirBART）。路線全長 167 公里，設有 43 座車站，軌距為寬軌，寬 1.676 公尺。最高營運速度為 128 公里/小時，全線平均營運速率約為 53 公里/小時。

共有 5 條路線，而有部分路線在同一路軌上有分支線。各線的班次均是平日每 15 分鐘一班，周末及假日約 20 分鐘一班。因有部分車站同時有 4 線可到達，因此每隔 3-4 分鐘即有一班列車到達。

自 2008 年 1 月起, BART 的行駛路線如下：

Richmond - Millbrae Line；Fremont - Daly City Line；Richmond - Fremont Line ；Pittsburg/Bay Point - SFO Line ；Dublin/Pleasanton - Millbrae Line

表 4.1 BART 相關營運資料

項目	數量
1.2008 年營運預算	$6.74 億元
2.平均平常日乘客數	357,775 人次
3.總路線數	5 條
4.車輛數	647 輛
5.車站數	43 站

資料來源：BART 網站。

本次行程在舊金山只停留一天，但體驗到：(1)國際機場三個航廈間的環狀(loop type)雙向（順時針運轉與逆時針運轉）運人系統（圖 4.6），相當便利，可讓旅客很快的在各航廈間轉乘。(2)舊金山的捷運系統 BART 已經延伸進入國際機場，往返市區與機場，亦相當便利。(圖 4.7)(3)舊金山街頭有許多自行車騎士，不見得均有良好的安全設備（例如頭盔、燈光等），但數量不少，是否是節能減碳的策略獲得民眾支持，仍有待觀察。

圖 4.5 舊金山灣區捷運路網圖

資料來源：http://www.bart.gov/stations/index.aspx

圖 4.6 舊金山機場內部之運人系統

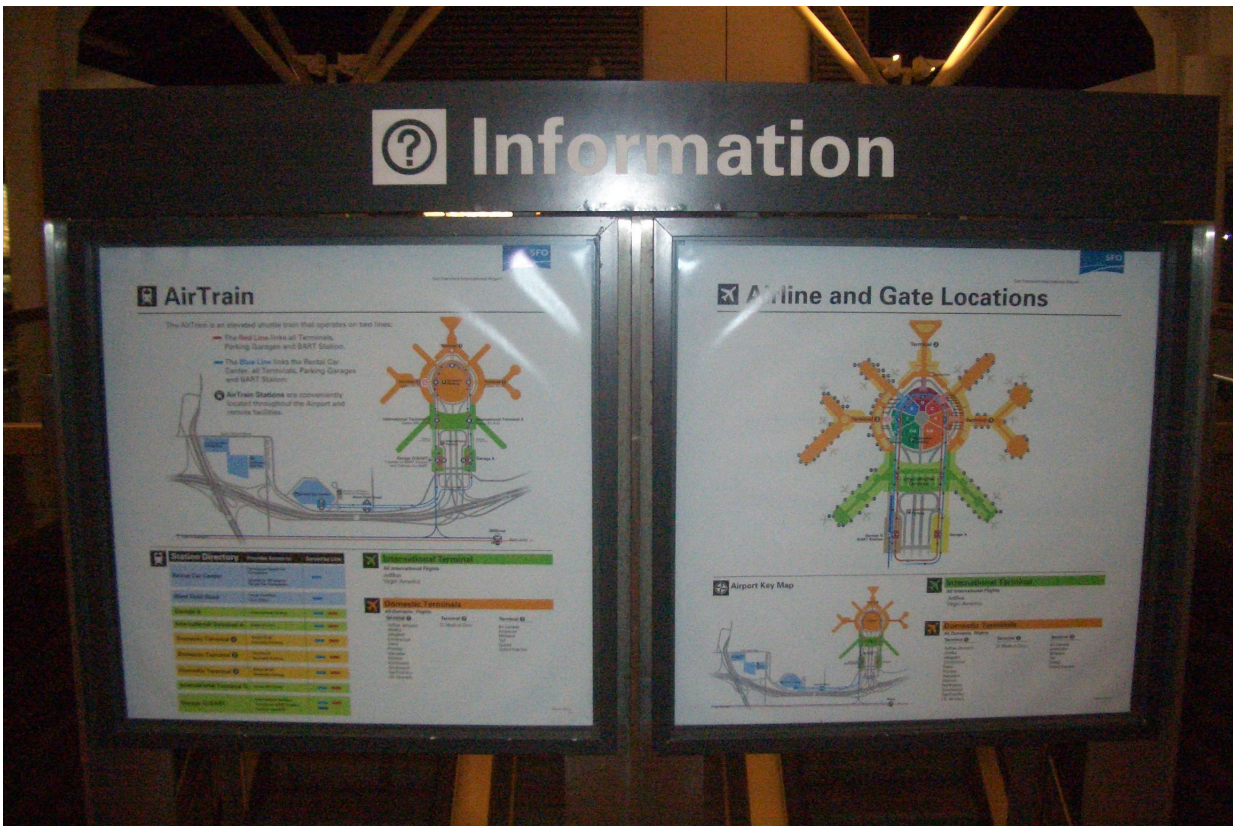

圖 4.7 舊金山機場配置圖

圖 4.8 舊金山路旁之機車停車位

五、心得與建議

心得：

1. TRB 為美國政府運輸部門所強力支持的學術研究團體，學會每年年會均會吸引美國國內外數以千計的運輸領域產、官、學、研單位人員與會，對於研究心得交換與新觀念與思維啟發有相當的助益。
2. 年會發表的論文範圍極廣，數量更多；於有限的時間內要造訪各個會場，實為一項不可能的任務。由於論文數量太多，近年來均已不印製書面之論文集，欲有效率的獲得進一步的資訊，可藉由年會所發的資料光碟印製相關的論文全文，以進一步了解其內容；另外於會場與作者作當面的溝通，並交換日後的聯絡資訊也是有效的方法。
3. 華府及舊金山兩大都市都有相當便捷的軌道運輸系統提供服務，對外來客而言，連接機場的捷運線，及主要車站（如華府聯合車站）可輕易地銜接區域鐵路系統等，非常便利，值得參考學習。
4. 本次參加 TRB 年會較為特殊的是與 TFHRC 之技術交流活動 (Technical Information Exchange between U.S. and Taiwan on Transportation Safety and Traffic Operations)，也了解目前美國在關於交通運作與模擬及運輸安全等議題上的研究重點。
5. 本次年會中，針對焦點議題各與會者所提因應氣候變遷議題，運輸界目前相關的努力與經驗，對於國內運輸部門在面對這些議題時，提供了一些思考方向，具有相當之參考價值。

建議：

1. 為了維持相關研究不至於中斷或與主要先進研究脫軌，建議政府部門仍宜於經費許可情況下，盡量派員參加。
2. 本次年會焦點議題中所提，運輸部門因應氣候變遷之相關議題與經驗非常值得參考，其中所提有關的策略與經驗資料，目前尚未納入研討會光碟論文中，建議後續可蒐集 TRB 於今年下半年出版的相關論文集，以深入了解此部分之內容。
3. 年會期間所舉辦的各展覽攤位，均大量提供相關研究成果之書面報告、論文集以及資料光碟，建議國內與會者務必參訪，一定可以獲得

許多寶貴之資料。

4.美國之 Highway Capacity Manual（公路容量手冊）向來是公路容量與服務水準分析之重要工具，目前正編定 2010 年版本。此次與 TFHRC 的技術交流座談另外得知，美國 FHWA 正編寫 Highway Safety Manual（公路安全手冊），以作為公路安全改善與評估之用，建議交通部及國內學術界密切注意其出版情形。