



IPWEA National Study Tour 2004.

“Quality and Innovation”

Report to IPWEA NSW Foundation

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Introduction

This report is presented by Richard Jane, Executive Engineer, Inverell Shire Council to the NSW Foundation of the Institute of Public Works Engineering Australia (IPWEA).

The report is the findings of the study tour of the United States, specifically the American Public Works Association (APWA) congress and exhibition, American Association of Architects conference and visits to the City of Campbell, City of Santa Cruz, City of San Louis Obispo and the County of San Louis Obispo. The APWA congress was held in Atlanta Georgia, the Architects conference was in New York and all the councils visited are on the west coast of the United States, in the State of California.

The tour group was made up of the following people:

Chris Champion	IPWEA NSW CEO (Tour Leader);
Ian Paterson	Vinidex QLD;
David Richardson	City of Casey, Victoria;
Paul Di Iulio	City of Campbelltown, South Australia;
Harry Galea	North Midlands Council, Tasmania;
Dennis Blair	City of Wanneroo, Western Australia;
Richard Jane	Inverell Shire Council, New South Wales.

For the first time, the tour group represented every state in Australia. All participants are qualified civil engineers but are from varying backgrounds being private industry, large city councils, small rural council, medium rural council and large coastal council.

The United States is very similar in a lot of ways to Australia, particularly when you see hundreds of eucalypts lining streets of many of the Californian cities. In stark contrast is the political environment, which is capitalism in its purest form.

The US has four tiers of government being Federal, State, County and City. The State Governments are the most powerful in the determination of legislation and thus the rules by which the underlying levels of government must operate. On the tour a comment was made by a senior US government official that “the United States was built on the distrust of government”. Whether the comment is justified or not, evidence of this can be seen written into state legislation whereby contracting out capital works projects is, in most cases, compulsory and hence the various government authorities have never equipped themselves to undertake anything more than maintenance works. The result of this is that the typical municipal form of works that are undertaken, are much more expensive than what an Australian local government authority undertaking their own works would achieve. I wonder if any American people realise the ambiguity this creates, because the legislation has in fact eroded the democratic right of the people to choose how capital works are carried out.

My own interest in this tour mainly focussed on finding innovations in a quality assurance environment, mainly roads capital works projects. Techniques used are very similar to those used in Australia to manage the quality assurance contracts and determine quality outcomes. Ninety-six percent of all sealed roads in the US are asphalt, so looking for innovation was limited to this type of work, but the study tour and this report also explored innovation and quality generally, in a Local Government environment.

I extend my immense appreciation of the NSW IPWEA Foundation for allowing me this opportunity and also to Chris Champion for his amazing flawless ability to put the trip together and keep it together throughout.

Pavement Preservation Techniques

Source: Paper presented at APWA Conference, Atlanta Georgia September 2004

by Bob Dalton, Koch Materials Company US. www.kochmaterials.com

In the United States, 96% of paved roads are surfaced with Asphaltic Concrete (AC). Portland Cement Concrete (PCC) Pavements are also widely used as pavement and wearing courses for urban and rural roads. The preservation of the AC and PCC surface has required innovation through improved asset management, improved material technology and improved application methods.

The focus on innovation in pavement preservation is directed toward the use of preventative maintenance because it is widely recognised that corrective maintenance is the more expensive option.

This has encouraged advances in technology in the following areas:

- polymer modified asphalt binders with lower temperature susceptibility and improved elasticity and durability,
- new asphalt emulsion chemistries to improve timed cures and improve adhesion, workability, coating and durability.
- improved aggregate tests and specifications aimed at durable performance
- improved construction equipment to obtain higher quality construction
- new performance related tests and specifications to meet performance expectations

The outcome of the improvements in technology is treatments such as Micro-Surfacing, Macro-Surfacing and Ultra-thin Bonded Wearing Course surfacing.

Micro Surfacing is very similar to a slurry seal, but uses a polymer-modified cationic emulsified asphalt and aggregate between 6.3 and 9.5mm, whereas a slurry seal uses standard cationic emulsified asphalt and a finer aggregate (less than 6.3mm). The micro-surfacing provides extra value because it is not only used as a sealant, but also for surface texturing and rut filling of the pavement.

Macro Surfacing is specialised open-graded cold mixed asphalt applied using a synchronised continuous application of ultra-fast polymer asphalt emulsion and single sized durable aggregate. The system uses a purpose built mixer box mounted on a truck similar to slurry sealing, but the product similar to hot mix asphalt in texture.

Macro-surfacing extends pavement life by protecting and preserving it from oxidation and wear. It results in a pavement that is quiet, better to drive on and requires less maintenance. Crumb rubber modification within the asphalt binder prior to emulsification and also post addition can be used to impart special properties for severe applications and crack retardation.

Ultra-thin Bonded Wearing Course (UTBWC) Surfacing is a gap-graded, polymer modified Hot Mixed Asphalt placed on a heavy, polymer modified emulsified asphalt membrane with a single machine. Products such as Nova Chip, which can be sourced in Australia, are economical as compared to conventional asphalt surfacing, have a high standard of surface texture giving good skid resistance and reduced water spray, have reduced noise levels compared to dense graded asphalts and sprayed seals, good ride qualities, are flexible and tolerant to surface deflections, assists water proofing of underlying surface, reduces the need for cold planing to match adjoining surfaces and does not leave loose aggregate on completion as does sprayed seals.

The UTBWC surfacing is particularly useful as an overlay for Portland Cement Concrete Pavements because it protects the construction joints, prevents moisture intrusion and protects early cracking in Continuously Reinforced Concrete Pavements (CRCP).



Micro-surfacing



Macro-Surfacing



UTBWC Surfacing

Pavement Lifecycle Management

Source: Paper presented at APWA Conference, Atlanta Georgia September 2004

by Post, Buckley, Schuh and Jernigan Inc. (PBS&J). US. www.pbsj.com

Cobb County, Georgia embarked on an innovative system to undertake Pavement Life-Cycle Management (PLCM) of their Asphalt Road network. They maintain approximately 8500 streets and self fund 60% to 65% of their resurfacing projects, which amount to between \$3 million and \$4 million US per annum. Initially they designed and built the PLCM system in-house but have recently outsourced to PBS&J to rewrite the required software.

It was recognised that poor management of the asphalt road network in Cobb County would result in a sharp decline of the condition of the road after ten years, with full failure of the pavement in fifteen years. The cost to repair the pavement would be in the vicinity of 400% of the cost of preventative maintenance that would keep the pavement in a fair to good condition. Further to this, the pavement can be maintained to a fair condition for a period approaching twenty five years.

The construction of the PLCM system required the integration of databases, GPS technology and cutting edge pavement management technology. The system was then designed to provide a systematic and consistent method for selecting maintenance needs, determining priorities, optimal timing of repairs, prediction of pavement failures and therefore reducing repair costs.

The PLCM process is a four step process as follows:

Step 1. Data Collection.

Inventory Information

- road inventory information such as segments
- functional class
- overall length and width

Daily Maintenance Records

Pavement Distress

- cracks
- rutting
- sag
- swell

Other Evaluation Factors

- Road Crown
- Superelevation
- Kerb and Gutter
- Drainage Conditions
- Footpaths
- Guardrail

Step 2. Evaluation Process.

The road is rated based on the inventory data collected. A condition rating and cost estimation is then carried out to determine if the road needs any corrective or preventative maintenance.

Because asphalt is a manufactured product, the PLCM system can be calibrated using historical data to determine pavement performance under varying conditions, such as traffic counts and sub-grade CBR.

An analysis is carried out on the best course of action. If the pavement condition is rated as good the matter is referred to the maintenance department for minor repairs or preventative maintenance. If the pavement condition is rated as poor, the county applies to the state for funding assistance to repair the road.

The real ingenuity of the PLCM is the data management, where historical pavement data, historical maintenance activity data are analysed along with construction and maintenance cost data as well as pavement design and material data.

When the number crunching is done a decision report is generated, providing economic and life cycle cost analysis based on selected treatments. To do this the PLCM forecasts long term pavement performance based on historical data based deterioration curves of roads with similar traffic and physical characteristics.

Step 3. Fund Procurement.

The roadway condition report and cost estimate is sent with a request for funding to the state. The state evaluates the submission and if the application is successful, funding is made available to the county.

Step 4. Execution.

Contracts are prepared and let. The works are carried out and the county is reimbursed by the state after producing monthly reports and progress claims.

New Innovations to Shape Transport

Source : Paper presented at APWA Conference, Atlanta Georgia September 2004

by Francine Shaw-Whitson, United States Department of Transportation, Federal Highway Administration, Office of Asset Management www.fhwa.dot.gov/construction/accelerated/index.htm

Accelerated Construction Technology Transfer (ACTT)

A major innovation developed by Transportation Research Board and implemented by The United States Department of Transportation, Federal Highway Administration (FHWA) is the ACTT, which is a process that uses various technologies and techniques to reduce construction time while enhancing safety and quality.

ACTT is a project specific 2-day workshop teaming up 20-30 national experts representing eleven skill sets to facilitate the evaluation of all facets of the project to identify ways to help achieve projected goals/objectives, primarily reduction of construction time. The primary objective of the ACTT initiative is to share national knowledge and expertise to demonstrate a new approach to highway construction and ultimately, promote the accelerated construction concept. The workshop is funded by FHWA and American Association of State Highway and Transportation Officials (AASHTO).

The skill sets represented at the workshops are as follows:

- Innovative Financing
- Right of Way/ Utilities/ Railroad Coordination
- Geotechnical/ Materials/ Accelerated testing
- Traffic Engineering/ Safety/ Intelligent Transportation Systems (ITS)
- Structures (Bridges, Retaining Walls, Culverts, Miscellaneous)
- Innovative Contracting
- Roadway/ Geometric Design
- Long Life Pavements/ Maintenance
- Construction (Techniques, Automation and Constructability)
- Environment
- Public Relations

Methods such as pre-casting, prefabrication and off-peak erection of bridge components along with optimising completion of secondary activities such as utility relocations, retaining walls, noise walls, and other off-line work which will restrict traffic flow are carried out outside of mainline activities to minimise the construction impact on the travelling public.

To minimise construction times, various methods are implemented, such as overlapping design with construction, innovative contracting methods such as incentive schemes and the use of accelerated materials testing methods such as maturity meter, air void analyser and ground penetrating radar. Also allowing contractors input into design elements that would impact time or quality during construction, can improve the effectiveness and efficiency of the overall project completion.

Transportation Management Systems (TMS), work zone traffic impact analysis softwares such as Quickzone, ITS, motorist advisory system (VMS), websites and media releases are utilised to both keep vehicular movement through the worksite at an optimum level and keep the travelling public informed about changes in the road environment and the effect this may have on travel times, so travellers can plan their trip around the impact the works may have on travel times.

To ensure an efficient ACCT workshop the road authority is required to identify overall corridor goals, objectives, urgency and needs. Goals should be clear, bold and attainable. Further to this a determination needs to be made on the impacts on the travelling public, business, development work etc for the years the project would be under construction. The skill set is then assembled from a 179 member national resource pool to brainstorm design and construction aspects of the project. Each skill set will have 2 to 3 national experts teaming with 2 to 3 local participants, including private sector members as appropriate. As part of the invitation selection process, the role local industry will play in the project is considered and representatives included in the workshop where appropriate.

Project where ACTT has been used:

- **Indiana** – 12-mile stretch of I-465 from SR-67 to 56th Street in Indianapolis. \$400 million project consisting of expanding six lanes to 8 or 10 lanes with 8 interchanges six bridges, and nine overpasses. Reduced construction time from 6-9 years to only 3 years.
- **Pennsylvania:** Upgrade 2-mile stretch of SR-28 in Pittsburgh. Brought 4-lane highway up to current design standards and reconstructed 2 interchanges. Consists of 21 bridge structures, 18 miles of retaining wall and 8 rock fall fences. Project construction time reduced from 4 to 2 years with only one year in traffic.
- **Dallas:** Project Pegasus – Reconstruction of Dallas Interstate: \$760 million project in 4 years instead of 7 years.
- **New Jersey:** Overpeck Creek Bridge \$10 million project reduced to \$3 million with a construction time of 3 months.
- **Montana:** Missoula: \$100 million project with construction time reduced from 5 years to 3 years.

Trends in Bridge Design and Construction

Source: Paper presented at APWA Conference, Atlanta Georgia September 2004

by Mir H. Ali, P.E. Mactec Engineering and Consulting, Inc www.mactec.com

Developments in Bridge Design

In 1994 the American Association of State Highway and Transportation Officials (AASHTO) published the first addition of the Load and Resistance Factor Design Specifications (LRFD). The second and third editions were published in 1998 and 2004 respectively and the deadline for all State Department of Transport (DOT) to fully adopt LRFD is 2007.

The LRFD defines four limit states that the design must satisfy to achieve safety, serviceability, and constructability. The four limit states are :

1. Service Limit State – imposes restrictions on stress, deformation and crack width under service conditions, which ensures elastic behaviour and little need for maintenance during the service life of the structure.
2. Fatigue Limit State – imposes restrictions on the stress range resulting from a design truck moving across the bridge and causing a given number of stress cycles which ensures there are no permanent fatigue cracking or failure of any members in the structure.
3. Strength Limit State – stipulates the strength and stability requirements to resist the specified statistically significant load combinations expected to be experience by a bridge over its design life which ensures adequate ultimate load capacity.
4. Extreme Event Limit State – ensures the structural survival of a bridge during a major earthquake, flood, and scour or when collided by a vessel, vehicle or ice flow.

The limit states serve as a systematic approach to structural design to ensure trouble-free, short and long term performance of bridges.

DEVELOPMENTS IN MATERIALS

High Performance Steel

- yield strength between 70ksi (483MPa) and 120ksi (827MPa)
- low carbon and carbon equivalent for weld-ability and ease of fabrication
- high levels of fracture toughness
- adequate elongation and yield to tensile strength ratio for ductility
- corrosion resistant, superior weathering steels currently used in highway bridges

High Performance Concrete

The comparison between conventional and high performance concrete is as follows :

Parameters	Conventional Concrete	High Strength Concrete	Very High Strength Concrete	Ultra High Strength Concrete
Strength	<7250psi (<50MPa)	7250 – 14500psi (50 – 100MPa)	14500 – 21750psi (100 – 150MPa)	> 21750psi (> 150MPa)
Water – Cement Ratio	> 0.45	0.45 – 0.30	0.30 – 0.25	< 0.25
Chemical Admixtures	Not Necessary	High Range Water Reducing Admixture (WRA)	High Range Water Reducer	High Range Water Reducer
Mineral Admixtures	Not Necessary	Fly Ash	Silica Fume	Silica Fume
Permeability Coefficient	> 10^{-10}	> 10^{-11}	> 10^{-12}	> 10^{-13}
Freeze – Thaw Protection	Needs Air Entrainment	Needs Air Entrainment	Needs Air Entrainment	No Freezable Water

In order to achieve the high performance characteristics of the concrete the following developments are used :

Cement

- Finely Ground Portland Cements such as Type III High Early Strength
- Particle Size Distribution 20 μ m to 2 μ m

Course Aggregate Properties

- Aggregate Strength
- Bond Strength
- Absorption Characteristics

Fine Aggregate Properties

- Shape and Texture of Fine Aggregate
- Grading
- Uniformity of grading from batch to batch

DEVELOPMENT IN CONSTRUCTION TECHNIQUES

Spliced Girder Technique

The award winning Riverside Bridge over Skagit River in Washington utilised High Performance Concrete, but was also one of the first bridges built in the United States using the spliced girder technique.

The bridge is three spans of 180ft (55m) and two spans of 150 feet (46m).

The girders for the bridge were precast and pre-tensioned, off-site, in three sections using 10,000psi (70MPa) High Performance Concrete. The girders were then spliced on site using 7500 psi (52MPa) concrete and post-tensioned on site. Once cured the completed girder was erected.



Girder Being Spliced On-Site



Spliced Girder Being Placed



Completed Riverside Bridge over Sagit River, Washington

Joint-less and Integral Abutment Bridges

Joint-less bridges are a concept gaining acceptance in the United States because they are proving to significantly reduce maintenance of bridges and are cheaper to build than conventional expansion joint bridges.

The main maintenance issue that the joint-less bridge overcomes is the leaking of expansion joints and seals that permit salt-laden run-off water from the roadway to attack the girder ends, bearings and supporting reinforced concrete structures. Also, elastomeric glands get filled with rocks trash and dirt and ultimately fail to function.

Integral abutment and joint-less bridges are simpler to design because where abutment and piers of a continuous bridge are supported by a single row of piles attached to the superstructure, or where self-supporting piers are separated from the superstructure by movable bearings, an integral bridge may, for analysis and design purposes, be considered a continuous frame with a single horizontal member and two or more vertical members.

The construction of the integral abutment and joint-less bridge is very rapid because only one row of vertical piles is used, meaning fewer piles and the back wall of the abutment can be cast simultaneously. Fewer parts are required, expansion joints are not needed and the normal delays associated with joint installations, adjustment and anchorages are eliminated.

The Bridge over Happy Hollow Creek on Route 50 in the State of Tennessee is the longest totally joint-less, integral abutment bridge in the United States.

The bridge is 1175ft (358m) long, 46ft (14m) wide, with a 4 degree, 45 minute curve constructed with precast pre-stressed bulb tee girders with spans from 129ft (39m) to 140ft (42.7m).

Precast Concrete Bridges

The use of precast sections for almost every component of a bridge is emerging as a popular choice for bridge construction in the United States, for the following reasons :

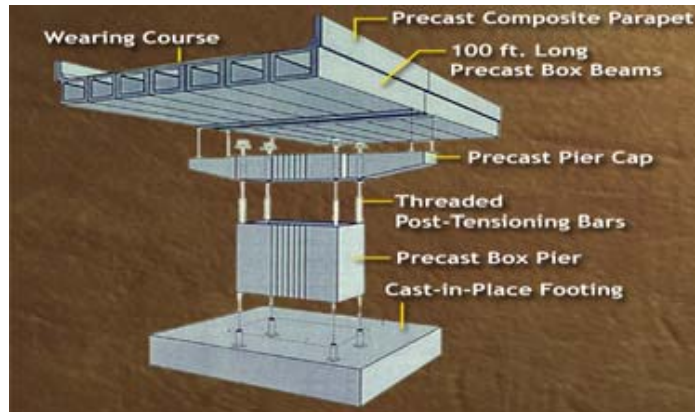
- reduction in the duration of work zones
- reduced traffic handling costs
- reduced accident exposure risks
- less inconvenience to the travelling public
- fewer motorist complaints

There are several benefits for the construction contractors also, which includes :

- more work in less time

- reduced exposure to hazards
- fewer weather delays
- lower costs
- less skilled labour

The Texas Department of Transport has constructed several bridges with segmental precast concrete piers. The piers are hollow and some are made of high performance concrete and are post tensioned once assembled.



Typical Precast Components of a Totally Precast Solution



Precast Concrete Abutment



Segmental Precast Concrete Pier



Precast Concrete Tub Girders in Place

InfraGuide

Source: Paper presented at APWA Conference, Atlanta Georgia September 2004

by Sylvain Boudreau, Technical Manager www.infraguide.ca

Infraguide is the National Guide to Sustainable Municipal Infrastructure and is a joint project of Infrastructure Canada in conjunction with the Federation of Canadian Municipalities and the National Research Centre.

Infraguide was created in response to the realisation by many of the government authorities that the Canadian infrastructure was ageing and required a consistent and sustainable approach to manage the upkeep and renewal of the infrastructure.

It is a very innovative way of sharing industry knowledge in a coordinated and cooperative way between agencies. There are over 1000 municipalities that are current members.

Guidelines for the development of best practice manuals focus on health and safety, cost, recycling and risk management while utilising a transparent consultative process. Guidelines also address life cycle costs in relation to social, environmental and economic factors.

A set of best practice manuals were created and are currently available for the following topics :

◆ **Decision Making and Investment Planning**

- Planning and Defining Municipal Infrastructure Needs
- Developing Indicators and Benchmarks
- Alternative Funding Mechanisms
- Coordinating Infrastructure Works
- Investment Parameters for Municipal Infrastructure

◆ **Potable Water**

- Deterioration and Inspection of Water Distribution Systems
- Water Use and Loss in Water Distribution Systems
- Selection of Technologies for the Rehabilitation or Replacement of Sections of a Water Distribution System

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- Water Quality in Water Distribution Systems
 - Establishing a Metering Plan to Account for Water Use and Loss
 - Developing a Water Distribution System Renewal Plan

◆ **Storm and Wastewater**

- Selection of Technologies for Sewer Rehabilitation and Replacement
- Inflow/Infiltration Control/Reduction for Wastewater Collection Systems
- Source and On-line Controls for Municipal Drainage Systems
- Wastewater Source Control
- Investment Parameters for Municipal Infrastructure
- Bio-solids Management Programs

◆ **Roads and Sidewalks**

- Timely Preventative Maintenance for Municipal Roads – A Primer
- The Construction of Utility Boxes in Pavements
- The Restoration and Repair of Utility Boxes in Pavements
- Guidelines for Sealing and Filling Cracks in Asphalt Concrete Pavement
- Rut Mitigation Techniques at Intersections
- Priority Planning and Budgeting Process for Pavement Maintenance and Rehabilitation
- Road Drainage, Design Alternatives and Maintenance

◆ **Environmental Protocols**

- Strategic Commitment to the Environment by Municipal Corporations
- Accounting for Environmental and Social Outcomes in Decision Making

◆ **Multidiscipline**

- Best Practices for Utility-Based Data

-
- An Integral Approach to Assessment and Evaluation of Municipal Road, Sewer and Water Networks.

Infraguide is currently in the second stage of development and when complete in march 2005 will have 50 best practice documents available. Once funding from Infrastructure Canada is secured the third stage will commence in the development.

COUNCIL VISITS

Tuesday 7th September 2004.

Visit to Campbell City Hall

www.cityofcampbell.com

The tour group attended the Management Team meeting of Campbell City. In attendance were the General Manager, Director Public Works, Director Corporate Services, City Solicitor and City Engineer.

Campbell City has a population of 39300, covers an area of six square miles and the mean income is \$80,000 US (\$108,000 AUS).

City Assistance for First Home Buyers

The city offers silent second mortgages for first home buyers. There is no interest applied to these loans and no payments are required on the capital. In return, the city benefits from the appreciation of the property, based on the proportion of capital contributed by each party at the date of the execution of the mortgage.

These mortgages are organised through the local banks and are asset tested to ensure that the neediest benefit from the initiative.

The initiative is designed to allow low-income earners the opportunity to have some form of permanency in the bay area, which is quite expensive and may otherwise be unattainable.

Compulsory Acquisition of Under-developed Land.

Under Californian Law, local authorities can compulsorily acquire under-developed land to allow the land to be developed by another party.

Say, a shop owner has not maintained their property to a standard consistent with other properties in the immediate vicinity, the local authority has the legislation to acquire that property, subject to a fair valuation of the property being undertaken and compensation paid to the owner.

The acquired property is then sold to a developer who will develop the land to a standard agreed upon with the local authority.

Risk Management

The City of Campbell is “self-insured” up to \$100,000 US, for claims against it. Any amount above this is paid by the insurance company.

Risk management is carried out by consultants. The consultants advise the City on how to minimise risk to the City by inspecting City assets when contracted to do so. Regular inspections of City assets, such as playgrounds, are not carried out.

Under Californian law, risk management by conducting regular inspections does not provide any form defence in the event of a claim going to court.

Most Cities and Counties have a contract solicitor, who spends 3-4 days per week as an employee.

Public Works Projects

Campbell City undertakes all survey and design of Capital Works Projects in-house. This was not always the case. Some years ago, on realising that it would be significantly cheaper to do this work in-house the City recruited young engineers, both male and female to do this work.

Survey is carried out using Trimble GPS Survey Equipment, which is ideal for any survey within a five-mile radius of the base station. The system has a base station at a fixed location, which is connected by 2-way radio to the mobile survey equipment. The fixed base station allows any reading taken to be correlated to the base station and any errors, normally experienced with GPS, to be corrected.

Once the design has been completed and all related aspects such as public exhibition and environmental impacts have been assessed, the project is put out to public bid. The structure of Californian law, and laws in most other states, the authority putting up the bid is obliged to accept the lowest bidder, regardless of previous performance or any other matter. Tender evaluation methods used in Australia, such as sensitivity analysis, best value or financial capacity are not used simply because it is written into the legislation that the lowest bidder must be selected.

The tour group visited a worksite in Campbell. The project was 3000 foot long (914metres), with a budget of \$1.2million US (\$1.6million AUS). Comparatively, it costs about three times as much as it costs to reconstruct a street in Inverell.

The method of construction mainly differs in that very few chip seals are undertaken in the US. Sealed road construction is almost exclusively asphalt pavements. The project we viewed in Campbell was a 7inch (180mm) asphalt pavement placed directly onto the subgrade, which had been proof rolled to 95% compaction.

Project Management

The contract for the construction of the project is undertaken on a schedule of rate contract, where payment is made for “quantities calculated by survey”, therefore the City only pays for actual quantity of work completed. The specification for the works is quite thorough, but very similar in nature to those used in Australia. Most of the specifications are “State Standard Specifications” which are sourced from the California Department of Transportation, Business and Transportation Agency. (www.dot.ca.gov/hq/esc/oe/specs_html/index.html). These are supplemented with City of Campbell Specifications and job specific specifications.

Once the project had begun, the project management was undertaken in a Quality Control fashion, where the City undertook all conformance survey, conformance testing and material testing. Once the City was satisfied the completed work met the specification for the project the actual quantity is calculated by survey using a robotic total station.



BEFORE



AFTER

Wednesday 8th September 2004.

Visit to Santa Cruz City Hall

www.ci.santa-cruz.ca.us

The City of Santa Cruz was established in 1792. The City has a population of 56,000 and the County of Santa Cruz has a population of 250,000.

City Finance

Revenue for the City is raised from property tax and sales tax. The State collects the property tax and the County collects the sales tax. Of the property tax collected, 80% goes to the state, the majority of which is directed to schools. The remaining 20% is divided between the County and City.

Property tax nets the city \$9.9million, while sales tax raises \$35million. Water sales and sewer charges raises \$7.8million. Further to this, taxes such as "Use of Space" taxes on phone and television providers, tax on hotels, tax on emissions and an entertainment tax draw revenue for the city. Of the revenue raised 50% of the expenditure is on public safety such as police and fire brigade.

The City issues bonds for capital improvement works, which are repaid over 30 years. The bonds are considered to be a very stable investment and are therefore well received by the community. Improvements such as new parks and remodelling of the fire department have been achieved through the issuing of bonds. To repay the bonds, the city raises funds via a levy or increase in sales tax. This increase must be approved via a two-thirds voter approval, which is carried out by ballot.

Prior to 1978, local authorities could increase property taxes at will to fund local projects and services.

In June 1978, Proposition 13 was passed by ballot in the state of California. Proposition 13 transferred the property tax collection powers from the Cities and Counties to the State. The changes were made to remove the local politician's tax raising capabilities because the property taxes in California had soared so high that many lower income families and elderly people on fixed incomes were forced to sell their homes because they could not afford to pay the property taxes.

Proposition 13 limited property tax rates to one percent of assessed value and limited property assessment increases to two percent annually. It triggered a \$5 billion reduction in property taxes in California from \$11 billion to \$6 billion. Further to this Proposition 218 now requires that all local general taxes secure a majority approval and that special taxes secure a two-thirds voter approval.

The property tax is calculated at 1% of the property value, CPI adjusted annually, at the last date of sale. This does not allow for appreciation in the housing market, so a property that was bought 15 years ago would have substantially less property tax than a recently bought property, because its value for property tax purposes would only have increased by the CPI.

The City of Santa Cruz supplements their revenue by providing water supply services and fire brigade services to the County of Santa Cruz.

Redevelopment

In the 1989 earthquake, the downtown Santa Cruz was all-but destroyed. The City created a program called “Vision Santa Cruz” to rebuild the main street. Whilst the main street was being rebuilt, businesses were relocated to tents.

“Vision Santa Cruz” allowed the City planners to completely change the streetscape of the main street. The redesign focussed on wider streets, better public visibility and more intense development. The use of cars has been discouraged and the use of bicycles encouraged.

Incentives were given to business to re-establish, such as waiver of parking contribution fees for a 10 year period. Speciality shops were preferred to Walmart type developments to give the atmosphere a more attractive market feel.

To redevelop the main street, a half a percent increase in sales tax was introduced. When put to a ballot, it was approved by the community. \$100 million was spend redeveloping downtown Santa Cruz.



Downtown Santa Cruz



Downtown Santa Cruz – showing wide streets with better public visibility.



Santa Cruz – showing bicycle facilities

Public Works

The US federal government requested that all water supply authorities undertake a vulnerability assessment on their water plants. Santa Cruz City undertook the vulnerability assessment but refused to forward it to the federal authorities because they were concerned that now that all their plants vulnerabilities had been documented, the document itself had become very valuable to potential terrorists. Having the vulnerability assessment completed is now a requirement to obtain federal government funding, but federal government funding for water supply works has not been available for ten years.

Capital Works projects are put to public bid as is required by Californian law, but maintenance and design is carried out by City staff. To supplement the streets maintenance budget, the streets maintenance department contracts to the water department for restoration of roads for streets openings. There is very little opportunity to be enterprising in a City or County environment due to the structure of Californian law and the requirement to put capital works to public bid.

Thursday 9th September 2004.

Visit to San Louis Obispo City Hall

www.ci.slo.ca.us

The City of San Louis Obispo has a population of 44,000 and is considered to be a no growth city, ie growth is limited to 0.25%.

San Louis Obispo is the half-way point between San Francisco and Los Angeles. The residents don't want the population to increase because they enjoy the lifestyle they have and they want to preserve it.

Because the city is the half-way point, the crime gangs of San Francisco and Los Angeles have declared the city as neutral ground, so there is almost no crime in the area.

San Louis Obispo is a college town, with California Polytechnic University or better known as "Calpoly". There are about 16,000 students at Calpoly and they are generally from wealthy families.

The city is a very stable place where wages increases are minimal, but it does have the second highest cost of living, for a city, in California. The average cost of a house is \$625,000 US, which equates to about \$850,000 in Australian dollars. The enrolments at Calpoly have been decreasing over recent years because young families can't afford the housing.

Both City Hall and San Louis Obispo County have difficulty attracting young professionals, unless they were trained at Calpoly.

Development Approval

Under Californian legislation, if an individual objects to a major development and they can raise a petition to oppose the development with signatures of a least 10% of the registered voters in the city, the resident can initiate a ballot to determine if the development will proceed.

A development approval currently being considered has been in progress for 11 years. It took 7 years to complete the environmental impact statements, including an Indian Archaeological Survey of relics and burial sites.

The developer is facing opposition from the general population because the people want to keep community feel of their city. The people are concerned that the development will create traffic, which is considered to be a big issue in the community.

Once the ballot has been initiated, a 75% majority of registered voters must vote against the development for it to be rejected.

This ballot style of development objection is limited to about one third of states in the US, including California.

Public Works

In 1950, Californian legislation was changed so that public authorities had to put out to public bid, all works in excess of \$5000US. This amount has not changed, but public authorities can undertake works internally, up to the value of \$100,000US under very strict rules which includes support of the unions to undertake this work internally.

To complete the works program, San Louis Obispo City has a “Job Order Contracting” system where a book of list items is published every two years. The list items are for specific tasks such as paving per sq.ft and there are almost twenty thousand of these items. The book of list items is put out to public bid and the city has to accept the lowest bid, without regard to any other factor, as is the law in California.

When a specific project requires work to be completed that falls under the “Job Order Contracting” system the contractor is required to scope the work and then submit the total price for all the work to be carried out relevant to the project. If the contractor’s price is in excess of the budget for the work required, the City then has the choice of accepting the price and sourcing more funds or the City can go to a public bid for the work.

There are five contractors in San Louis Obispo that do most of the work for the City. The successful bidder under the “Job Order Contracting” system is guaranteed \$50,000 US worth of work for the two year period, and the upper limit of works is \$1million US.

Standard specifications apply to most of the line items. Most of these specifications are “State Standard Specifications” which are sourced from the California Department of Transportation, Business and Transportation Agency. (www.dot.ca.gov/hq/esc/oe/specs_html/index.html). These are supplemented with City of San Louis Obispo specifications and job specific specifications.

The City has a very strict “Encroachment Permit” system for their roads. An asphalt pavement cannot be opened for five years after laying, and a slurry seal pavement cannot be opened for three years. This requires any utility

authority to bore and jack under the road, which is quite expensive because the city has a rock shelf very close to the surface.

The “downtown” area of San Louis Obispo is a major focus of City Hall. The City spends a lot of money to keep it looking nice for the community and visitors.

Geographic Information System

The City has a very advanced GIS, which is populated with information such as protected trees, houses which are earthquake protected and police records.

Because the privacy laws in California are almost non-existent, any person who has access to the internet can access the police records of any person living in San Louis Obispo. Information such as parking tickets, speeding fines and criminal convictions are freely available via the GIS system.

Laser modelling was carried out using an aeroplane to define the canopy over San Louis Obispo. The canopy is defined by the tops of buildings and trees.

Information such as manholes and trees are picked up using aerial photography, works as executed plans and laser modelling. These features are then verified in the field using pocket computers that have been GIS enabled with the software Arc Pad.

Water Supply and Sewer

The City of San Louis Obispo owns and operates the local water supply and sewer systems, including treatment plants.

There is a water quality standard which covers the entire United States, but the state of California has a more strict standard for the water supply authorities to comply to.

Further too this, water harvested from above ground for drinking water purposes, has much stricter quality guidelines than does subsurface water.

Thursday 9th September 2004.

Visit to County of San Louis Obispo

www.co.slo.ca.us

The County of San Louis Obispo is one of fifty eight counties in California and has a population of 245,000. The county contains seven cities of which where fifty percent of the population in the county lives. The county has a 7% housing vacancy rate.

The county maintains 1300 miles of roads, of which approximately 1000 miles is paved, the remainder being gravel. On these roads are 200 bridges, which are also maintained by the county.

The county has 2553 employees divided into 18 departments. The public works department has 183 employees. The average age of employees is 49.

The county's annual budget is approximately US\$364.3 million, which equates to AUS\$486 million. The financial system is managed using software written in Germany called SAP-Enterprise Financial System.

The financial system and reporting must comply with Government Accounting Standards Board Statement No.34 (GASB34). GASB34 is very similar to the Australian Accounting Standard AAS27, in that all assets and liabilities must be identified and valued and then reported in the Annual Report. Further to this, GASB34 requires State and Local Government have an accrual accounting system to ensure that all revenues and costs of providing services is reported in the current year.

To supply the required information, the Public Works Department inspects and values all roads infrastructure assets every two years.

Employee Development

The County management team has a very innovative employee development program. In conjunction with CalPoly University, the County has a Supervisory Academy to develop non-technical skills in employees. Further to this, the County has programs covering leadership development, team building, writing and presentation and dealing with stress and burn-out.

The county policy is "to develop competent and well trained employees committed to continuous improvement"

Public Works

The County of San Louis Obispo maintains 1300 miles (2100 klm) of roads, of which 1000 miles (1600 klm) are paved. They also maintain 200 bridges on their network.

To comply with the required legislation, projects are scrutinised according to the following requirements:

- ◆ EO11593 - Executive Order for the Protection and Enhancement of the Cultural Environment
- ◆ CEQA - Californian Environmental Quality Act
- ◆ ESA – U.S. Endangered Fish and Species Act 1973
- ◆ CZMA – Coastal Zone Management Act
- ◆ CWA – U.S. Environmental Protection Agency, Clean Water Act
- ◆ F&G Code – Californian Department of Fish and Game Code
- ◆ National Environmental Policy Act
- ◆ California Environmental Quality Act
- ◆ California Coastal Act

Below is a site visited by the Study Tour Group. The site was a revitalisation project, designed to make the area more attractive to families that could not afford to live closer to San Louis Obispo.

The project was carried out with a significant amount of input from the local business owners, who promoted the project to ensure that it was completed quickly and without criticism. The project was a great success because of the joint venture nature of the project.



Project Site in San Louis Obispo County.

American Institute of Architects Conference

Theme “Learning from Lower Manhattan”.

www.newyorknewvisions.org

Assessment Immediately after the 9/11 Disaster .

The focus for the assessment was the area south of Fulton Street, New York, which comprises 270 acres. The first task was to assess the damaged buildings and make them safe. Also, transport links had to be re-established because several roads were blocked, railway tunnels were crushed and many other railway tunnels became filled with water.

The next task was to assess community needs on a ‘whole of community’ basis rather than an individual project basis. The area was sealed off by closing all roads into lower Manhattan, by the erection of “Downtown Closed” signs on all highway signs going into the city.

Immediately after the tragedy, all power and community services were crippled, with white ash shrouding everything. Now, three years later most businesses have re-established in Lower Manhattan.

Assessment of the Future of Lower Manhattan

Lower Manhattan is the engine of the U.S. Economy and the World Trade Centre is considered the symbol and heart of the U.S. economy. The Lower Manhattan Development Corporation was created in response to the 9/11 disaster to formulate a plan to rebuild and reinvigorate the Lower Manhattan district and ensure that these icons remain.

Twenty five percent of the gross city product for New York came from lower Manhattan, so apart from rebuilding after the 9/11 tragedy the major focus became reinvigorating Lower Manhattan. The office space needed reinvigorating, transportation to and around Lower Manhattan needed reinvigorating and cultural aspects such as open spaces and the East River waterfront needed invigorating to make better use of the spectacular harbour.

Part of the assessment of the future of Lower Manhattan is identifying the stimulants for economic development. New buildings providing office space that are ultra-modern and very high-tech are required to replace the ageing office buildings. Outmoded office space is being converted to residential apartments to provide local accommodation for the working population of Lower Manhattan. The facades of the older, former office buildings have a very good ambience for residential use and are proving very popular.

New York City's greatest export is sophisticated finance and business services. New York has the only major CBD in the world that has not become a museum. Cities such as Venice and Paris have lost their vibrancy because they have become virtual museums.

Car parks, open spaces and public areas are now being designed for security and easy access for the police. Police are very swift in responding to callouts of any description and the police presence is very noticeable. The safety and lack of any threat is also very noticeable, with Lower Manhattan experiencing very little crime.

The replacement building for the World Trade Centre buildings will be called the 'Freedom Tower'. Currently 49% of the available office space is Class A office space, the completion of the Freedom Tower will increase this to 56%. The corner stone of the freedom tower was laid on 4th July 2004 and the construction of the memorial to the people who lost their lives in the 9/11 disaster, designed by Michael Rodd, has also started.

The aim of the revitalisation of Lower Manhattan is to have:

- ✚ 24/7 Community
- ✚ Improved Culture
- ✚ Spectacular Waterfront
- ✚ Critical Mass of Class A Office Space



World Trade Centre Site under Reconstruction



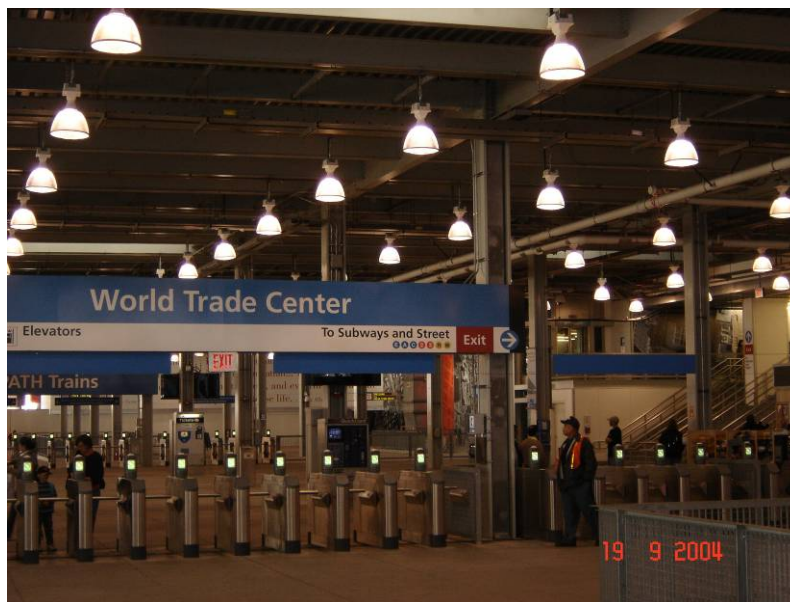
Site of the Former WTC 7 which Collapsed in the 9/11 Disaster. New Building Almost Complete.

Transport

Although the transportation in Lower Manhattan has made it the major economic centre it is, the network is tired and outdated. New transportation issues are being investigated, particularly attracting people from the east parts of New York, such as Long Island and JFK Airport. Lower Manhattan is the only major CBD in the world that does not have a direct link to an international airport.



The Ageing Fifth Avenue Railway Station



The New, Modern World Trade Centre Path Station


Further proposed improvements to transport in Lower Manhattan include a major overhaul of the South Ferry Terminal and direct access to JFK Airport, but all proposals have a 'No Trucks' philosophy. Apart from small delivery trucks and couriers, all efforts are being directed at keeping trucks out of Lower Manhattan.

The direct rail access to JFK is a major project which would be a trip of about 36 minutes. If realised the project would be operating by 2013. New York City is bidding for the 2012 Olympic Games, and if successful, project such as the JFK link may be completed sooner.


Lessons Learned So-Far

 Action – Get things done

Due to the sheer scope of work to be undertaken, deadlines had to be set and all efforts were made to stick to them.

 Reaction – constructively critical

Keeping a positive focus on the task while having the flexibility to make alterations to the project where required.

 Outreach – public consultation, community assistance with the healing process.

This proved to be a messy process, which required a “Learning as we go” attitude. The enormity and intimacy of the disaster had a massively emotional effect on the New York people. Community consultation is used for any project as part of the rebuilding and revitalisation of Lower Manhattan.

While the Tour Group was in New York, we had the opportunity to get a very good look at how New York City is recovering and developing in the aftermath of the 9/11 disaster. The New York people are very mindful of the 9/11 disaster, but increasingly more positive about the future. New York is a wonderfully vibrant place and if the city succeeds in obtaining the 2012 Olympics, will be the most modern major CBD in the world.