Pavements are Queensland’s largest publicly owned asset

- 180,500 km of mainly sealed flexible pavements
- 25% of all Australian state controlled roads
- Average annual expenditure 2008 to 2012 = $3.3 billion

1 State Overview, Road Implementation Plan 2009 to 2010, Queensland Motorways Ltd
2 RACQ 2011, Queensland State Government Review

Pavements are important to economic success

- We
  - Walk, cycle, drive, taxi and park on them
  - Store and transport exportable goods on them
  - Play games on them
- Pavements have different uses and therefore need different engineering
  - Seaports have very different requirements to airports

Universities should undertake industry sponsored research

- Of the 26 civil engineering undergraduate courses, in Australia, only 12 contain subject matter in road engineering
  - None of these teach all the road engineering capabilities
- Universities are the workplace of smart minds, unfettered by preconceived notions
- Without the benefit of local research we only teach information that is already in text books and standards

3 Austroads Internal Report 2006, Publication No. IR-129/06, Professional Development of Road Engineering – Phase 1, Austroads Incorporated

Does Government/Industry sponsored research at Universities work?

- The Ministry of Transport Ontario established the Highway Infrastructure Innovation Funding Program (HIIFP) in 2003 to encourage and assist Ontario universities and colleges to pursue basic and applied graduate and graduate research in transport infrastructure.

Highway Infrastructure Innovation Funding Program (MOT Ontario)

- MOT have funded 103 projects at 12 institutions at a cost of $4.6 million leveraging an additional 3.4 million from industry for a total research fund of $8 million.
Subject topics included

- Engineering Materials
- Environment and Sustainability
- Highway Design
- Structures
- Construction
- Traffic Operations
- Intelligent Transportation Systems
- Geomatics
- Maintenance

Was it worth while?

"Based on the FHWA definition, many of the projects that MTO has funded through partnership arrangements have proven to be demonstrably worthwhile by several measures. There is ample evidence that research benefits include cost savings and improvements to asset quality and longevity." 4

4 NCHRP Report 610 Communicating the Value of Transportation Research

What is the University of the Sunshine Coast doing to address these issues?

- Establishment of the Queensland Functional Pavement Centre (QFPC)
  - Accelerated Pavement Testing Facility
  - Product Approval Scheme
  - Master of Engineering (Transport Technologies)
  - CPD Seminars for Professional Engineers

Our Mission

- To provide leadership and scholarship in the pavement and transportation field through a talented pool of highly educated people providing innovative and industry oriented solutions to technical and economic challenges.

CPD Seminars for Professional Engineers

- Queensland Professional Registration Board requires that engineers maintain registration through Continuing Professional Development (CPD) and are able to demonstrate currency of practice
  - Up-to-date technical skills
  - Knowledge of processes technology and legislation
CPD Seminars for Professional Engineers

- A minimum of 150 hours* over a three year period
  - At least 50 hours which must relate to area(s) of practice
  - At least 10 hours must cover risk management
  - At least 15 hours must address business and management skills

*This requirement is audited every five years.

USC CPD Seminars

- Are offered twice a year in May and September
  - May: Transport Technologies
  - September: Environment, Water and Waste
- 25 CPD Series 11 hours
  - 20 hours area of practice
  - 3 hours business and management
  - 2 hours risk management

Master of Engineering (Transport Technologies)

- AQF Level 9 qualification
  - Entry level B.E.
- 8 Courses – 96 teaching units
  - Commencing Semester 1, 2014
- 6 Courses offered in block release
  - 2 weeks concentrated study
- 2 Courses offered online

Course structure (offered on Campus, Sunshine Coast)

- BUS 705 Innovation and Entrepreneurship*
- MGT 702 Managing People*
- ENG 703 Design
- ENG 701 Construction
- ENG 705 Operation and Renewal
- ENG 704 Maintenance

*Offered by Faculty of Arts & Business can be credited to a MBA in the same Faculty

Course structure (offered online)

- ENG 702 Contract Management
- ENG 706 Planning for Project Management

Performance Assessment Scheme

- Research Oriented
  - In situ monitoring of pavements
    - Final year projects to monitor one site
    - HDR students to investigate pavement performance over two Queensland summers
    - Supported by laboratory research
      - Master Curves
      - Endurance Limits
- 4G Pavement Management
Deterioration Data
SIPPY DOWNS DRIVE – 22 May 2013
Lat. -26.714947, Long.153.059484

- Photograph taken every day at 10:00am
- Registered with daily data at the same time
- Built into database

Parameter Value
- Surface Layer Strain (µε) -48.3
- Surface Layer Temperature °C 18.1
- Surface Layer Moisture (%) 10.19
- Sub Base Layer Strain (µε) -1.13
- Sub Base Layer Moisture (%) 9.82
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- Surface Temperature °C 18.3
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- Relative Humidity (%) 48.8
- Rainfall (mm) na

R² = 0.73633

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Deterioration Data
SIPPY DOWNS DRIVE – 8 September 2013
Lat. -26.714947, Long.153.059484

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- Registered with daily data at the same time
- Built into database

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- Surface Layer Moisture (%) 9.97
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- Rainfall (mm) 0

R² = 0.73633

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Rouges Gallery 1
26 May 2013, 14:59

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Rogues Gallery 2
22 August 2013 – 10:28

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Product Approval Centre

- Close to University
- Has a finite life
  - Approximately 12 years
  - 2 Million SAR
- Restricted access to public
- All traffic entering and leaving the site is weighed so we will know exact traffic load factors
- Test sections 70m x 8m wide, up to 6
- Analysis is over two Queensland summers
- Certificate of actual performance under University banner

Proposed Product Approval Centre

- 90 m
- 200 m
- 350 m
- Weighbridge
Accelerated Pavement Testing

- USC proposes to phase in an Accelerated Pavement Testing (APT) facility over the next three to five years.
- Moves are under way for a student project to design and build a test apparatus in association with the inventor.
- Site can be flooded using the resources of two lakes on the property and sites tested under water.
- We expect that the facility will test around 10 sites per year.

Area allocated within USC Campus for APT Facility

QFPC – Round Table

- We propose to sell five places at our table for $250,000 per year for five years to fund research
- Open to Government, Local Government, Industry and/or Consortiums
- Chair USC representative
  - Deputy Chair to be chosen from shareholders
- Charter to select relevant and innovative transport technology research

What do shareholders get for their money?

- A chance to dictate research directions
- Access to the latest technology
- Four places at University courses each year
- One test site of their choosing in years 1 to 4
- Fee free candidature for Higher Degree by Research

The Queensland Functional Pavement Centre (QFPC)

- Is a reality
  - Three of the five initiatives are in place
  - Approval processes including costing the APT site and instrumentation are under way
- USC is seeking Government and Industry partners to help finance the next steps