APPROACH TO SUSTAINABLE ROAD ASSET MANAGEMENT IN ETHEKWINI
How many Municipalities have:

- A dedicated budget for roads maintenance
- A dedicated budget for road rehabilitation
- A dedicated department for roads maintenance
- Dedicated department for road rehabilitation
- A functioning PMS
  - or
- Know the length of their road network
- Know the condition of their road network
- Know the value of their road network
What is important in asset management

- The amount of money
- The size of the asset
- The people that manage the asset
- The people that use the asset
- The condition of the asset
- The system used to manage the asset

- or

- How all these aspects work in harmony and function together
- But, disharmony forces change
Making asset management sustainable:
Organisational structure – discipline specific

- Human Settlements & Infrastructure
  - Electricity
  - Water
  - Engineering
  - Housing
Engineering Unit: Specialist specific

- Roads Provision
- Roads & Stormwater Maintenance
- Arch Dev Eng Survey
### Specialist technical staff

<table>
<thead>
<tr>
<th></th>
<th>PMS</th>
<th>Road Rehab (tech)</th>
<th>Road Rehab needs at least 3 more prof &amp; 6 more technologists</th>
<th>Road Rehab (construction)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• 2 Civil engineering prof</td>
<td>• 3 Civil engineering prof</td>
<td></td>
<td>• 110 site construction staff</td>
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<tr>
<td></td>
<td>• 1 Civil eng technologist</td>
<td>• 4 Civil eng technologists</td>
<td></td>
<td>• 20 asphalt manufacturing</td>
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</table>
eThekwni Road Network Management

Existing Surfacd Road Network
- Road Rehabilitation
  - Design & Construction

New Surfacd Roads
- Capital Roads
  - Design & Construction
- Housing
  - Design & Construction
- Private Development
  - Design & Construction

Handover to Roads Provision
- Pavement Design Report
- Materials As Built
- Letter of Compliance

Network Rehabilitation Programme
- Prioritization & Optimization

Pavement Management System
- Data Capture

Gravel Road Network
- Routine & Planned Maintenance
  - Road & Stormwater Maintenance
Annual Road Rehabilitation Capital Budget

<table>
<thead>
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<th>Financial Year</th>
<th>Budget Allocation (R Million)</th>
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<tr>
<td>2004/05</td>
<td>20</td>
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<tr>
<td>2005/06</td>
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<tr>
<td>2011/12</td>
<td>400</td>
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<tr>
<td>2012/13</td>
<td>500</td>
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## eThekweni Road Network Statistics

<table>
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<tr>
<th>RISFSA Category</th>
<th>Road Length (km)</th>
<th>Road Length (km)</th>
<th>PMS Category</th>
<th>Road Length (km)</th>
<th>Road Length (km)</th>
<th>Total Road Length (km)</th>
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<tr>
<td><strong>Total</strong></td>
<td><strong>5 927</strong></td>
<td><strong>1 052</strong></td>
<td><strong>Total</strong></td>
<td><strong>5 927</strong></td>
<td><strong>1 052</strong></td>
<td><strong>6 979</strong></td>
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</tbody>
</table>
We got the

- Organisational structure
- People
- Money
- We identified our asset

- We need a system that will help our people use the money to manage the asset – asset management system
Road Management System: eRoads

- accurate & reliable location referencing of road data.
- easy access to accurate road network inventory information.
- quantify & report on the condition of the road network on a network, sub-network and road segment level basis (historic trends and current status quo).
- integration with Geographic Information Systems for presentation of data.
- a basis for allocating funds among different sub-networks through life cycle costing and optimisation.
Road Management System: eRoads

- Assist in selection of viable alternative maintenance strategies for each road section & determining Life Cycle effects of these in terms of:
  - future network conditions, future maintenance requirements and budgetary needs,
  - future road network rehabilitation backlogs,
  - future asset values of the road network.

- Assist in selection of the best preventative maintenance and rehabilitation strategies for each road section while taking into account imposed budgetary and resource constraints, now and in the future.

- Assist in identifying the budgetary requirements for implementing the ideal preventive maintenance and rehabilitation strategy for each road section, now and in the future.
The system

- Shell software system – dTims CT
  - Populated by data gathered using

- Visual assessment manual for urban roads drawn up by eThekwini Municipality
Visual condition index (VCI)

- The assessment data, expressing the surfacing condition, structural condition and functional condition through the degree (seriousness) and extent of occurrence of distresses, are used to calculate a single Visual Condition Index (VCI) for a road network.

- VCI is a percentage index ranging between 0 and 100; 0 represents a road segment in very poor condition and 100 represents a road segment in very good condition.
Average VCI for paved roads, 2003 to 2011
eRoads output

- Optimised and prioritised list of projects with recommended rehab options within a constrained budget.

- The last iteration generated a list of 1850 projects to be done over a 2 year period.
Current asset value

R 46 billion
Road rehab variables in city environment

- Continuously working under live traffic conditions
- Shut down a road, shut down business, shut down society
- Very high degree of variability of pavement structures
- Fixed alignments
Skills required

- Good knowledge of pavement materials
- Excellent communication
- Good understanding of pavement behaviour
- Solution oriented
- Problem analysis
- Construction technique understanding

This is highly experienced and post grad skills, new industry entrants cannot handle this.
Sustaining the talent pool

- Without the skills to implement, money, structure and systems do not matter!

- What is eThekwini doing about creating and sustaining the talent pool
eThekwini skills development initiatives

- PMS Visual Inspection Training – in excess of 100 trained thus far.
- SABITA partnered NQF level 1 to 4, road rehab (not patching & plugging potholes)
- SARF & Wirtgen partnered recycling course
- 1 UKZN PhD + 1 Stellenbosch PhD + 4 MSc research into reclaimed materials.

- Training is a requirement for contracting with eThekwini
Road rehabilitation work process flow to implement multiple projects concurrently.

PMS Candidate List of Projects

GIS

Budget Level Inspection Planning

Budget Level Inspections

Detailed Investigation

Design

Specification

Documentation

Procurement

External contractor resources
- Project construction
- Project construction
- Project construction

In-house resources
- Project construction
- Project construction
- Project construction
- Project construction
In-house Plant

- 3 Asphalt Pavers
- 2 Milling machines
- Mobile Crusher
- MobileScreen
- 110 ton/hr Asphalt Manufacturing Plant
- 12 Asphalt Rollers
- 27 Tippers
Evolving guidelines: New roads to asset management for Municipalities

- Our network is firmly in the maintenance phase
- Our documentation and specifications are still in new roads phase
- We are merging COLTO with our Municipal specifications and bits from recycling guidelines?
- TRH 12 was written for highways in ???
- Visual assessment manual for municipal roads

- No national guideline for maintenance and rehab of urban roads???
Sustaining our virgin raw materials

- Big focus area
- Co-authors of TRH 21 – recycling asphalt
- All our pavement structure rehabilitation projects are either in-plant or in-place recycling.
- All the material in the road belongs to us.
- First option is always to use in place – BSM our favourite option.
Green procurement: reclaimed asphalt

Savings realised by using RA

- 20% RA
- 30% RA
- 40% RA
- 50% RA

- 5 years
- 10 years
- 15 years
- 20 years
Reclaimed concrete pavement

- Concrete pavement does fail
- Buildings do get broken down – sent to urban dumpsites – finite space & impedes organic degradation

- Both ready sources of material
- Research phase with both Stellenbosch Univ & UKZN to characterise, understand and propose pavements using the reclaimed concrete and masonry
Longer life asphalt: WMA

- WMA asphalt – we have hosted all the national trials and co-authored the National Guideline for WMA.
- Positively disrupting asphalt industry
- Allows use very high % of RA (now 40% to 60 %)
- Lower emissions
- Less aged bitumen – longer lasting road
- Longer haul distances
Longer life asphalt: HiMA

- High modulus asphalt is asphalt that has a much higher stiffness than traditional asphalt.
- Allows pavement to carry higher and slower moving loads
- We have hosted the first trial on a public road – Bayhead Road – country’s commercial life-line.
Life cycle analysis

- We know we are doing it
- Is our practice optimally sorted such that any data generated will be based on best practise.
- Are the differences between not doing it and doing it so small that we need a calculator to tell us?
- Will it generate great PR when we report the calcs?
How sustainable is this all?

- mmmmmmmmmmm

- We are therefore not rigid in sticking to the approach

- Variables are changing

- We are forcing them to change
“We cannot solve our problems with the same thinking we used when we created them“ Albert Einstein.