DBSA

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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

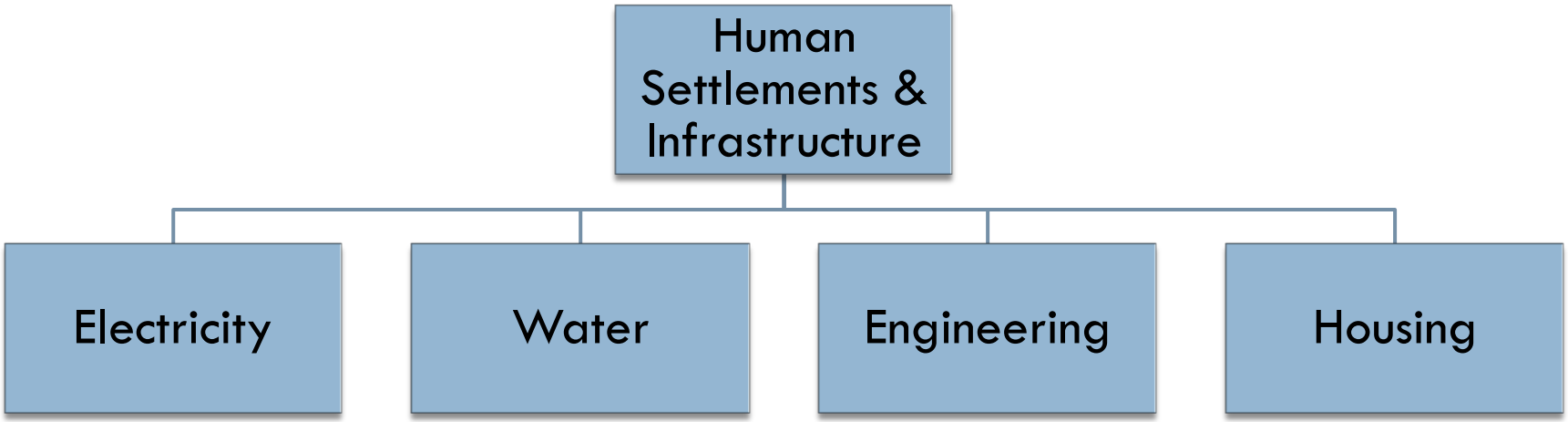
- The amount of money
- The size of the asset
- The people that manage the asset
- The people that use the asset
- The condition of the asset
- The system used to manage the asset

  - or

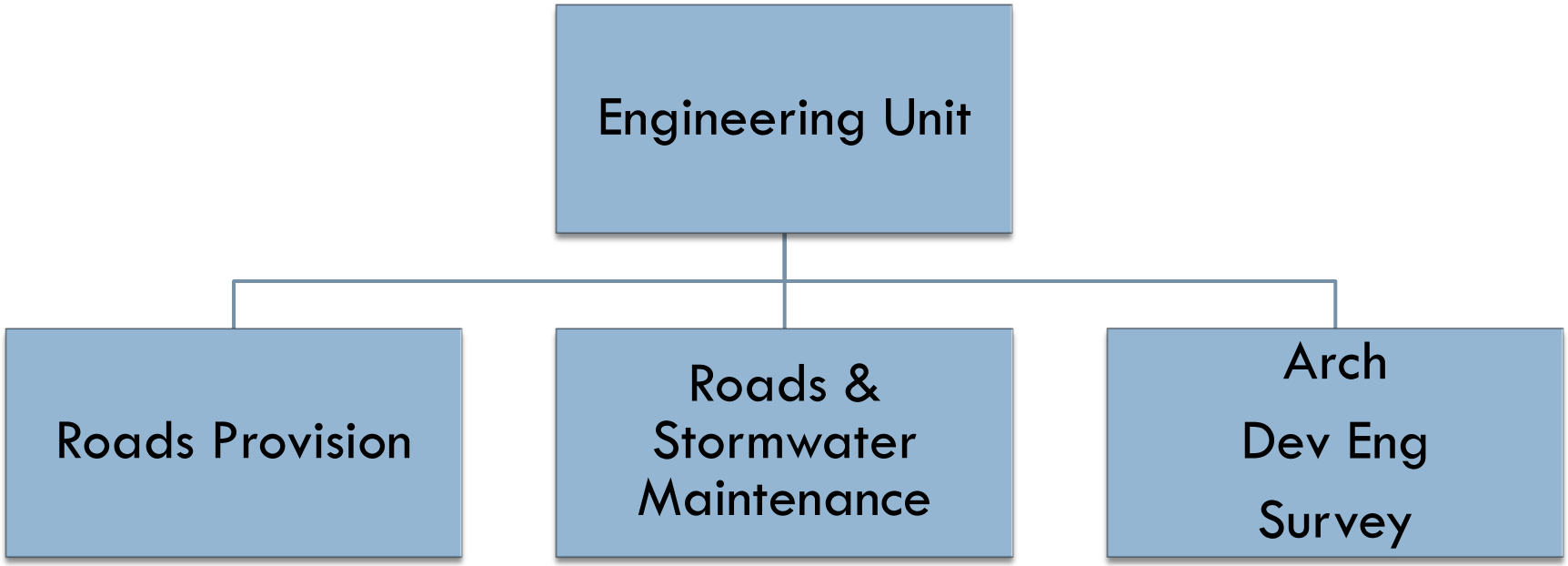
- How all these aspects work in harmony and function together
- But, disharmony forces change

Making asset management sustainable:

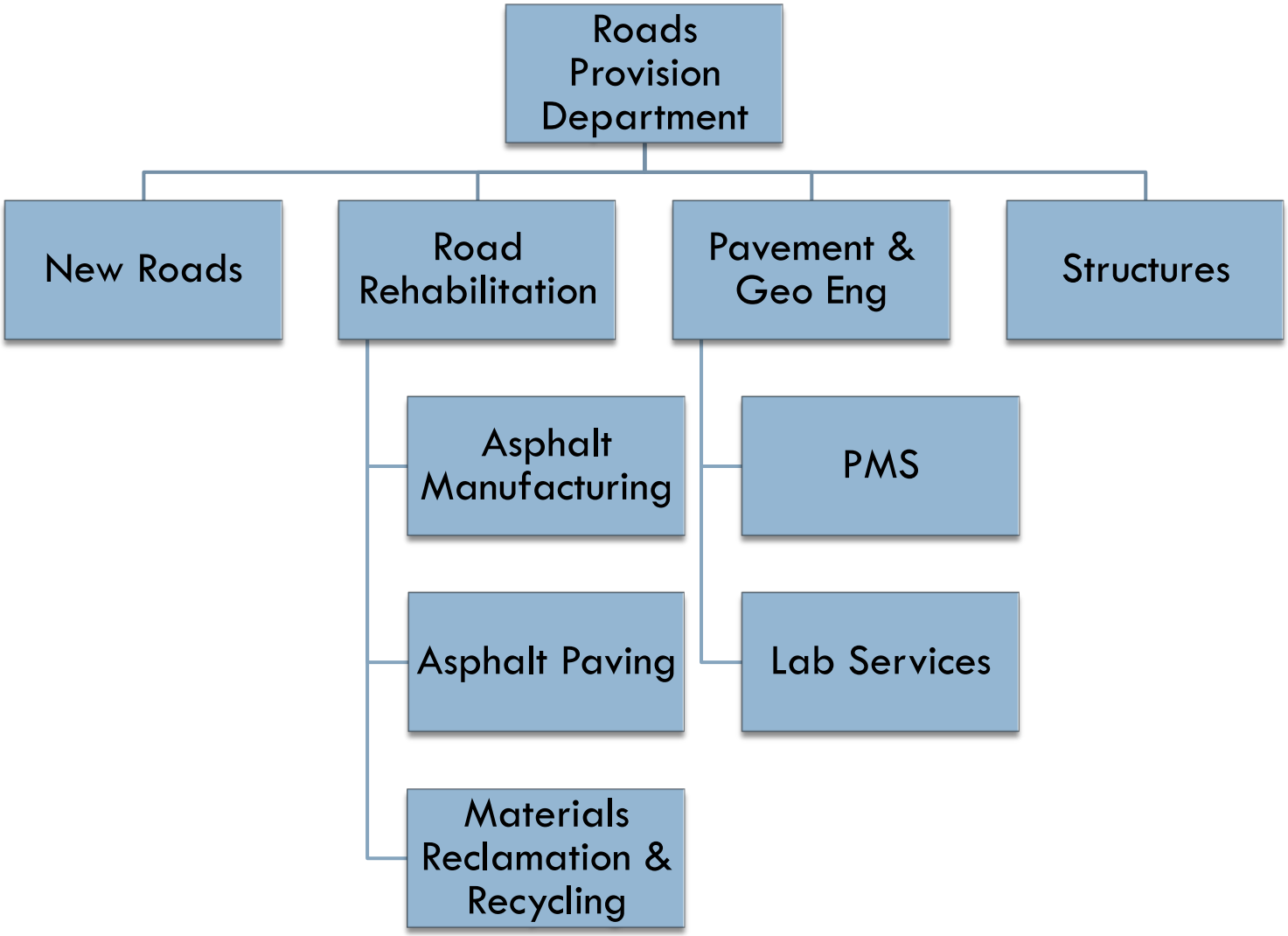
Organisational structure – discipline specific



Engineering Unit: Specialist specific



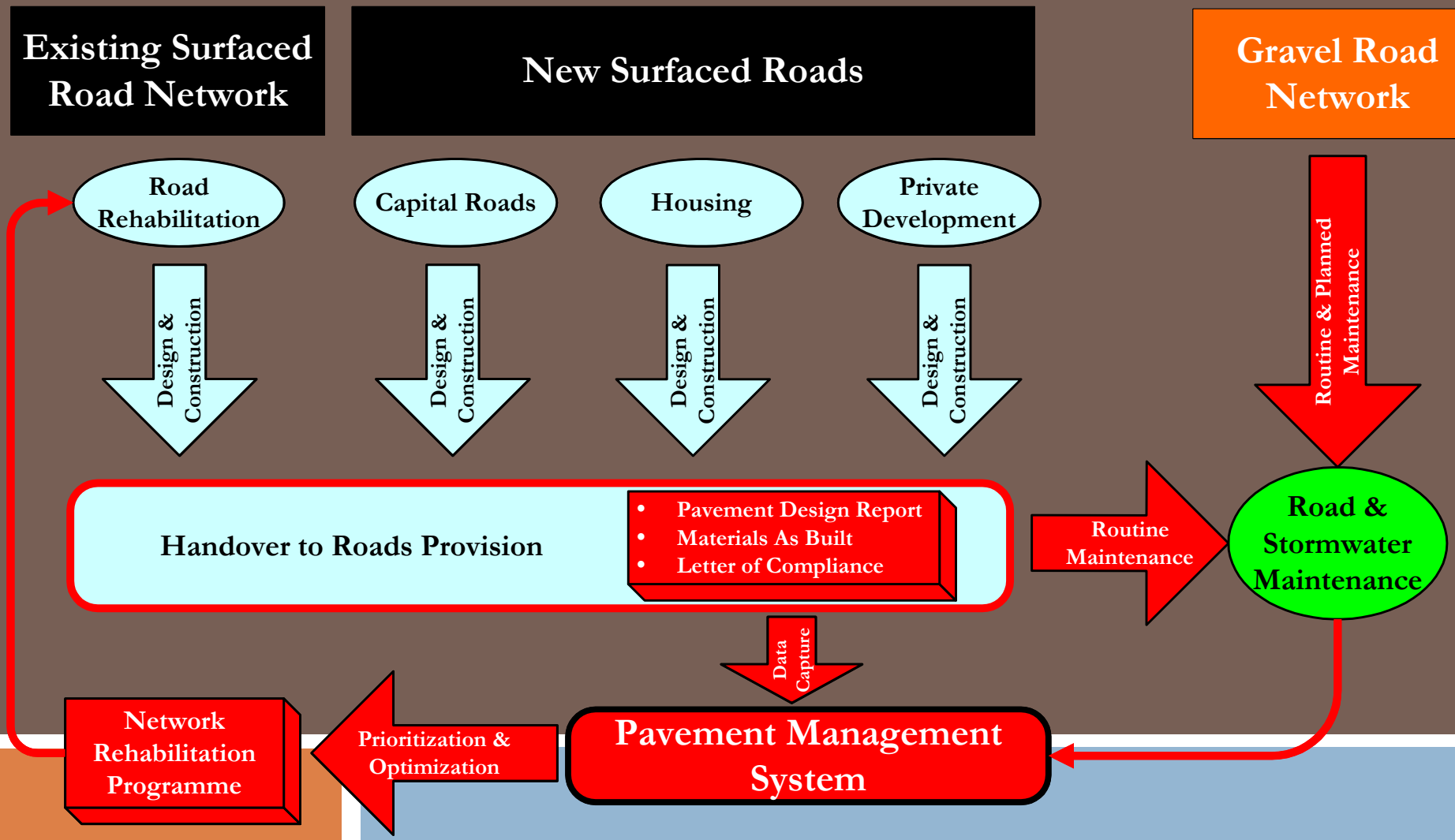
Functional structure



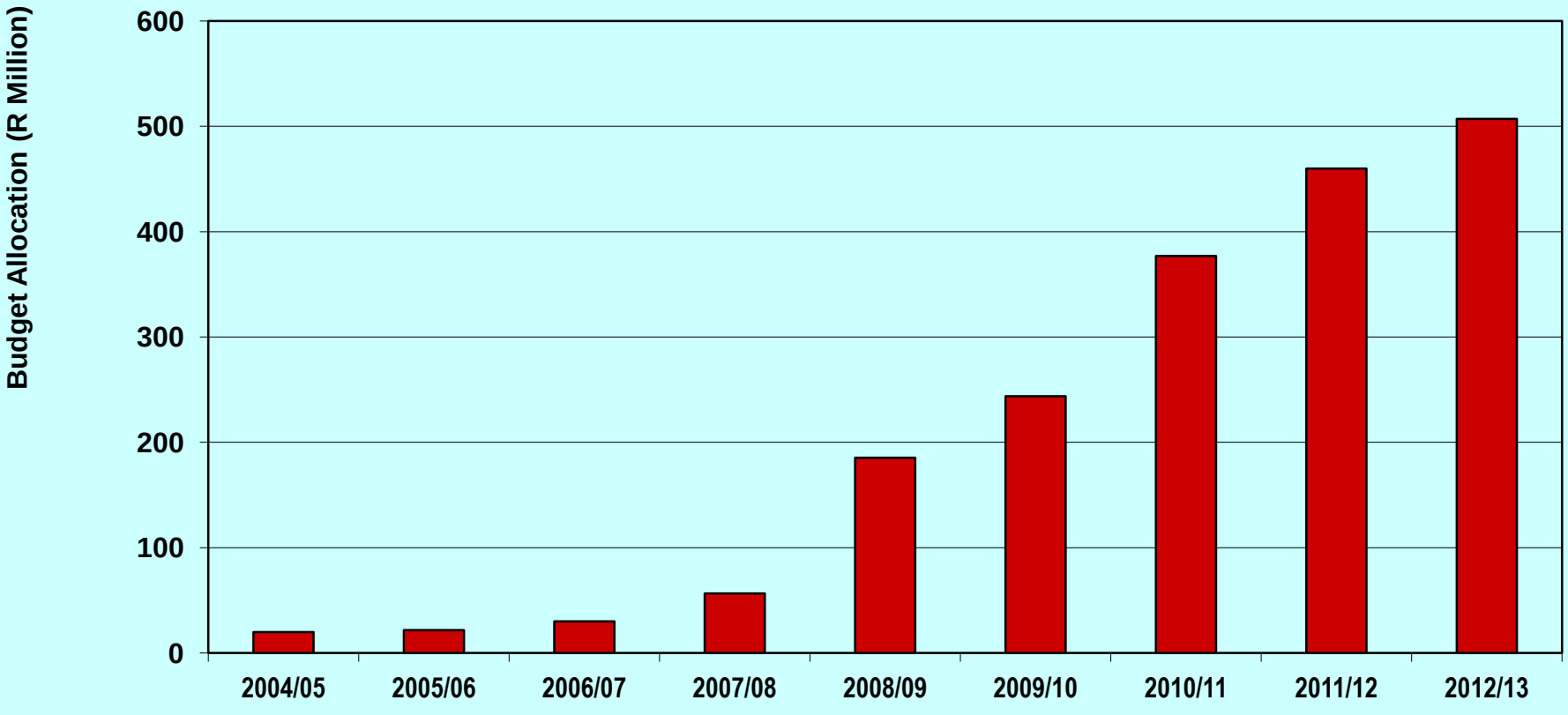
Specialist technical staff

PMS	• 2 Civil engineering prof • 1 Civil eng technologist
Road Rehab (tech)	• 3 Civil engineering prof • 4 Civil eng technologists
Road Rehab needs at least 3 more prof & 6 more technologists	
Road Rehab (construction)	• 110 site construction staff • 20 asphalt manufacturing

eThekwini Road Network Management



Annual Road Rehabilitation Capital Budget



eThekwini Road Network Statistics

RISFSA Category	Road Length (km)	Road Length (km)	PMS Category	Road Length (km)	Road Length (km)	Total Road Length (km)
	Surfaced	Gravel		Surfaced	Gravel	
2	117	0	A	117	0	117
3	359	0	B	1 343	0	1 343
4	2 259	0				
			C	1 275	0	1 275
5	3 192	1 052	D	3 192	1 052	4 244
Total	5 927	1 052	Total	5 927	1 052	6 979

We got the

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

- We need as 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.

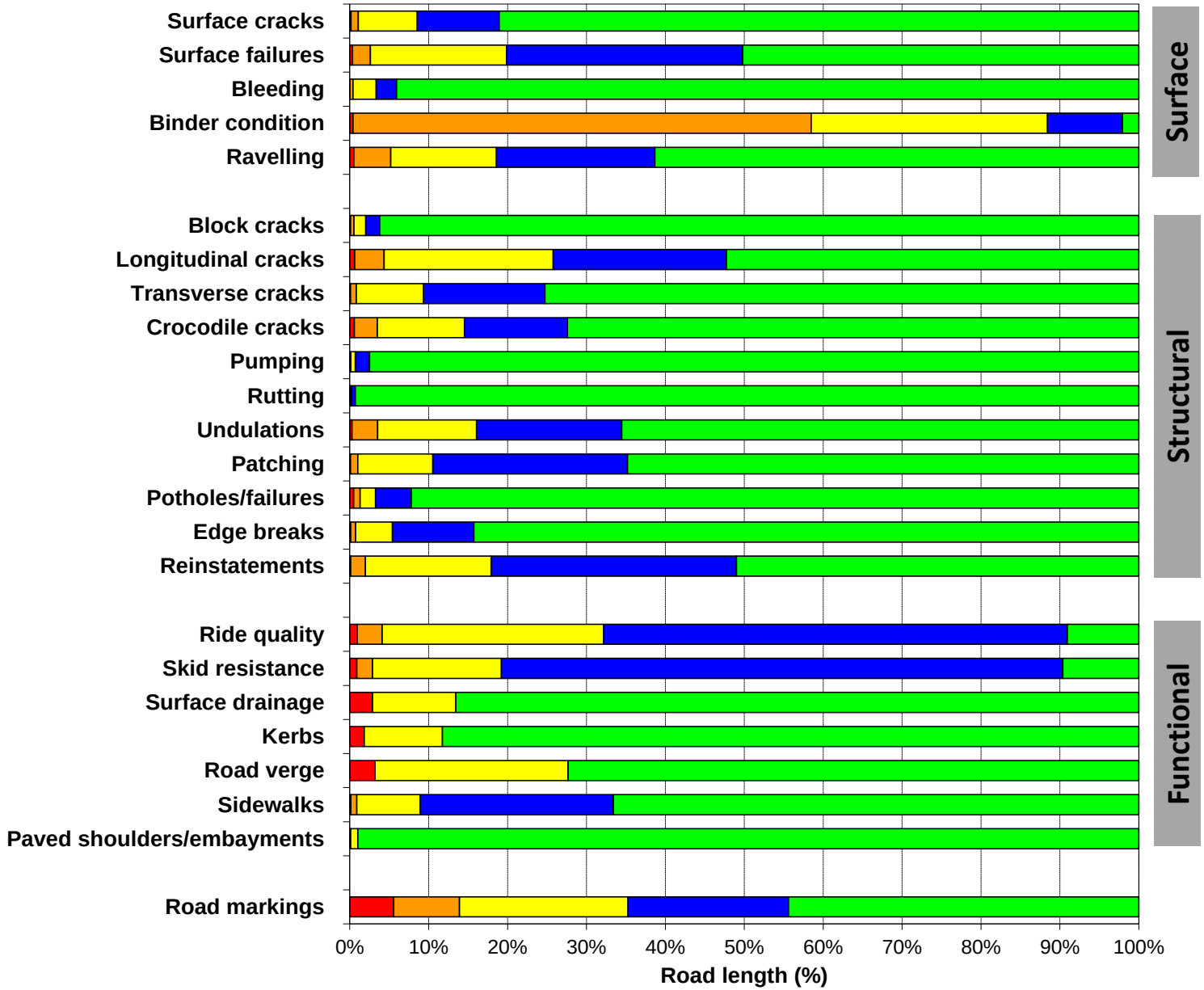
Road Management System: eRoads

- 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

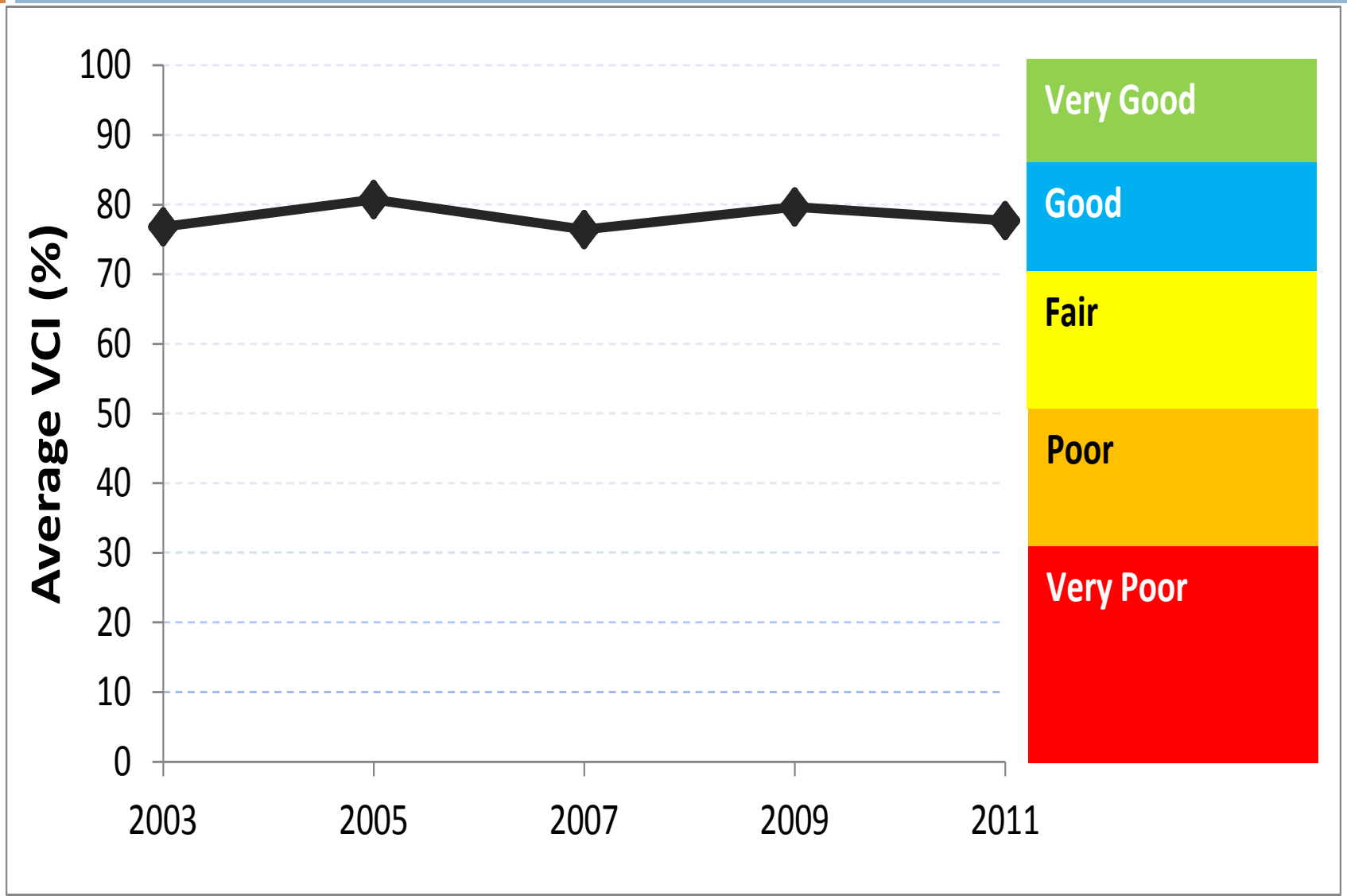
Distress Distribution, Flexible paved roads for eThekwini MM, 2011



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

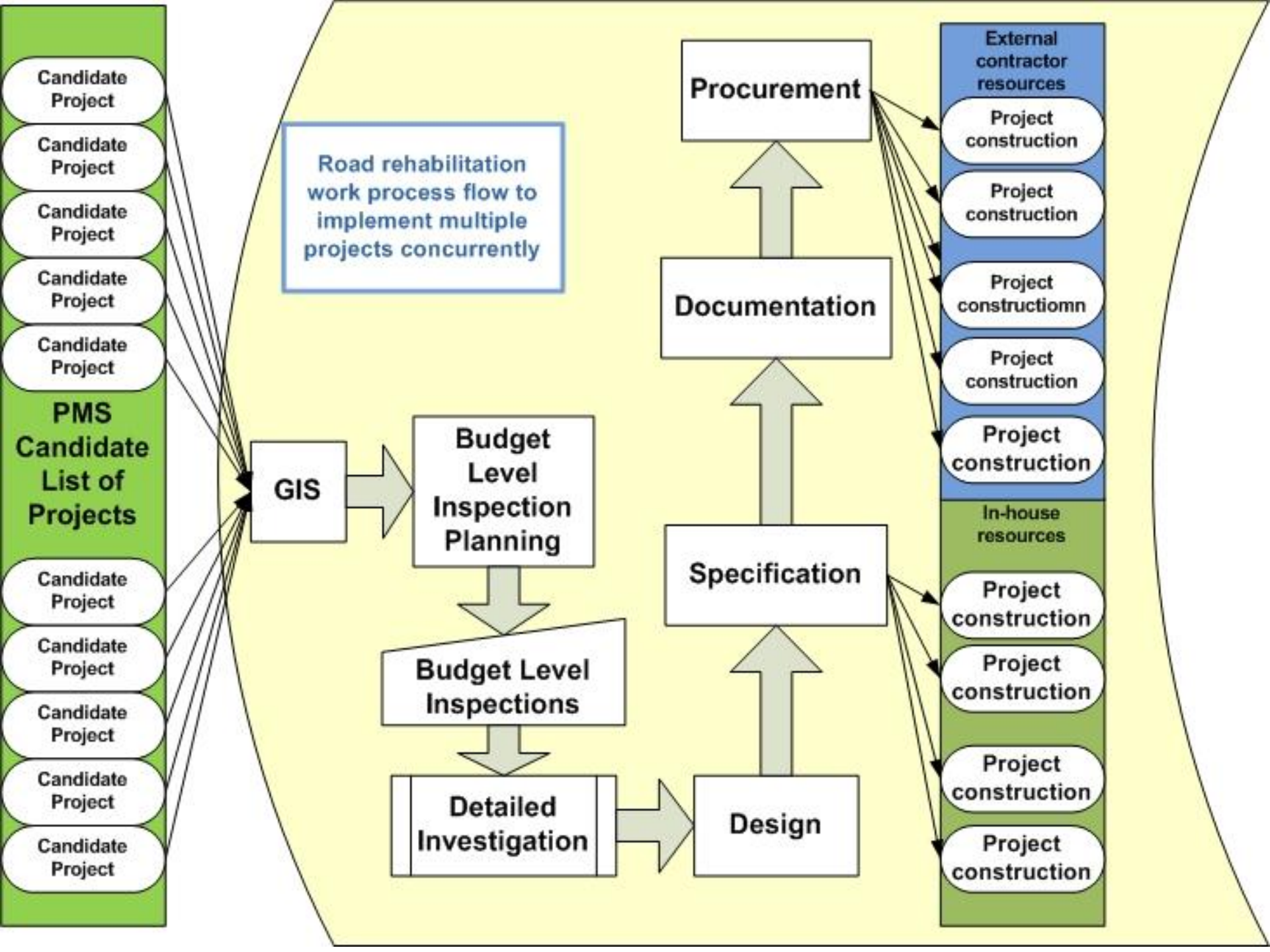
- Without the skills to implement, money, structure and systems do not matter!

- 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


Candidate Project
Candidate Project
Candidate Project
Candidate Project
Candidate Project
PMS Candidate List of Projects
Candidate Project
Candidate Project
Candidate Project
Candidate Project
Candidate Project
Road rehabilitation work process flow to implement multiple projects concurrently
GIS
Budget Level Inspection Planning
Budget Level Inspections
Detailed Investigation
Design
Specification
Documentation
Procurement
External contractor resources
Project construction
Project construction
Project constructiomn
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


VÖGELE
HAMM
DYNAPAC
NDM 14500


VOLVO
KOMATSU
PC 200
KOMATSU
hartl


NDH 14504

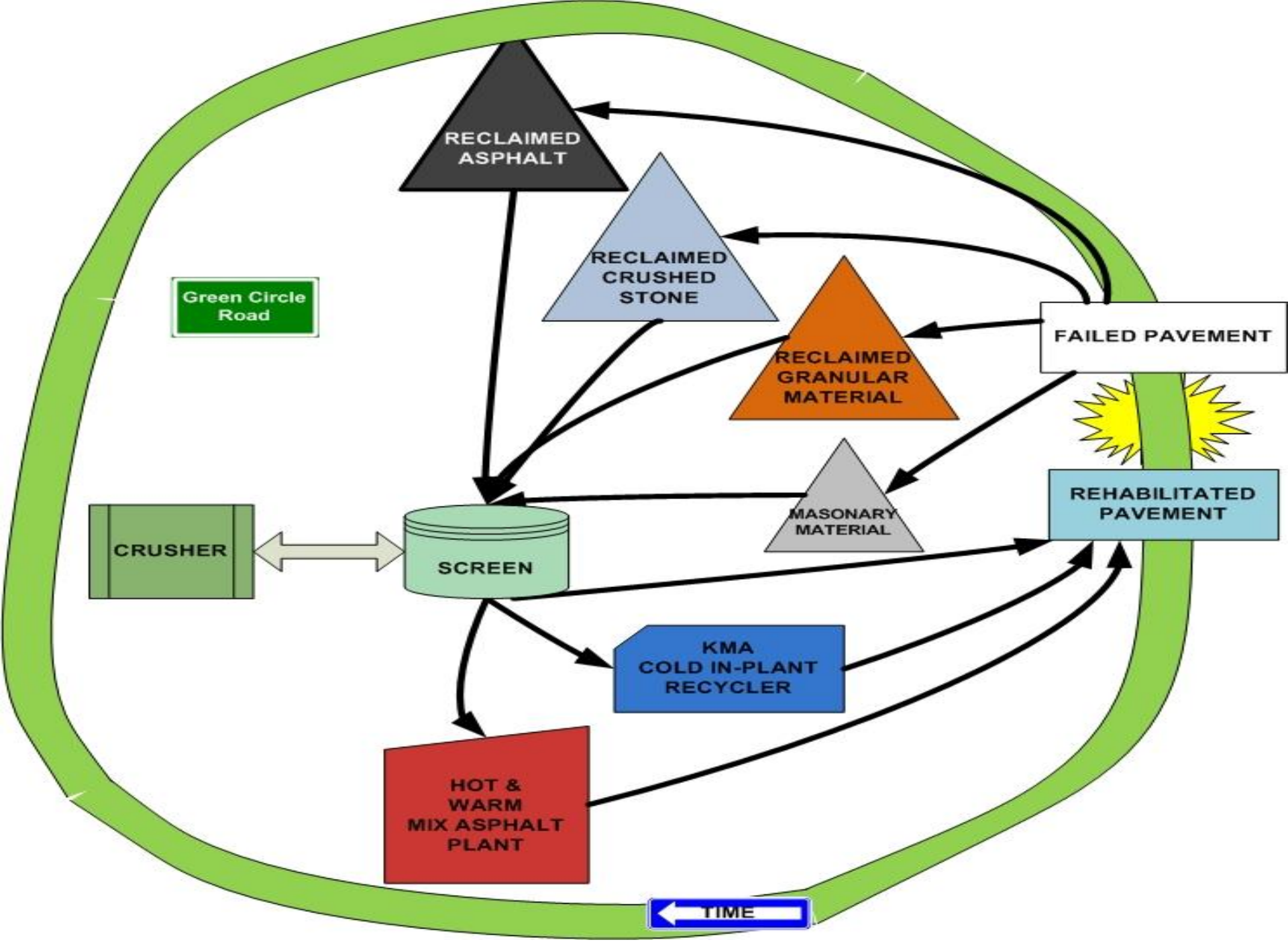
Evolving guidelines: New roads to asset management for Municipalities

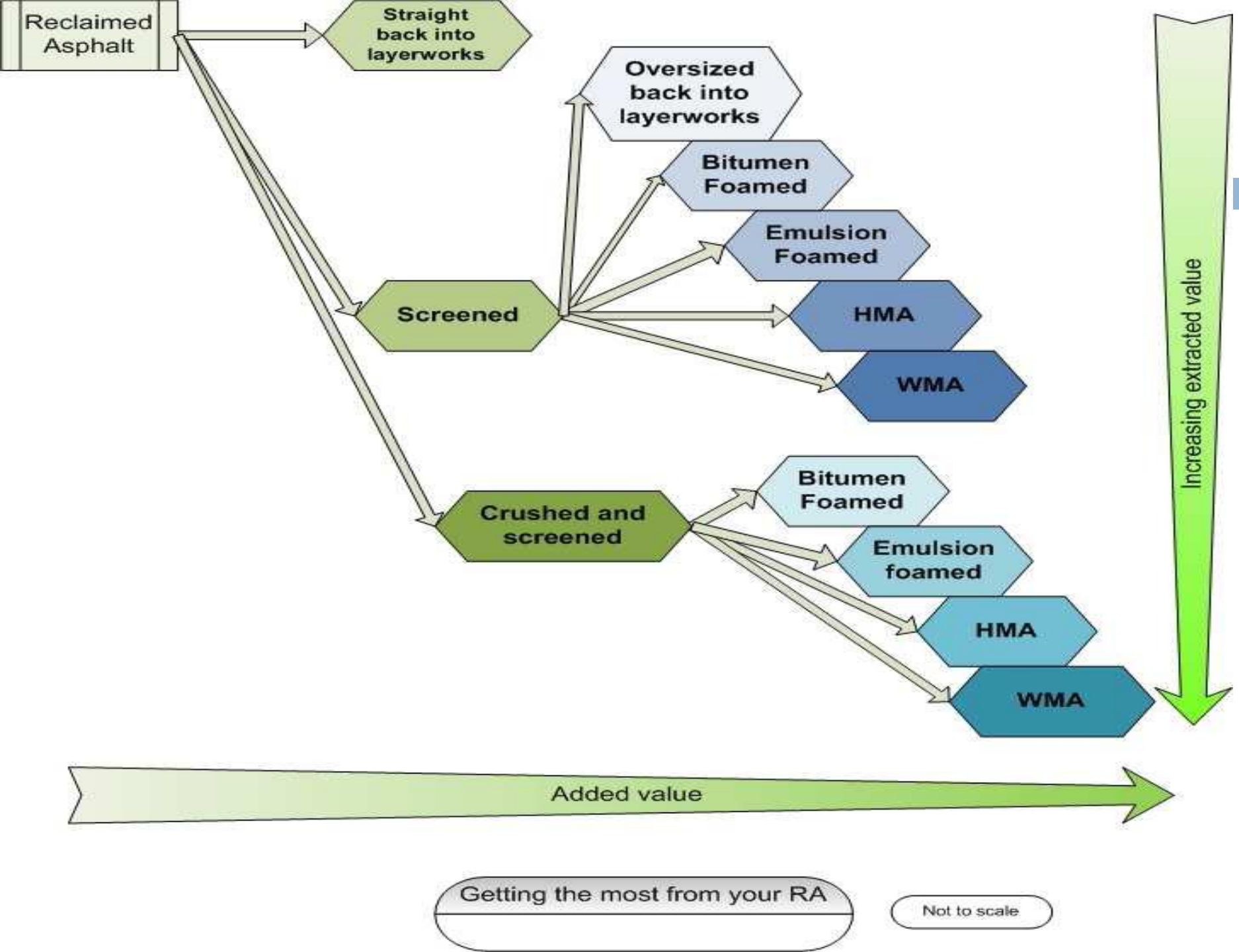
- Our network is firmly in the maintenance phase
- Our documentation and specifications are still in new roads phase
- We are merging COLTO with our Municipal specifications and bits from recycling guidelines?
- TRH 12 was written for highways in ???
- Visual assessment manual for municipal roads

- **No national guideline for maintenance and rehab of urban roads???**

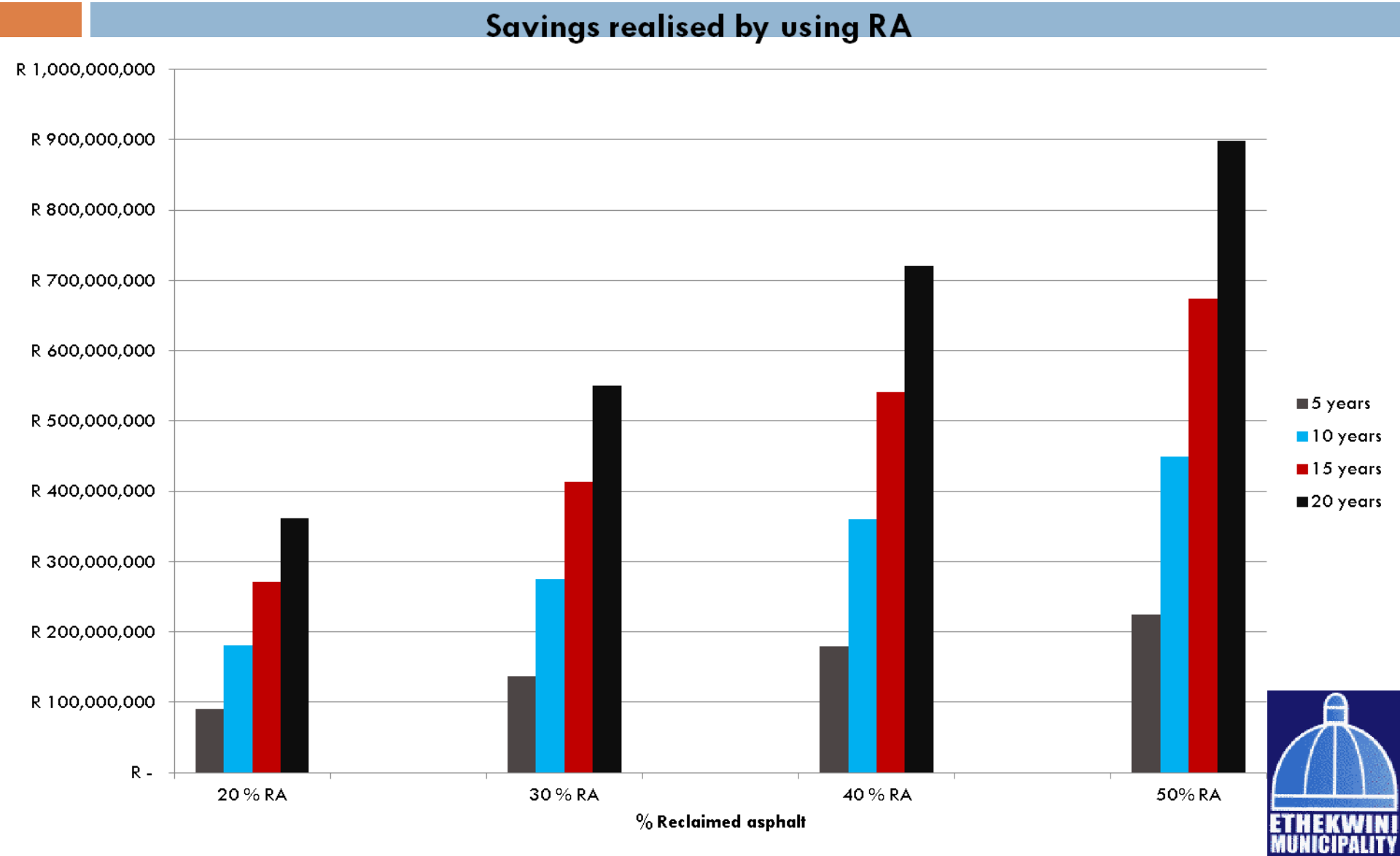
Sustaining our virgin raw materials

- 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.


RECLAIMED ASPHALT
RECLAIMED CRUSHED STONE
RECLAIMED GRANULAR MATERIAL
MASONARY MATERIAL
Green Circle Road
FAILED PAVEMENT
REHABILITATED PAVEMENT
CRUSHER
SCREEN
KMA COLD IN-PLANT RECYCLER
HOT & WARM MIX ASPHALT PLANT
TIME


Reclaimed Asphalt
Straight back into layerworks
Oversized back into layerworks
Bitumen Foamed
Emulsion Foamed
Screened
HMA
WMA
Crushed and screened
Bitumen Foamed
Emulsion foamed
HMA
WMA
Increasing extracted value
Added value
Getting the most from your RA
Not to scale

Green procurement: reclaimed asphalt



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

warm mix asphalt rsa

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?

- mmmmmmmmm
- 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.