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South African Institution of **Civil** Engineering

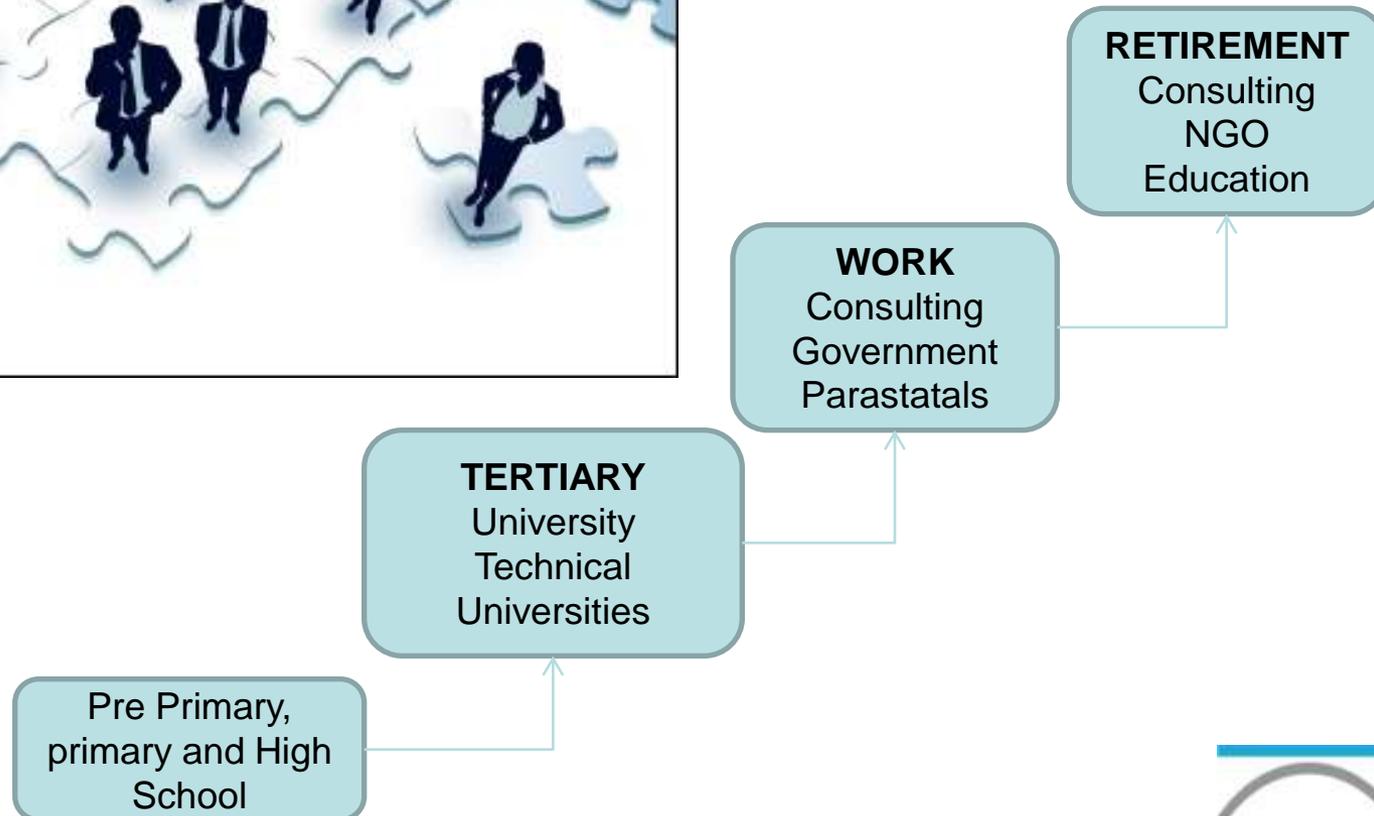
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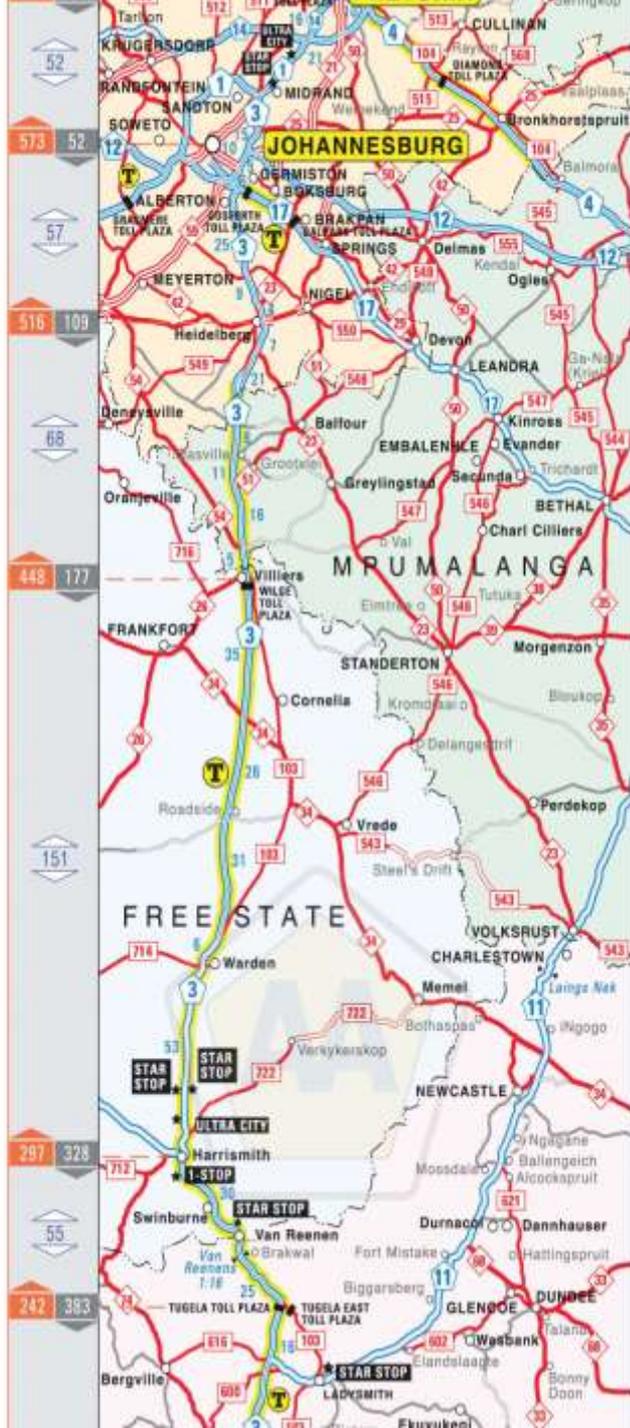


# South African Institution of Civil Engineering



**CPD**  
**10 000 Members**  
**Connected**  
**Programs**





# THE NEED

## Infrastructure Report Card

## National Development Plan

# CHALLENGES IN THE

# GOVERNMENT SECTOR

# SKILLS

## Engineering Capacity

# PROBLEM SOLVING



# THE NEED: Infrastructure Report Card



Category	Rating	Area	Key Findings
Water	D-	for Department of Water Affairs infrastructure	<p>There has been further deterioration in the ageing bulk water infrastructure portfolio as a result of insufficient maintenance and neglect of ongoing capital renewal.</p> <p>Persistent, serious salination of key river systems and eutrophication in many dams and rivers continues. These problems increase the cost of water treatment infrastructure and damage the environment. Acid mine drainage is a cause for concern in the vicinity of gold and coal mines.</p> <p>Large dams are developing capacity problems and require urgent refurbishment. Farm dams are deteriorating rapidly because of lack of maintenance, threatening accelerated sedimentation of bulk storage infrastructure.</p> <p>The level of water supply in certain systems has fallen far below the 98% assurance of supply as recommended in the National Water Resources Strategy. Owing to long lead-times required for development of new supply schemes, the situation is likely to become worse before it becomes better.</p> <p>Serious concerns remain about funding for maintenance.</p>
	C+	for major urban areas	<p>Major and ongoing strides in provision of water since 1994, but focus on quantity, not quality, makes water services unsustainable.</p> <p>Water quality is a serious problem, especially outside metros. Seeking Blue Drop status might assist in improving water quality in municipalities.</p>
	D-	for all other areas	<p>Water wastage (through leaks) is still too high.</p> <p>Serious shortage of skilled personnel and officials; governance failures increasing.</p> <p>Increase in protests in urban and rural areas – efforts to force improvement in services.</p>
Sanitation (including wastewater)	C-	for major urban areas	<p>Serious problems with management of many wastewater (sewage) treatment works. Wastewater leakage and spillage, especially into major rivers, is still too high.</p> <p>Frequent problems with inappropriate and unsustainable design, e.g. on-site sanitation VIPs not designed to be emptied once full. Sanitation backlog is increasing owing to unsustainable infrastructure.</p>
	E-	for all other areas	<p>Lack of buy-in from users.</p> <p>Inadequate operation and maintenance capacity, and shortage of skilled personnel.</p>



# THE NEED: Infrastructure Report Card



<b>Solid waste management</b> 	<b>C</b> 	for waste collection in major urban areas	<p>In general approximately 60% of households receive adequate refuse removal service. In the major urban areas, the percentage is over 80%, while in the rural areas it is as low as 20%.</p> <p>Landfill sites in metros are generally licensed, but not all are well managed.</p> <p>Many other municipalities, especially rural municipalities, have unlicensed landfill sites or licensed sites that are not operated according to acceptable/appropriate standards.</p> <p>Hazardous and health care risk waste disposal is a concern.</p>
	<b>D</b> 	for waste collection in other areas	
	<b>C+</b> 	for waste disposal in major urban areas	
	<b>D</b> 	for waste disposal in other areas	

<b>Roads</b> 	<b>B</b> 	for national roads	<p>The national road network is in the good to excellent range with the proportion of roads in poor to very poor condition never exceeding the international benchmark of 10%. SANRAL demonstrates expert knowledge, world-class management and excellent monitoring and maintenance systems.</p> <p>Close to 80% of the network has exceeded its 20-year structural design lifespan. SANRAL's current success in maintaining the national road network will see its responsibilities and network allocation expand further. These will be severe challenges.</p> <p>The paved provincial road network has deteriorated significantly over time. Shortages of skilled personnel in provincial departments, inadequate funding and outdated systems, and the lack of routine and periodic maintenance, have contributed to the current condition.</p> <p>Generally, these roads are in satisfactory condition.</p> <p>Less than 10% (except for Buffalo City) of the paved metropolitan roads are in poor to very poor condition. Balancing the need for the upgrading of township roads with the necessity to perform routine and periodic maintenance remains a challenge given the limited resources at their disposal.</p> <p>Concerns about the lack of capital expenditure on capacity improvements and signalling upgrades. In general, municipalities lack capacity, skilled resources and funding to efficiently and effectively manage their road networks. Reliable condition data is scarce. Few municipalities make use of pavement management systems to prioritise their needs.</p> <p>Capacity improvements amount to much less than that required, especially with high urbanisation rates. Based on the limited data available, the paved road network on average, nevertheless appears to be in a fair condition.</p> <p>Maintenance of gravel roads, which constitutes 75% of the total length of the proclaimed South African road network, has been neglected.</p> <p>Condition data is scarce (only available for 24% of the network). Approximately 50% of the provincial gravel roads and 30% of the municipal gravel roads, for which condition data is available, are in a poor to very poor condition.</p>
	<b>D-</b> 	for paved provincial roads	
	<b>C-</b> 	for paved metropolitan roads	
	<b>D</b> 	for paved district and local municipal roads	
	<b>E</b> 	for all provincial, metropolitan and municipal gravel roads	



# THE NEED: Infrastructure Report Card



**Airports**

**B+** 

ACSA-owned facilities only

ACSA provides world-class aviation infrastructure at most of its airports. It demonstrates a model of excellent maintenance and operational practice, with first-rate institutional memory. A profitable company, it is strongly driven not only by the need to meet statutory requirements, but also by its own high standards.

The delays and inconvenience owing to continuous expansion, reported on in 2006, have largely been overcome, thanks to the substantial completion of the most recent expansion programme, and only relatively minor deficiencies remain, e.g. signage and minor security concerns.

**Ports**

**B-** 

Commercial ports only

**C**

Fishing harbours  
(new sub-sector)

Expenditure on upgrading and providing new port infrastructure owned and operated by Transnet has continued at a steady pace since 2006, with a number of large projects already complete, including the new port, Ngqura. Other ports are ageing but well-maintained.

The repair and maintenance programme completed in 2007 drastically improved the condition of the harbours. However, urgent follow-on maintenance is required, particularly for mechanical installations such as slipways, to prevent deterioration.

**Rail**

**B+** 

for heavy haul freight lines

**C+** 

for general freight lines on the core network

**D** 

for active branch lines

**C-** 

for passenger lines (excluding Gautrain)

These lines are in a good condition and are well maintained. Infrastructure expansion will provide capacity for increased volumes. Some operational issues do exist. The additional capital expenditure on these lines has enhanced the state of the network.

The condition of the network has improved slightly. Some bottlenecks exist on specific lines. The focus on the core network will further improve the network condition. Operational performance needs to increase together with higher volumes to take advantage of infrastructure investment. More needs to be done regarding service levels and reliability.

Just over half of the branch lines have been closed or lifted and active lines are maintained to provide network flexibility or for future expansion. Transnet's focus on the core network means that if active branch lines are not concessioned or earmarked for expansion, further deterioration will occur. (The score has improved from an E to D, with only active branch lines taken into account.)

The capital investment programme is slowly starting to reduce the backlog, but not quickly enough. Operational inefficiencies do exist and passenger volumes are restricted by inadequate and failing rolling stock. Theft and vandalism is another major concern and safety remains a significant issue.



# THE NEED: Infrastructure Report Card



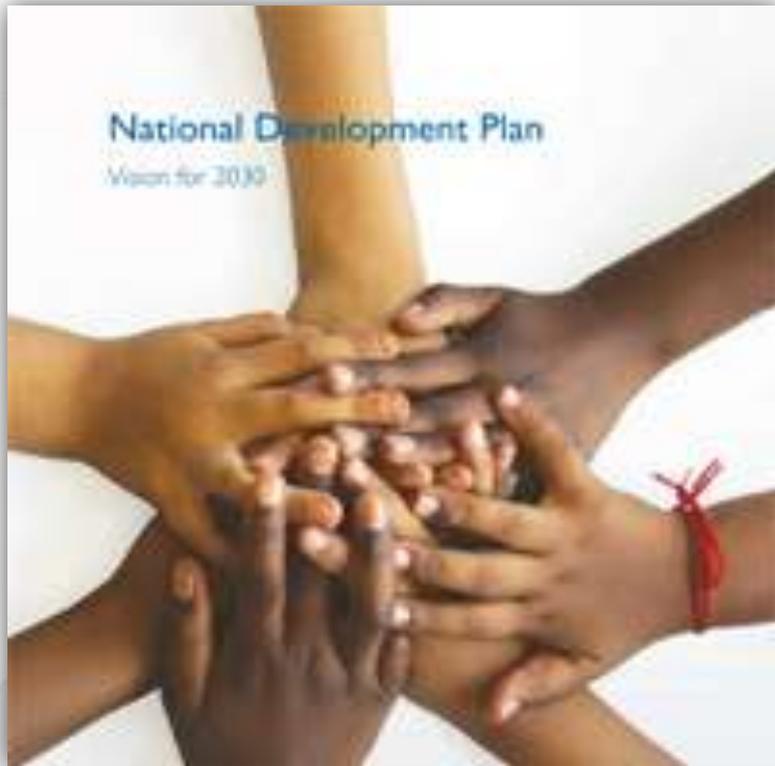
 <b>Electricity</b>	<b>C+</b> 	Eskom's generation infrastructure (95% of South Africa's generation capacity) is in a satisfactory condition with a reasonable maintenance regime. It can meet current demand. However, major capital investment for new infrastructure, is needed to meet needs in the next five years. Such investment is being made, but there are a number of risks associated with ageing infrastructure, new project completion and coal supply.
	<b>B-</b> 	Eskom's high-voltage long-distance transmission infrastructure is in a better than average condition, with a reasonable maintenance regime. It can meet current demand and handle minor incidents across the network. However, major capital investment is required to meet needs in the next five years.
	<b>D</b> 	Characterised by inadequate operation and maintenance capacity and shortage of skilled personnel. In many areas, infrastructure is ageing and/or overloaded. Municipal infrastructure in particular is below standard and poorly maintained. There is often a lack of capacity to meet demand and it is not resilient. In the absence of significant investment there may be an impact on the national economy. Eskom's distribution network on average is in a significantly better condition than the municipal distribution network.
for Eskom's generating infrastructure for Eskom's transmission network for local distribution		

 <b>Healthcare infrastructure</b>	<b>D+</b> 	Serious lack of credible and current condition data. Poor financial and procurement management with little dedicated maintenance resources. Serious systemic and capacity failures are typical.
	<b>D</b> 	Similar to hospitals. Instances of poor building quality and specification.
for hospitals for clinics	Lack of skilled support staff to care for infrastructure. Ageing infrastructure will deteriorate further.	Lack of empowerment at facility level to undertake programmes of infrastructure care.

 <b>Public ordinary schools</b>	<b>D+</b>	In general, maintenance of education infrastructure in South Africa has been limited, resulting in conditions deteriorating across all provinces. However, there is some variation in school infrastructure condition, with urban and ex-Model C schools being generally better maintained than rural schools. Degradation over time means that many schools now need urgent maintenance to ensure environments are suitable for teaching and learning, and to avoid expensive unplanned repairs.
for public ordinary schools in South Africa (new sector)		



# THE NEED: National Development Plan (and others)



# Government sector capacity challenges

- Education system – Poor Maths and Science (1%)
- University throughput (<30%)
- Career path and development
- Stop start spending on infrastructure projects (PICC)
- Poor quality contracts/tenders/ procurement systems
- Unprofessional and inelegant – lack of ownership
- No long term planning or O&M



## WHY GOVERNMENT

Perception

Stop picking on me

Race Card

Incompetency Card



# Engineering Capacity in South Africa



Year	Professional Engineers in Public Sector	Number of People per Registered Technical Government Professional	Engineers Employed in Private Sector
1990	40%	2 700	12 000
2010	25%	27 000	21 000

Country	Number of People per Registered Technical Professional	Number of People per Registered Doctor
Norway	122	308
Swaziland	12 300	9 100
UK	311	492
<b>South Africa</b>	<b>3 166</b>	<b>1 493</b>
Argentina	453	354
Ghana	12 800	2 500
Japan	303	476
<b>Brazil</b>	<b>227</b>	<b>379</b>
<b>India</b>	<b>157</b>	<b>2 320</b>
<b>China</b>	<b>130</b>	<b>593</b>



# Engineering Capacity in South Africa



- Government/ Engineers (History/ Aspirations)
- Who are these people/ Recognition of Engineers
- Where are the engineers
- Transactional and Dynamic Engineers (Engineers, Technologists...)



# Problem Solving: 3 Phase Approach

## Short term

- Harness skills available

## Medium term

- Redesign public sector technical departments

## Long term

- Rebuild a training culture and the public sector technical skills base



**All engineers are behind SA**

**EISH**

**32 Year old with 2 years of consulting experience**

# Problem Solving: Phase 1 – SHORT TERM



## Use current resources

- Appoint experienced engineering personnel to senior engineering posts (**Insource concept**)
- Offer permanent posts for senior public sector personnel VS current model of 3 to 5 year contracts (**Need for Institutional Capacity**)
- Second private sector staff to public sector (**Insource concept**)
- Deploy retired engineering capacity
- Address immigration/ migration
- Remove barriers to employing experienced personnel (**temporary leniency on BEE rules**)
- Pay appropriate salaries
- Structures and systems





## **SERVICE DELIVERY MUST CONTINUE WHILE WE GET THE HOUSE IN ORDER**

- Use of GFIP model – major service providers appointed on condition that they JV and develop smaller companies
- BOTT – for water projects – lead consultant to act for the state per region and manage service providers
- Gautrain – Use of experienced project office personnel and international experts to plan and manage



## Problem Solving: Phase 2 MEDIUM TERM

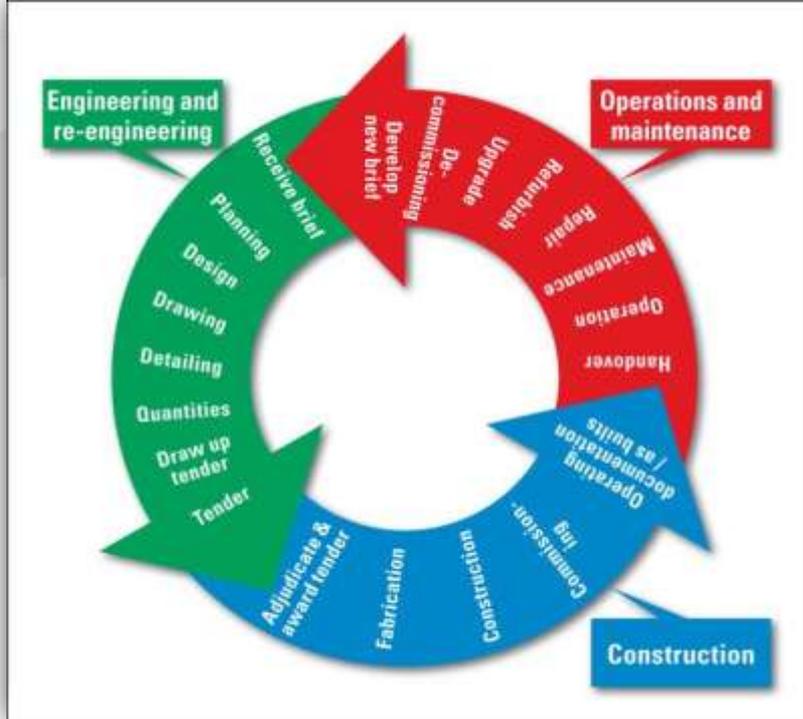
### Enabling Environment

- Recreate structures, systems and processes (QMS)
- Ensure job descriptions include technical competency and experience
- Recreate City Engineer and Chief Engineer posts  
(Potential for a separate Engineering Project Management Unit)
- Create junior training posts
- Address bureaucracy
- Ensure that line departments have the authority over support departments such as supply chain, HR, & finance
- Consider retention measures such as appropriate salaries, recognition of registration and CPD support



# Problem Solving: Phase 3 LONG TERM

## Career development path

- Career guidance, scouting & bursaries
  - Support students with mentoring and experiential training opportunities
  - Develop graduate training programmes (Secondments to private sector) providers
- 
- Provide adequate supervision, coaching and mentoring Develop training policies
  - Ensure that comprehensive training requirements and guidelines are included in public sector tenders



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