

Road Pavements Forum  
N2 & N3 & other projects: some  
lessons learnt & thoughts

May 2023

Krishna Naidoo

**SANRAL**



BUILDING SOUTH AFRICA  
THROUGH BETTER ROADS

# The opportunity

- There is more work to come than these project experiences.
- This is a public servant take – there are experts and far more knowledgeable people in our audience & industry.
- Big lesson learnt – I need to spend lots more time on site – not at the site office.

# Big lesson

- I need to spend lots more time on site – not at the site office .....

# Investigation stage

- Due to some projects taking a while to get to implementation, some investigation data was outdated.
- We asked teams to update with latest data like condition assessment & traffic loading.
- Outlier – one pavement engineer did not visit site at all but did the design???
- Outlier – one prelim to prelim report was more complex than a couple of detail design – some Luna guys are next level.

# Geotech

- They must have seat at the table - not just design engineers interpreting & reporting
- Geotechnical engineers must report and present on their designs.
- They must be involved in spec and schedule of quantities compilation – not just check someone else drawing up the spec & quantities
- There should be actual working cooperation between the geotech, pavement and structural design engineers – not just mailing of drawings, reports and designs.

## Design stage

It was said that EME was permeable! Fundamentally flawed – it tends towards zero voids.

Make sure the Geotech & project lead agree that the Geotech did the design.

Ensuring that design consultants engaged with each other about interface issues.

# Documentation

Transition stage from COLTO to COTO

Supporting manuals and guidelines being updated quite rapidly

Manual 33 & 35

PG binders

# Design constructability

- Deconstruction of existing pavement
- Recycling, reusing and upcycling of existing materials
- Deconstruction & construction sequence & programme had to work with traffic accommodation along the adjacent projects.
- Drainage management during deconstruction and construction critical when working in the median
- Materials movement in and out the median with adequate access points that were also safe.



# Traffic accommodations plan

- Concrete barriers are used but to actually set them up under live traffic conditions ....challenge.
- Maintenance of mainline under live traffic also challenge...some night work.
- Alternate routes on the provincial and municipal network.

# Drainage management plan during construction

- How does one drain a potential swimming pool.
  - Pumps?
- Drainage management plan during construction
  - Avert under-cuts as well as consequential delays
- Is it being done....hmmmmm

# Construction equipment and materials supply access & exit

- Reality during construction was access from and into the fast lane.
- Flagmen had to stand behind the concrete barriers
- Various options were tried ...carefulness and attention of drivers was key

# Asphalt Mix designs

- All are still getting caught out with the amount of time it takes to get it finalised
- Gaps are still significant between all parties
- I supply what my customer wants
- Some still do not want to do Manual 35 mix designs rather stick with Marshall
- Some are taking old testing to support new mix designs
- Recently design done with SAPREF binder in 2021 tabled now consideration – is there still SAPREF binder stockpiled since then.
- .

# Concrete mix designs

- Still a problem that few concrete labs are accredited for concrete testing
- Massive trust deficit between concrete manufacturers & labs doing mix design testing
- How does. Concrete mix designer do concrete mix design without doing it in a lab
- There is this thing called concrete mix verification
- Question- what is being left on the table that adds value to Sanral
- Mix designers do not visit the site

# Mix designs

- Some still being submitted without testing from labs accredited for those tests
- Still being submitted without main contractors reviewing and motivating for acceptance
- Still being submitted without consultants reviewing, analysing and reporting.
- N3 & N2 has improved
- Industry labs seem not keen on getting accredited for concrete mix design work & testing.

# Specified concrete strength

- “The relationship between the 28-day cube compressive and the 28-day flexural of the concrete shall be established by laboratory tests.
- The specified compressive strength shall be the highest of the following four values:
  - (i) 35 MPa at 28 days; or
  - (ii)  $0,85 f_{c1}$  where  $f_{c1}$  is the 28-day compressive strength corresponding to a 28-day flexural strength of 4,5 MPa.
  - (iii)  $0,85 f_{c2}$ , where  $f_{c2}$  is the 28-day compressive strength corresponding to a water: cement ratio of 0,53.
  - (iv)  $0,85 f_{c3}$ , where  $f_{c3}$  is the 28-day compressive strength corresponding to a cement content of 320 kg/m<sup>3</sup>.
- Where  $f_{c1}$ ,  $f_{c2}$  and  $f_{c3}$  shall be the 28-day compressive strengths determined from laboratory mixes as prescribed in Clause A6.1.4.3. “

# Method statements & Trail sections

- “Where applicable the methodology to be used and the acceptability of the work / product shall be demonstrated by means of an appropriate trial section carried out by the Contractor.”
- It’s not meant to be used for:
  - the contractor to use it to determine the method statement
  - the contractor to use it to figure out how to actually do the work
- Danger that method statements are becoming “cut and paste” efforts just to tick off a box.
- Mix design proposals seldom include trial section reports – they should.
- Failure rate of trial sections is quite telling and quite worrying – still.



# Gap between parties in the value chain: Who actually sees the mat going down & how often?



# concrete

Cement manufacturer	Additive supplier	Additive manufacturer	Aggregate supplier	Sand supplier	Concrete mix designer
Concrete mix designers lab	Concrete manufacturer	Concrete manufacturers control lab	Concrete supplier	Main contractor	Main contractor's quality manager
Main contractor's site agent	Main contractor's concrete foreman	Concrete laying contractor	Concrete pavement shutter contractor	Concrete pavement steel supplier	Concrete contractor steel fixer
Concrete contractor finishing contractor	Concrete contractor tining team	Curing compound manufacturer	Curing compound supplier	Concrete contractor curing compound applicators	Main contractor QC lab

# Bond coats



Control of application rates  
needs more attention



The chemist was only too  
happy to help



Needs more engagement

# Milling

- Fine milling drum is different from regular milling drum.
- Milling a joint breaks EME, the joint is then irregular both longitudinally & vertically – making for a porous joint.
- Change the picks to make sure of a consistent surface finish
- Longitudinal furrows are a poor excuse for so called mechanical interlock – eish!

# Quality manager

- “The Contractor shall institute a quality management system and provide experienced engineers, technicians, foremen, inspectors and other technical staff, under the control of a designated quality manager, to give effect to and manage the quality management system.”
- Are we leveraging this resource adequately
- Is this resource at an appropriate level of expertise
- How many have seen an ISO 17025 non-conformance report from?
- How about the same from the consultants?
- An area of engagement going forward.
- Liking Gary’s approach



# The mat

- Segregation of the mix – big issue & needs more attention
  - Not cutting joints
  - Excessive raking
  - Poor setting of side-plate
  - Poor to almost little relative compaction on the joints
  - Over rolling with PTR
  - Variability of mix
  - Poor milling practice
- 
- Who is critically checking the mat as paving is taking place?

# Asphalt mat segregation

- Segregation in the mat is influenced by the full value chain of asphalt  
.....



# EME

- Be careful with EME construction
  - It shows up short cuts very quickly
  - It shows up poor attention to operations very quickly
- Is it difficult to construct?
  - No
- 3 different consultants were asked to do investigation reports on poor EME.
  - Reports varied from relatively complex to rudimentary
- South Coast Road, Durban first EME trial section is still performing well.
- Mainline temporary overlay is performing relatively fine.





# The slab

- Concrete is being shovelled significantly
- Concrete chute drop points not planned adequately
- Poker vibrator used almost indiscriminately
- Segregated mix, mostly mastic being drawn with straight edge.
- Poor consistency of application of curing compound
- Poor finishing of slab
- Tining not well timed
- Shuttering sitting proud of the base allowing mastic to run out
- Inconsistent levelling of stools
- Inconsistent cover of longitudinal steel
- Slump control sometimes by more mixing time in the truck

# SANRAL Responses

Industry  
engagement

- SABITA
- CEMCON
- CSIR
- SARF
- SAT

Internal  
workshops  
planned

- Concrete pavements
- EME

# SANRAL Responses

SAT workshops

SATBinderrr

ConPavStruc Conference

RPF

SARF Courses

# Industry responses?

- The opportunity:
  - We are just getting going.
  - Volumes are increasing significantly.
  - No of concurrent projects is increasing significantly.
  - More expert and knowledgeable industry people will get involved.