

# LABOUR BASED SURFACING ASPHALT TECHNOLOGY



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# Labour Based Surfacing Asphalt

BACKGROUND

**2004**

ILO requested RMS to develop a labour intensive asphalt

**2007**

20km of access roads surfaced in Soshanguve

**2009**

3km of sidewalks in Swellendam

**2011**

Feasibility Study: PGWC: Transport & Public Works

**2015**

Phase 1 surfacing of access roads Stellenbosch Municipality

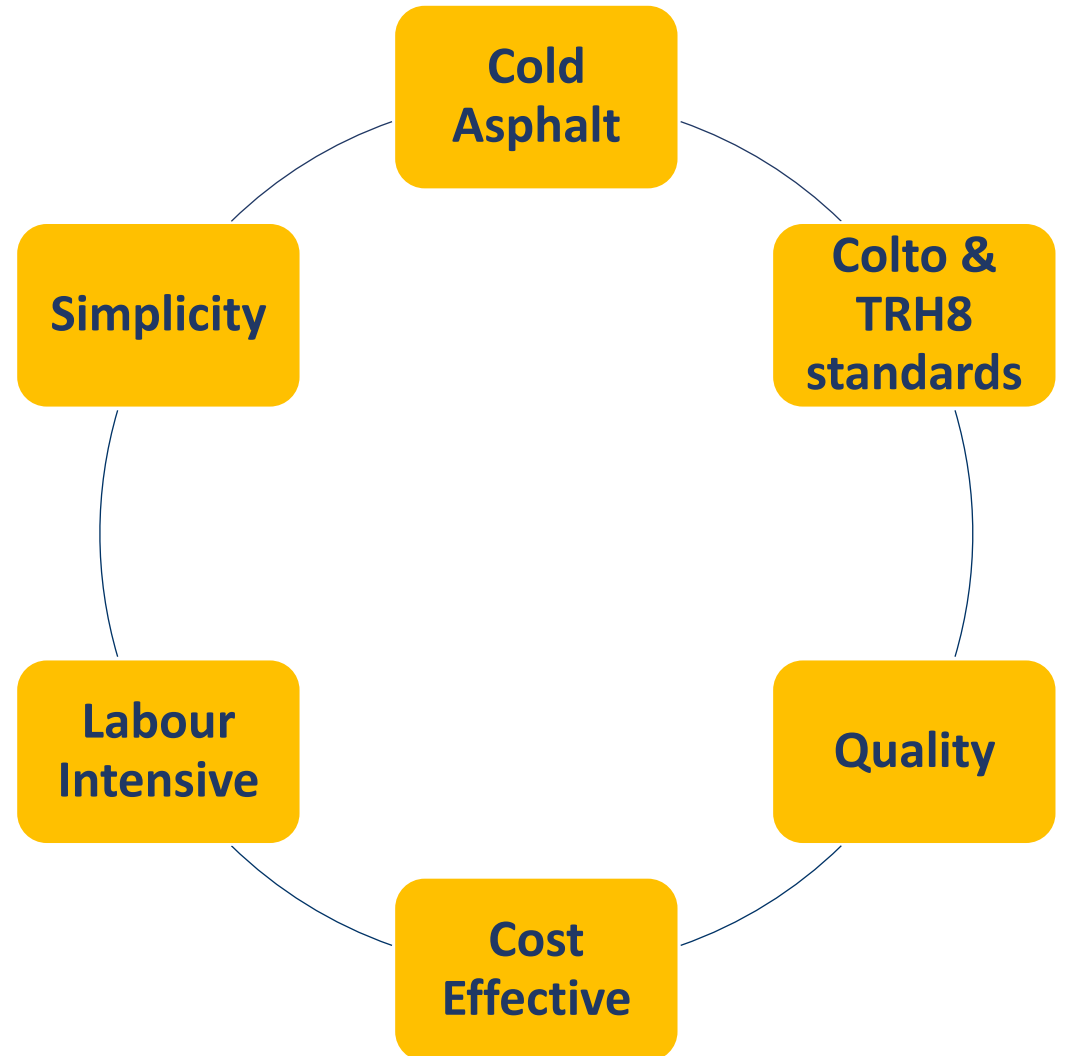
# Stellenbosch Project Ph1 –Ph3

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- 7,000 m of kerbing, channelling and edging;
- 17,500m<sup>2</sup> of asphalt surfacing (3,5km);
- Operations done by hand, except layerworks;
- Structured training programme;
- Onsite asphalt batching;
- Phase 1 - 40 Workers with a Total Person workdays 2960



# What is LBS Asphalt?



# What makes LBS Asphalt unique?

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- Communities can make and lay their own asphalt;
- Can be bagged or simply covered;
- Insitu mix or batch mixing offsite;
- Road Authorities will have fresh quality asphalt readily available;
- Samples can be taken and assessed in a laboratory.



# Mix Designs

## FINE CONTINUOUSLY GRADED ASPHALT

-Sidewalks, cycle tracks, overlays etc



Material	% of total	Mass (kg)
Crusher Sand	50	75
7mm Roadstone	21	31,5
Bitumen SS60	9	13,5
LBS Filler*	20	30
<b>Total</b>	<b>100</b>	<b>150</b>

## MEDIUM CONTINUOUSLY GRADED ASPHALT

-Roads, parking areas, pothole repairs etc

Material	% of total	Mass (kg)
Crusher Sand	50	75
7mm Roadstone	9	12
10mm Roadstone	12	18
Bitumen SS60	9	15
LBS Filler	20	30
<b>Total</b>	<b>100</b>	<b>150</b>

\*Coal dust, fly ash, crusher dust and fibres

# Typical Lab Test Results



Property	TRH8 Requirement for low volume roads (< 0.8 million E80s)		LBS Asphalt Typical Results	Test Method
	Minimum	Maximum		
Binder content (%)	6% nominal for fine graded mixes		5,5	TMH1, C1
Air Voids (%)	2	5	3,5	TMH1, C3
Marshall Stability (kN)	4	10	8,5	TMH1, C2
Marshall Flow (mm)	2	5	3,2	TMH1, C2
Stability / Flow Ratio	>2		2,7	TMH1, C2
Indirect Tensile Strength at 25°C (kPa)	>800		1074	ASTM
Immersion Index (%)	>75		86	TMH1, C5

# Construction of LBS Asphalt

**Step 1** Structured  
Training



**Step 2** Plant and  
Equipment  
Requirements



**Step 3** Labour  
Requirements





# Structured Training Programme

**Empowerment Mastery**

**Manufacture & application of 4 different eco-friendly cold asphalt related products for road surfacing, repair & maintenance**

**To maintain & repair potholes using CSIR Technical Guide**

**Entrepreneurial Development Training**



# Plant and Equipment Requirements

- 4 x wheel barrows
- 3 x metal rakes
- 8 x shovels
- 3 x watering cans
- 6 x containers (25 ℓ)
- 1 x 4 m level
- 1 x broom
- 1 x pedestrian roller (or hand tampers if required)
- 2 x hammer (plus 6 nails and fish line)
- 2 x thickness guides (30 mm angle iron x 30 m long)
- 1 x 500 -1000ℓ water tank
- 1 x drum stand
- 1 x drum tap



# Labour Requirements

Task	No of Persons	Activity
Supervision	2	Check quality and maintain production rate
Materials supply and manufacture	14	Mix the measured aggregate, LBS filler and bitumen emulsion
Thickness guides and setting out	2	Setting out of the road and the thickness guides
Spreading and levelling of final mix	4	Place and roughly level LBS Asphalt
Compaction	2	Compact the asphalt road surface and water
<b>Total</b>	<b>24</b>	

# LBS Asphalt Application

- Place thickness guides (30 mm loose placed material for a nominal 25 mm compacted seal).
- Lightly water the base sweeping off any free standing water (no prime is required).
- Spread the prepared LBS mix and level to the required thickness. Lightly apply water to the surface of the levelled LBS mix if necessary.



# LBS Asphalt Application

- Compact the area by roller with 2 – 4 passes using vibration.
- Compact the area by roller with 2 to 3 passes without vibration (water the drums to prevent sticking of material).
- If required lightly water the compacted area again and roll again with 2 to 4 passes without vibration.



# LBS Asphalt Application

- Once the surface becomes saturated with brown liquid sufficient water and compaction has been applied.
- Note: If a greater labour input is required, the road surface can be compacted by hand using hand tampers, although if this is done, greater attention should be paid to the quality of the compaction and the densities achieved.



# Benefits of LBS Asphalt

Description	Benefit to:			
	Implementing Authority	Contractor	Community	Environment
Complies with TRH8 strength and volumetric requirements for asphalt wearing course	X	X	X	
<b>LBS Asphalt is ideally suited to labour intensive construction projects with no specialised equipment being required &amp; adequate training and support available</b>	<b>X</b>		<b>X</b>	
Minimal disruption to traffic, roads can be opened to light traffic immediately after compaction, higher trafficked areas can be opened within 24 hours			X	
<b>No heating is required during the preparation or application of the LBS mix</b>		<b>X</b>		<b>X</b>
LBS is self tacking (i.e. no tack coat required)		X		X

# Limitations of LBS Asphalt

- upgrading of low volume rural access roads (design speed < 60km/h) from gravel to surfaced standard;
- upgrading of low volume residential streets (design speed < 60km/h) from gravel to surfaced standard;
- resurfacing of low volume rural access roads or residential streets (design speed < 60km/h);
- construction of sidewalk surfacing in either rural or urban environment;
- pothole repair







# Design Considerations

- Consider crossfall of road at 3% to assist runoff.
- With the irregularities of hand screeding on the LBS Asphalt this ensures that the water gets into the channel even at places where the screeding is not perfect.
- Base levels can be adjusted to be 5mm higher in order for the final surface to be 5mm higher than the kerbs. This will also ensure that the water runs off the road easily.

# Inspection of Soshanguve roads



## Comments from the J&G Feasibility study

- the roads are generally in a good condition with little visible distress;
- distress that was observed consisted of sporadic minor surfacing failures and very occasional longitudinal cracking;
- no rutting or shoving was observed at intersections; no bleeding was observed;
- no fatigue cracking (i.e. brittle/aged binder) was observed and the binder appeared to be in good condition (i.e. black and sticky);
- adequate side drainage exists with formalised concrete dish channels along one road edge;

# Before



# After



# Before



# After



# Before



# After



# Before



# After



**Thank You**

**Any Questions?**