

PART C4 SITE INFORMATION

C4.1 - Site Information.....	SI.1
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C4.1 SITE INFORMATION

C4.1.1 Introduction

The project entails construction of a transloading facility at Mkuze Rail siding, where cane will be transferred from road trucks to rail wagons and transported by Transnet Freight Rails to the mill, a total journey length of 350kms.

Parameter	Data
Site Co-ordinates	S 27°36'55.80" and E 32° 1'58.13
Altitude	116 m above mean sea level
Minimum Average Temperature	8.3 °C
Maximum Average Temperature	31.6°C
Warmest month	February
Coldest month	July
Minimum Relative Humidity	62 %
Maximum Relative Humidity	82%
Rainfall Period	Oct to Feb
Maximum Average monthly precipitation	67mm
Minimum Average monthly precipitation	5mm
Maximum wind speed	32.2 kph
Maximum average wind speed	24.4 kph
Minimum wind speed	15.8 kph

C4.1.2 Background

The cane grown in the Makhathini region currently being transported to the Felixton mill by road requires a more economically, sustainable, and efficient way of transporting the cane to the mill as of March 2021.

C4.1.3 Ground Conditions

The Tenderer shall satisfy themselves of the existing ground conditions during the site briefing. The tenderer can come at any stage to site to verify existing ground conditions to assist them to price accurately.

A draft Geotech report is attached here in as a guide.

The Tenderer shall be responsible for the general stormwater management in and around the sites. This will include for diversion of run-off away from the site and the maintenance thereof.

C4.1.4 Existing Services

There are existing services near the site and these are to be proved by the Contractor prior to construction. We will share information on existing services from the client if it becomes available.

C4.2 DRAFT GEOTECH REPORT

Refer document overleaf



Sharadesh Sewlal & Associates cc t/a
SHARDESH SEWLAL ENGINEERS

Geotechnical and Civil Engineering Consultants

Est. 2002

**REPORT TO BOSCH PROJECTS (PTY) LTD ON THE RESULTS OF A
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE UPGRADING OF
THE MKUZE RAILWAY SIDING**

REPORT No: GEO/20/21/785

DATE: 8 DECEMBER 2020

REPORT STATUS: **DRAFT**

CARRIED OUT BY:

Sharadesh Sewlal and Associates cc T/A Sharadesh
Sewlal Engineers
Suite 3007
3rd Floor
Building 2
34 Essex Terrace
Westville
3629

AUTHOR:

Sharadesh Sewlal

Tel: +27 31 266 7299

Fax: +27 86 641 8113

Email1: geotech@shardesh.co.za

Email2: shardesh.sewlal@shardesh.co.za

CLIENT:

Bosch Projects (Pty) Ltd
1 Holwood Park
5 Canegate Road
La Lucia Ridge Office Estate
4320

CLIENT CONTACT PERSON:

Mr Songezo Ndzamela

Tel: +27 31 535 6212

Mobile: +27 83 536 1792

Email1: ndzamelas@boschprojects.co.za

Email 2:

QUALITY VERIFICATION

ISO 9001:2015

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001:2015 which has been independently certified by Trans Pacific Certifications Ltd under Certificate No. 15396.



QUALITY MANAGEMENT

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REPORT TO BOSCH PROJECTS (PTY) LTD ON THE RESULTS OF A GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE UPGRADING OF THE MKUZE RAILWAY SIDING

1. INTRODUCTION AND TERMS OF REFERENCE

Shardesh Sewlal Engineers was requested by Mr Barry Kriel, acting on behalf of Bosch Projects (Pty) Ltd to provide a quotation for the geotechnical investigation for the upgrading of the Mkuze Railway Siding. Shardesh Sewlal Engineers submitted the quotation, referenced Q1012 on 1 December 2020 and was subsequently appointed by Bosch Projects (Pty) Ltd on 2nd December 2020 to proceed with the geotechnical investigation and reporting.

The proposed upgrade includes:

- i. Refurbishing of the existing building.
- ii. Construction of a new hardstand / truck staging (parking zone for trucks).
- iii. Construction of a new hardstand for cane handling using an excavator.
- iv. Construction of a new Hilo 50T cane off-loader.
- v. Construction of two weigh bridges, one for trucks coming in and the other for trucks going out.
- vi. Gravelling of the surface leading to the cane off-loading area and construction of the service road.

This report presents the findings of the geotechnical investigation and based on these findings, recommendations for earthworks, excavatability, materials usage, subgrade improvements, foundations and site drainage are provided.

2. INFORMATION SUPPLIED

The following information was drawn upon for the purposes of this investigation:

- The 1: 250 000 Geological Map of St. Lucia issued by the Council for Geoscience.
- Google Imagery of the site.
- Drawing No 10969 – 011 – 002 – GGL showing the overall site layout.
- Plan No. LS / EMG / MKD0021L /1 showing the aerial photo of the site and the locality plan prepared by Transnet.

3. SITE DESCRIPTION

The Mkuze Railway Siding is located north of the Mkuze Central Business District on Main Road P2 Section 9. The site can be accessed by travelling north along the National Route N2, then turn right at Mkuze onto Kingfisher Avenue, travel 1.8km, then turn left onto Main Road P2/9 and then travel for approximately 900m before entering the site on the left hand side.

The site currently is occupied by an existing dilapidated building which has been vandalised. The existing railway line is located adjacent the building to the south.

The area proposed for the service road and truck staging area is vegetated with short to medium growing bush and trees

Topographically, the natural ground slopes very gently in an easterly direction.

4. FIELD WORK AND NATURE OF THE INVESTIGATION

The fieldwork for the upgrading of the Mkuze Railway Siding was carried out on 6 December 2020 and comprised the following:

Description	Test Pits	DCP / DPL
Refurbishment of Existing Building	3No. to 2m depth - TLB	3No. DPL Tests
New Hard Stand for Cane off-loading	2No. to 1m depth - TLB	2No. DCP Tests
New Hilo 50T Cane off-loading	1No. to 3.170m - TLB	1No. DPL Test
Weigh Bridge-in / Weigh Bridge-out	2No. to 3.180m/2.380m - TLB	2No. DPL Tests
Truck Staging Area	2No. to 1.3m - TLB	4No. DCP Tests

Three hand auger tests were performed in the vicinity of the steel columns to determine the depth of the bases for the columns.

The test pits were profiled according to The South African Guidelines for Soil and Rock Logging. The test pit logs are presented in Appendix B. The purpose of the test pitting was to:

- Profile the subsoils across the investigated area and identify and identify soil types regarding foundation and stormwater drainage.
- Identify problems related to potential slope stability.
- Establish the depth to bedrock if occurring at shallow depth.
- Determine the presence of any perched or shallow ground water tables.

The aim of the DPL testing was to:

- Establish the consistency of the subsoils.
- Establish the depth to bedrock if occurring at shallow to moderate depth.

In order to facilitate an interpretation of the DPL results in respect to the consistency of the non-cohesive soils underlying the investigated area, the following table is provided. It must be however noted that it is only a guide to DCP equipment.

Table 1: Subsoil Consistency Inferred from DCP Results

Cohesive Soils		Non-Cohesive Soils	
DCP Blow Count Blow / 300mm	DCP Blow Count Blow / 300mm	DCP Blow Count Blow / 300mm	DCP Blow Count Blow / 300mm
0 – 4	Very Soft	0 – 8	Very Loose
4 – 8	Soft	8 – 18	Loose
8 – 15	Firm	18 – 54	Medium Dense
15 – 24	Stiff	54 – 90	Dense
24 – 54	Very Stiff	>90	Very Dense
>54	Hard		

The positions of the test pits and DCP tests are shown on the plan attached in Appendix A.

5. SITE GEOLOGY

5.1. GENERAL GEOLOGY

According to the 1:250 000 Geological Map of St. Lucia issued by The Department of Mines and Mineral Affairs, Map No. 27¹/₂32, the site is underlain by Lebombo Group Lethaba Formation Basalt.

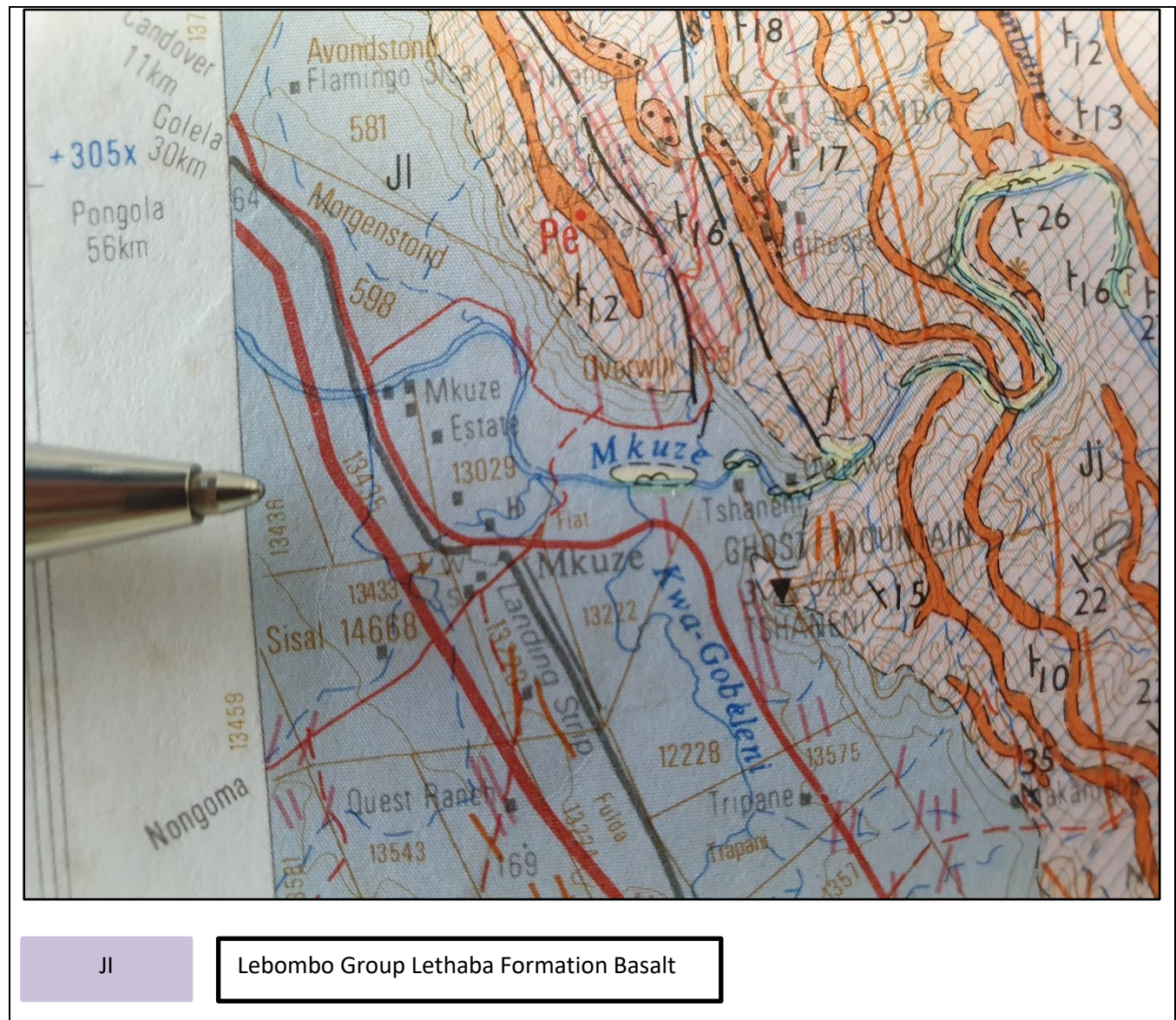


Fig 1: Geological Map of Mkuze, Taken from Map No 27¹/₂32 St. Lucia

5.2. STRATIGRAPHY

On the basis of the field investigation, the following stratigraphy may be identified under the .

Existing Building

The hand augers indicate the existing building to be founded at 2.1m depth. The three tests pit performed around the existing building indicate the underlying soils to comprise dry, orangey pale red brown, dense, fine grained silty sand. These in-situ subsoils are observed to possess low plasticity and considered to possess low potential expansiveness. The DPL tests indicate that these subsoils are medium dense to dense, and these subsoils are therefore considered to possess low potential to compress under structural loading.

New Cane off-loading area

This area is located on an elevated platform that has been filled. A layer of approximately 190mm of imported coarse grained clayey sandy gravel overlies fill material comprising dark orangey red brown, medium dense clayey silt.

Weigh Bridge In / Weigh Bridge Out

The proposed weigh bridge in is underlain by orangey pale red brown, dense silty sand. These subsoils are observed to possess low plasticity and low potential to undergo cycles of heave and shrink with seasonal fluctuations in soil moisture contents.

The proposed weigh bridge out is underlain by 1.630m of fill material comprising several different layers. The upper layer comprises a medium dense clayey gravelly sand gravel wearing course below which a thin layer of recycled asphalt (RA) mixed with ash was encountered. Below the recycled asphalt layer, a deep layer of fill comprising medium dense, orangey brown, fine grained silty sand was recorded. A thin fill layer of blue grey yellow brown, medium dense, coarse grained sandy gravel is recorded below the silty sand fill. Insitu subsoils comprising pale orangey brown, medium dense silty sand was recorded below the fill layer. The insitu subsoils are recorded to possess low plasticity and low potential to undergo cycles of heave and shrink.

New Hilo 50T Cane off-loader

This area is located adjacent the elevated platform along an existing service road. Dense, pale orange brown, silty sand underlies this site with shallow fill comprising pale red, fine grained dense sand overlying the insitu silty sand.

Truck Staging Area

This area is underlain by completely weathered Rhyolitic Basalt recovered as sandy gravel. Above the completely weathered Rhyolitic Basalt, clayey sand with nodules and silty sand was recorded in the test pits. Colluvium comprising brown, medium dense silt overlies the area.

6. STABILITY

No signs of gross instability that may fatally flaw the proposed upgrade was recorded on site.

7. GROUNDWATER

No groundwater seepage was encountered in the test pits and or anywhere else on site.

8. LABORATORY TEST RESULTS

Laboratory tests were conducted on selected materials sampled from the inspection pits in order to classify them and assess their suitability for use in the proposed upgrade.

The following laboratory tests were conducted on the materials sampled:

- (i) Particle size distribution and Atterberg Limits;
- (ii) Maximum Dry Density (MDD) and Optimum Moisture Content Tests (OMC);
- (iii) California Bearing Ratio (CBR) Tests;
- (iv) Shear Box Tests

The complete laboratory tests are attached in Appendix F but summarised below in Table 2.

Table 2

Summary of Results of Particle Size Distribution Analysis, Atterberg Limit Determinations and CBR tests

Test Pit No.	Km	Depth (m)	Description	Particle Size %					Atterberg Limits			GM	Modified AASHTO		CBR Values					Swell (%)	AASHTO and TRH 14 Classification
				Coarse Sand	Coarse / Fine sand	Medium / Fine Sand	Fine / Fine Sand	Silt & Clay	LL	PI	LS		MDD (kgm ³)	OMC (%)	90	93	95	98	100		
TP4		190 - 1460																			
TP10		410 - 1200																			

Abbreviations used:

LL	–	Liquid Limit
PI	–	Plasticity Index
LS	–	Linear Shrinkage
GM	–	Grading Modulus
MDD	–	Maximum Dry Density
OMC	–	Optimum Moisture Content
UCS	–	Unconfined Compressive Strength
ITS	–	Indirect Tensile Strength
CBD	–	Cannot Be Determined

Classification in Terms of:

TRH 14 (1985)
Unified Soil AASHTO Classification System

Table 3

Summary of Results of Shear Box Tests

Test Pit No.	Depth (mm)	Description	Maximum Shear Stress (kN/m ²)	Angle of Friction (°)	Apparent Cohesion (kPa)
TP7	670 - 3170				

9. CLASSIFICATION OF MATERIALS

Test Pit	Description	Comments
TP4		
TP10		

AWAITING RESULTS

10. DEVELOPMENT RECOMMENDATION

10.1. RIPPABILITY AND TRENCHABILITY

Soft excavation in terms of SABS 1200 is generally anticipated to a depth of 4.0m below existing ground level using hand held equipment and light earth moving equipment such as a Tractor Loader Backhoe (TLB).

More difficult excavation may be encountered below 2.0m in the area proposed for the truck stage due to the presence of the weathered Basalt occurring at shallow depth and this may require heavier earthmoving equipment such as an excavator or small dozer.

10.2. EARTHWORKS

To promote the long-term stability of the site, all earthworks should be carried out to engineer's design and details; and in accordance with the guidelines provided in SABS 1200.

It is important the earthworks for the different upgrade initiatives are properly planned and supervised. The indiscriminate cutting and filling of the site without reference to predetermined levels could cause irrevocable damage which would be costly to remedy.

All vegetation should be removed before any cutting or filling is undertaken.

Recommendations for earthworks are given below in item 10.3.

10.3 UPGRADING RECOMMENDATIONS

The following recommendations are given for the proposed upgrading initiatives:

Existing Building

No enhancements to the foundations of the existing building is considered essential. An inspection of the building did not reveal any defects that may suggest that the underlying soils possess undergo heave and shrink cycles or that the soils are susceptible to compression. The hand augers indicate that the foundations have been placed in the dense silty sands.

New Cane off-loading area – Concrete Platform

This area is underlain by deep fill comprising medium dense clayey silt. We recommend that the concrete slab be supported on at least 350mm of imported material that would qualify to yield the following layerworks structure:

200mm G5 compacted to 98% Mod AASHTO Density

150mm G7 compacted to 96% Mod AASHTO Density

Insitu – Rip 150mm and compact to 93% Mod AASHTO Density

Weigh Bridge In / Weigh Bridge Out

Soft excavations are expected to the required depths for the weigh bridges. As a precautionary measure, we recommend that a soil raft comprising 200mm to 300mm of G5 material be placed below all concrete surfaces. The in-situ materials are susceptible to a rapid loss of strength with increase in soil moisture contents.

New Hilo 50T Cane off-loader

The geotechnical investigation reveals that the upper 1.2m is very dense becoming medium dense to 5m. It is recommended that the Hilo be supported on both compression piles and tension piles which will require to be designed by a structural engineer with experience in such works. To enhance the performance of the concrete slab, we recommend that a 350mm soil raft below the concrete slab, similar to the layerworks recommendation for the new cane off-loading area.

Truck Staging Area / New Gravel Service Road

For the construction of the Truck Staging Area, the existing colluvium which ranges between 330mm and 410mm is to be removed to stockpile. The silty sand below the topsoil is considered suitable for use as subgrade material. Acceptable gravel material of at least G6 quality as per TRH 14 is recommended to be imported as a gravel wearing course.

10.4 SURFACE DRAINAGE

An effective stormwater management plan is essential to ensure storm water does not accumulate and pond on surfaces on site. Ingress of moisture into the silty sands will result in rapid and sudden decrease in strength of the in-situ materials and this will adversely affect the performance of the proposed upgrades. As far as practically possible, all storm water should be directed away from the site.

10.5 SUB-SURFACE DRAINAGE

Although no groundwater seepage was encountered during the geotechnical investigation, there is the possibility of a perched water table forming at the interface of the colluvium/silty sands and the weathered Rhyolitic Basalt in the vicinity of the proposed truck staging area. Should ground water be encountered during construction, it is recommended that Shardash Sewlal Engineers be contacted to further investigate the site and provide recommendations.

11 CONCLUSIONS

This report presents the results of a geotechnical investigation carried out for the upgrading of the Mkuze Railway Siding.

The proposed upgrade includes:

- i. Refurbishing of the existing building.
- ii. Construction of a new hardstand / truck staging (parking zone for trucks).
- iii. Construction of a new hardstand for cane handling using an excavator.
- iv. Construction of a new Hilo 50T cane off-loader.
- v. Construction of two weigh bridges, one for trucks coming in and the other for trucks going out.
- vi. Gravelling of the surface leading to the cane off-loading area and construction of the service road.

The geotechnical investigation concludes the site is stable for the proposed upgrade. Geologically the area is underlain by Lebombo Group Lethaba Formation Rhyolitic Basalt. Most of the site is underlain by fine grained, medium dense to dense silty sand. Recommendations for earthworks, layerworks and subgrade treatment are provided in this report.

Finally, the ground conditions described in this report refer specifically to those encountered in the inspection pits. It is possible that conditions at variance to those described in this report can be encountered elsewhere on site. It is recommended that Shardesh Sewlal & Associates cc undertake periodic inspections during the construction operations to confirm appropriate founding conditions and materials suitability.

ATTACHED:

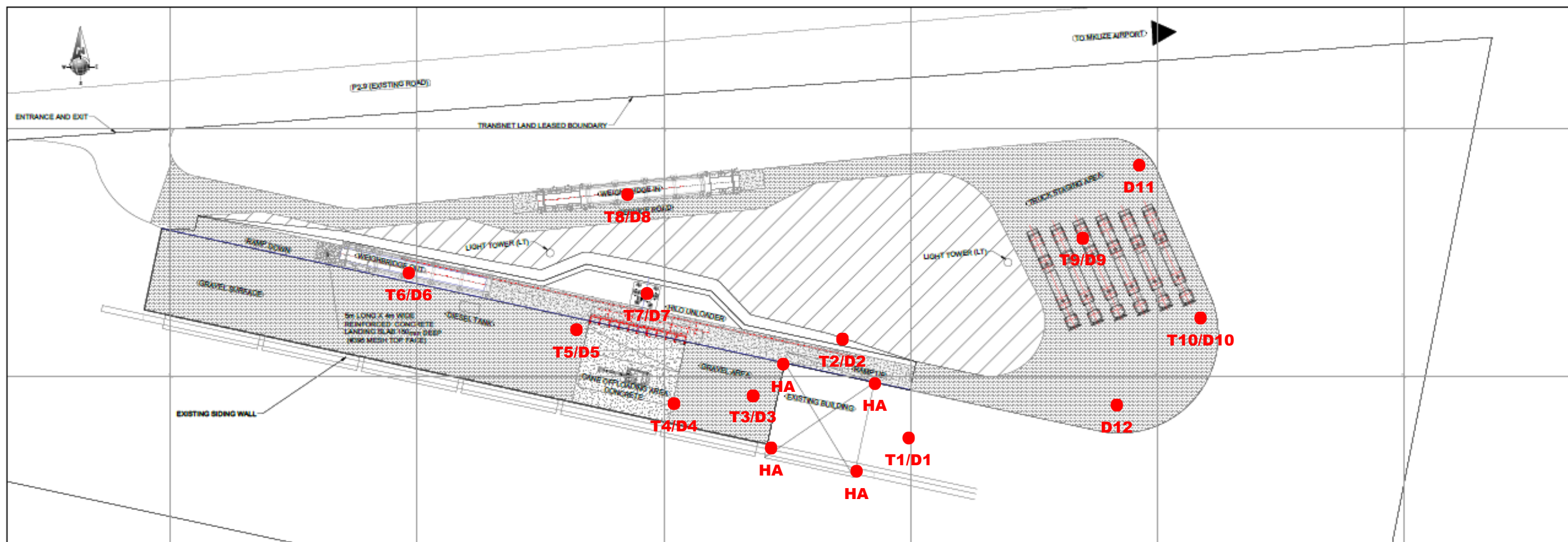
- Appendix A: Plan showing the positions of test pits and dynamic cone penetrometer tests
- Appendix C: Profiles of the test pits
- Appendix D: Dynamic cone penetrometer tests – DPL
- Appendix E: Dynamic cone penetrometer tests – DCP
- Appendix F: Laboratory Test Results

SIGNED BY:




.....
SHARDESH SEWLAL
(PR. SCI. NAT 400082/00)


PLAN SHOWING POSITIONS OF THE INSPECTION PITS AND DYNAMIC CONE PENETROMETER TESTS





T: Test Pit
 Dynamic Cone Penetrometer (DPL): D1, D2, D3, D6, D7, D8,
 Dynamic Cone Penetrometer (Structural): D4, D5, D9, D10, D11, D12


PROFILE OF TEST PITS


 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		HOLE: T1
		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		EX. BUILDING
Sample	Depth (m)	Description		
	N. T. S	(Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)		
	0.000	Slightly Moist, Pinkish Pale Reddish, Medium Dense to Dense, Fine Grained, Silty Sand and Brown, Fine Grained, Sand (FILL)		
	1.610			
		2.210	Dry, Brown, Medium Dense to Dense, Fine Grained, Intact, Silty Sand (COLLUVIUM)	
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered.				
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E
				HOLE: T1


 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T2
						EX. BUILDING
Sample	Depth (m) N. T. S	Description (Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)				
	0.000	Slightly Moist to Moist, Brown, Medium Dense to Dense, Silty Sand with abundant roots, leaves, organic debris and building rubbles (FILL)				
	0.460					
	0.700	Dry, Brown, Medium Dense to Dense, Fine Grained, Intact, Silty Sand (COLLUVIUM)				
	2.310	Slightly Moist, Orangey Pale Reddish, Medium Dense to Dense, Intact, Fine to Slightly Medium Fine Grained, Sandy Silt				
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered. 5. Dis-used electric cable encountered at 300mm BGL.						
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E		HOLE: T2


 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T3
						EX. BUILDING
Sample	Depth (m)	Description				
	N. T. S	(Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)				
	0.000	Slightly Moist, Dark Brown Black, Firm, Clayey Gravel, Imported Gravel (Leucocratic Granitic Gneiss) with abundant organic matter				
	0.120					
		Slightly Moist, Pale Reddish Pinkish, Medium Dense to Dense, Intact, Fine to Slightly Medium Fine Grained, Sandy Silt				
	2.400					
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered.						
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E		HOLE: T3


 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		HOLE: T4
		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		
Sample	Depth (m) N. T. S	Description (Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)		
2 x BB	0.000	Slightly Moist, Light Grey Pink Brown, Medium Dense, Fine to Coarse Grained, Clayey Sandy Gravel (Imported Gravel) with abundant organic matter		
	0.190	0.190		
	1.460	Slightly Moist, Dark Orange Pinkish Red Brown, Fine Grained, Medium Dense, Intact, Clayey Silt (Fill) 1.460		
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered. 5. Sample: 2 x Big Bags for Full Classification.				
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E
				HOLE: T4


 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T5
				Cane off-loading surface
Sample	Depth (m) N. T. S	Description (Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)		
	0.000	Slightly Moist, Brown, Medium Dense, Medium Coarse Grained, Silty Sand with Gravel (Imported Gravel)		
	0.100	0.100		
		Recycled Asphalt, Ash		
	0.310	0.310		
	1.450	Slightly Moist, Pale Orangey Red, Medium Dense to Dense, Fine Grained, Silty Sand (FILL) with isolated Granite rock fragments 1.450		
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered.				
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E
				HOLE: T5

 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		<div style="border: 1px solid black; padding: 2px; text-align: center;"> HOLE: T6 </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> Weigh Bridge Out </div>	
		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020			
Sample	Depth (m) N. T. S	Description (Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)			
	0.000	Slightly Moist, Brown, Medium Dense, Fine to Medium Coarse Grained, Clayey Gravelly Sand (Imported Gravel Wearing Course)			
	0.210	0.210			
		Recycled Asphalt, Ash			
	0.300	0.300			
	1.520	Slightly Moist, Pinkish Orangey Brown, Medium Dense to Dense, Fine Grained, Silty Sand (FILL)			
	1.630	Dry, Blue, Grey Yellow Brown, Dense, Fine to Coarse Grained Sandy Gravel (Imported Gravel)			
	3.180	Slightly Moist, Pale Orangey Red, Dense, Fine Grained, Silty Sand			
NOTES: 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered.					
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E	
<div style="border: 1px solid black; padding: 2px; text-align: center;"> HOLE: T6 </div>					

 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T7	
				Hilo Unloader	
Sample	Depth (m)	Description			
	N. T. S	(Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)			
2 x BB	0.000	Dry, Pale Red Brown, Dense, Fine Grained, Silty Sand (FILL) with a thin layer of cemented layer and Granite gravel			
	0.670				0.670
		Slightly Moist, Pale Orangey Red, Dense, Fine Grained, Silty Sand			
	3.170				3.170
<p>NOTES:</p> <ol style="list-style-type: none"> 1. No refusal encountered. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered. 5. Samples: 2 x Big Bags for Shear Box Test 					
Method: Hand		Inclination:		Elevation: m	
Profiled By: S. Sewlal		Diam:		Coord. (S): ° ' " S	
Captured By: S. Kalpee				Coord. (E): ° ' " E	
					HOLE: T7

 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T8
				Weigh Bridge In
Sample	Depth (m)	Description		
	N. T. S	(Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)		
	0.000	Dry to Slightly Moist, Pale Orange Pale Red Brown, Dense to Very Dense, Fine Grained, Silty Sand		
	2.370			
NOTES: 1. Excavation stopped at 2.310m. TLB experienced difficulty excavating through the dense sand. 2. No Groundwater seepage encountered. 3. No bedrock encountered. 4. No sidewall collapse encountered. 5. Rubble encountered along the northern wall between 0.0m and 1.790m				
Method: Hand		Inclination:		Elevation: m
Profiled By: S. Sewlal		Diam:		Coord. (S): ° ' " S
Captured By: S. Kalpee				Coord. (E): ° ' " E
				HOLE: T8

 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE		PROJECT: UPGRADING OF MKUZE RAILWAY SIDING		HOLE: T9	
		LOCATION: MKUZE		CLIENT: BOSCH PROJECTS (PTY) LTD		Truck Staging Area	
		DATE: 6 DECEMBER 2020					
Sample	Depth (m)	Description					
	N. T. S	(Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)					
	0.000	Dry, Brown, Medium Dense, Fine Grained, Intact, Silt (COLLUVIUM)					
	0.330						
	0.830	Dry, Orangey Brown Speckled Red Yellow, Fine to Medium Grained, Dense, Clayey Sand with abundant nodules and irregular Granitic Gneiss rock fragments					
	1.290	Completely Weathered, Highly Fractured, Dark Grey Red Orange Brown, Very Soft Rock Rhyolitic Basalt recovered as Coarse Gravel with cobble size rock fragments					
NOTES: 1.No refusal encountered. 2. No Groundwater seepage encountered. 3. Completely weathered Rhyolitic Basalt bedrock encountered in test pit. 4. No sidewall collapse encountered.							
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E		HOLE: T9	

 SHARDESH SEWLAL ENGINEERS		TEST PIT PROFILE PROJECT: UPGRADING OF MKUZE RAILWAY SIDING LOCATION: MKUZE CLIENT: BOSCH PROJECTS (PTY) LTD DATE: 6 DECEMBER 2020		HOLE: T10
				Truck Staging Area
Sample	Depth (m) N. T. S	Description (Moisture, Colour, Consistency, Structure, Soil Type, Origin, Strat Unit)		
2 x BB	0.000	Dry, Brown, Medium Dense, Fine Grained, Intact, Silt (COLLUVIUM)		
	0.410	0.410		
	1.200	Dry, Orangey Brown Speckled Red Yellow, Fine to Medium Grained, Dense, Clayey Silty Sand		
	1.290	Completely Weathered, Orange Red Brown Black, Very Dense Completely Weathered Rhyolitic Basalt recovered as Coarse Sandy Gravel		
NOTES: 1.No refusal encountered. 2. No Groundwater seepage encountered. 3. Completely weathered Rhyolitic Basalt bedrock encountered in test pit. 4. No sidewall collapse encountered. 5. Samples: 2 x Big Bags for Material Classification				
Method: Hand Profiled By: S. Sewlal Captured By: S. Kalpee		Inclination: Diam:		Elevation: m Coord. (S): ° ' " S Coord. (E): ° ' " E
		HOLE: T10		

St

DYNAMIC CONE PENETROMETER TESTS - DPL



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

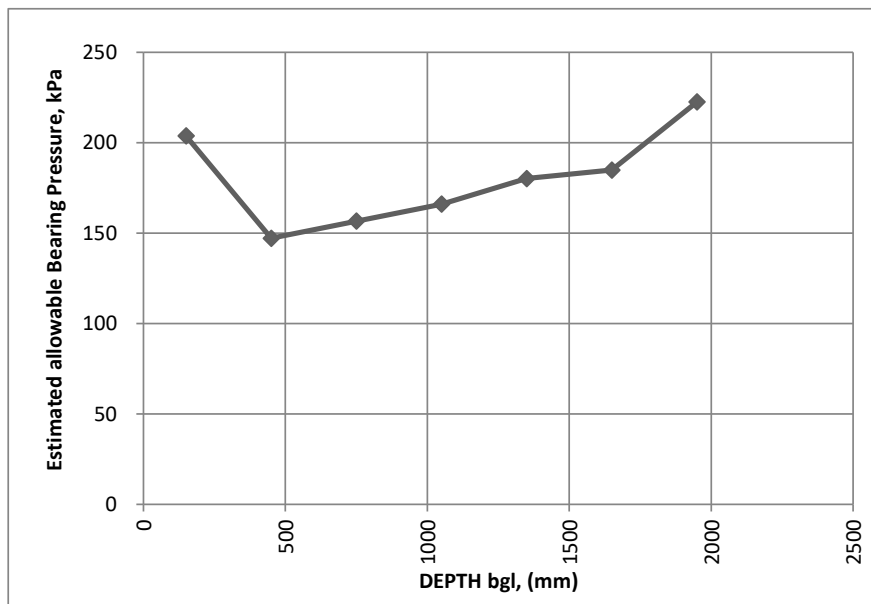
DATE: 6 DECEMBER 2020

DPL NO. 1

Elevation: m
Coord. (S): ° ' ' S
Coord. (E): ° ' ' E

DPL NO. 1

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : 0 mm below NGL

Applied Factor : 1.0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	39	150	8	15	32	204
2	300	600	450	27	450	11	10	20	147
3	600	900	750	29	750	10	11	22	157
4	900	1200	1050	31	1050	10	12	24	166
5	1200	1500	1350	34	1350	9	13	27	180
6	1500	1800	1650	35	1650	9	13	28	185
7	1800	2100	1950	43	1950	7	16	36	223



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

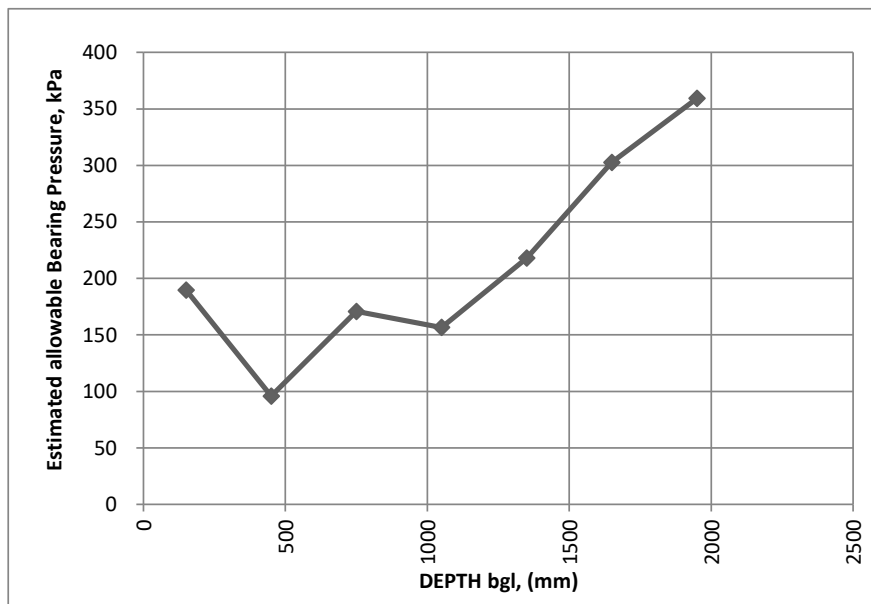
DATE: 6 DECEMBER 2020

DPL NO. 2

Elevation: m
Coord. (S): ° ' " S
Coord. (E): ° ' " E

DPL NO. 2

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : 0 mm below NGL

Applied Factor : 1.0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	36	150	8	14	29	190
2	300	600	450	21	450	14	8	14	96
3	600	900	750	32	750	9	12	25	171
4	900	1200	1050	29	1050	10	11	22	157
5	1200	1500	1350	42	1350	7	16	35	218
6	1500	1800	1650	60	1650	5	23	56	303
7	1800	2100	1950	72	1950	4	27	72	359



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

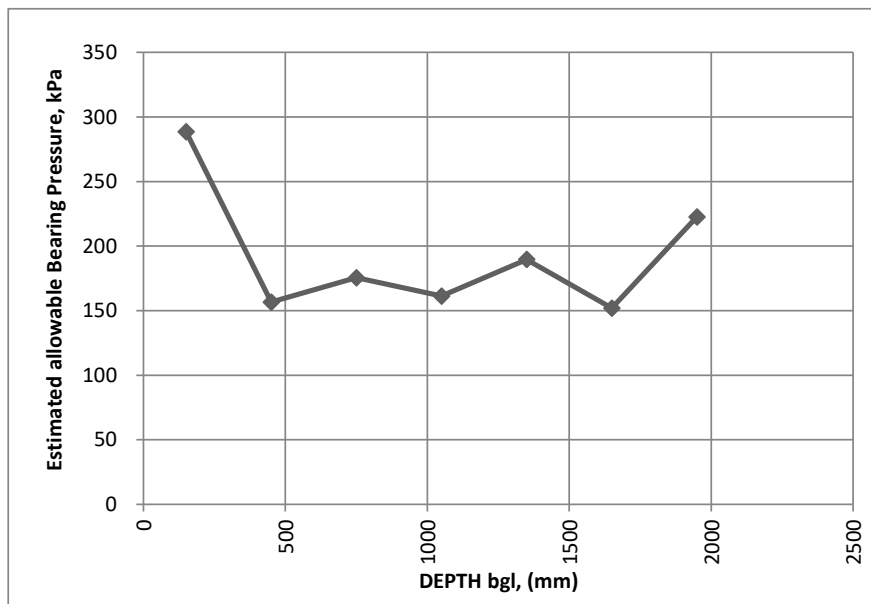
DATE: 6 DECEMBER 2020

DPL NO. 3

Elevation: m
Coord. (S): ° ' " S
Coord. (E): ° ' " E

DPL NO. 3

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : 0 mm below NGL

Applied Factor : 1.0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	57	150	5	22	53	289
2	300	600	450	29	450	10	11	22	157
3	600	900	750	33	750	9	13	26	175
4	900	1200	1050	30	1050	10	11	23	161
5	1200	1500	1350	36	1350	8	14	29	190
6	1500	1800	1650	28	1650	11	11	21	152
7	1800	2100	1950	43	1950	7	16	36	223



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

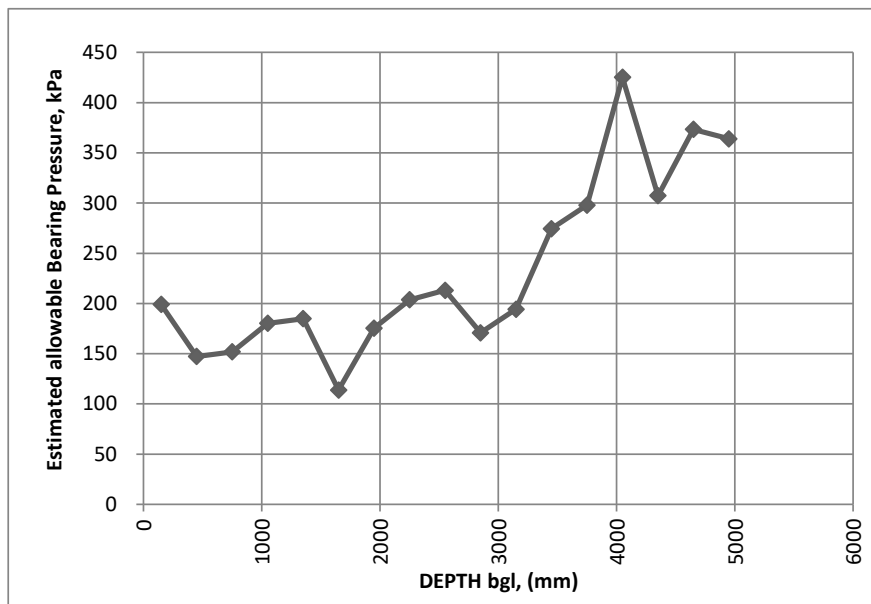
DATE: 6 DECEMBER 2020

DPL NO. 6

Elevation: m
Coord. (S): ° ' ' S
Coord. (E): ° ' ' E

DPL NO. 6

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : 0 mm below NGL

Applied Factor : 1.0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	38	150	8	14	31	199
2	300	600	450	27	450	11	10	20	147
3	600	900	750	28	750	11	11	21	152
4	900	1200	1050	34	1050	9	13	27	180
5	1200	1500	1350	35	1350	9	13	28	185
6	1500	1800	1650	26	1650	12	10	19	114
7	1800	2100	1950	33	1950	9	13	26	175
8	2100	2400	2250	39	2250	8	15	32	204
9	2400	2700	2550	41	2550	7	16	34	213
10	2700	3000	2850	32	2850	9	12	25	171
11	3000	3300	3150	37	3150	8	14	30	194
12	3300	3600	3450	54	3450	6	21	49	274
13	3600	3900	3750	59	3750	5	22	55	298
14	3900	4200	4050	86	4050	3	33	90	425
15	4200	4500	4350	61	4350	5	23	58	307
16	4500	4800	4650	75	4650	4	29	76	373
17	4800	5100	4950	73	4950	4	28	73	364



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

DPL NO. 7

DATE: 6 DECEMBER 2020

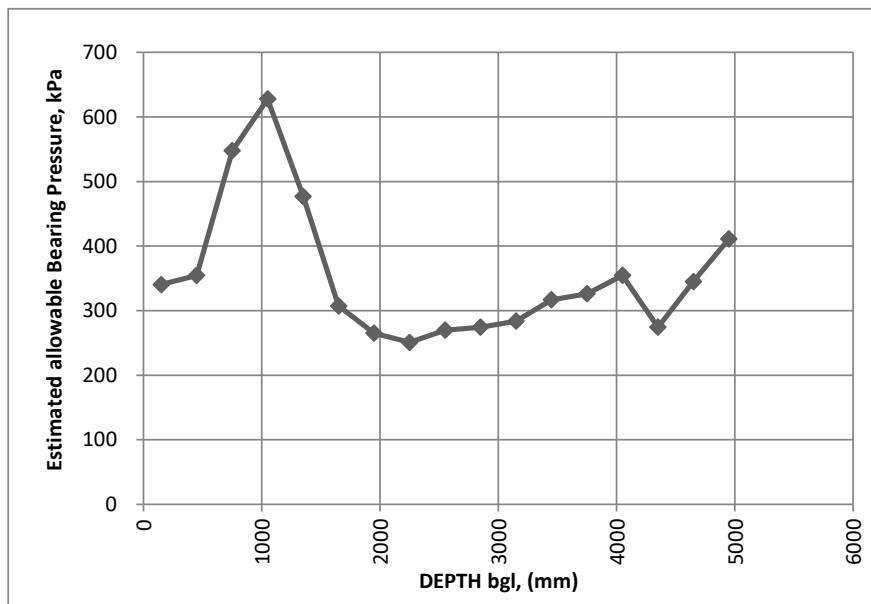
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Coord. (S): ° ' ' S

Coord. (E): ° ' ' E

DPL NO. 7

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : 0 mm below NGL

Applied Factor : 1.0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	68	150	4	26	67	340
2	300	600	450	71	450	4	27	70	355
3	600	900	750	112	750	3	43	110	548
4	900	1200	1050	129	1050	2	49	110	628
5	1200	1500	1350	97	1350	3	37	106	477
6	1500	1800	1650	61	1650	5	23	58	307
7	1800	2100	1950	52	1950	6	20	47	265
8	2100	2400	2250	49	2250	6	19	43	251
9	2400	2700	2550	53	2550	6	20	48	270
10	2700	3000	2850	54	2850	6	21	49	274
11	3000	3300	3150	56	3150	5	21	52	284
12	3300	3600	3450	63	3450	5	24	60	317
13	3600	3900	3750	65	3750	5	25	63	326
14	3900	4200	4050	71	4050	4	27	70	355
15	4200	4500	4350	54	4350	6	21	49	274
16	4500	4800	4650	69	4650	4	26	68	345
17	4800	5100	4950	83	4950	4	32	86	411



**SHARDESH SEWLAL
ENGINEERS**

PROJECT: UPGRADING OF MKUZE RAILWAY SIDING

LOCATION: MKUZE

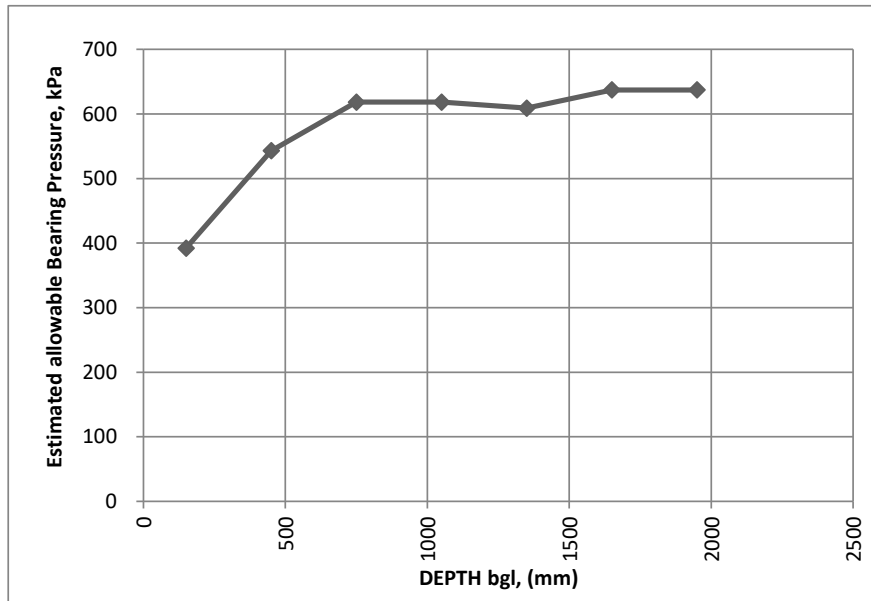
DATE: 6 DECEMBER 2020

DPL NO. 8

Elevation: m
Coord. (S): ° ' " S
Coord. (E): ° ' " E

DPL NO. 8

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 - 25	Loose
75 -100	<10	Very Loose

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : mm below NGL

Applied Factor : times Terzaghi's value

Remarks : **DPL STOPPED AT 2.1M DUE TO VERY DENSE CONDITIONS**

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN blows/300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	79	150	4	30	81	392
2	300	600	450	111	450	3	42	110	543
3	600	900	750	127	750	2	48	110	618
4	900	1200	1050	127	1050	2	48	110	618
5	1200	1500	1350	125	1350	2	48	110	609
6	1500	1800	1650	131	1650	2	50	110	637
7	1800	2100	1950	131	1950	2	50	110	637

DYNAMIC CONE PENETROMETER TESTS - DCP

LABORATORY TEST RESULTS

DCP Report - Single analysis

Region:	DURBAN	Road number:	MKUZE RAILWAY SIDING
Project date:	08 December, 2020	Print date:	08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Crane Off loading Area-D4	06 December 2020	5 - MID	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN₈₀₀): 92 Selected DCP Design Curve: Heavy traffic

Rut Limit: $\frac{20\text{mm}}{0.2}$ Road category: A
 Structural capacity (MISA): Base type: Granular
 (MISA = Million Standard Axles, 80 kN) Moisture condition of base: Optimum

Average equivalent strength (Existing Pavement Structure)

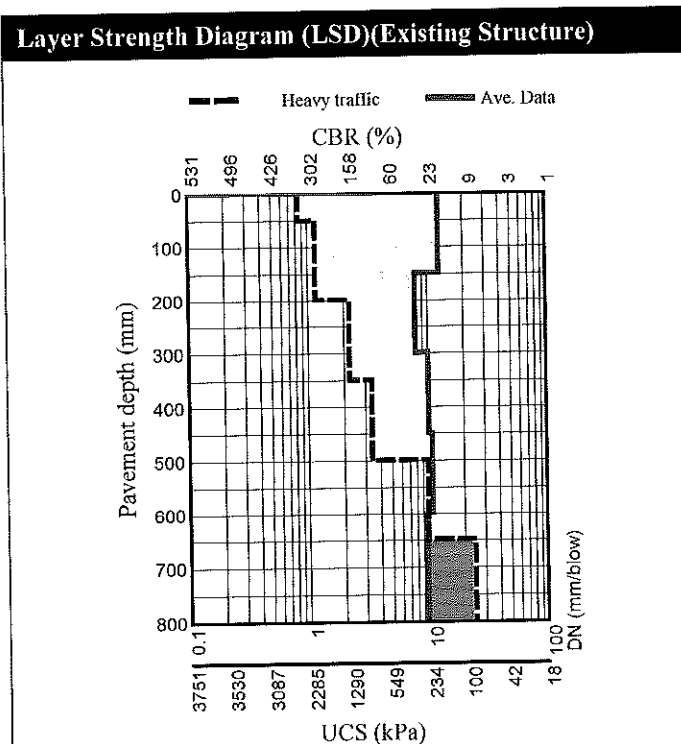
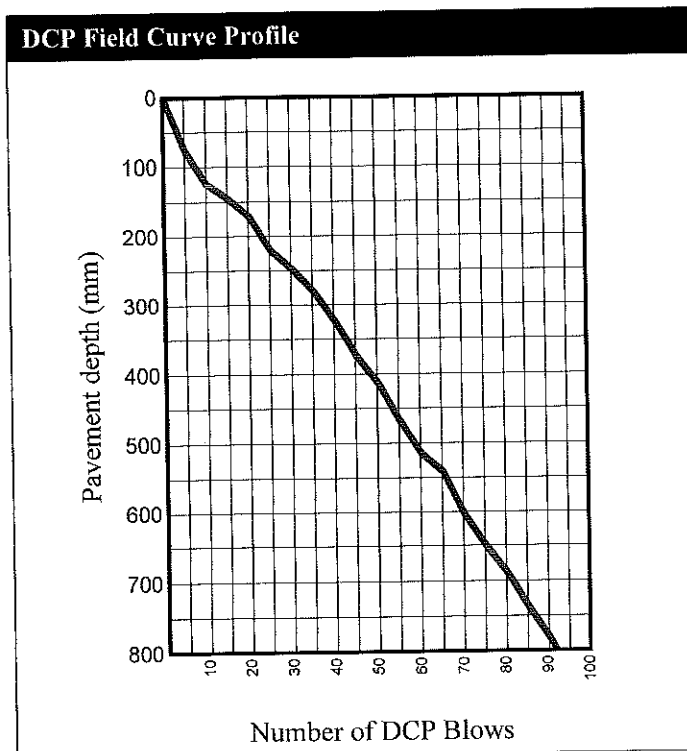
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 150	11.78	16	4.3	18.9	18	190	81	19 - 570
151 - 300	7.47	22	2.0	10.7	32	316	132	34 - 629
301 - 450	9.54	16	1.2	11.6	23	240	102	31 - 346
451 - 600	10.15	16	2.6	14.4	22	224	95	25 - 448
601 - 800	9.20	22	1.0	10.9	24	250	106	34 - 346

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighted average penetration rate

*** Unconfined Compressive Strength - calculated from weighted average penetration rate

P = Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

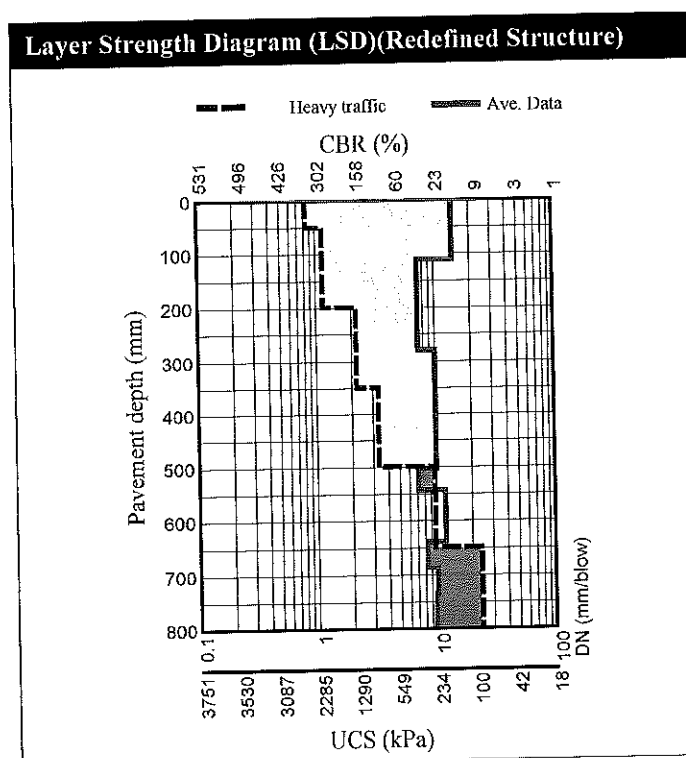
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 112	13.72	9	2.9	18.4	15	160	69	19 - 285
113 - 280	7.00	26	2.2	10.6	35	339	141	35 - 793
281 - 504	9.61	24	1.1	11.4	23	238	101	32 - 334
505 - 544	6.81	6	2.3	10.5	36	350	145	35 - 891
545 - 640	11.40	9	1.6	14.1	19	197	84	26 - 295
641 - 688	8.00	6	0.7	9.1	29	292	123	40 - 381
689 - 736	9.71	5	0.4	10.4	23	236	100	35 - 286
737 - 800	9.39	7	0.6	10.4	24	245	104	35 - 308

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

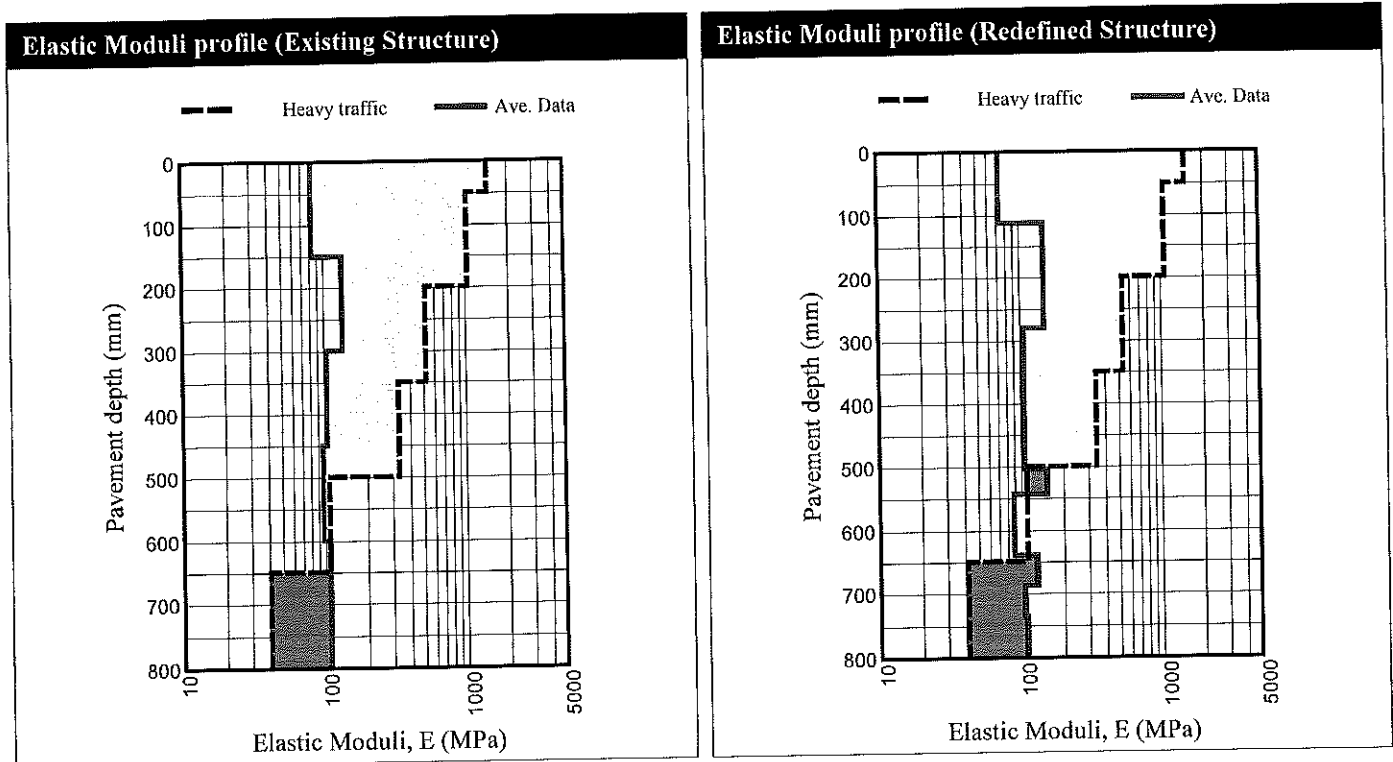


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 150	81	19 - 570	18	190
151 - 300	132	34 - 629	32	316
301 - 450	102	31 - 346	23	240
451 - 600	95	25 - 448	22	224
601 - 800	106	34 - 346	24	250

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 112	69	19 - 285	15	160
113 - 280	141	35 - 793	35	339
281 - 504	101	32 - 334	23	238
505 - 544	145	35 - 891	36	350
545 - 640	84	26 - 295	19	197
641 - 688	123	40 - 381	29	292
689 - 736	100	35 - 286	23	236
737 - 800	104	35 - 308	24	245



Summary of + and - Areas (Curve fitting table - Existing structure)

Depth (mm)	Cumulative Area (%mm), A
0 - 240	-694
241 - 448	159
449 - 520	-41
521 - 584	41
585 - 680	-52
681 - 720	4
721 - 752	-1
753 - 792	4
Absolute Area	995

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 78	78	5	15.60	13	139	60
78 - 125	125	10	9.40	24	244	103
125 - 146	146	15	4.20	66	601	243
146 - 172	172	20	5.20	51	473	194
172 - 221	221	25	9.80	23	233	99
221 - 248	248	30	5.40	48	454	186
248 - 280	280	35	6.40	39	375	155
280 - 324	324	40	8.80	26	263	111
324 - 375	375	45	10.20	21	223	95
375 - 414	414	50	7.80	30	301	126
414 - 469	469	55	11.00	20	205	87
469 - 517	517	60	9.60	23	239	101
517 - 543	543	65	5.20	51	473	194
543 - 606	606	70	12.60	16	176	76
606 - 652	652	75	9.20	24	250	106
652 - 690	690	80	7.60	31	310	130
690 - 739	739	85	9.80	23	233	99
739 - 784	784	90	9.00	25	256	108
784 - 836	836	95	10.40	21	218	93

DCP Report - Single analysis

Region:	DURBAN	Road number:	MKUZE RAILWAY SIDING
Project date:	08 December, 2020	Print date:	08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Crane Off loading Area -D5	06 December 2020	5 - MID	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN ₈₀₀):	91	Selected DCP Design Curve:	Heavy traffic
Rut Limit:	20mm	Road category:	A
Structural capacity (MISA):	0.2	Base type:	Granular
(MISA = Million Standard Axles, 80 kN)		Moisture condition of base:	Optimum

Average equivalent strength (Existing Pavement Structure)

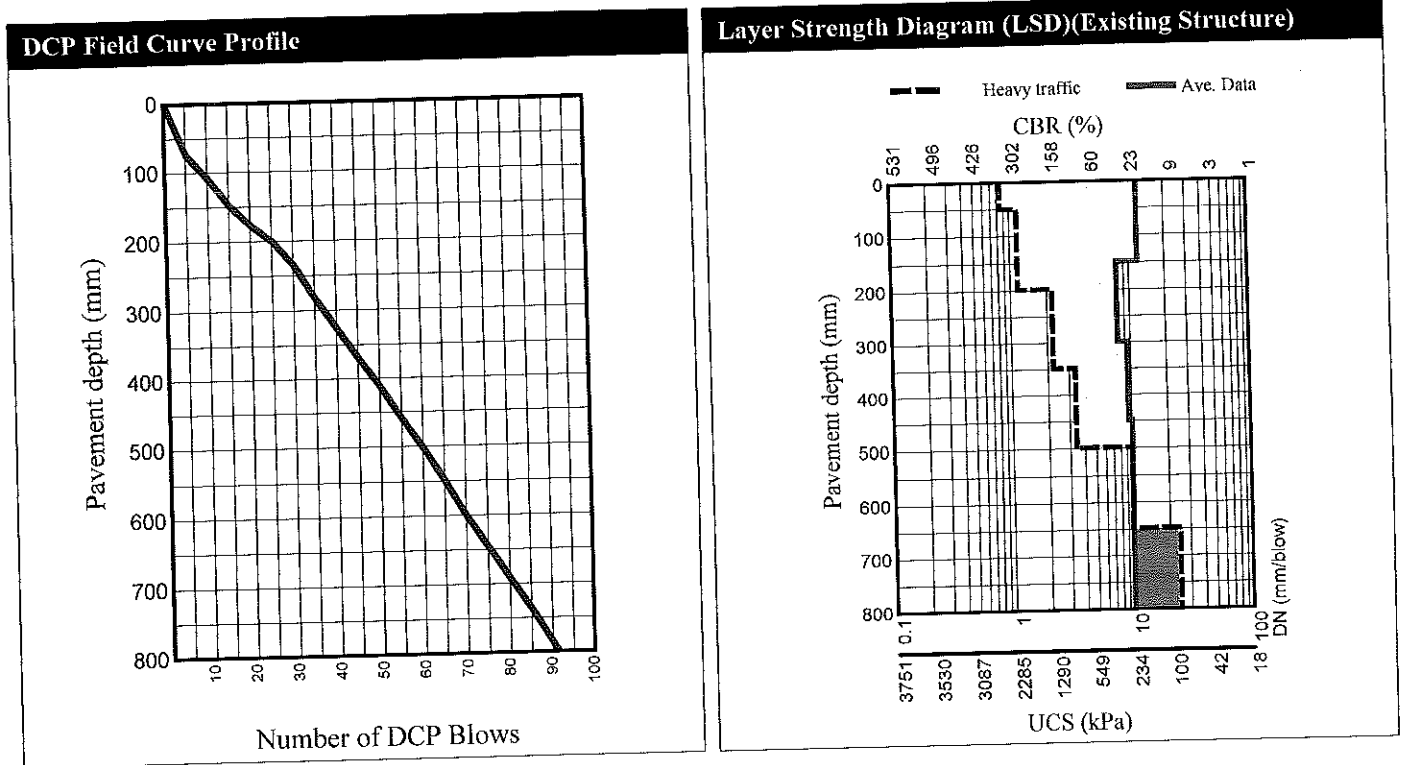
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 150	11.20	15	3.8	17.5	19	201	86	20 - 541
151 - 300	7.43	22	1.9	10.5	32	318	133	35 - 615
301 - 450	8.88	17	0.3	9.4	26	260	110	39 - 307
451 - 600	9.47	16	0.6	10.4	24	242	103	35 - 301
601 - 800	9.44	21	0.5	10.3	24	243	103	35 - 302

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P - Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

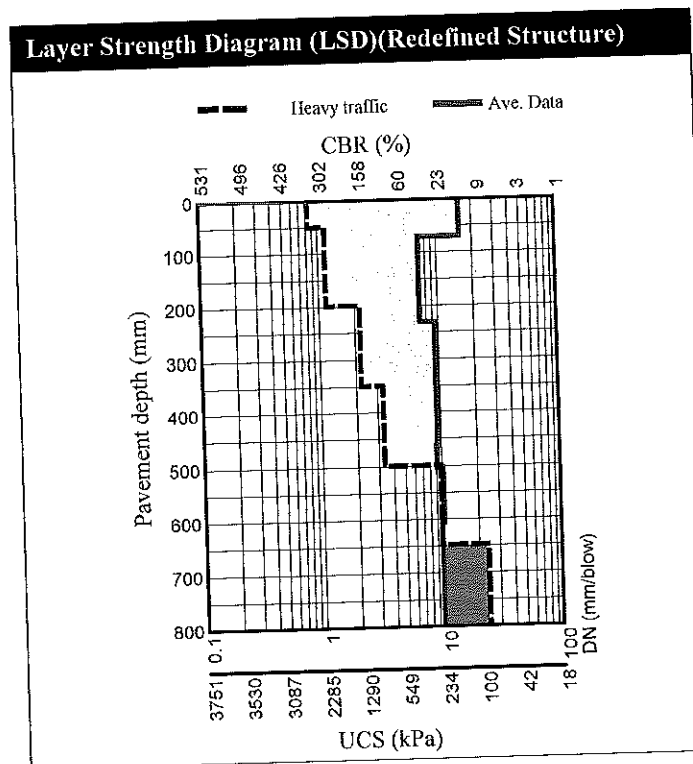
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 72	15.00	5	0.0	15.0	13	145	63	24 - 166
73 - 232	6.78	25	1.6	9.3	36	352	146	40 - 635
233 - 464	9.02	26	0.5	9.8	25	256	108	38 - 313
465 - 504	8.80	5	0.0	8.8	26	263	111	42 - 292
505 - 608	9.77	11	0.4	10.5	23	234	99	35 - 283
609 - 800	9.43	20	0.5	10.3	24	243	103	35 - 302

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

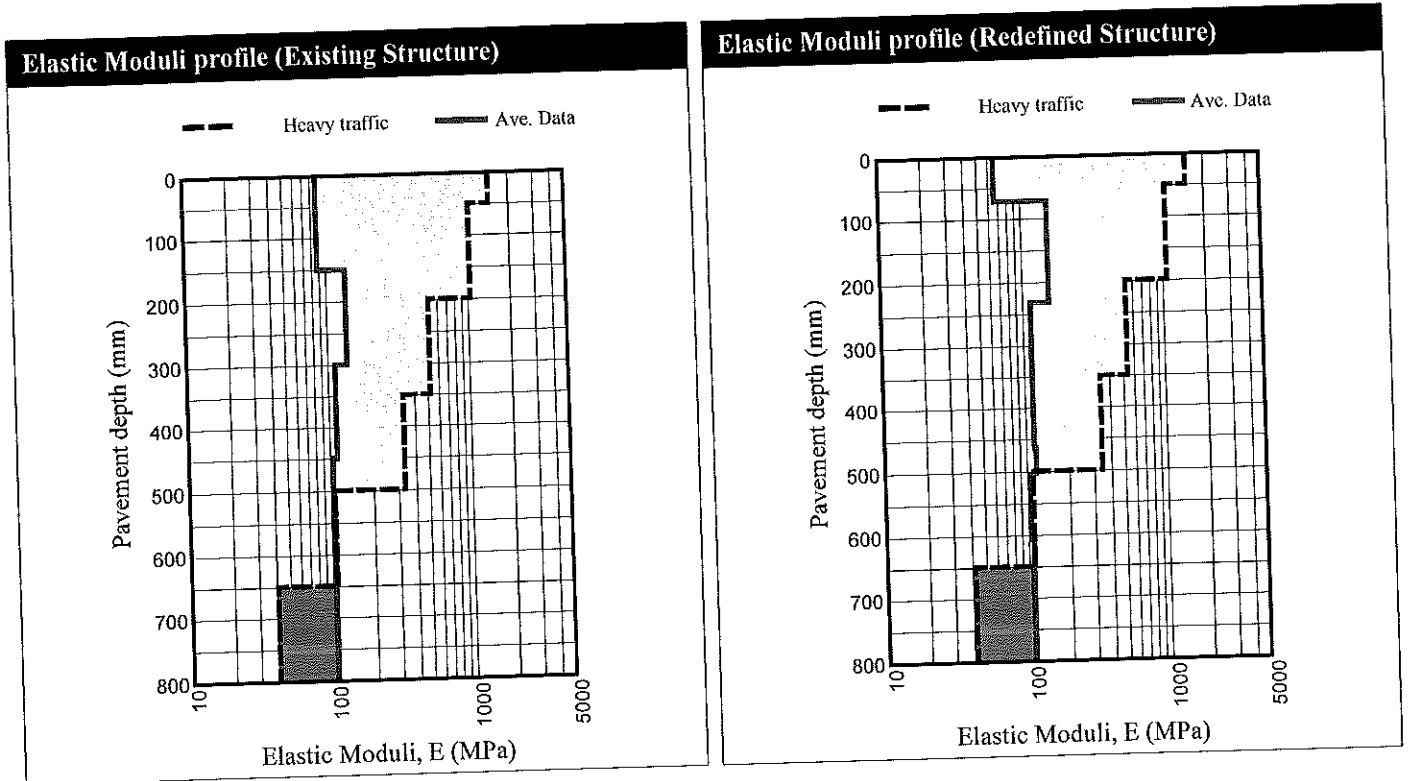


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 150	86	20 - 541	19	201
151 - 300	133	35 - 615	32	318
301 - 450	110	39 - 307	26	260
451 - 600	103	35 - 301	24	242
601 - 800	103	35 - 302	24	243

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 72	63	24 - 166	13	145
73 - 232	146	40 - 635	36	352
233 - 464	108	38 - 313	25	256
465 - 504	111	42 - 292	26	263
505 - 608	99	35 - 283	23	234
609 - 800	103	35 - 302	24	243



Summary of + and - Areas (Curve fitting table - Existing structure)

Depth (mm)	Cumulative Area (%mm), A
0 - 200	-626
201 - 440	60
441 - 496	-3
497 - 512	0
513 - 712	-61
713 - 792	11
Absolute Area	760

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 75	75	5	15.00	13	145	63
75 - 110	110	10	7.00	35	340	141
110 - 149	149	15	7.80	30	301	126
149 - 178	178	20	5.80	44	419	173
178 - 201	201	25	4.60	59	543	221
201 - 236	236	30	7.00	35	340	141
236 - 284	284	35	9.60	23	239	101
284 - 328	328	40	8.80	26	263	111
328 - 372	372	45	8.80	26	263	111
372 - 415	415	50	8.60	27	270	114
415 - 462	462	55	9.40	24	244	103
462 - 506	506	60	8.80	26	263	111
506 - 553	553	65	9.40	24	244	103
553 - 604	604	70	10.20	21	223	95
604 - 650	650	75	9.20	24	250	106
650 - 695	695	80	9.00	25	256	108
695 - 740	740	85	9.00	25	256	108
740 - 791	791	90	10.20	21	223	95
791 - 843	843	95	10.40	21	218	93

DCP Report - Single analysis

Region:
Project date:

DURBAN
08 December, 2020

Road number:
Print date:

MKUZE RAILWAY SIDING
08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Truck Staging -D9	06 December 2020	5 - MID	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN₈₀₀):

535

Selected DCP Design Curve:

Heavy traffic

Rut Limit:

20mm

Structural capacity (MISA):

106.3

(MISA = Million Standard Axles, 80 kN)

Road category

A

Base type:

Granular

Moisture condition of base:

Optimum

Average equivalent strength (Existing Pavement Structure)

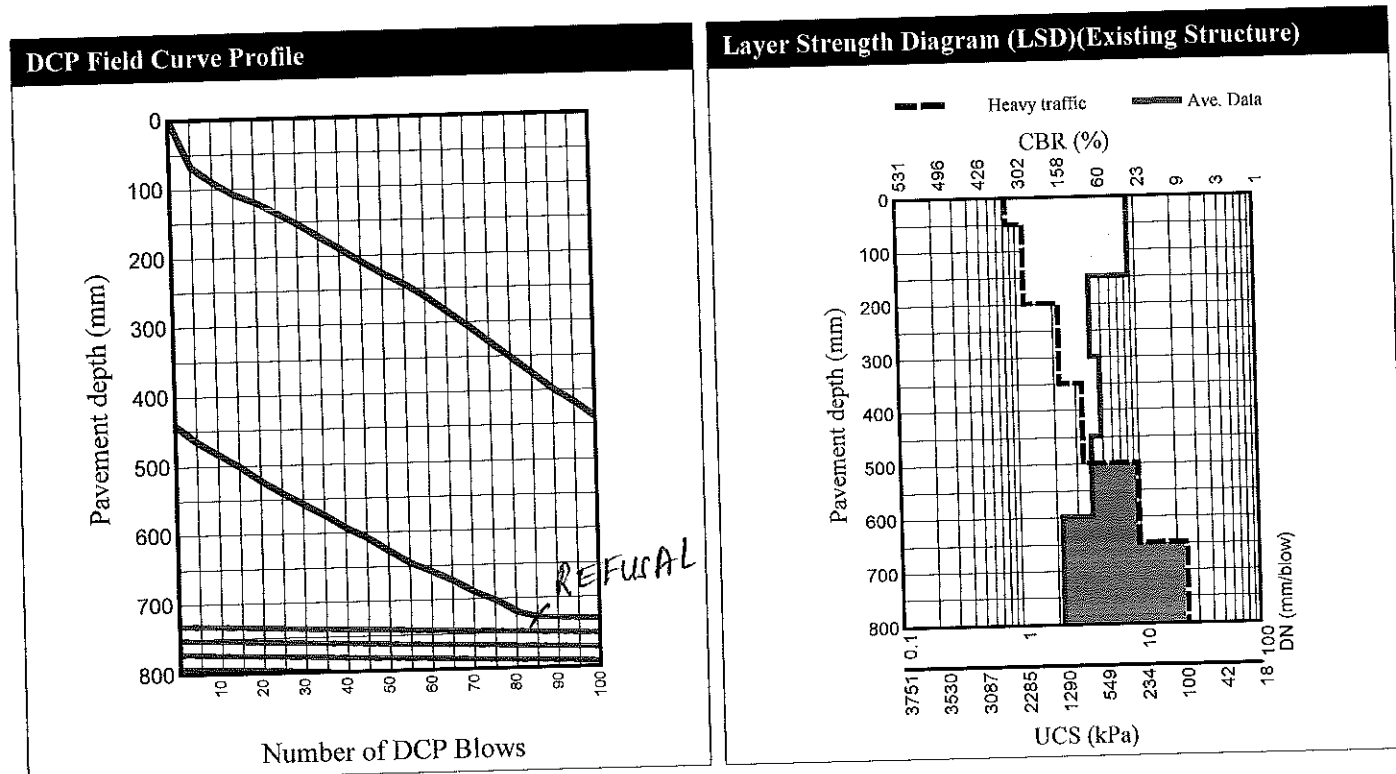
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range SP - 95P (MPa)
0 - 150	8.25	29	5.2	16.7	28	282	119	21 - -1
151 - 300	3.83	40	0.4	4.4	75	667	269	87 - 853
301 - 450	4.56	33	0.3	5.1	60	548	223	75 - 666
451 - 600	3.78	40	0.5	4.5	76	676	272	85 - 906
601 - 800	2.12	393	1.5	4.6	158	1293	503	85 - -1

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

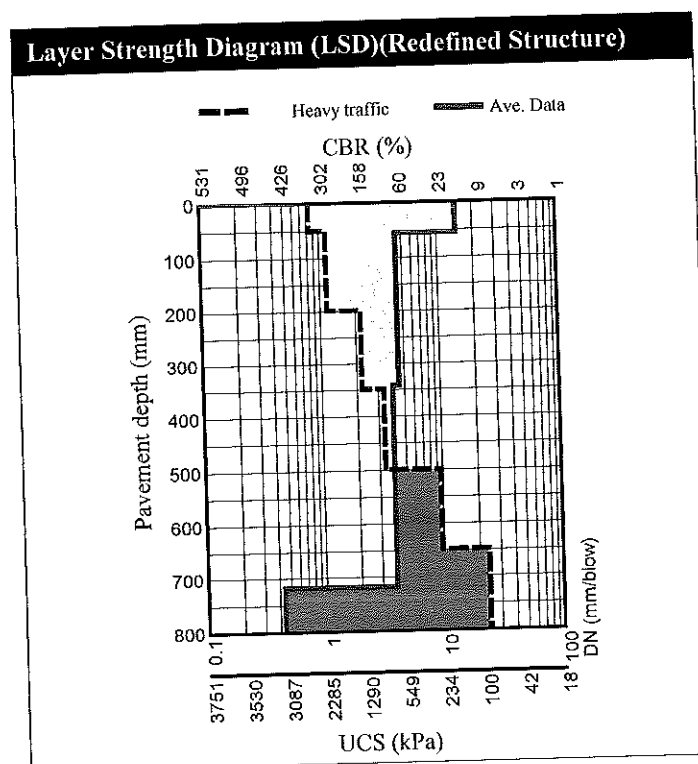
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 56	13.80	4	0.0	13.8	15	159	69	26 - 181
57 - 344	4.32	74	2.1	7.8	64	582	236	48 - 3686
345 - 720	3.82	102	0.7	4.9	75	669	269	79 - 1007
721 - 800	0.42	356	0.7	1.5	435	3148	2768	273 - -1

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

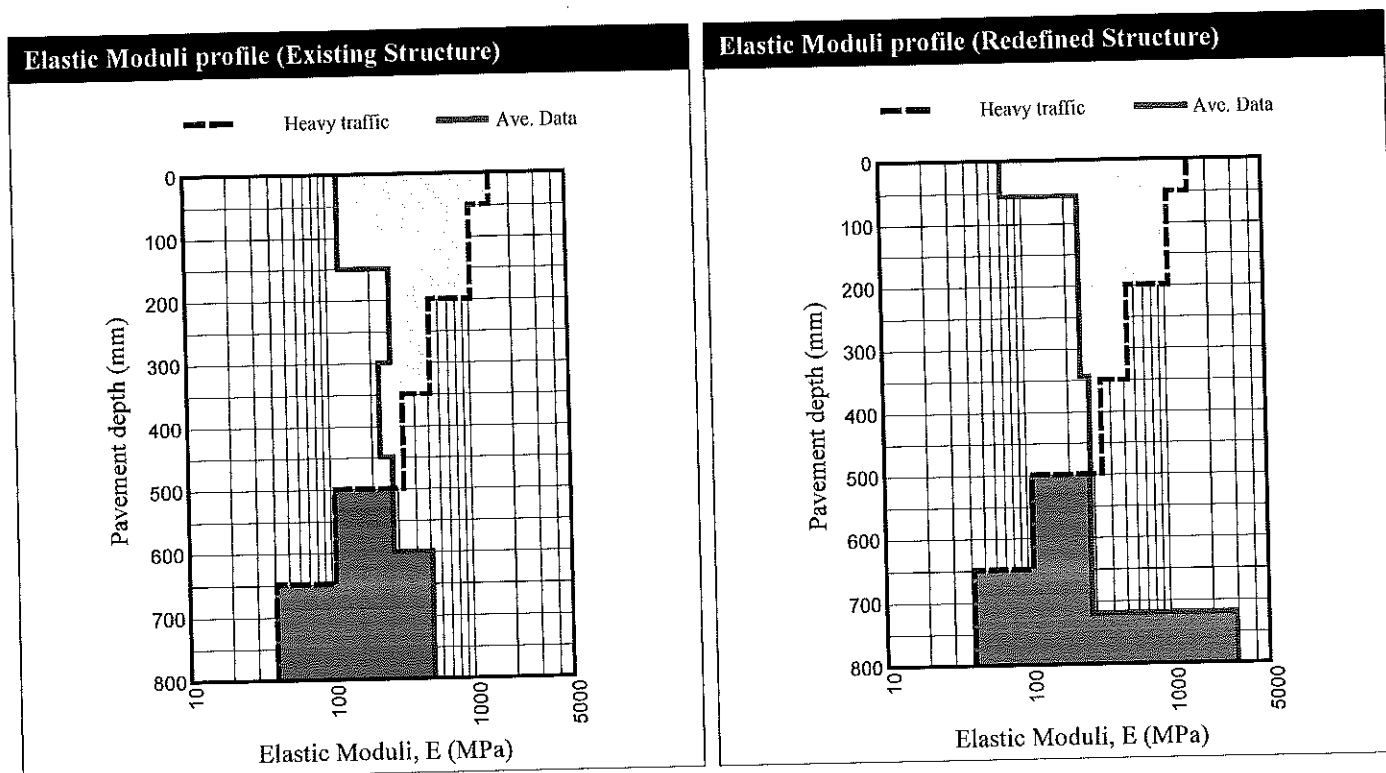


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 150	119	21 - -1	28	282
151 - 300	269	87 - 853	75	667
301 - 450	223	75 - 666	60	548
451 - 600	272	85 - 906	76	676
601 - 800	503	85 - -1	158	1293

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 56	69	26 - 181	15	159
57 - 344	236	48 - 3686	64	582
345 - 720	269	79 - 1007	75	669
721 - 800	2768	273 - -1	435	3148



Summary of + and - Areas (Curve fitting table - Existing structure)

Depth (mm)	Cumulative Area (%mm), A
0 - 72	-8
73 - 592	2112
593 - 784	-1659
785 - 792	0
Absolute Area	3779

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 69	69	5	13.80	15	159	69
69 - 91	91	10	4.40	62	570	231
91 - 109	109	15	3.60	81	714	286
109 - 121	121	20	2.40	135	1123	440
121 - 137	137	25	3.20	94	814	325
137 - 154	154	30	3.40	87	761	304
154 - 173	173	35	3.80	75	672	270
173 - 191	191	40	3.60	81	714	286
191 - 210	210	45	3.80	75	672	270
210 - 228	228	50	3.60	81	714	286
228 - 244	244	55	3.20	94	814	325
244 - 263	263	60	3.80	75	672	270
263 - 285	285	65	4.40	62	570	231
285 - 307	307	70	4.40	62	570	231
307 - 331	331	75	4.80	56	518	211
331 - 354	354	80	4.60	59	543	221
354 - 377	377	85	4.60	59	543	221
377 - 401	401	90	4.80	56	518	211
401 - 420	420	95	3.80	75	672	270
420 - 443	443	100	4.60	59	543	221
443 - 467	467	105	4.80	56	518	211
467 - 485	485	110	3.60	81	714	286
485 - 503	503	115	3.60	81	714	286
503 - 524	524	120	4.20	66	601	243
524 - 542	542	125	3.60	81	714	286
542 - 559	559	130	3.40	87	761	304

Single analysis - MKUZE RAILWAY SIDING

559 - 576	576	135	3.40	87	761	304
576 - 595	595	140	3.80	75	672	270
595 - 610	610	145	3.00	102	875	348
610 - 629	629	150	3.80	75	672	270
629 - 647	647	155	3.60	81	714	286
647 - 660	660	160	2.60	122	1027	405
660 - 674	674	165	2.80	111	945	374
674 - 691	691	170	3.40	87	761	304
691 - 704	704	175	2.60	122	1027	405
704 - 722	722	180	3.60	81	714	286
722 - 730	730	185	1.60	206	1630	677
730 - 731	731	190	0.20	500	3558	6161
731 - 732	732	195	0.20	500	3558	6161
732 - 733	733	200	0.20	500	3558	6161
733 - 734	734	205	0.20	500	3558	6161
734 - 735	735	210	0.20	500	3558	6161
735 - 736	736	215	0.20	500	3558	6161
736 - 737	737	220	0.20	500	3558	6161
737 - 738	738	225	0.20	500	3558	6161
738 - 739	739	230	0.20	500	3558	6161
739 - 740	740	235	0.20	500	3558	6161
740 - 741	741	240	0.20	500	3558	6161
741 - 742	742	245	0.20	500	3558	6161
742 - 743	743	250	0.20	500	3558	6161
743 - 744	744	255	0.20	500	3558	6161
744 - 745	745	260	0.20	500	3558	6161
745 - 746	746	265	0.20	500	3558	6161
746 - 747	747	270	0.20	500	3558	6161
747 - 748	748	275	0.20	500	3558	6161
748 - 749	749	280	0.20	500	3558	6161
749 - 750	750	285	0.20	500	3558	6161
750 - 751	751	290	0.20	500	3558	6161
751 - 752	752	295	0.20	500	3558	6161
752 - 753	753	300	0.20	500	3558	6161
753 - 754	754	305	0.20	500	3558	6161
754 - 755	755	310	0.20	500	3558	6161
755 - 756	756	315	0.20	500	3558	6161
756 - 757	757	320	0.20	500	3558	6161
757 - 758	758	325	0.20	500	3558	6161
758 - 759	759	330	0.20	500	3558	6161
759 - 760	760	335	0.20	500	3558	6161
760 - 761	761	340	0.20	500	3558	6161
761 - 762	762	345	0.20	500	3558	6161
762 - 763	763	350	0.20	500	3558	6161
763 - 764	764	355	0.20	500	3558	6161
764 - 765	765	360	0.20	500	3558	6161
765 - 766	766	365	0.20	500	3558	6161
766 - 767	767	370	0.20	500	3558	6161
767 - 768	768	375	0.20	500	3558	6161
768 - 769	769	380	0.20	500	3558	6161
769 - 770	770	385	0.20	500	3558	6161
770 - 771	771	390	0.20	500	3558	6161
771 - 772	772	395	0.20	500	3558	6161
772 - 773	773	400	0.20	500	3558	6161
773 - 774	774	405	0.20	500	3558	6161
774 - 775	775	410	0.20	500	3558	6161
775 - 776	776	415	0.20	500	3558	6161
776 - 777	777	420	0.20	500	3558	6161
777 - 778	778	425	0.20	500	3558	6161
778 - 779	779	430	0.20	500	3558	6161
779 - 780	780	435	0.20	500	3558	6161
780 - 781	781	440	0.20	500	3558	6161
781 - 782	782	445	0.20	500	3558	6161
782 - 783	783	450	0.20	500	3558	6161
783 - 784	784	455	0.20	500	3558	6161
784 - 785	785	460	0.20	500	3558	6161
785 - 786	786	465	0.20	500	3558	6161
786 - 787	787	470	0.20	500	3558	6161
787 - 788	788	475	0.20	500	3558	6161
788 - 789	789	480	0.20	500	3558	6161
789 - 790	790	485	0.20	500	3558	6161
790 - 791	791	490	0.20	500	3558	6161
791 - 792	792	495	0.20	500	3558	6161
792 - 793	793	500	0.20	500	3558	6161

793 - 794	794	505	0.20	500	3558	6161
794 - 795	795	510	0.20	500	3558	6161
795 - 796	796	515	0.20	500	3558	6161
796 - 797	797	520	0.20	500	3558	6161
797 - 798	798	525	0.20	500	3558	6161
798 - 799	799	530	0.20	500	3558	6161
799 - 800	800	535	0.20	500	3558	6161

DCP Report - Single analysis

Region:
Project date:

DURBAN
08 December, 2020

Road number:
Print date:

MKUZE RAILWAY SIDING
08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Truck Staging- D10	06 December 2020	5 - MID	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN₈₀₀): 118

Selected DCP Design Curve:

Heavy traffic

Rut Limit:

20mm

Road category

A

Structural capacity (MISA):

0.5

Base type:

Granular

(MISA = Million Standard Axles, 80 kN)

Moisture condition of base:

Optimum

Average equivalent strength (Existing Pavement Structure)

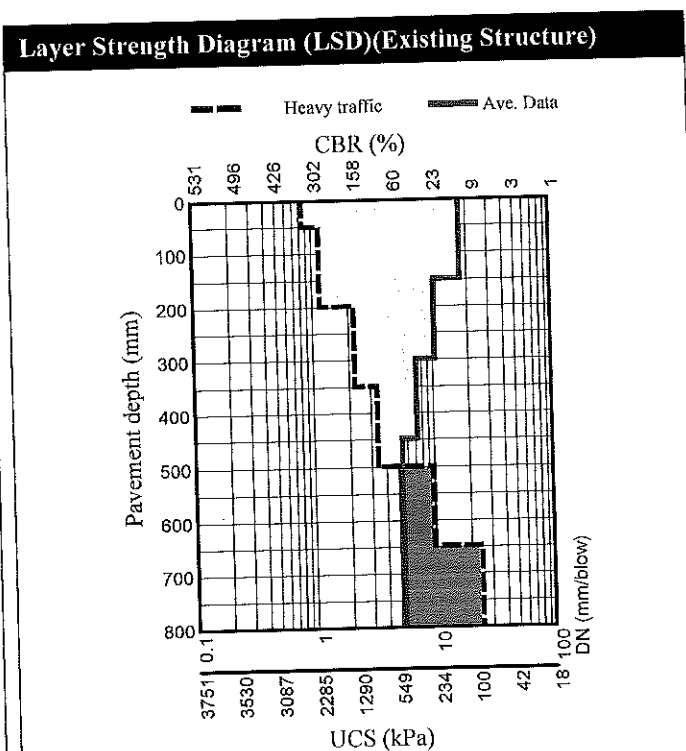
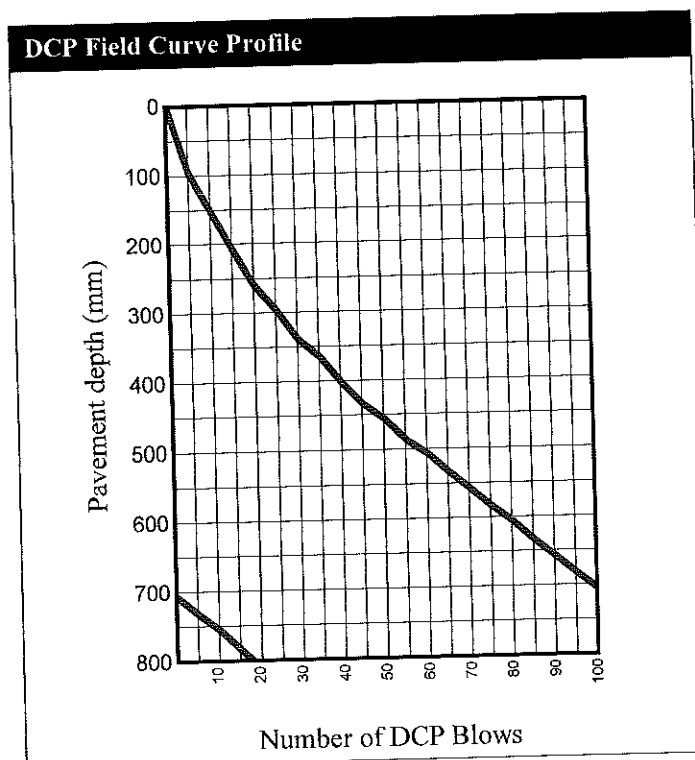
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 150	16.50	10	3.9	23.0	12	130	57	15 - 254
151 - 300	9.91	16	1.6	12.5	22	230	98	29 - 357
301 - 450	6.85	23	1.4	9.1	36	348	145	40 - 586
451 - 600	5.09	30	0.7	6.2	52	485	198	61 - 679
601 - 800	5.12	39	0.4	5.8	51	481	197	65 - 610

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

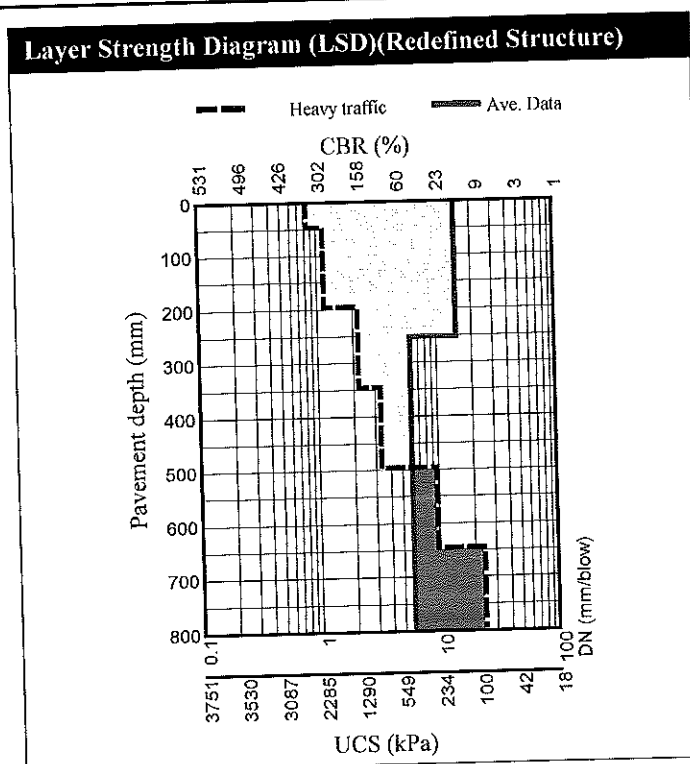
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 256	14.16	20	4.1	20.9	14	154	67	17 - 350
257 - 800	5.79	98	1.3	7.9	44	419	173	47 - 744

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

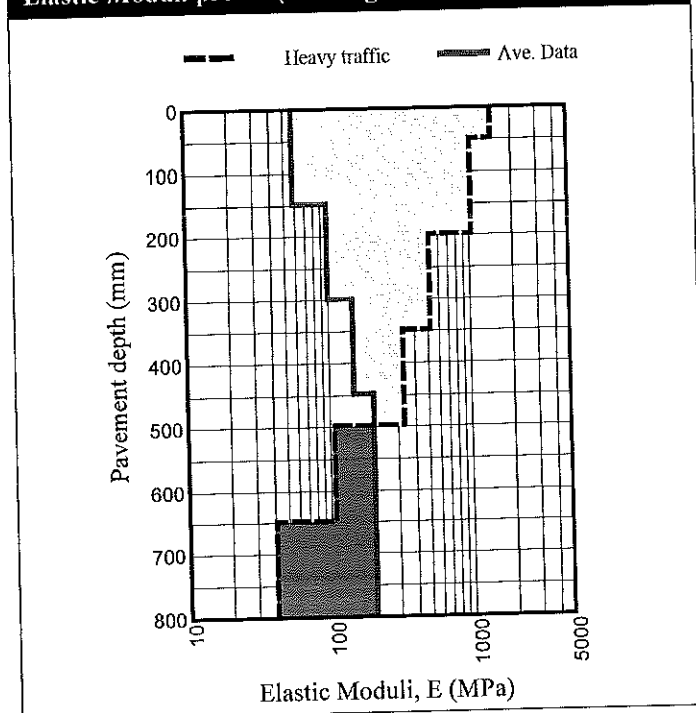
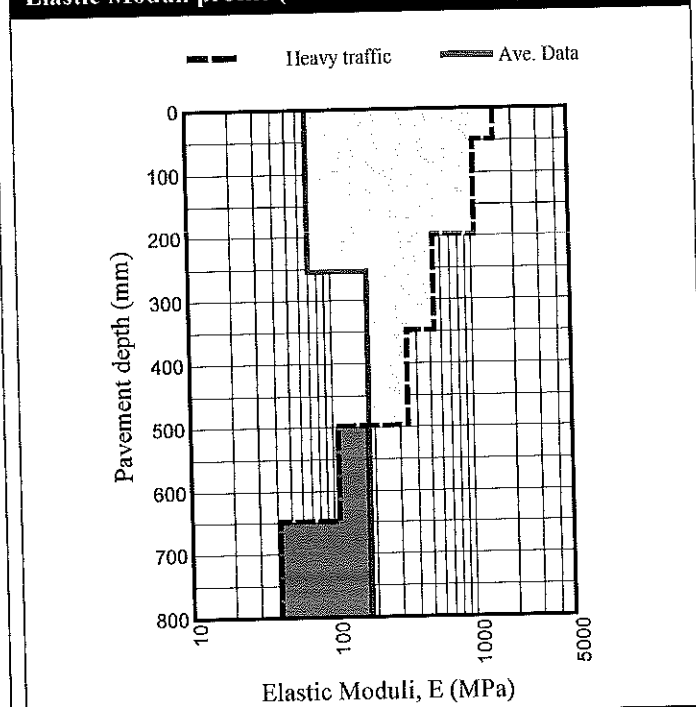


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 150	57	15 - 254	12	130
151 - 300	98	29 - 357	22	230
301 - 450	145	40 - 586	36	348
451 - 600	198	61 - 679	52	485
601 - 800	197	65 - 610	51	481

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 256	67	17 - 350	14	154
257 - 800	173	47 - 744	44	419

Elastic Moduli profile (Existing Structure)**Elastic Moduli profile (Redefined Structure)****Summary of + and - Areas (Curve fitting table - Existing structure)**

Depth (mm)	Cumulative Area (%mm), A
0 - 448	-1097
449 - 792	1059
Absolute Area	2157

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 97	97	5	19.40	9	109	48
97 - 153	153	10	11.20	19	201	86
153 - 209	209	15	11.20	19	201	86
209 - 261	261	20	10.40	21	218	93
261 - 297	297	25	7.20	33	329	137
297 - 340	340	30	8.60	27	270	114
340 - 366	366	35	5.20	51	473	194
366 - 403	403	40	7.40	32	319	133

403 - 435	435	45	6.40	39	375	155
435 - 458	458	50	4.60	59	543	221
458 - 489	489	55	6.20	40	389	161
489 - 509	509	60	4.00	70	635	256
509 - 535	535	65	5.20	51	473	194
535 - 560	560	70	5.00	53	495	202
560 - 585	585	75	5.00	53	495	202
585 - 608	608	80	4.60	59	543	221
608 - 636	636	85	5.60	46	436	179
636 - 660	660	90	4.80	56	518	211
660 - 685	685	95	5.00	53	495	202
685 - 708	708	100	4.60	59	543	221
708 - 734	734	105	5.20	51	473	194
734 - 757	757	110	4.60	59	543	221
757 - 786	786	115	5.80	44	419	173
786 - 813	813	120	5.40	48	454	186

DCP Report - Single analysis

Region:
Project date:

DURBAN
08 December, 2020

Road number:
Print date:

MKUZE RAILWAY SIDING
08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Truck Staging - D11	06 December 2020	5 - MFD	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN₈₀₀): 122

Selected DCP Design Curve:

Heavy traffic

Rut Limit:
Structural capacity (MISA):
(MISA = Million Standard Axles, 80 kN)

20mm
0.6

Road category
Base type:
Moisture condition of base:

A
Granular
Optimum

Average equivalent strength (Existing Pavement Structure)

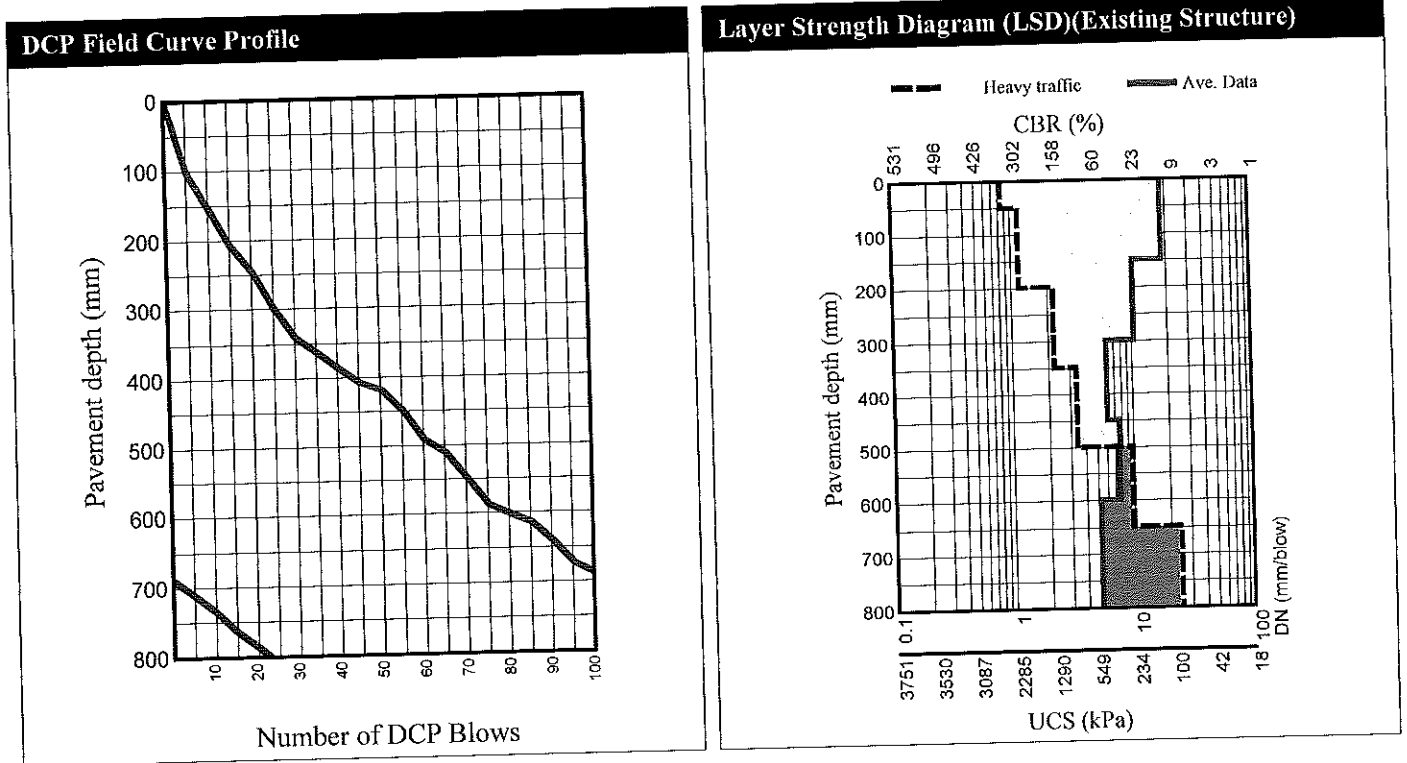
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 150	17.40	10	4.7	25.2	11	123	54	14 - 266
151 - 300	9.91	15	1.4	12.1	22	230	98	30 - 337
301 - 450	5.73	30	1.9	8.9	45	424	175	41 - 1088
451 - 600	7.18	24	1.9	10.3	34	330	138	36 - 669
601 - 800	4.96	44	1.2	6.9	54	499	204	55 - 911

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighted average penetration rate

*** Unconfined Compressive Strength - calculated from weighted average penetration rate

P = Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

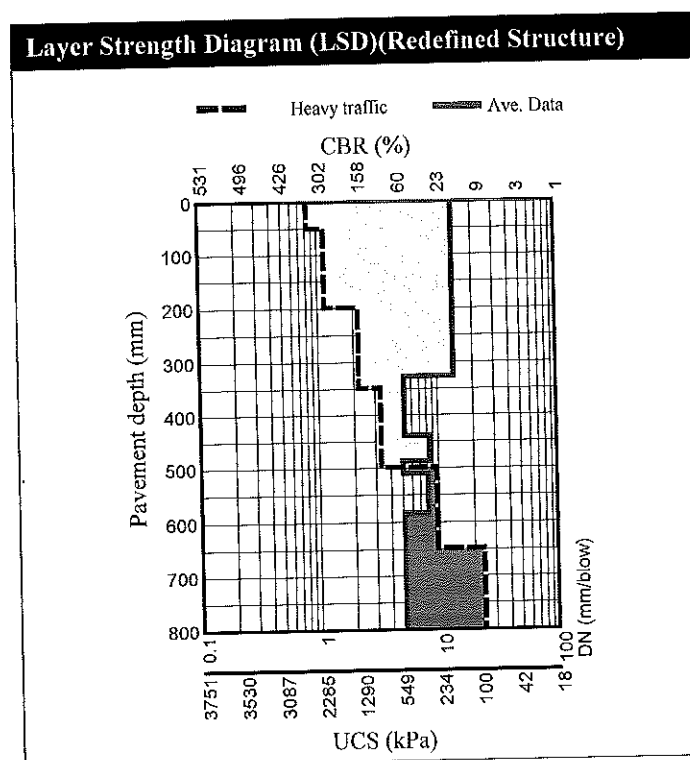
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 328	13.21	28	5.1	21.6	15	167	72	16 - 554
329 - 440	5.03	25	1.7	7.7	53	492	201	48 - 1207
441 - 488	8.10	6	1.0	9.7	29	288	121	38 - 404
489 - 512	4.80	6	2.0	8.1	56	518	211	46 - 1867
513 - 584	7.79	9	0.2	8.1	30	301	126	46 - 348
585 - 800	4.93	48	1.3	7.1	54	502	205	53 - 1014

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

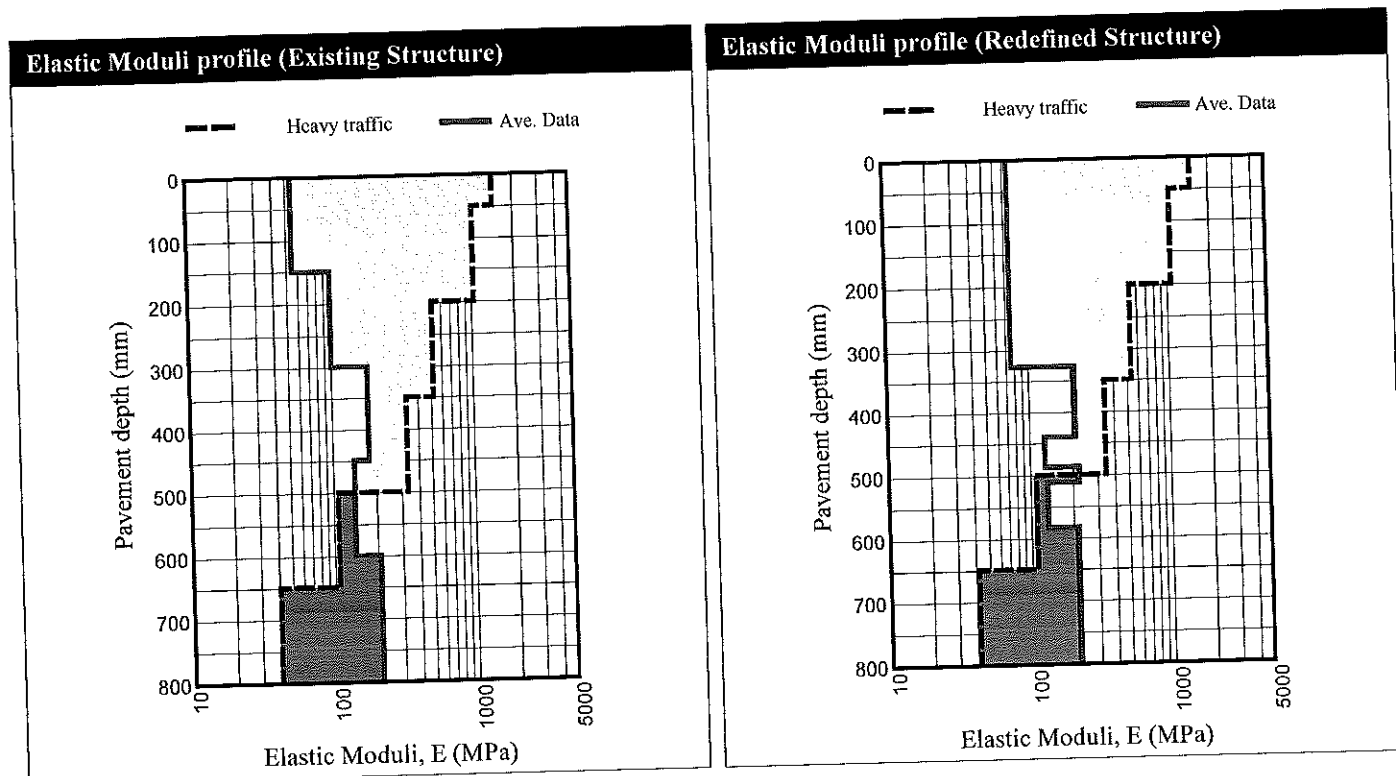


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) SP - 95P	CBR (%)	UCS (kPa)
0 - 150	54	14 - 266	11	123
151 - 300	98	30 - 337	22	230
301 - 450	175	41 - 1088	45	424
451 - 600	138	36 - 669	34	330
601 - 800	204	55 - 911	54	499

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) SP - 95P	CBR (%)	UCS (kPa)
0 - 328	72	16 - 554	15	167
329 - 440	201	48 - 1207	53	492
441 - 488	121	38 - 404	29	288
489 - 512	211	46 - 1867	56	518
513 - 584	126	46 - 348	30	301
585 - 800	205	53 - 1014	54	502

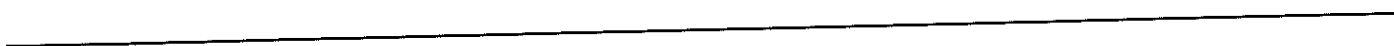


Summary of + and - Areas (Curve fitting table - Existing structure)

Depth (mm)	Cumulative Area (%mm), A
0 - 408	-1619
409 - 560	163
561 - 592	-21
593 - 792	411
Absolute Area	2215

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 103	103	5	20.60	9	102	45
103 - 155	155	10	10.40	21	218	93
155 - 208	208	15	10.60	20	214	91
208 - 246	246	20	7.60	31	310	130
246 - 300	300	25	10.80	20	209	89
300 - 342	342	30	8.40	27	277	116
342 - 364	364	35	4.40	62	570	231
364 - 387	387	40	4.60	59	543	221
387 - 408	408	45	4.20	66	601	243
408 - 419	419	50	2.20	151	1238	483
419 - 450	450	55	6.20	40	389	161
450 - 493	493	60	8.60	27	270	114
493 - 512	512	65	3.80	75	672	270
512 - 550	550	70	7.60	31	310	130
550 - 590	590	75	8.00	29	292	123
590 - 603	603	80	2.60	122	1027	405
603 - 615	615	85	2.40	135	1123	440
615 - 642	642	90	5.40	48	454	186
642 - 675	675	95	6.60	37	363	150
675 - 690	690	100	3.00	102	875	348
690 - 713	713	105	4.60	59	543	221
713 - 737	737	110	4.80	56	518	211
737 - 766	766	115	5.80	44	419	173
766 - 788	788	120	4.40	62	570	231
788 - 813	813	125	5.00	53	495	202



DCP Report - Single analysis

Region:	DURBAN	Road number:	MKUZE RAILWAY SIDING
Project date:	08 December, 2020	Print date:	08 December, 2020

Measurements included in analysis

Measurement Name	Measurement Date	Position	Distance (km)	Condition	Rutting	Pumping	Long. Crack	Croc. Crack	Deform	Other
Truck Staging - D12	06 December 2020	5 - MID	0	Overstressed	No	No	No	No	No	No

Design Structure Number in blows (DSN₈₀₀): 595 Selected DCP Design Curve: Heavy traffic

Rut Limit: 20mm
 Structural capacity (MISA): 154.1
 (MISA = Million Standard Axles, 80 kN)

Road category: A
 Base type: Granular
 Moisture condition of base: Optimum

Average equivalent strength (Existing Pavement Structure)

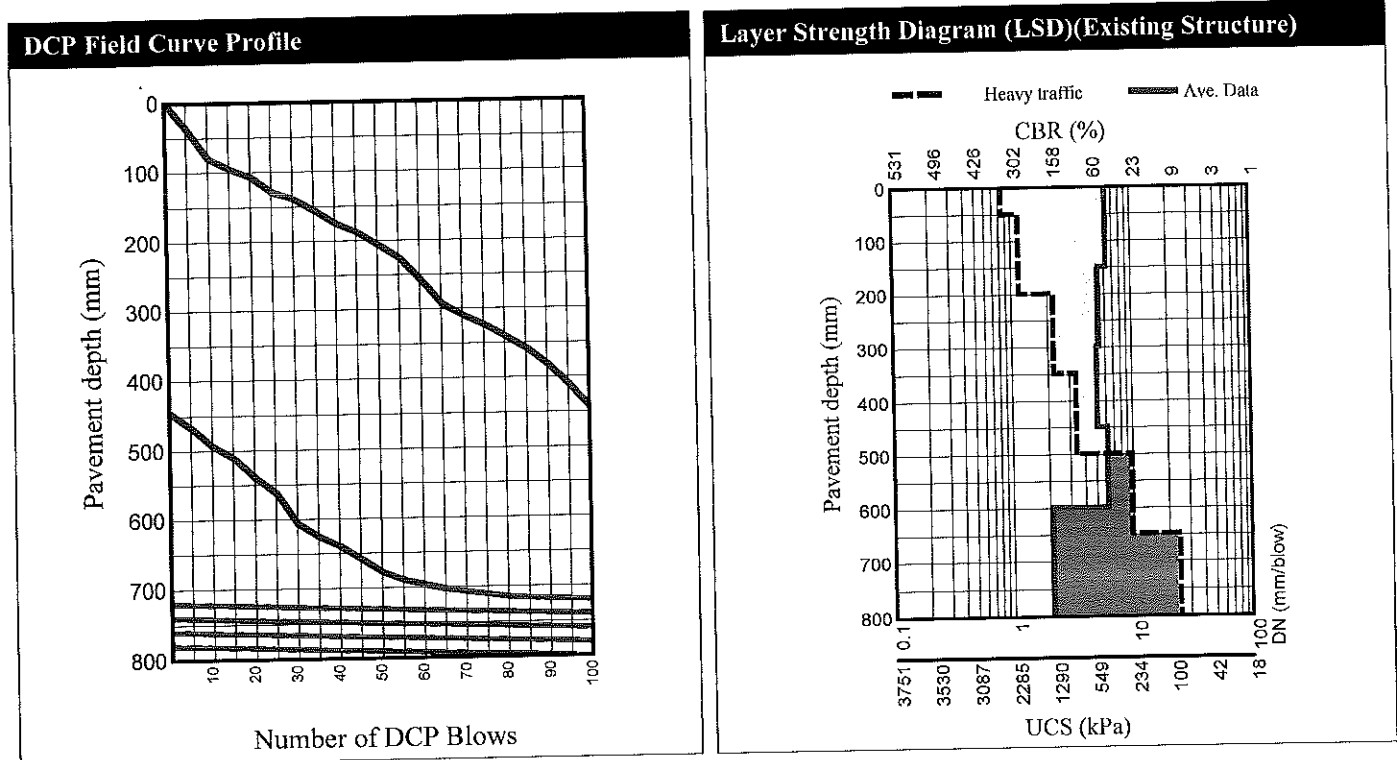
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 150	5.89	33	2.5	10.1	43	412	170	36 - 1665
151 - 300	5.03	34	1.7	7.8	53	492	201	48 - 1215
301 - 450	4.79	34	1.4	7.0	56	519	212	54 - 1082
451 - 600	5.82	28	1.8	8.8	44	417	172	42 - 973
601 - 800	2.01	466	2.1	5.5	169	1369	532	70 - -1

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %



Average equivalent strength (Redefined Pavement Structure)

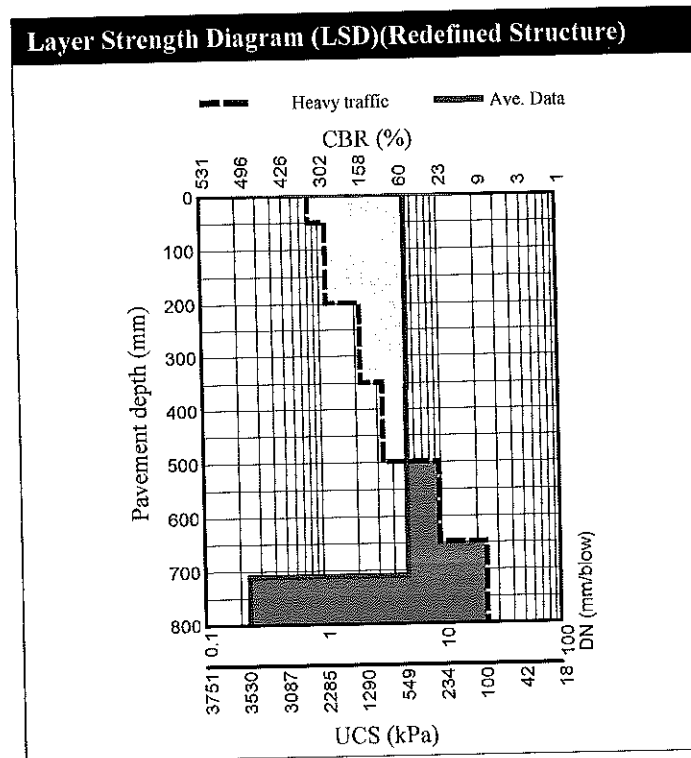
Depth (mm)	W. Ave. Pen. * (mm / blow)	Blows	SD (mm / blow)	95P (mm / blow)	CBR ** (%)	UCS *** (kPa)	Ave. E-Moduli (MPa)	E-Moduli Range 5P - 95P (MPa)
0 - 360	5.10	85	2.2	8.6	52	484	198	43 - 1827
361 - 712	5.04	90	2.0	8.3	53	490	200	45 - 1570
713 - 800	0.23	420	0.1	0.4	490	3498	5267	1007 - 173421

* Weighted average penetration rate

** California Bearing Ratio - calculated from weighed average penetration rate

*** Unconfined Compressive Strength - calculated from weighed average penetration rate

P = Percentile value in %

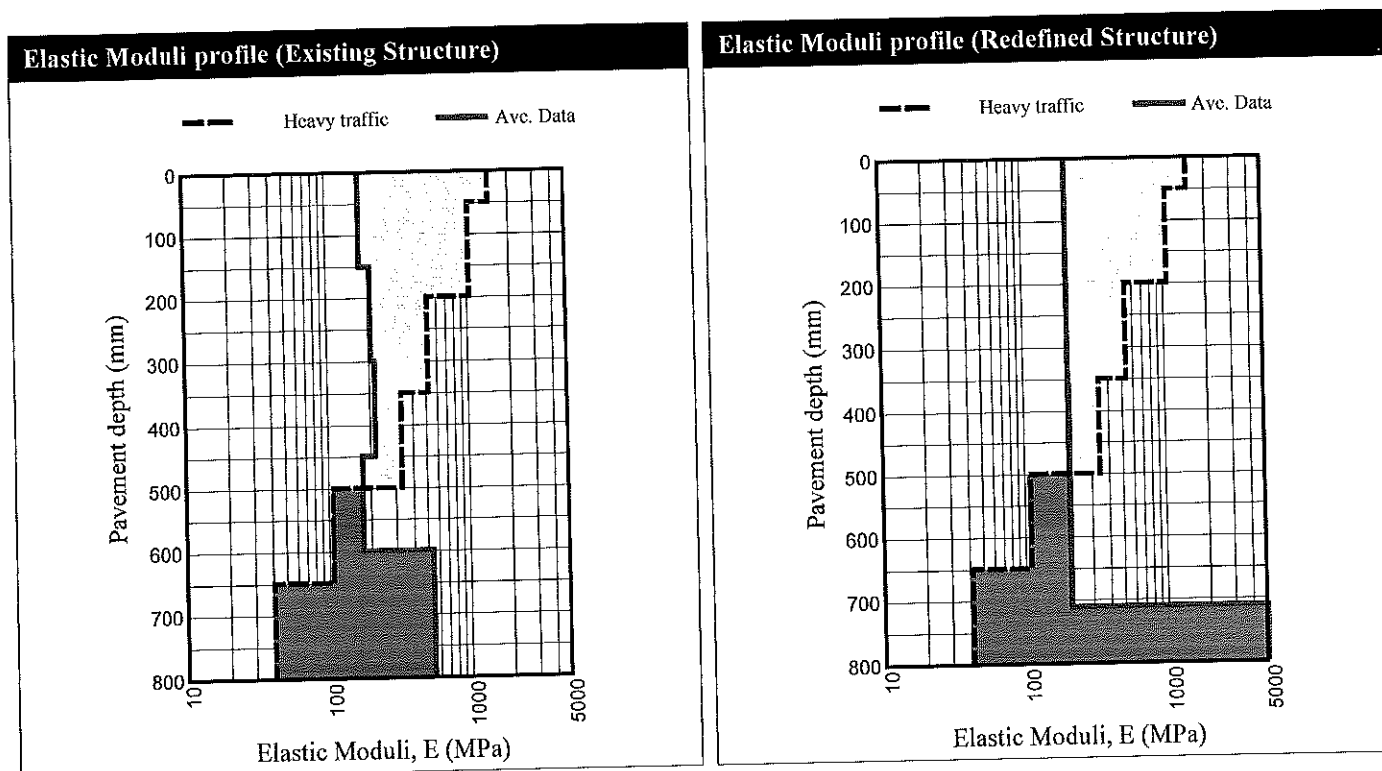


E-Moduli (MPa) and Layer Strength Diagram (Existing Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 150	170	36 - 1665	43	412
151 - 300	201	48 - 1215	53	492
301 - 450	212	54 - 1082	56	519
451 - 600	172	42 - 973	44	417
601 - 800	532	70 - -1	169	1369

E-Moduli (MPa) and Layer Strength Diagram (Redefined Pavement Structure)

Depth (mm)	Ave. E-Moduli (MPa)	E-Moduli Range (MPa) 5P - 95P	CBR (%)	UCS (kPa)
0 - 360	198	43 - 1827	52	484
361 - 712	200	45 - 1570	53	490
713 - 800	5267	1007 - 173421	490	3498



Summary of + and - Areas (Curve fitting table - Existing structure)

Depth (mm)	Cumulative Area (%mm), A
0 - 568	2144
569 - 760	-1453
761 - 792	65
Absolute Area	3661

DCP Penetration data

From-To (mm)	Depth (mm) per 5 blows	Blows	DN (mm / blow)	CBR (%)	UCS (kPa)	Ave. E-Moduli (MPa)
0 - 38	38	5	7.60	31	310	130
38 - 81	81	10	8.60	27	270	114
81 - 96	96	15	3.00	102	875	348
96 - 108	108	20	2.40	135	1123	440
108 - 130	130	25	4.40	62	570	231
130 - 139	139	30	1.80	185	1485	598
139 - 156	156	35	3.40	87	761	304
156 - 175	175	40	3.80	75	672	270
175 - 188	188	45	2.60	122	1027	405
188 - 207	207	50	3.80	75	672	270
207 - 226	226	55	3.80	75	672	270
226 - 259	259	60	6.60	37	363	150
259 - 294	294	65	7.00	35	340	141
294 - 311	311	70	3.40	87	761	304
311 - 325	325	75	2.80	111	945	374
325 - 342	342	80	3.40	87	761	304
342 - 360	360	85	3.60	81	714	286
360 - 384	384	90	4.80	56	518	211
384 - 413	413	95	5.80	44	419	173
413 - 446	446	100	6.60	37	363	150
446 - 468	468	105	4.40	62	570	231
468 - 495	495	110	5.40	48	454	186
495 - 512	512	115	3.40	87	761	304
512 - 541	541	120	5.80	44	419	173
541 - 564	564	125	4.60	59	543	221
564 - 608	608	130	8.80	26	263	111
608 - 627	627	135	3.80	75	672	270

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627 - 641	641	140	2.80	111	945	374
641 - 660	660	145	3.80	75	672	270
660 - 680	680	150	4.00	70	635	256
680 - 691	691	155	2.20	151	1238	483
691 - 698	698	160	1.40	232	1810	781
698 - 704	704	165	1.20	263	2024	919
704 - 708	708	170	0.80	342	2547	1414
708 - 712	712	175	0.80	342	2547	1414
712 - 716	716	180	0.80	342	2547	1414
716 - 718	718	185	0.40	442	3192	2952
718 - 719	719	190	0.20	500	3558	6161
719 - 720	720	195	0.20	500	3558	6161
720 - 721	721	200	0.20	500	3558	6161
721 - 722	722	205	0.20	500	3558	6161
722 - 723	723	210	0.20	500	3558	6161
723 - 724	724	215	0.20	500	3558	6161
724 - 725	725	220	0.20	500	3558	6161
725 - 726	726	225	0.20	500	3558	6161
726 - 727	727	230	0.20	500	3558	6161
727 - 728	728	235	0.20	500	3558	6161
728 - 729	729	240	0.20	500	3558	6161
729 - 730	730	245	0.20	500	3558	6161
730 - 731	731	250	0.20	500	3558	6161
731 - 732	732	255	0.20	500	3558	6161
732 - 733	733	260	0.20	500	3558	6161
733 - 734	734	265	0.20	500	3558	6161
734 - 735	735	270	0.20	500	3558	6161
735 - 736	736	275	0.20	500	3558	6161
736 - 737	737	280	0.20	500	3558	6161
737 - 738	738	285	0.20	500	3558	6161
738 - 739	739	290	0.20	500	3558	6161
739 - 740	740	295	0.20	500	3558	6161
740 - 741	741	300	0.20	500	3558	6161
741 - 742	742	305	0.20	500	3558	6161
742 - 743	743	310	0.20	500	3558	6161
743 - 744	744	315	0.20	500	3558	6161
744 - 745	745	320	0.20	500	3558	6161
745 - 746	746	325	0.20	500	3558	6161
746 - 747	747	330	0.20	500	3558	6161
747 - 748	748	335	0.20	500	3558	6161
748 - 749	749	340	0.20	500	3558	6161
749 - 750	750	345	0.20	500	3558	6161
750 - 751	751	350	0.20	500	3558	6161
751 - 752	752	355	0.20	500	3558	6161
752 - 753	753	360	0.20	500	3558	6161
753 - 754	754	365	0.20	500	3558	6161
754 - 755	755	370	0.20	500	3558	6161
755 - 756	756	375	0.20	500	3558	6161
756 - 757	757	380	0.20	500	3558	6161
757 - 758	758	385	0.20	500	3558	6161
758 - 759	759	390	0.20	500	3558	6161
759 - 760	760	395	0.20	500	3558	6161
760 - 761	761	400	0.20	500	3558	6161
761 - 762	762	405	0.20	500	3558	6161
762 - 763	763	410	0.20	500	3558	6161
763 - 764	764	415	0.20	500	3558	6161
764 - 765	765	420	0.20	500	3558	6161
765 - 766	766	425	0.20	500	3558	6161
766 - 767	767	430	0.20	500	3558	6161
767 - 768	768	435	0.20	500	3558	6161
768 - 769	769	440	0.20	500	3558	6161
769 - 770	770	445	0.20	500	3558	6161
770 - 771	771	450	0.20	500	3558	6161
771 - 772	772	455	0.20	500	3558	6161
772 - 773	773	460	0.20	500	3558	6161
773 - 774	774	465	0.20	500	3558	6161
774 - 775	775	470	0.20	500	3558	6161
775 - 776	776	475	0.20	500	3558	6161
776 - 777	777	480	0.20	500	3558	6161
777 - 778	778	485	0.20	500	3558	6161
778 - 779	779	490	0.20	500	3558	6161
779 - 780	780	495	0.20	500	3558	6161
780 - 781	781	500	0.20	500	3558	6161
781 - 782	782	505	0.20	500	3558	6161

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782 - 783	783	510	0.20	500	3558	6161
783 - 784	784	515	0.20	500	3558	6161
784 - 785	785	520	0.20	500	3558	6161
785 - 786	786	525	0.20	500	3558	6161
786 - 787	787	530	0.20	500	3558	6161
787 - 788	788	535	0.20	500	3558	6161
788 - 789	789	540	0.20	500	3558	6161
789 - 790	790	545	0.20	500	3558	6161
790 - 791	791	550	0.20	500	3558	6161
791 - 792	792	555	0.20	500	3558	6161
792 - 793	793	560	0.20	500	3558	6161
793 - 794	794	565	0.20	500	3558	6161
794 - 795	795	570	0.20	500	3558	6161
795 - 796	796	575	0.20	500	3558	6161
796 - 797	797	580	0.20	500	3558	6161
797 - 798	798	585	0.20	500	3558	6161
798 - 799	799	590	0.20	500	3558	6161
799 - 800	800	595	0.20	500	3558	6161
