

Ref: TPW16/6/4/1/1 – C1117

CONCEPT & VIABILITY REPORT

CONTRACT No. C1117

PAVEMENT STRENGTHENING OF TR75/1 (KM 16.50
TO KM 31.20) NEAR OUDTSHOORN

BOOK 1 of 2

CHIEF DIRECTORATE: ROAD PROGRAMME MANAGEMENT
ROADS BRANCH

DATE: APRIL 2023

Ref: TPW16/6/4/1/1 – C1117

BOOK 1 OF 2

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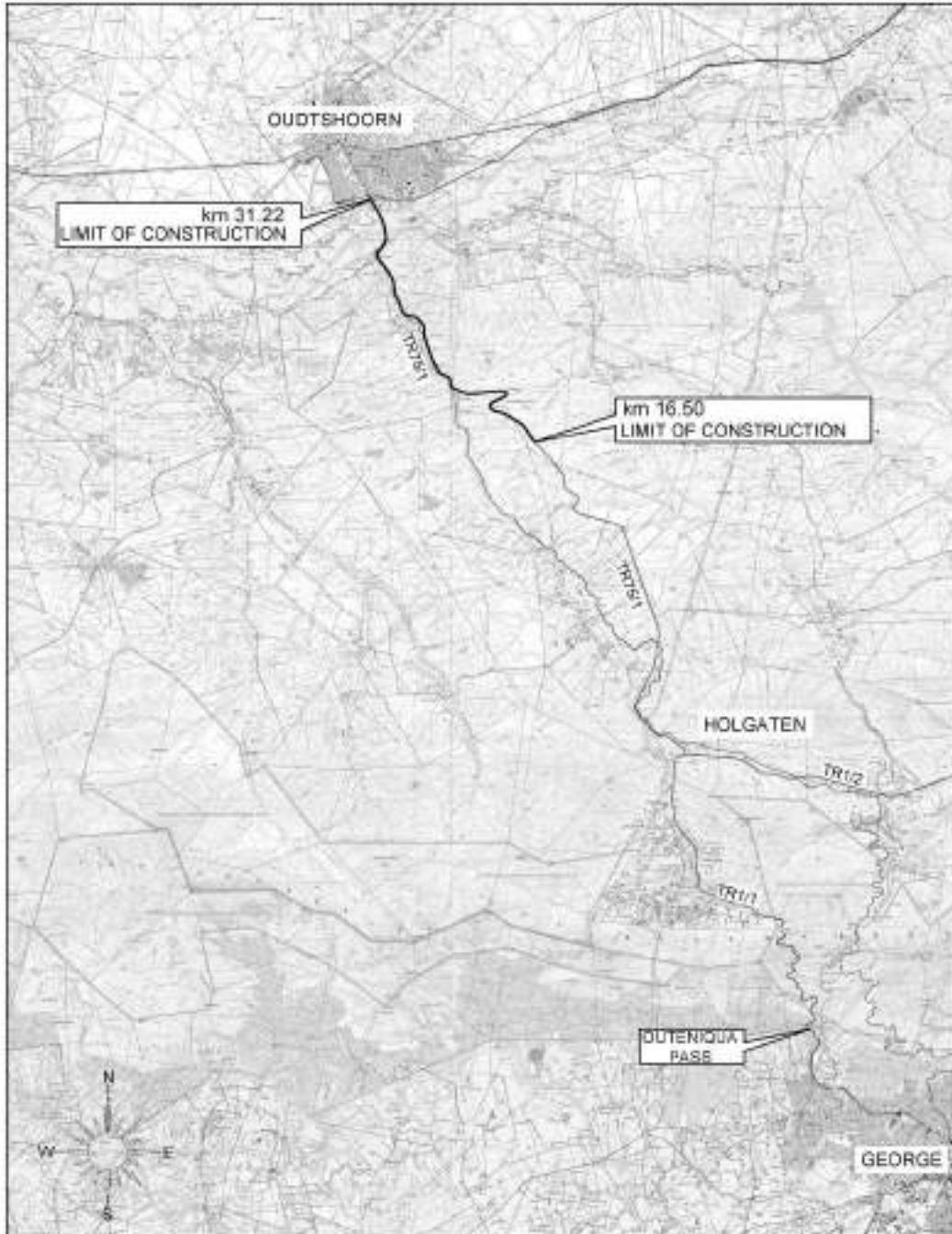
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Figure 1
CONTRACT NO C1117: PROJECT LOCALITY



1. INTRODUCTION

1.1 Terms of reference

Kantey & Templer Consulting Engineers has been appointed by the Department of Infrastructure: Transport Infrastructure Branch of the Western Cape Government (WCG) in its letter, reference TPW16/6/4/1/1-C1117, dated 6 April 2018, for engineering services related to Contract no. C1117: Periodic Maintenance of TR75/1 – George to Oudtshoorn.

1.2 Background to the report

The following reports have been submitted by Kantey & Templer in terms of C1117:

Inception Report (January 2019)

The report investigated the condition of the existing infrastructure and contained recommendations based on the appointed scope of the works (Periodic Maintenance) at the time.

Addendum to Inception Report (December 2019)

The report constituted an addendum to the Inception Report and addressed the issues raised by the WCG: Department of Infrastructure in their feedback on the Inception Report and furthermore recommended the introduction of the following auxiliary lanes:

- km 16.50 to km 17.36 to Holgaten (0.86 km)
- km 18.70 to km 19.94 to Holgaten (1.24 km)
- km 23.55 to km 24.70 to Oudtshoorn (1.15 km)
- km 23.84 to km 24.86 to Holgaten (1.02 km)
- km 25.46 to km 25.96 to Holgaten (0.50 km)
- km 26.14 to km 26.70 to Oudtshoorn (0.56 km)
- km 27.74 to km 28.38 to Holgaten (0.64 km)

The total length of the proposed auxiliary lanes is 5.97 km. These recommendations were approved in a meeting held on 30 August 2022 – see **Annexure 1**.

Planning Report (April 2022)

This report comprised an economic evaluation of reseal / rehabilitation alternatives between km 16.50 and km 29.44, specifically:

1. Reseal (6.8 m wide) including 3 km rehabilitation (6.8 m wide)
2. Rehabilitation (6.8 m wide) – 10-year pavement design life
3. Rehabilitation (8.6 m wide – Class 3 cross section) 20-year pavement design life

Uniform road sections were determined by evaluating the condition of the existing pavement, the road cross section and the traffic volumes along the route which resulted in the following two uniform sections in terms of the economic evaluation:

- Section 1: km 16.50 to km 26.58
- Section 2: km 26.58 to km 29.44

The recommended alternative was Alternative 3 as it yielded the lowest Total Transport Cost (NPV) and the highest Benefit / Cost (B/C) ratio of 4.75 and 6.07 for the respective uniform sections. It also had the highest First Year Rate of Return.

Based on the outcome of the economic evaluation, K&T were informed that the Scope of the project was changed from "Periodic Maintenance" to "Pavement Strengthening" by WCG in a meeting held on 30 August 2022 and subsequently in its letter TPW16/6/4/1/1-C1117, dated 4 October 2022 – see **Annexure 1**.

1.3 Concept & Viability report

Due to the scope change, Kantey & Templer was requested to compile Concept & Viability Report (this report) recommending an appropriate road cross section for the section between km 16.50 and the tie-in to the existing Class 1 cross section at km 29.44, based on a cost evaluation of standard alternative road class cross sections.

The recommended cross section should also be such that it can be applied in the future over the section between km 0.00 and km 16.50 of TR75/1 with minimal cost. Well-motivated, localized geometric improvements could also be considered.

This report comprises of 2 Books:

- Book 1 of 2 This Report and Annexures
- Book 2 of 2 Book of drawings

2. PAVEMENT STRENGTHENING STRATEGY

2.1 Geology

The geology of the route is described in section 2.3 of the Inception Report.

2.2 Climate

The climate of the route is described in section 2.4 and 2.5 of the Inception Report. In terms of Figure 4 of Draft TRH8 (1996), the project falls within a dry macro climatic region, with an approximate Weinert N-value that is greater than 5.

2.3 Centreline soils and road prism investigation

Profiling and testing of the existing pavement and road prism in selected locations was done by Steyn-Wilson Laboratories during February and March 2023.

A total of 53 trial pits were excavated at 250m intervals on the road in order to establish the nature and classification of the existing pavement and its materials. CBR and indicator tests were done on the pavement layers and subgrade in order to classify the existing materials and inform the pavement strengthening strategy.

The available results of the centreline soils investigation are included **Annexure 2.1**: Centreline trial holes and test results.

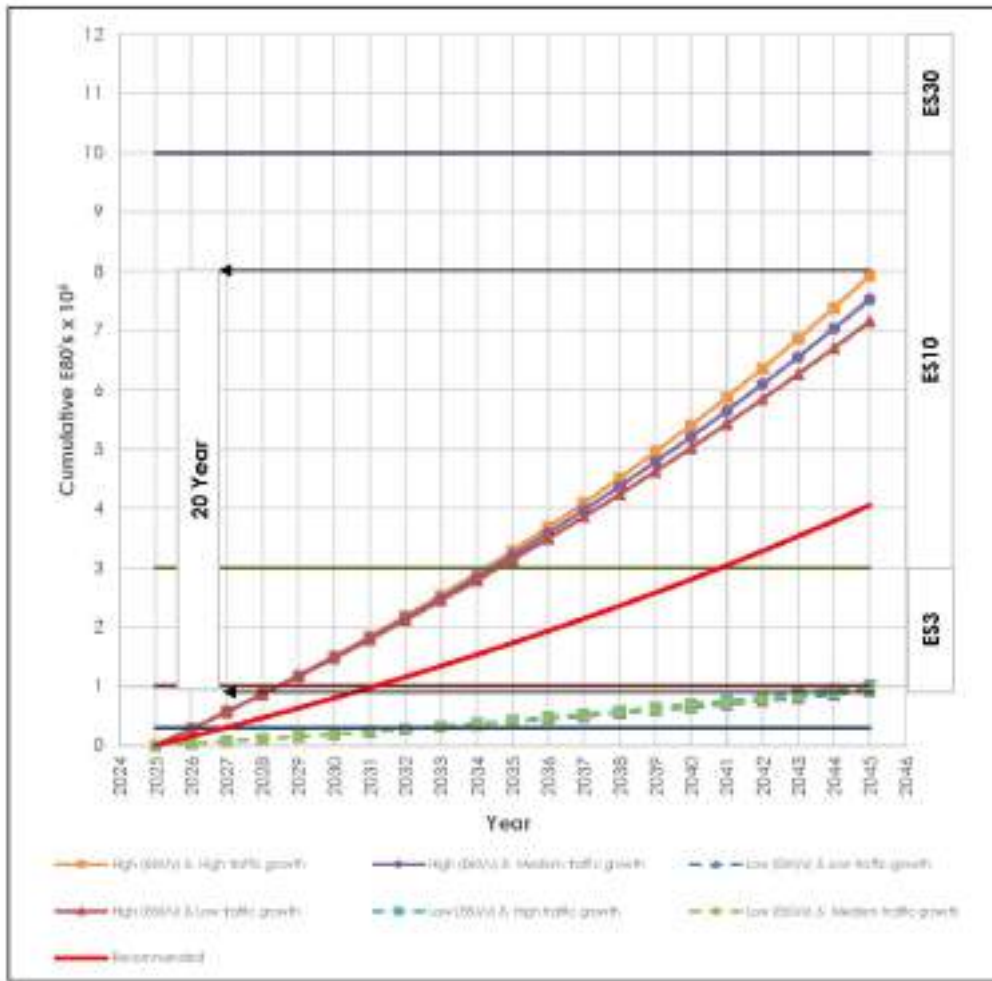
An additional 20 trial pits were excavated in the road prism where the auxiliary lanes will be constructed in order to establish the nature of founding on which the pavement widenings will be constructed. These test results were however not available at the time of compiling this report.

2.4 Pavement Loading

According Draft TRH4 (1996), TR75/1 can be classified as a Category B Road with a recommended structural design period of 20 years.

The detailed pavement traffic analysis is described under section 3 of the Inception Report. A pavement loading calculation was undertaken with a road opening year 2025, resulting in an ES10 pavement based on 20-year structural design period as shown in **Figure 2.1** overleaf (a repeat of *Figure 3.1* of the Inception Report).

Figure 2.1
CUMULATIVE PAVEMENT TRAFFIC LOADING



2.5 Pavement Strengthening Strategy

It is recommended that the pavement strengthening strategy be based on Draft TRH4(1996), considering the extent of new auxiliary lanes that will be constructed as well as the improvement of the road cross section from a lower order surfaced road.

Based on the Draft TRH4 (1996) catalogue, considering an ES10 pavement for a category B road falling within a dry climatic zone, the following granular base pavement is recommended:

- 150mm G2 Base
- 200mm C4 Subbase
- 150mm G7 USSG
- 150mm G9 LSSG

Based on the findings of the centreline soils investigation, two options were considered in order to incorporate as much of the in situ material into the new pavement structure.

Option 1: Insitu reconstruct the existing base to comply with the requirements of a cement stabilized subbase and construct a new G2 base. A summary plan of the trial pits along the route which reflects the proposed Option 1 pavement layers relative to the EGL datum is included as **Annexure 2.2**. Layers marked with "X" do not comply with the required material quality. It is noted that multiple layers do not comply.

Option 2: Insitu reconstruct the existing base to comply with the requirements of an upper selected layer and construct a new cement stabilized subbase and new G2 base. A summary plan of the trial pits along the route which reflects the proposed Option 2 pavement layers is included as **Annexure 2.3**. Layers marked with "X" do not comply with the required material quality. It is noted that all layers comply in this option.

The following is also to be considered in the determination of the recommended pavement strategy:

- The upper 200mm of the existing pavement generally consists of an imported sandstone gravel of a G5 quality, with the exception of 8 trial pits out of the 53 (15%) where the quality is that of a G6. A G5 quality material is required for Option 1.
- The material quality within the 200 mm to 350 mm depth horizon is generally that of a G8 as encountered in 20 of the trial pits out of the 53 (38%). A G7 quality material is required for Option 1.
- The material found in the gravel shoulders along the portion of TR75/1 which was maintained through Contract 993.02 (km 0.0 to km 16.5) in 2019 was typically poor, but inconsistent in quality and grading. This supports Option 2 where the gravel shoulders will be incorporated into the insitu reconstructed upper selected layer.
- The extent of auxiliary lanes that will be constructed and the improvement of the road cross section from a lower order surfaced road to a Class 3 cross section (as recommended in **Section 5**) further supports Option 2.

Based on the above analysis, it is recommended that Option 2 be implemented. The evaluated road cross sections are therefore also based on a new vertical alignment, approximately 300 mm above the existing as per Option 2.

2.6 Seal Design

The selection of the appropriate surfacing seal for the pavement strengthening was based on the guidelines as contained in TRH3, considering traffic volumes, topography, operating speed, turning movements and quality of the base material. These aspects are summarised below:

- Approximately 9700 ELVs per design lane (Road opening 2025)
- Road Environment: Rural
- Grades up to 7%
- Up to 100 km/h operating speed
- Turning Actions: Rural with occasional heavy vehicles (10% Heavies)
- New base

In terms of the guidelines, a Cape Seal with a 14 mm aggregate and one layer of slurry should be considered as the minimum seal on the road.

It is however recommended that a 20 mm stone be used in the initial seal to minimise stone embedment. The potential for punching in of the surfacing stone becomes even more critical

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where steep grades are present resulting in slow-moving heavy vehicles, particularly on the auxiliary lanes at these locations.

It is therefore believed that a 20 mm Cape Seal or a 20 mm + 7.1 mm (split) Double Seal could be used as the initial seal on the road. The 20mm + 7.1mm (split) Double Seal is however recommended considering:

- The double seal has a similar construction cost to the Cape Seal.
- The double seal produces reduced road noise levels compared to the Cape Seal.
- The double seal is less sensitive to bleeding than the Cape Seal, particularly on steeper grades.
- Visually, the double seal appears better than a Cape Seal.
- The labour component of the two seals are similar.
- The double seal can be used as a reseal for the Class 1 road section between km 29.44 and km 31.22 (as per **Section 3** of this report) and thus provide a consistent surfacing over the project.

3. RESEAL PROPOSAL (KM 29.44 TO KM 31.22)

In terms of Section 10 of the Inception Report, the recommended surfacing seal for the reseal of TR75/1 between km 16.50 and km 31.22 was a 14mm single seal using a rubber modified binder as a tack coat.

The 14 mm single seal remains an appropriate surfacing options for the section between km 29.44 and km 31.22. However, considering the relatively small surfacing area of this section in comparison to the remainder of the road (13.5% of the total surface area), it is recommended that the 20 mm + 7.1 mm (split) Double Seal be extended as a reseal over the section between km 29.44 and km 31.22.

3.1 Surfacing and base repair (patching)

Section 10.2.2 of the Inception Report recommended that severe surfacing defects be repaired using asphalt while a granular base patch strategy be adopted for the repair of base failures. Considering the limited number of patches (seven) and the recommendations relating to the surfacing of B4691 (asphalt surfacing) in **Section 10** of this report, it is recommended that defects are repaired using an asphalt strategy.

3.2 Application of fog spray / rejuvenator

Section 10.2.6 of the Inception Report recommended the application of a diluted emulsion (fog spray) over the length of the road due to the age of the existing seal and associated brittleness of the binder. This recommendation remains for the portion between km 29.44 and km 31.22.

3.3 Texture correction

Section 10.2.7 of the Inception Report noted that a texture correction would be envisaged over the portion of road between km 29.44 and km 31.22 (the existing seal is a 14mm single seal). It is recommended that sand patch tests are conducted during the Design Development Stage to provide accurate and recent texture values.

4. EXISTING ROAD GEOMETRY AND CONSTRAINTS

4.1 Cross section

The WCG Geometric Design Manual classifies TR75/1 as a low order surfaced road between km 16.50 and km 29.44 and as a Class 1 cross-section between km 29.44 and km 31.22. The average surfacing widths are:

km 16.50 and km 29.44: Two 3.1m surfaced travelling lanes and 1.8m unpaved shoulders
km 29.44 and km 31.22: Two 3.7m surfaced travelling lanes and 2.0m surfaced shoulders

The width of the unpaved shoulders varies greatly between km 16.50 and km 29.44, depending on the presence of guardrails, cuts and side drains. In some places it is as narrow as 0.6m.

4.2 Topography

The existing road geometry is essentially constrained by the varying terrain on which the route is located. **Table 4.1** describes the topography along TR75/1.

Table 4.1
TOPOGRAPHY ALONG THE ROUTE

SV Start	SV End	TOPOGRAPHY
km 16.50	km 18.40	Rolling
km 18.40	km 20.00	Mountainous
km 20.00	km 26.30	Rolling
km 26.30	km 27.30	Flat
km 27.30	km 28.20	Rolling
km 28.20	km 31.20	Flat

The route is also constrained by the railway line running parallel to TR75/1 on the LHS from km 22.2 to where it eventually crosses at km 31.7. The alignment of the railway line is such that it runs along the road reserve for majority of the length, only diverging away at localised sections of the route. Furthermore, existing overhead Telkom lines are located on the right-hand side just outside the road reserve which could be impacted by the change in road cross section.

4.3 Horizontal alignment

The existing horizontal alignment was covered under section 4.2 of the Addendum Report but repeated below for ease of reference.

Photogrammetric Survey Plans compiled in 1988 were the only record drawings available. The horizontal alignment was determined from these plans as it is not believed that the alignment of the route has been changed since this survey was undertaken. These horizontal curves are summarised in **Table 4.2** and the equivalent design speeds based on these radii and assuming the corresponding super elevation are indicated. The road geometry and design speed of the road are furthermore indicated on drawing 15675R-02-51 included in **Book 2**.

It is evident that the design speed of the horizontal curves between km 19.0 and km 23.2 is inconsistent and generally below 100km/h.

Table 4.2
SUMMARY OF HORIZONTAL CURVES

CURVE NO	BC STAKED VALUE	EC STAKED VALUE	RADIUS (m)	DESIGN SPEED (km/h)
1	16578	16736	950	140
2	17246	17686	930	140
3	18285	18457	460	110
4	18660	18783	360	100
5	18930	19211	166	70
6	19866	20131	122	60
7	21481	21856	760	140
8	22315	22466	150	60
9	22608	22814	255	80
10	22818	22864	370	100
11	22927	22943	250	80
12	23082	23237	245	80
13	23810	23888	380	100
14	24756	24945	650	130
15	25136	25434	400	100
16	25609	25862	400	100
17	26050	26537	430	110
18	26856	27000	420	100
19	27070	27289	430	110
20	27631	27796	380	100
21	28690	29180	400	100
22	29573	29826	355	100
23	30203	30334	450	110

Note: Red highlighted cells with design speed below 80 km/h and orange highlighted cells with a design speed below 90 km/h. Blue highlighted cells to be subjected to 0.6m curve widening as per the WCG GDM Table 2-203.8.

4.4 Vertical alignment

The same photogrammetric survey plans mention in **Section 4.3** were digitised to determine the existing vertical alignment. This alignment is summarised in **Table 4.3** and the design speed indicated is based on the K-values pertaining to the respective vertical curves. The design speeds is furthermore indicated on drawing 15675R-02-51 included in **Book 2**.

There is a significant inconsistency in the design speed of the vertical curves along the length of the road with various vertical curves having a design speed below 100 km/h.

**Table 4.3
SUMMARY OF VERTICAL CURVES**

VPI NO	VPI STAKED VALUE	K Value	Forward Grade (%)	Curve Type	Design Speed (km/h)
1	17313	49	-1.2	Sag	115
2	17650	56	-4.4	Crest	90
3	17971	63	0.7	Sag	140
4	18355	38	-1.9	Crest	80
5	18560	72	0.6	Sag	140
6	18923	56	-3.4	Crest	90
7	19257	68	-6.3	Crest	100
8	19931	65	-2.3	Sag	140
9	20517	66	-4.6	Crest	100
10	20919	68	-2.2	Sag	140
11	21530	74	0.0	Sag	140
12	22009	140	-1.2	Crest	130
13	22376	32	-5.0	Crest	80
14	22726	25	3.8	Sag	80
15	23083	26	-4.4	Crest	70
16	23390	81	-1.9	Sag	140
17	23676	57	0.7	Sag	130
18	23860	36	-2.7	Crest	80
19	24162	26	0.4	Sag	80
20	24366	57	-1.4	Crest	100
21	24581	76	1.3	Sag	140
22	25013	44	5.4	Sag	110
23	25257	32	-0.3	Crest	80
24	25492	77	2.0	Sag	140
25	25771	28	-5.8	Crest	70
26	26053	34	-1.7	Sag	95
27	26429	68	-0.4	Sag	140
28	26682	57	-2.5	Crest	100
29	26979	28	4.0	Sag	85
30	27161	24	-3.5	Crest	70
31	27388	15	0.3	Sag	60
32	27572	66	-1.6	Crest	100
33	27959	82	-0.7	Sag	140
34	28566	103	2.7	Sag	140
35	29086	24	-5.5	Crest	70
36	29465	52	-0.1	Sag	120
37	30170	128	-0.9	Crest	125
38	30473	116	0.0	Sag	140

Note: Red highlighted cells with design speed below 80 km/h and orange highlighted cells with a design speed below 90 km/h

4.5 Geometric constraints

There are various sections of the existing route which are geometrically constrained either by the topography, geology or services (railway reserve). These constraints, which are summarised in **Table 4.4** and briefly described hereafter, impact the cost of widening the road prism at the specific locations.

Table 4.4
SUMMARY OF ROUTE CROSS SECTION AND CONSTRAINTS

SV Start	SV End	Typical LHS	Typical RHS
km 16.50	km 18.50	Low fill	Low fill
km 18.50	km 19.40	Fill	Low cut
km 19.40	km 20.00	High fill	Deep cut Overhead fibre optic line
km 20.00	km 22.00	Fill	Cut Overhead fibre optic line
km 22.00	km 23.30	High fill Constrained by railway	Deep cut Mesh drapery system Gabion catchment wall Overhead fibre optic line
km 23.30	km 24.80	Low cut / fill Constrained by railway	Low cut / fill Overhead fibre optic line
km 24.80	km 29.55	Deep cut / high fill Constrained by railway	Deep cut / high fill Overhead fibre optic line
km 29.55	km 31.20	Low fill	Low fill

Along most of the route, the road prism is typically in cut on the RHS and fill on the LHS. Widening the cut on the RHS often results in chasing the natural topography and consequently very high cuts, while fill widening on the LHS results in high and narrow fills being constructed. A typical example of this can be found near km 19.80 on the decent to the hair pin bend, as shown in **Photo 4.1**.

Photo 4.1
TYPICAL CROSS SECTION (km 19.40) LOOKING TOWARDS OUDTSHOORN



The section between km 22.0 and km 23.3 is constrained on the LHS by the railway reserve and on the RHS by deep cuts which are potentially unstable, as observed by the mesh drapery system and gabion catchment wall at km 23.0 shown in **Photo 4.2**. A widening of the road prism beyond a Class 3 cross section would require the removal of this system and the reshaping of the cut faces in this vicinity as realignment of the railway is not considered a viable alternative due to it being constrained by the adjacent Kliprivier.

Photo 4.2
MESH DRAPERY SYSTEM AND GABION WALL AT KM 23.0



The railway reserve further constrains widening of the road prism on the LHS up to km 29.55. **Photo 4.3** illustrates the proximity of the reserve to the road reserve.

Photo 4.3
TYPICAL CROSS SECTION (km 24.90) LOOKING TOWARDS OUDTSHOORN



5. EVALUATION OF CROSS SECTION ALTERNATIVES

5.1 Methodology

The evaluation compared the impact and cost of Class 3, Class 2 and Class 1 cross sections.

Although a topographic survey is being conducted along the route, the information was not available at the time of compiling this report. Therefore, a 1988 photogrammetric survey record which is still considered relevant, was digitised to create a digital terrain model for evaluation of the cross-section alternatives.

Furthermore, all alternatives have a common vertical alignment which is approximately 300 mm higher than the existing alignment, as per the pavement strategy discussed in **Section 2.5** of this report.

Slight horizontal alignment changes were made to accommodate the wider cross sections and auxiliary lanes within the existing road prism as far as possible. Where this was not possible, the alignment was offset slightly to generate cut or require fill on one side only. As only slight horizontal changes were made, the auxiliary lanes summarised in **Section 1.2** are common to all alternatives.

Where the road alignment was constrained as discussed in **Section 4.5**, narrow concrete side drains (as opposed to 1.8m concrete side drains) through cuttings were used as not to impact the existing cuts and retaining walls were used at high fills so as not impact on the adjacent railway reserve or chase the fill slope. .

In the absence of a geotechnical investigation, new cut and fill slopes were designed to match the existing as far as possible.

5.2 Evaluation

The layout drawings for the Class 3 alternative are included in **Book 2** (only Class 3 due to number of drawings) together with cross section drawings for all three the alternatives.

Included in **Annexure 3** is a detailed table that describes the localised improvements which were introduced to remain within existing road prism as far as possible. A summary of the evaluation output is given in **Table 5.1**

Table 5.1
SUMMARY OF EVALUATION OUTPUT

	Road cross section		
	Class 3	Class 2	Class 1
Total Cut [m³]	24 512	36 235	53 359
Total Fill [m³]	21 731	25 079	31 467
Excess Cut [m³]	2 781	11 156	21 892
Retaining Structure [m]	80	310	530
Expropriation Area [ha]	±0.7	±1.0	±1.5
Major culverts impacted (No)	7 out of 9	9 out of 9	9 out of 9
Impact on services	Minor	Vast realignment	Vast realignment

The principle of an increased impact corresponding with an increased surfaced width can be drawn from the table. The existing road prism varies in width over the length of the road. The gravel shoulder can be as narrow as 0.6m through cuttings or as wide as 2.0m on low height

fills. Consequently, the increased width of a Class 2 and Class 1 cross section impacts significantly on the volume of excess material generated.

The Class 2 and Class 1 cross sections result in long lengths of retaining structures being required at high fills.

The variance of the expropriation areas is seemingly negligible when comparing the various options, especially considering the surrounding land use and value.

Nine existing major culverts are located between km 16.50 and km 29.44. The introduction of the auxiliary lanes necessitates the extension of three major culverts, while the introduction of a Class 3 cross section only requires the extension of one additional major culvert. A Class 2 and Class 1 cross section will require the extension of a further five major culverts.

Only Telkom overhead services running parallel to the road reserve were observed during the inspection undertaken during the inception stage of the project. It is believed that this is the fibre optic line connecting Oudtshoorn and George. Relocation of this line would not be required for the Class 3 cross section, with minor relocations for the Class 2 and Class 1 cross sections.

5.3 Cost estimate

The estimated cost of the works (excl. contingencies, CPA and VAT) is given in **Table 5.2**. A breakdown of this estimate is included as **Annexure 8**.

Table 5.2
COST ESTIMATE SUMMARY EXCLUDING GEOMETRIC IMPROVEMENTS

	Estimated cost (excl. contingencies, CPA and VAT)	Approximate cost (per km)
Class 3	R 105 220 000	R 8 130 000
Class 2	R 121 290 000	R 9 370 000
Class 1	R 140 330 000	R 10 840 000

The table excludes the cost of any geometric improvements which are further discussed in **Section 7**.

5.4 Recommendation

The following is recommended based on the above evaluation:

- Upgrade the route to a Class 3 – Rural Highway cross section (3.4m surfaced lanes + 0.9m surfaced shoulders);
- Offset the horizontal alignment from the existing alignment to remain on the existing road prism, or to only cut / fill on one side, as far as practically possible;
- Offset the vertical alignment by approximately 0.3m from the existing alignment to accommodate imported subbase and base layers;
- Use kerb and channel combination concrete side drains through cuttings instead of 1.8m concrete lined side drains where required so as not to widen existing cuts; and
- Use low height retaining structures at the top of extremely high fills where the cross section cannot be contained on the existing road prism to avoid impacting on the railway reserve.

6. CROSS SECTION EVALUATION (KM 0.0 TO KM 16.50)

The rolling/mountainous terrain of the section between km 16.50 and km 29.44 is more restrictive than the terrain of the section between km 0.00 and km 16.50. Providing a consistent design (Class 3 cross section) throughout the route should not be an issue.

Notwithstanding the abovementioned, a Class 3 cross section with auxiliary lanes (as constructed under C993.01) was applied to the road section between km 0.00 and km 16.50 to check whether it could be accommodated within the existing road prism. The layout and cross section drawings for this analysis are included in **Book 2** as 15675R-02-39 to 15675R-02-50.

The existing horizontal and vertical alignment, as extracted from the photogrammetric survey, was used for this analysis. While there are sections which require widening of the existing road prism, it can be deduced that a Class 3 cross section could generally be accommodated within the existing road reserve with the benefit of adjusted alignments.

The constraints discussed under section 3.5 are mostly not applicable to this road section, other than the proximity of the railway reserve on the RHS between km 1.6 and km 3.6.

There is one existing bridge on this section of TR75/1, B2904 over rail at km 5.93. This bridge has a width of 9.76m between balustrades. It could therefore accommodate a Class 3 or Class 2 cross section without having to be widened.

7. LOCALISED GEOMETRIC IMPROVEMENTS

The WCG Geometric Design Manual states that the normal design speed of a road shall be 100 km/h in flat country. In more difficult terrain, such as that experienced to some extent along TR75/1, this design speed may be reduced to a minimum of 70 km/h for road Classes 1 to 3. However, the minimum length of a particular design speed should preferably not be less than 8 km and in no case less than 4 km.

7.1 Class 3

To meet the above stipulated criteria, an analysis for a Class 3 cross section was done using 80 km/h as the preferred minimum design speed along the route, based on the route topology.

TR75/1 has several isolated horizontal and vertical curves which have a design speed below 80 km/h, as highlighted in **Table 4.2** and **Table 4.3**. These are further summarised with recommendations in **Table 7.1**.

Table 7.1
CURVES WITH A DESIGN SPEED OF 70 KM/H OR LESS

CURVE TYPE	STAKED VALUE (BC, EC or VPI)	DESIGN SPEED (km/h)	DRAWING REFERENCE	RECOMMENDATION FOR CLASS 3 CROSS SECTION	APPROXIMATE COST FOR CLASS 3
Horizontal	18 930 to 19 211 (before hairpin bend)	70	Refer to drawing	Existing geometry is constrained by topography. Severe impact on earthworks to improve the design speed. No geometric improvement recommended.	Considerably high
Horizontal	19 866 to 20 131 (hairpin bend)	60	15675R-02-02, 52 and 53		
Horizontal	22 315 to 22 466	60	Refer to drawing 15675R-02-54	Improvement to 80 km/h design speed would impact significantly on stabilised rock face. No geometric improvement recommended.	Prohibitively high
Vertical	23 083	70	Refer to drawing 15675R-02-54	Localised geometric improvement to 80 km/h design speed possible without significant impact. Geometric improvement recommended.	R 890 000.00
Vertical	25 771	70	Refer to drawing 15675R-02-55	Localised geometric improvement to 80 km/h design speed possible without significant impact. Geometric improvement recommended.	R 712 000.00
Vertical	27 161	70	Refer to drawing 15675R-02-55	Localised geometric improvement to 80 km/h design speed possible without significant impact. Geometric improvement recommended.	R 800 000.00
Vertical	27 388	60	Refer to drawing 15675R-02-55	Localised geometric improvement to 80 km/h design speed possible without significant impact. Geometric improvement recommended.	
Vertical	29086	70	Refer to drawing 15675R-02-56	Localised geometric improvement to 80 km/h design speed possible without significant impact. Geometric improvement recommended.	R 445 000.00

7.2 Class 2 and Class 1

For Class 2 and Class 1 upgrades, an analysis was conducted using 80km/h and 90km/h as the preferred minimum design speeds, respectively.

The Class 2 cross section has three horizontal curves and five vertical curves with a design speed below 80km/h. Approximately 4.5km of geometric improvements will be required to obtain the desired design speed for this cross section.

The Class 1 cross section has six horizontal curves and eleven vertical curves with a design speed below 90km/h. Approximately 6.5km of geometric improvements will be required to obtain the desired design speed for this cross section.

7.3 Cost estimate

An estimate of the cost of geometric improvements and the total estimated cost of the road upgrade is given in **Table 7.2**.

Table 7.2
COST ESTIMATE SUMMARY

	Estimated cost (Table 5.2)	Est. additional cost of geometric improvements (per km)	Total est. cost of geometric improvements	Total estimated cost (excl. contingencies, CPA and VAT)	Total estimated cost (per km)
Class 3	R 105 220 000	R 890 000	R 2 847 000	R 108 067 000	R 8 340 000
Class 2	R 121 290 000	R 3 785 000	R 17 032 500	R 138 322 500	R 10 680 000
Class 1	R 140 330 000	R 13 745 000	R 89 342 500	R 229 672 500	R 17 740 000

8. AUXILIARY LANES

An investigation into the introduction of auxiliary lanes was undertaken and the findings were submitted to the Branch in the December 2019 Addendum to Inception Report. The recommendations of that report are summarised hereafter.

8.1 Climbing lanes

The analysis found that two climbing lanes were warranted and economically viable. Accordingly, they were recommended for inclusion in the scope. These are:

1. Km 16.50 to km 17.36 RHS (0.86 km, total 1.61 km as a continuation of the climbing lane constructed as part of C993.01)
2. Km 18.70 to km 19.94 RHS (1.24 km)

8.2 Passing lanes

Five passing lanes were found to be warranted and economically viable and were recommended for inclusion in the scope. These are:

1. Km 23.55 to km 24.70 LHS (1.15 km)
2. Km 23.84 to km 24.86 RHS (1.02 km)
3. Km 25.46 to km 25.96 RHS (0.50 km)
4. Km 26.14 to km 26.70 LHS (0.56 km)
5. Km 27.74 to km 28.38 RHS (0.64 km)

8.3 Cost estimate

The total length of auxiliary lanes to be constructed under C1117 is 5.97 km. The cost of these auxiliary lanes was estimated to be in the order of R16.44 million in the Addendum to Inception Report and it is estimated that these will now cost in the order of R19.23 million for the Class 3 cross section alternative, accounting for inflation. An estimate of the cost of geometric improvements and the total estimated cost of the road upgrade is given in **Table 8.2**.

Table 8.2
COST ESTIMATE SUMMARY

	Estimated cost (Table 7.2)	Est. additional cost of auxiliary lanes	Total estimated cost (excl. contingencies, CPA and VAT)	Total estimated cost (per km)
Class 3	R 108 067 000	R 19 230 000	R 127 297 000	R 9 830 000
Class 2	R 138 322 500	R 21 537 600	R 159 860 100	R 12 340 000
Class 1	R 229 672 500	R 6 410 000*	R 236 082 500	R 18 230 000

Note: the cost of the auxiliary lanes for the Class 1 cross section is reduced as the geometric improvements for this cross section will allow for greater passing opportunities and a reduced need for auxiliary (passing) lanes.

9. DRAINAGE

9.1 Introduction

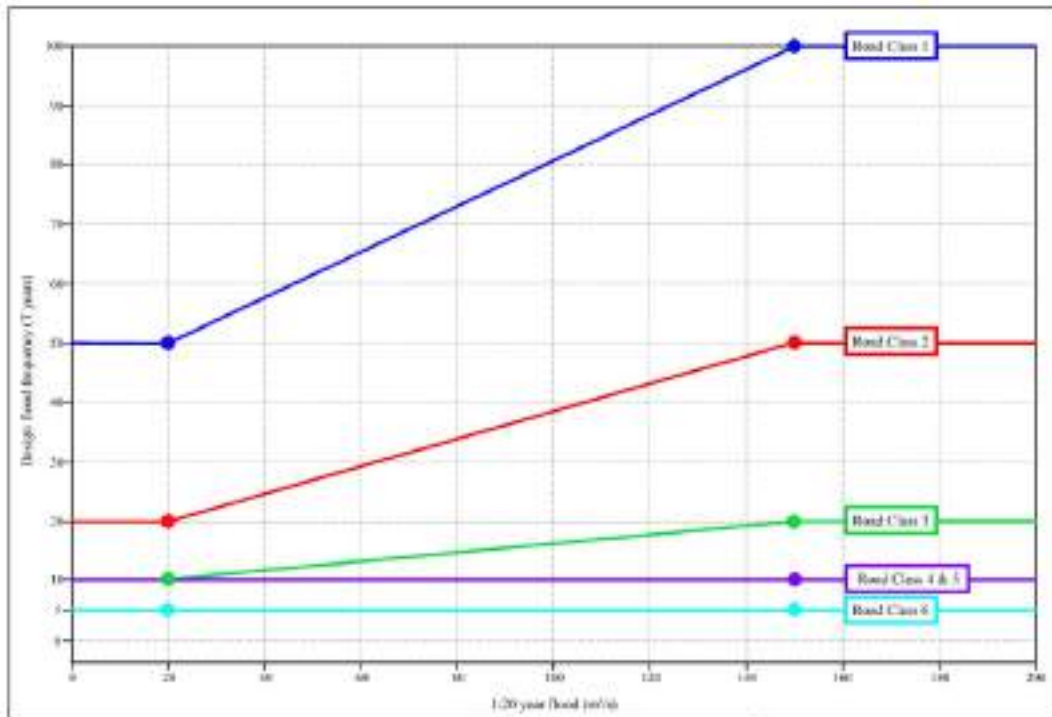
All drainage lines intersecting or crossing the road were identified, their respective catchment areas were determined and the stormwater run-off for each was determined - all in accordance with the requirements of the SANRAL Drainage Manual 6th Edition. Thereafter the appropriate stormwater culvert sizes were determined for each drainage line.

Side drains will be assessed and finalised during the detail design stage of the project.

9.2 Design flood return period

Based on the existing and forecast AADT (see **Section 3.1** of the Inception Report), TR75/1 is classified as a Class 2 Rural Road in terms of the SANRAL Drainage Manual 6th Edition. The flood return periods for each culvert were determined using **Figure 9.1** below.

Figure 9.1
DESIGN FLOOD FREQUENCY ESTIMATE
(ADOPTED FROM SANRAL DRAINAGE MANUAL (6TH EDITION))



9.3 Design peak flow










A total of 63 catchment areas were identified along TR75/1 between km 16.50 and km 29.00, as indicated in **Book 2**: drawing 15675R-02-57. None of these catchment areas exceed 15km². Therefore the Rational Alternative 3 and the Standard Design Flood (SDF) methods were considered applicable and were used to determine the design peak flow for a 20-year flood return period. The design peak flows calculated using each method are indicated in **Annexure 4.1**. The variance in the peak flow between the two methods can be attributed to various catchment characteristic assumptions made when calculating the run-off coefficient using the rational method. The run-off coefficient used in the SDF method is a calibrated value making it a non-site specific value.

9.4 Capacity checks on existing culverts

The capacity of the existing culverts was determined and evaluated in terms of the design floods calculated for the respective catchment areas. **Annexure 4.2** provides the details of the existing culverts, as well as compares their capacity to the design floods calculated for respective catchment areas. A flood return period of 1:20 was determined for the route.

The Rational Alternative 3 method was chosen to determine whether existing culvert capacities are adequate. Three culverts, located at km 16.90, km 18.30 and km 19.75, were found to have insufficient capacity with this method. It should be noted that two of the culverts (km 16.90 and km 19.75) are located where auxiliary lanes are proposed and require extension. **Table 9.1** provides a photographic summary of the culverts found to have insufficient capacity.

**Table 9.1
 CULVERTS WITH INSUFFICIENT CAPACITY**

CULVERT NUMBER	STAKED VALUE	SIZE (mm)	INLET	BARREL	OUTLET
C3	16 900	600PC			
C9	18 300	600PC			
C15	19 750	450PC			

Visual inspections found non-functional headwalls, scouring at select locations and siltation. No evidence was found of overtopping at these culvert locations despite capacity checks revealing insufficient capacity. The DRE: Oudtshoorn further confirmed the capacity of the existing culverts to be adequate during storm events.

9.4.1 Proposed actions for minor culverts

A full summary of the proposed actions at the minor culverts is included as **Annexure 4.3**.

The majority of minor culverts have dry stone packed headwalls and no wingwalls and the DRE confirmed that continuous clearing of the inlets / outlets is required. Due to the construction of the auxiliary lanes, 20 minor culverts require extension and the construction of standard inlet / outlet structures is recommended at these culverts. A consistent approach to the drainage structures over the length of the project is furthermore recommended whereby standard inlet / outlet structures are constructed at all minor culverts. Standard grid inlets will be required where culverts are located at the position of proposed concrete side drains.

Erosion protection should be provided in line with the standard plans at locations where the velocity and Froude number warrant the need thereof.

Due to the need to extend the 450mm pipe culvert at km 19.75, it is recommended that it be upgraded to a minimum 600mm diameter pipe culvert for maintenance purposes.

9.5 Cut-off Drains

Cut-off drains were observed above numerous cut faces, particularly from km 22.8 onwards. The photos below show a typical cut-off drain along TR75/1 in the vicinity of km 23.0.

Photo 9.1
TYPICAL CUT-OFF DRAINS



Perspective view of cut-off drain.



Close-up of cut-off drain.

It is recommended that debris be removed from the drains and they be re-shaped and then stone pitched. This will aid the maintenance agent with clearing the cut-off drains and the side drains through cuttings where material build up is an issue noted by the DRE.

10. STRUCTURES

10.1 Background

This chapter provides supplementary informal, final responses and recommendations on the following reports and related feedback from WCG:

- Inception Report: Contract C1117 dated January 2019
- Addendum to Inception Report: Contract C1117 dated December 2019

The structures that are in the study area generally consist of concrete structures, which were constructed during the late nineteen fifties to seventies and are around 40 to 70 years old.

Bridge B4691 over the Olifants River was constructed in 1977 and consists of a simply supported precast prestressed beam with in-situ slab concrete deck with solid wall piers and spill through abutments. The bridge was part of a major bridge rehabilitation contract which was completed in 2008. This was the first pilot bridge rehabilitation project based on the inspection data from the WCG Bridge Management System and included several bridges and selected major culvert structures in the area.

The major culvert structures, as defined by TMH19, consist of in-situ reinforced concrete deck slabs supported on wall type abutments with inlet and outlet cantilever wall structures and are assumed to be constructed much earlier than B4691. None of these structures were included in the above rehabilitation contract as the BMS at that time only included structures with span lengths from around 3.0m upwards. The culverts on TR75/1 have span lengths of 2.5m or less. There were also no signs of recent repairs observed during the current visual investigation.

Concrete durability and concrete material performance has been shown to be dependent on the interaction of various factors, specifically the concrete cover to the reinforcement, the concrete quality and the aggressiveness of the exposure environment. In this project, the area forms part of the Klein Karoo geographical region. High temperature variations from winter to summer seasons and low relative humidity are the dominant ambient conditions, with occasional flash floods during periods of heavy rain.

In such an environment, carbonation (the rate of ingress of carbon dioxide from the atmosphere) is expected to occur at a high rate due to the low relative humidity of the environment and constant availability of air (and carbon dioxide). However, the low relative humidity will result in a low risk of corrosion for the structures, except near permanent moisture sources, i.e., perennial rivers and streams, where an increased corrosion risk is possible.

The structures are generally in a fair to good condition except for the specific defects detailed in previous reports and discussed below.

Widening requirements which may be necessary due to the proposed road geometric improvements are also noted. These relate only to the Major Culvert structures.

10.2 Bridge B4691 over Olifants River

10.2.1 Introduction

The existing bridge along the section of TR75/1 under consideration is summarised in **Table 10.1** and shown in **Photo 10.1**.

Photo 10.1
PART ELEVATION OF BRIDGE B4691



Table 10.1
EXISTING BRIDGE B4691 DETAILS

LOCATION (KM)	BRIDGE NO	DESCRIPTION	SPANS NO	LENGTH (M)	SKEW
TR75/1					
30.02	4691	Olifants River bridge	9	202.5	90°

10.2.2 Proposed rehabilitation/ maintenance measures

Bridge 4691 at km 30.02 on TR75/1 is in a good condition and only selected remedial activities are proposed. The following key defects were identified:

- Deck surfacing at end of service life
- Honey combing on northern abutment face
- Balustrade cracking, rebar corrosion and spalling
- Cracking and pavement settlement behind abutments
- Service life of bridge deck expansion joints

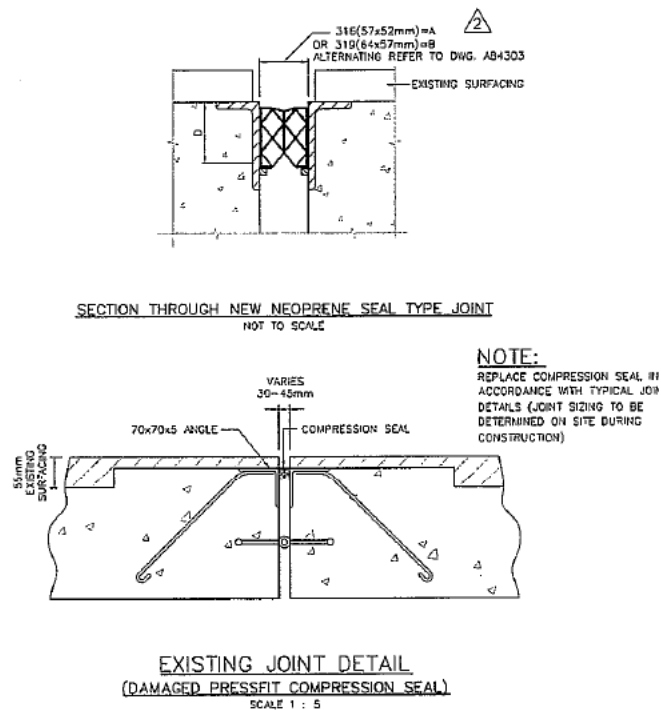
Annexure 5.1 provides a detailed summary of defects identified, together with photographs and recommended remedial / maintenance measures.

10.2.3 Asphalt surfacing and bridge deck joints

The deck surfacing is to be milled and replaced with new asphalt surfacing, including a short tie in of approximately 20m at the approaches. It will also include the replacement of the base with bitumen treated basecourse where settlement and reflective cracking is evident at the approaches.

At the stage of the previous bridge rehabilitation project, which was completed in 2008, it was concluded that complete joint replacement with new concrete nosings or asphaltic plug joints was not suited for this bridge. This was in view of the good functional condition of the existing steel nosings and waterstop seal below the neoprene seal. **Figure 10.1** illustrates the typical detail of a neoprene seal type joint.

**Figure 10.1
 TYPICAL JOINT DETAIL**



The road surface seal was not replaced at that stage. The neoprene seal was severely damaged, at some locations, however. After considering various options and also consultation with joint installation contractors it was concluded that the replacement of the neoprene seals were the most suitable solution from a cost and practical perspective. At that stage resurfacing was not envisaged due to the relatively good condition thereof.

Tender rates for the replacement of the neoprene seals during the 2007 contract varied from around R600 /m to R900 /m. Currently it is estimated at around R1500 /m to R2000 /m to replace the seals and with an overall joint length of around 130m the installation cost would be R195 000 to R260 000 (excluding P&Gs).

New asphaltic plug joints would cost in the order of R780 000 and armoured edge nosings around R2 000 000.

The armoured edge nosing solution is not favoured in view of the much higher cost relative to the other solutions and the asphaltic plug joints is deemed suitable in this instance.

The photos below provide an indication of the performance of the joint seal in comparison to the previous installation over the last 15 years. It is therefore considered an option to repeat the same joint seal replacement operation as was done previously. For this solution care should be taken to minimize the asphalt thickness to limit edge damage and breaks.

Photo 10.2
JOINT CONDITION COMPARISON



Joint condition prior to 2008 seal installation.



Joint condition at visual inspection conducted 2019.

However, in view of the overall pavement strengthening project and the recommendation to replace the deck surfacing with new asphalt, it is proposed to replace the existing joint system with new asphaltic plug joints which will be installed after completion of the asphalt deck surfacing.

Considering the potential cost implication of this proposal it remains an option that, after the milling operation during construction, to reassess the condition of the existing joint nosings and revert to the previous solution of replacing the neoprene seal only. This would then require the proposed surfacing seal be placed over the asphalt surfacing similar to the existing situation.

10.3 Major Culverts

10.3.1 Introduction

The major culvert structures consist of in-situ mass concrete type walls with in-situ reinforced concrete solid slabs of varying spans. These structures are generally in a good condition and no major structural or other defects were observed.

Photo 10.2
TYPICAL MAJOR CULVERT ALONG THE ROUTE



10.3.2 Proposed rehabilitation/ maintenance measures

Only defects that affect the long-term durability or functionality of the structures have been considered for repairs. The following key defects were identified:

- Diagonal and vertical cracks at inlet / outlet wingwalls
- Vertical cracks in barrel walls
- Spalling and longitudinal cracking of roof slab
- Scour in barrels and inlets / outlets
- Miscellaneous defects related to maintenance and safe operation

Annexure 5.2 provides a summary of the key defects identified, together with photographs and recommended remedial / maintenance measures.

Culvert specific defects observed during the visual inspection with proposed remedial activities for the existing major culverts along the section of TR75/1 under consideration are summarised in **Annexure 5.3**. These are in addition to general maintenance activities such as siltation, vegetation growth and debris accumulation, which was also observed. The widening requirements for the new road cross section have also been taken into consideration in the proposed remedial activities.

11. MESH DRAPERY SYSTEMS

During the Inception Stage, Kantey & Templer recommended that the two mesh drapery systems along the route (at km 22.20 and km 23.00) be assessed by a suitably qualified Geotechnical Engineer. This recommendation was not supported due to the Scope of the Works at that time (Periodic Maintenance).

Given that the Scope has subsequently changed, it is our recommendation that this matter is investigated during the Design Development Stage. It is further recommended that these systems be cleared of the debris which has accumulated behind the nets. The input of a specialist will be required to develop a method statement to detach and re-attach the systems in the best manner.

12. ACCESSES

12.1 Background

A total of 30 intersections are located along TR75/1 between km 16.50 and km 31.22, which includes one surfaced intersection (km 29.56), one surfaced main farm access (Chandelier – km 24.59) and several gravel main and minor farm accesses. In addition to the accesses, this portion of TR75/1 accommodates three formal rest areas (km 16.50, km 22.57 and km 28.01) as well as three informal rest areas (km 22.80, km 23.53 and km 28.26).

An inventory of existing accesses, intersections and rest areas was submitted as Annexure 9 of the Inception Report and Annexure C1 of the Addendum Report.

The accesses along the route up to km 29.44 will all be affected by the proposals contained in this report, particularly the proposed pavement strategy and the introduction of auxiliary lanes. An updated summary of recommendations for the accesses and rest areas based on these impacts is included as **Annexure 6**.

12.2 Proposed actions to accesses

The importation of a new base layer and subbase layer impacts on the vertical alignment of 22 out of 30 accesses along the route. Those unaffected are located from km 29.44 onwards where a Class 1 cross section is present. It is recommended that the affected accesses are re-graded to ensure a satisfactory vertical alignment tie-in to the raised TR75/1 pavement and at the same time reconstructed to comply with the WCG standard plans. Discussions with landowners and the DRE will be had during the Design Development Stage to ensure that disused accesses are closed and not erroneously improved.

Accesses between km 24.67 and km 27.01 all have substandard sight distance. Relocation of only one access appears feasible over this portion; the minor farm access located at km 24.67. It is recommended that this access be relocated to km 24.61, opposite the main farm access to Chandelier. It is also recommended that high visibility signage "concealed access" signage (W218) be installed at either end of the section.

Eight intersections / accesses are located from km 29.44 onwards. It is recommended that one of these (km 30.61) be upgraded to a main farm access while other recommendations include constructing concrete edge beams where edge break was noted and resurfacing surfaced bellmouths.

12.3 Proposed actions to rest areas

Feedback on the Addendum to Inception Report stated that rest areas within 10km of towns should not be upgraded. With this in mind, it is recommended that:

- the formal rest area at km 16.50 LHS is brought up to the same standards that were applied to the rest area at km 15.60 RHS on C993.02 (entrance and exit tapers);
- The furniture at the formal rest areas at km 22.57 and km 28.01 is removed, existing gravel be ripped and earth side drains are constructed to discourage motorists from stopping here; and
- The existing gravel be ripped and earth side drains are introduced at the informal rest areas to discourage motorists from stopping at these locations.

13. ROADSIDE FURNITURE

13.1 Fencing

13.1.1 Existing fencing

The fencing along route consists mainly of vermin proof and stock proof fencing. Game fencing was also observed at specific locations. The general condition of fencing along TR75/1 ranges from a fair to poor condition. The majority of fencing along the route was erected with non-standard material.

There are several locations where the fencing has been damaged or removed. There is also no fencing between km 28 and km 29 where the railway runs adjacent to the road reserve. A summary of the existing fencing can be found in **Annexure 7.1**.

Photo 13.1
DAMAGED FENCING AT A REST STOP
ON LHS OF THE ROAD



Photo 13.2
MISSING FENCE BETWEEN KM 28 AND KM 29
ON LHS OF THE ROAD



13.1.2 Proposed work to fencing

The following actions are proposed relating to fencing:

- Although the majority of fencing is constructed from non-standard materials, they appear to be functional and therefore no action is recommended for functional fencing.
- Where expropriation is required or where fencing is impacted by the roadworks, new fencing that matches the existing fencing type is proposed. This is predominantly stock proof and vermin proof fencing.
- Where fencing is missing or non-functional, it is recommended that new fencing is installed to match the adjacent fencing. This is predominantly stock proof fencing.

13.2 Guardrails

13.2.1 Existing Guardrails on TR75/1

The existing guardrail locations and conditions were noted, assessed and discussed in Section 16.2 of the Inception Report. Although the majority were in fair condition, the guardrail posts were found to be brittle. Most guardrails do not comply to WCG Standards in terms of height, reflectors and spacer blocks.

13.2.2 Proposed work

Due to the proposed Class 3 road upgrade, it is recommended that all existing guardrails be replaced if warranted and additional guardrails be installed where warranted. The warrants for guardrails were determined according to the WCG GDM's Severity Index Curve (Fig 2-219.2A) and are summarised in **Annexure 7.2**. The total length of additional guardrails proposed is approximately 1.3 km.

13.3 Road Signs

13.3.1 Existing Road Signs on TR75/1

The existing road sign locations and conditions were noted, assessed and discussed in Section 16.3 of the Inception Report.

13.3.2 Proposed work

It is noted that some work has been undertaken on the road signage by the maintenance agent since the submission of the Inception Report in 2019. However, it is recommended that existing signs be replaced and additional signs be installed where warranted, such as GS101 and GS202 signs at the auxiliary lanes. Tourism signage (directional) shall remain regardless of the condition unless the necessary contributions from the relevant facilities are agreed to.

13.4 Kilometre Markers

During the visual assessment all 15 kilometre markers were found in good condition and do not require any maintenance at this stage. It is recommended that the kilometre markers impacted by auxiliary lanes be relocated as per WCS/56/2/D1.

In any case, the position of the markers will be checked with the coordinates provided by the Branch during the Design Development Stage. Should the markers be further than 30 m from the GPS coordinate, they will be relocated to the correct position.

14. SERVICES

A complete list of services which were identified is included as **Annexure 7.3**.

14.1 Telkom / Fibre optic

A Telkom / fibre optic overhead line was observed running parallel to the road outside the road reserve for the majority of its length. The overhead line crosses the road at several locations. No relocation of the line is anticipated and clearances will be checked, although it is not expected to be below the requirements at any location.

14.2 Eskom

Throughout the route only one Eskom underground crossing was observed at km 29.93. Wayleaves indicate that more underground cables can be found upon entry into Oudtshoorn, although these do not require relocation due to the Scope.

An Eskom overhead line is present between km 30.52 and km 31.22 in the road reserve. No relocation of this service is anticipated.

14.3 Counting station

A WCG counting station (station 5021) was noted at km 16.65 on the RHS. This service will be affected by the pavement strengthening and the proposed auxiliary lane at this location. Should the Employer wishing to reinstate the service and not have another mechanism to do so, it is recommended that a Prime Cost sum be allowed for in this contract's schedule of quantities to allow the operating service provider to reinstate the service after the roadworks have been completed.

14.4 Private services

Several unknown private services were observed, specifically irrigation canals with suspected irrigation pipes crossing in box culverts between km 30.40 and km 31.22. These services do not appear on the road log and further investigation into their wayleaves will be undertaken in Stage 3. It does appear though, that the culvert crossings were specifically constructed for the purpose of the irrigation canals. Nevertheless, these services remain unaffected by the scope of the works.

15. ENVIRONMENTAL AND OTHER REQUIREMENTS

15.1 Environmental & Heritage

The various legal issues and potential impacts on the project and required mitigating actions are summarised in **Table 15.1**.

Table 15.1
SUMMARY OF LEGAL ASPECTS, EMPOWERMENT AND EXPROPRIATION

Authority	Project Impact on:	Action
Department of Minerals and Energy (DME)	Minerals	N/A : Minerals to be obtained from commercial sources and from cut material generated on site.
Department of Water Affairs and Forestry (DWAF)	Water resources and water for construction	Watercourses affected by cross section upgrade. Aquatic specialist currently undertaking study – outcome will determine whether Water Use License or General Authorization required. Anticipated General Authorisation due to likely low risk rating.
Department of Forestry, Fisheries & the Environment (DFFE)	Environment	Basic Assessment study underway.
South African Heritage Resource Agency (SAHARA)	Heritage resources	Compliance statement contained in Basic Assessment Report and will be issued to Heritage Western Cape for comment and approval as part of BAR process.
Department of Labour	Construction stage	Construction permit required and project specific Occupational Health and Safety Plan to be incorporated in Contract Documentation.
Provincial Government of the Western Cape	Empowerment	EmplA to be undertaken during Stage 3 after agreement of Scope. Findings to be incorporated in Empowerment Feasibility Report and Contract Documentation (Targets for Local Labour and Targeted Enterprises).
	Expropriation	Expropriation required at selected areas.

15.2 Health & Safety

It is required that an agent be appointed as an Employer's Agent for health and safety in the design stage and the construction stage of the project. The scope of the services should include:

- Preparing a baseline risk assessment for the project;
- Reviewing the Employer's Agents design;
- Preparing a health and safety specification;
- Reviewing tenders with respect to health and safety;
- Preparing and submitting the application for the Construction Work Permit;
- Undertaking audits during the construction stage; and
- Monitoring the construction works for compliance with the OH&S specifications by undertaking regular audits.

An agent will be appointed for the above service during Stage 3 after finalisation of the scope.

15.3 Land Acquisition

The acquisition of land will be required where auxiliary lanes are being introduced and where the introduction of the recommended cross section impacts on the high fills and deep cuts.

Land use along the affected areas is agricultural in nature and generally not intensively farmed. The relative cost per hectare to acquire land in this area is approximately R 250,000.

In total, approximately 0.7 hectares will have to be acquired from approximately six different farm portions. It is therefore anticipated that the total cost of expropriation will be in the order of R 175,000.

16. DESIGN IMPLEMENTATION PROGRAMME

A preliminary design implementation programme based on the on recommended scope of works is included as **Annexure 9**.

The programme provides for two scenarios.

- The first scenario is based on Stage 4 "Documentation and Procurement" starting at end August 2023, directly after the Environmental Authorization for the project is issued. It is envisaged that Stage 5 "Contract Administration and Inspection" could start at end November 2023.
- The second scenario is based on Stage 5 "Contract Administration and Inspection" starting at end August 2023, directly after the Environmental Authorization for the project is issued. It is however the believe that this scenario could potentially be unrealistic due to the tight timeframes and limited information regarding the materials investigation, where all test results will be available shortly before the end of the Design Development stage. A further point of concern relates to the approved Environmental Management Plan (EMP) which will not be available at the Documentation Stage.

The construction duration is discussed in further detail in **Section 17.3** of this report.

17. CONSTRUCTION

17.1 Traffic Accommodation

As there are no feasible alternate routes and bypass construction is not a viable option, traffic will be accommodated in half-widths with signalised Stop / Go controls. Special attention will be given to the position of the control points, the number of work zones and the length thereof to ensure minimal disruption to traffic flow as the route is used by many as a daily commute between George and Oudtshoorn.

Temporary widening will be required along most of the route between km 16.50 and km 29.44 where the existing surfaced width is too narrow to accommodate vehicles at an offset from the proposed centreline. The recommended layerworks and details of the temporary widening will be submitted to the Design Directorate for approval during Stage 3 for comment / approval. There is sufficient width between km 29.44 and km 31.22 to undertake half width construction on the existing road width.

17.2 Labour-intensive Works

The nature of the project is such that limited labour intensive works can be undertaken. The following sections of work typically have a higher labour component that can be fulfilled by suitably trained temporary local labour:

- Traffic management
- Construction of drainage infrastructure
- Stone pitching cut-off drains
- Construction of guardrails and fencing
- Construction of stone masonry walls
- Installation of road signage

17.2.1 *Alternative crash barrier*

As an alternative to providing guardrails, stone masonry walls could be provided at certain locations to visually blend into the surrounding environment and enhance the labour component. These walls could replace guardrails between km 22.10 and km 22.40 as well as between km 22.52 and km 23.00, where the route topography is more mountainous, with deep cuts on the RHS and high fills on the LHS and the design speed is typically low.

Sandstone / shale material could be obtained from the cut widening between km 19.00 and km 20.00 as well as from behind the rock mesh drapery system at km 23.00 and be stockpiled and sorted at the rest area at km 22.60 or km 22.80.

Stone masonry walls can be found over a vast length of TR1/1 which forms part of the Oudtshoorn to George route along with TR75/1. A select few similar examples of such walls can be found on the N1 near Sandhills in the Hexrivier valley, Chapmans Peak Drive, Cogmanskloof, Meiringspoort and Clarence Drive. A typical photo of a stone masonry wall is shown in **Photo 17.1**.

Photo 17.1
EXAMPLE OF STONE MASONRY WALL
ON TR31/2 IN COGMANSKLOOF



It is anticipated that the cost of the stone walls could be in the order of R2 800 /m, compared to approximately R600 /m for guardrails. The total increased cost for the proposal is therefore in the order of R1.71 million.

17.3 Construction Duration

A construction duration of 16 months (including the year-end break) is foreseen at this stage, requiring an average expenditure of approximately R 7.95 million per month. Other than the winter seal embargo, there are no other restrictions (such as seasonal harvesting etc.) that should be taken into account in the contract programme.



18. SUMMARY OF RECOMMENDATIONS

The following is recommended to implement the necessary improvements along the route:

- Upgrade the route to a Class 3 – Rural Highway cross section (3.4m surfaced lanes + 0.9m surfaced shoulders) between km 16.50 and km 29.44;
- Offset the horizontal alignment from the existing alignment to remain on the existing road prism, or to only cut / fill on one side, as far as practically possible;
- Offset the vertical alignment by approximately 0.3m from the existing alignment to accommodate imported subbase and base layers;
- Use kerb and channel combination concrete side drains through extremely restricted cuttings so as not to widen existing cuts;
- Use low height retaining structures at the top of extremely high fills where the cross section cannot be contained on the existing road prism to avoid impacting on the railway reserve;
- Implement localised geometric improvements at vertical curves where the existing design speed is below 80 km/h to provide greater consistency in the design speed;
- Construct auxiliary lanes at locations recommended in the Addendum to Inception Report;
- Pre-treat the portion between km 29.44 and km 31.22 with asphalt patches, a fog spray and a texture correction prior to resealing;
- Construct a 20 mm + 7.1 mm (split) Double Seal over the entire length of the project;
- Relocate one minor farm access and upgrade the other existing accesses to comply with the latest WCG standard plans;
- Formalise the rest area at km 16.50 LHS by introducing entrance and exit tapers;
- Extend 20 pipe culverts, replace one pipe culvert and construct standard inlet / outlet structures at all minor culverts, erosion protection where warranted;
- Shape and stone pitch the cut-off drains at the top of selected cuts;
- Replace the road signage with new road signage and add additional warranted signage;
- Replace the existing guardrails with new guardrails where warranted;
- Repair and supplement the existing fencing where in a poor state (or missing) and construct a new fenceline where land acquisition is required;
- Enhance the labour component of the project by construction stone masonry crash barriers through the mountainous topography between km 22.10 and km 22.40 as well as between km 22.52 and km 23.00;
- Construct head and wingwalls at minor culverts and erosion protection where scour has been observed;
- A geotechnical engineer to inspect the mesh drapery systems during the Design Development Stage for any failures;
- Clear the rock debris from behind the mesh drapery systems at km 22.2 and km 23.0;
- Repair and / or extend the nine major culverts along the route; and
- Mill and replace the surfacing with asphalt surfacing on B4691 over the Olifants Rivier and replace the exiting joints with asphaltic plug joints.

The total cost of the recommended alternative is estimated to be **±R 127.3 million (excl. contingencies, CPA and VAT)**, with a project duration of **16 months (incl. the year-end break)**.

POINT	MINUTES OF MEETING	ACTION
3.2	<p>JB noted that it is a requirement that the selected cross-section between km 16.5 and km 28.0 (change to Class 1 cross section) should be such that it can also be applied in the future between km 0.0 and km 16.50 so to ensure a consistent design along the entire length between Holgaten and Oudtshoorn.</p> <p>PB stated that the rolling/mountainous the terrain in the Northern section (km 16.5 to km 29.32) is more restrictive than the terrain of the section between km 0.0 and km 16.50 and therefore, providing a consistent design should not be an issue, but this investigated/confirmed.</p>	
3.3	<p>PB noted that there are three cross section options that will be evaluated for the section between km 16.50 and km 29.32:</p> <ol style="list-style-type: none"> 1. Class 3 – Fits mostly within existing road prism 2. Class 2 – Requires geometric improvements and increased earthworks 3. Class 1 – Requires significant geometric improvements and earthworks 	
3.4	<p>PB stated that HDM4 modelling might be required to obtain the most economical solution. The recommended solution will however be subject to budget constraints.</p>	
3.4.1.	<p>JB stated that it is difficult to give an exact figure w.r.t budget constraints but reiterated that the initial scope of the project was periodic maintenance and that WCG would be reluctant to spend significant money on the upgrade of the road (improvements in alignment etc.).</p>	
3.4.2.	<p>JB stated that HDM4 modelling is not required. K&T can consider various options in terms of total cost and summarise the findings in the report.</p>	K&T
3.4.3.	<p>JB noted that proposals for localized improvements will be considered but that such improvements must be well motivated.</p>	K&T
3.5	<p>JB noted that the proposed location of auxiliary lanes as per the Addendum Report has been approved internally at WCG and will still form part of the project and therefore supports the provision of a lower class of cross section. Approval of approved auxiliary lanes to be provided by JB.</p>	JB
3.6	<p>GRT queried the consistency of the class of road relevant to the other approach roads. JB stated that other approach roads do not influence the class of the said road, but consideration might be given to other roads when an argument is made for a certain road cross section class.</p>	
4.	<p>TOPOGRAPHICAL SURVEY</p>	
4.1	<p>PB stated that K&T created a DTM model of the entire road between km 0.0 and km 29.32, using old survey drawings. K&T believes that the created DTM is sufficient for the determination of an appropriate road cross section. Using the DTM will also result in a significant time saving since that the analysis could be done now oppose to waiting for a survey to become available of the entire route.</p> <p>JB agreed that the analysis for the appropriate road cross section can be based on the created DTM but would also like to know the discrepancy between the existing DTM and a surveyor's DTM. K&T to investigate.</p>	K&T
4.2	<p>PB proposed that a surveyor be appointed as soon as possible to undertake the survey of the section between km 16.5 and km 29.32. JB agreed and stated that if the created DTM is found to be insufficient for cross section analysis, he is happy that the survey is conducted for the whole route (km 0.0 to km 29.32).</p>	K&T

POINT	MINUTES OF MEETING	ACTION
5	EXPROPRIATION	
5.1	JB stated that expropriation processes are to commence as soon as possible and should be conducted concurrently with the other processes e.g., topographical survey, C&V Report, and environmental authorization.	K&T
5.2	PB stated that the expropriation process done different ways, at varying risks, and the decision lies with WCG to decide on the way to be followed.	
5.3	JB stated that the cost of time is most likely greater than the cost of potential errors pertaining to expropriation and that a fast-tracked process would most likely be preferred. JB to discuss the preferred process internally and revert to K&T.	JB
6	MATERIALS INVESTIGATION	
6.1	PB suggested that the centreline materials investigation be conducted as soon as possible due to the long lead time.	
6.2	PB also stated that the extent of geotechnical drilling can only be determined once the road cross section has been finalized. At this stage it is however not envisaged that drilling will be required.	
6.2	JB stated that a proposal be compiled in terms of the required materials testing. The proposal must be supplied to him after which it will forward it to Mr L Truter for comment. The proposal must also be included in the C&V Report.	K&T
7	ENVIRONMENTAL, HEALTH AND SAFETY & EMPOWERMENT	
7.1	JB noted that processes such as environmental authorization and EmplA to run concurrently with the reporting process and should commence as soon as possible. An OHS agent is to be appointed as soon as possible.	K&T
8	GENERAL	
8.1	AGS suggested that the report is done in the form of a Concept & Viability report which includes the relevant information (and terms of reference) of the Inception Report and the subsequent Addendum Report. JB agreed to the proposal.	K&T
8.2	K&T to provide a project implementation programme the JB. The critical path will be environmental authorisation process followed by the tender and award process. This will result in the earliest construction commencement date.	K&T
	<p>MINUTED BY:</p>  <p>P BUYS KANTEY & TEMPLER</p>	<p>ACCEPTED</p>  <p>Jaco Brink 2022-09-09</p>

Mr J Brink	Western Cape Government	jaco.brink@westerncape.gov.za
Mr G R Tyndall	Kantey & Templer	royt@ct.kanteys.co.za
Mr P Barkhuizen	Kantey & Temper	pbarkhuizen@ct.kanteys.co.za
Mr A Smith	Kantey & Templer	asmith@ct.kanteys.co.za

Reference number: TPW16/6/4/1/1- C1117

Enquiries: Mr Jaco Brink

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8000

Kantey & Templer Consulting Engineers (Pty) Ltd
119 Hertzog Blvd
Cape Town City Centre
Cape Town
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Attention: Mr. Pierre Barkhuizen

Dear Sir,

**CONTRACT No. C1117: THE PERIODIC MAINTENANCE OF TR75/1 – GEORGE TO OUDTSHOORN:
STAGE 2 SCOPE CHANGE**

Your "Economic Evaluation of Road Maintenance and Upgrade Alternatives Report" submitted on 21 April 2022 refers.

Based on the findings of your report, the Branch has opted to change the project scope from "Periodic Maintenance" to "Pavement Strengthening". In addition, economically and holistically viable geometric improvements should be considered. The work related to the scope change will remain as part of Stage 2.

Accordingly, please find the Scope Change form attached.

Please do not hesitate to contact the undersigned if you have any further queries.

Yours faithfully



AK NOVEMBER
ACTING CHIEF DIRECTOR: ROAD PROGRAMME MANAGEMENT
DATE: 2022/10/04



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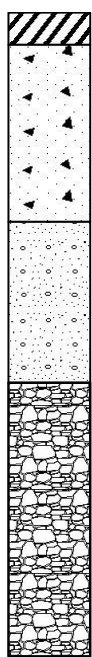
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°42'12" E22°17'18"	Stake Value:	Km 16.500, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 16.500, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0	0 - 40mm	Cape Seal, /	
100	40 - 260mm	Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/1
200	260 - 460mm	Slightly Moist, Dark Reddish BROWN, Dense, Intact, Silty/Clayey SAND with minor Gravel (weathered SHALE), Imported, HCL - / PHEN -, G10	25739/2
300	460 - 800mm	Slightly Moist, Light BROWN, Very Dense, Intact, Shale Bedrock, Insitu, HCL + / PHEN -	25739/3
400			
500			
600			
700			
800			
900			

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/1 taken at 40mm (Disturbed)
 Layer 3 Sample No. 25739/2 taken at 260mm (Disturbed)
 Layer 4 Sample No. 25739/3 taken at 460mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 1	SPEC	25739 / 2	SPEC	25739 / 3	SPEC
HOLE No. / SV. / CHAINAGE		Km 16.500, LHS	G5	Km 16.500, LHS	G10	Km 16.500, LHS	
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		24/01/23		24/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty/Clayey SAND with minor Gravel (weathered SHALE)		Shale Bedrock	
REDUCTION FACTOR / RF CHECK		0,0369		0,0553		0,3454	
		0,05	< 1%	0,08	< 1%		< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100		100	
	75,0	99		100		91	
	63,0	98		100		78	
	53,0	94		100		67	
	37,5	84	-	99	-	52	
	28,0	83	-	98	-	42	
	20,0	73	-	96	-	35	
	14,0	64	-	93	-	27	
	5,00	42	-	84	-	17	
	2,00	36	20-70	78	-	14	
	0,425	26	-	70	-	11	
0,075	14	-	45	-	7		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20	≤ 30	33	-	42,8	
	P.I.	4,6	≤ 10	12,6	-	8,8	
	LS%	1,9	≤ 5	6,3	-	4,9	
	GM	2,25	2,5 ≥ GM ≥ 1,5	1,07	-	2,68	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	27		11		20	
	Fine sand	34		31		33	
	Coarse fine sand	10		9		9	
	Medium fine sand	12		11		14	
	Fine fine sand	12		12		10	
	Silt and clay	39		58		47	
	Coarse sand ratio	0,3		0,1		0,2	
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,5			
	MDD(KG/M ³)	2258		1947			
C.B.R. SANS 3001 GR40	COMP MC	5,4		5,4		IND ONLY	
	% SWELL	0,0	≤ 0.5	1,27	-		
	100%	115	-	5	-		
	98%	92	-	4	-		
	97%	81	-	4	-		
	95%	65	45	3	-		
	93%	51	-	3	-		
	90%	36	-	2	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - INDICATOR		

NOTE: All tests marked with (*) means that those test methods are not accredited.



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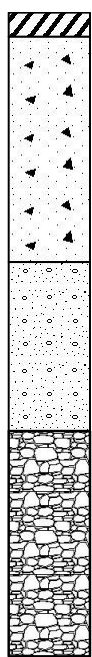
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°42'06" E22°17'12"	Stake Value:	Km 16.750, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 16.750, RHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0	0 - 30mm	Cape Seal, /	
100	30 - 310mm	Slightly Moist, Light Reddish BROWN, Dense, Intact, Minor Silty/Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/7
200	310 - 520mm	Slightly Moist, Dark Reddish BROWN, Dense, Intact, Clayey Sandy fine to coarse weathered Shale GRAVEL, Imported, HCL + / PHEN -, G8	25739/8
300	520 - 800mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Weathered Shale BEDROCK, Insitu, HCL + / PHEN -, G7	25739/9
400	Samples Taken:		
500	Layer 1	None Taken	
600	Layer 2	Sample No. 25739/7 taken at 30mm (Disturbed)	
700	Layer 3	Sample No. 25739/8 taken at 310mm (Disturbed)	
800	Layer 4	Sample No. 25739/9 taken at 520mm (Disturbed)	
900			

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 7	SPEC	25739 / 8	SPEC	25739 / 9	SPEC	
HOLE No. / SV. / CHAINAGE	Km 16.750, RHS	G5	Km 16.750, RHS	G8	Km 16.750, RHS	G7	
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	24/01/23		24/01/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Minor Silty/Sandy fine to coarse S/Stone GRAVEL		Clayey Sandy fine to coarse weathered Shale GRAVEL		Weathered Shale BEDROCK		
REDUCTION FACTOR / RF CHECK	0,0630		0,0478		0,0479		
	0,04	< 1%	0,05	< 1%	0,05	< 1%	
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100		100		
	75,0	98	99		98		
	63,0	97	97		94		
	53,0	92	94		90		
	37,5	79	84	-	82	-	
	28,0	64	76	-	75	-	
	20,0	48	70	-	65	-	
	14,0	43	66	-	60	-	
	5,00	28	54	-	35	-	
	2,00	22	49	-	22	-	
	0,425	18	41	-	11	-	
0,075	7	23	-	5	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19	≤ 30	24,7	-	48	-
	P.I.	4,9	≤ 10	8	≤ 12	12,7	≤ 12
	LS%	1,8	≤ 5	3,8	≤ 7	6,1	≤ 7
	GM	2,53	2.5≥ GM ≥ 1.5	1,87	2.7≥ GM ≥ 0.75	2,62	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	16		16		49	
	Fine sand	51		36		28	
	Coarse fine sand	21		9		9	
	Medium fine sand	19		12		9	
	Fine fine sand	11		15		10	
	Silt and clay	34		48		23	
	Coarse sand ratio	0,2		0,2		0,5	
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,4		6,3	
	MDD(KG/M ³)	2268		2192		1900	
C.B.R. SANS 3001 GR40	COMP MC	5,4		6,2		6,2	
	% SWELL	0,0	≤ 0.5	1,39	1,50	1,76	1,50
	100%	160	-	34	-	62	-
	98%	130	-	24	-	50	-
	97%	110	-	20	-	44	-
	95%	83	45	14	-	34	-
	93%	63	-	10	10	27	15
90%	42	-	6	-	20	-	
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

NOTE: All tests marked with (*) means that those test methods are not accredited.



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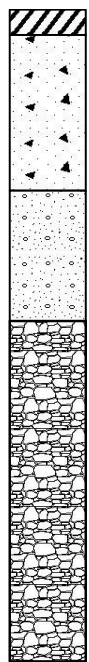
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°42'00" E22°17'08"	Stake Value:	Km 17.000, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 17.000, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
---------	------------	-------------	------------



Depth (mm)

0
100
200
300
400
500
600
700
800
900
1 000

0 - 35mm	Cape Seal, /	
35 - 250mm	Slightly Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/4
250 - 430mm	Slightly Moist, Dark Reddish BROWN, Dense, Intact, Clayey fine to coarse grain SAND with minor Gravel (Weathered Shale), Imported, HCL + / PHEN -, G7	25739/5
430 - 900mm	Slightly Moist, Light BROWN, Very Dense, Intact, Shale BEDROCK, Insitu, HCL + / PHEN -	25739/6

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/4 taken at 35mm (Disturbed)
 Layer 3 Sample No. 25739/5 taken at 250mm (Disturbed)
 Layer 4 Sample No. 25739/6 taken at 430mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 4	SPEC	25739 / 5	SPEC	25739 / 6	SPEC
HOLE No. / SV. / CHAINAGE	Km 17.000, LHS	G5	Km 17.000, LHS	G7	Km 17.000, LHS	
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1	
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4	
DATE RECEIVED	24/01/23		24/01/23		24/01/23	
CLIENTS MARKING	-		-		-	
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Clayey fine to coarse grain SAND with minor Gravel (Weathered Shale)		Shale BEDROCK	
REDUCTION FACTOR / RF CHECK	0,0511 0,04	< 1%	0,0613 0,06	< 1%	0,2950 0,04	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	100	100	
	75,0	100	100	100	100	
	63,0	99	100	100	97	
	53,0	98	97	97	92	
	37,5	89	-	92	70	
	28,0	75	-	86	59	
	20,0	61	-	80	48	
	14,0	52	-	79	38	
	5,00	33	-	69	22	
	2,00	28	20-70	61	16	
	0,425	22	-	51	11	
0,075	10	-	31	6		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	22	≤ 30	27,4	-	42
	P.I.	5,1	≤ 10	10,5	≤ 12	7,7
	LS%	2,5	≤ 5	5	≤ 7	3,7
	GM	2,40	2.5≥ GM ≥ 1.5	1,57	2.7≥ GM ≥ 0.75	2,68
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	23		17		34
	Fine sand	41		33		31
	Coarse fine sand	13		8		9
	Medium fine sand	16		12		11
	Fine fine sand	12		13		11
	Silt and clay	35		50		35
	Coarse sand ratio	0,2		0,2		0,3
MOD AASHTO SANS 3001 GR30	OMC%	6,5		6,5		
	MDD(KG/M³)	2250		2050		
C.B.R. SANS 3001 GR40	COMP MC	6,5		6,3		IND ONLY
	% SWELL	0,0	≤ 0.5	1,47	1,50	
	100%	140	-	31	-	
	98%	105	-	25	-	
	97%	95	-	23	-	
	95%	77	45	19	-	
	93%	62	-	16	15	
90%	45	-	12	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - INDICATOR	

NOTE: All tests marked with (*) means that those test methods are not accredited.



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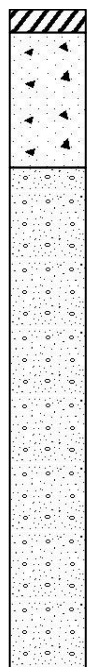
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Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 17.250, RHS	Test Hole No:	Km 17.250, RHS
GPS / WGS8:	S33°41'52" E22°17'02"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 35mm	Cape Seal, /	
35 - 240mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/10
240 - 1000mm	Slightly Moist, Light Orange BROWN, Very Dense, Intact, Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL, Imported, HCL + / PHEN -, G8	25739/11

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/10 taken at 35mm (Disturbed)
 Layer 3 Sample No. 25739/11 taken at 240mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 10	SPEC	25739 / 11	SPEC		
HOLE No. / SV. / CHAINAGE	Km 17.250, RHS	G5	Km 17.250, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	25/01/23		25/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0482		0,0480			
	0,04	< 1%	-0,03	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	99	99			
	63,0	99	98			
	53,0	97	94			
	37,5	84	88	-		
	28,0	72	81	-		
	20,0	61	74	-		
	14,0	53	72	-		
	5,00	34	56	-		
	2,00	29	47	20-70	-	
	0,425	21	37	-	-	
0,075	8	23	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,3	≤ 30	25,5	-	
	P.I.	2,1	≤ 10	9,3	≤ 12	
	LS%	0,7	≤ 5	4,8	≤ 7	
	GM	2,42	2.5 ≥ GM ≥ 1.5	1,93	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		22		
	Fine sand	45		31		
	Coarse fine sand	14		8		
	Medium fine sand	13		10		
	Fine fine sand	18		13		
	Silt and clay	29		48		
	Coarse sand ratio	0,3		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		5,4		
	MDD(KG/M ³)	2257		2058		
C.B.R. SANS 3001 GR40	COMP MC	5,3		5,3		
	% SWELL	0,0	≤ 0.5	1,43	1,50	
	100%	150	-	34	-	
	98%	110	-	25	-	
	97%	98	-	21	-	
	95%	76	45	16	-	
	93%	60	-	12	10	
90%	40	-	7	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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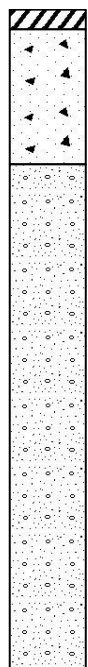
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'46" E22°16'55"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 17.500, LHS</p> <p>Test Hole No: Km 17.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Sunny & Hot Condition</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm Cape Seal, /</p> <p>30 - 235mm Slightly Moist, Dark Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>235 - 1000mm Slightly Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Shale GRAVEL, Residual, HCL - / PHEN -, G8</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/14 taken at 30mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/15 taken at 235mm (Disturbed)</p>	<p>25739/14</p> <p>25739/15</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 14	SPEC	25739 / 15	SPEC		
HOLE No. / SV. / CHAINAGE	Km 17.500, LHS	G5	Km 17.500, LHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	25/01/23		25/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0538		0,0460			
	0,04	< 1%	0,05	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	98	98			
	63,0	98	96			
	53,0	93	93			
	37,5	80	86	-		
	28,0	68	78	-		
	20,0	56	71	-		
	14,0	46	62	-		
	5,00	31	42	-		
	2,00	26	31	20-70	-	
	0,425	19	19	-	-	
0,075	10	12	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	25	≤ 30	28,4	-	
	P.I.	5,3	≤ 10	7,4	≤ 12	
	LS%	2,2	≤ 5	3,5	≤ 7	
	GM	2,45	2.5 ≥ GM ≥ 1.5	2,39	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	27		39		
	Fine sand	36		23		
	Coarse fine sand	20		7		
	Medium fine sand	7		9		
	Fine fine sand	9		7		
	Silt and clay	37		38		
	Coarse sand ratio	0,3		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	5,3		6,3		
	MDD(KG/M ³)	2248		2259		
C.B.R. SANS 3001 GR40	COMP MC	5,3		6,1		
	% SWELL	0,0	≤ 0.5	0,0	1,50	
	100%	110	-	35	-	
	98%	82	-	27	-	
	97%	70	-	24	-	
	95%	52	45	19	-	
	93%	39	-	14	10	
90%	25	-	10	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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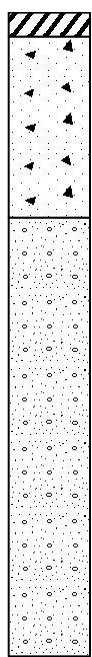
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'41" E22°16'48"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 17.750, RHS</p> <p>Test Hole No: Km 17.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm</p> <p>30 - 255mm</p> <p>255 - 800mm</p>	<p>Cape Seal, /</p> <p>Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>Slightly Moist, Light OLIVE, Very Dense, Intact, Silty Sandy fine to coarse Shale GRAVEL, Residual, HCL - / PHEN -, G7</p>	<p></p> <p>25739/12</p> <p>25739/13</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/12 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/13 taken at 255mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 12	SPEC	25739 / 13	SPEC		SPEC
HOLE No. / SV. / CHAINAGE	Km 17.750, RHS	G5	Km 17.750, RHS	G7		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	25/01/23		25/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0474		0,0537			
	0,05	< 1%	0,05	< 1%		< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	98	96			
	63,0	97	93			
	53,0	94	90			
	37,5	82	81	-		
	28,0	71	73	-		
	20,0	61	64	-		
	14,0	58	60	-		
	5,00	45	46	-		
	2,00	37	35	20-70	-	
	0,425	27	23	-	-	
0,075	10	13	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19	≤ 30	26,5	-	
	P.I.	7,2	≤ 10	7,8	≤ 12	
	LS%	1,3	≤ 5	3,9	≤ 7	
	GM	2,27	2.5 ≥ GM ≥ 1.5	2,29	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	28		35		
	Fine sand	46		29		
	Coarse fine sand	13		9		
	Medium fine sand	14		10		
	Fine fine sand	20		10		
	Silt and clay	26		36		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,4		
	MDD(KG/M ³)	2294		2245		
C.B.R. SANS 3001 GR40	COMP MC	5,3		6,3		
	% SWELL	0,0	≤ 0.5	1,44	1,50	
	100%	130	-	34	-	
	98%	100	-	28	-	
	97%	92	-	25	-	
	95%	72	45	20	-	
	93%	60	-	16	15	
90%	42	-	12	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND	

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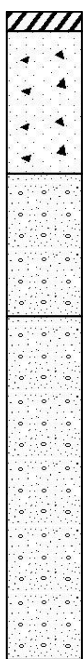
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JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 18.000, LHS	Test Hole No:	Km 18.000, LHS
GPS / WGS8	S33°41'37" E22°16'40"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	Cape Seal, /	
30 - 250mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/16
250 - 470mm	Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Shale GRAVEL, Residual, HCL - / PHEN -, G8	25739/17
470 - 1000mm	Moist, Dark BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL - / PHEN -, G9	25739/18

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/16 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/17 taken at 250mm (Disturbed)
 Layer 4 Sample No. 25739/18 taken at 470mm (Disturbed)

Surface Visual

Profile Measurement



Spills





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 16	SPEC	25739 / 17	SPEC	25739 / 18	SPEC	
HOLE No. / SV. / CHAINAGE	Km 18.000, LHS	G5	Km 18.000, LHS	G8	Km 18.000, LHS	G9	
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1		
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4		
DATE RECEIVED	26/01/23		26/01/23		26/01/23		
CLIENTS MARKING	-		-		-		
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse Shale GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL		
REDUCTION FACTOR / RF CHECK	0,0480 0,05	< 1%	0,0454 0,05	< 1%	0,0395 0,06	< 1%	
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	100	100		
	75,0	100	99	99	99		
	63,0	97	98	98	98		
	53,0	94	96	95	95		
	37,5	86	92	89	89	-	
	28,0	75	85	81	81	-	
	20,0	61	77	75	75	-	
	14,0	50	66	62	62	-	
	5,00	33	43	38	38	-	
	2,00	27	20-70	27	27	-	
	0,425	21	-	18	18	-	
0,075	10	-	13	12	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20,3	≤ 30	25	≤ 7	28	≤ 7
	P.I.	8,1	≤ 10	7,9	≤ 12	10,1	≤ 12
	LS%	1,3	≤ 5	4,3	-	5,3	-
	GM	2,43	2.5≥ GM ≥ 1.5	2,34	2.7≥ GM ≥ 0.75	2,43	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	23		33		35	
	Fine sand	42		28		22	
	Coarse fine sand	19		9		6	
	Medium fine sand	14		10		7	
	Fine fine sand	8		8		8	
	Silt and clay	35		40		43	
	Coarse sand ratio	0,2		0,3		0,4	
MOD AASHTO SANS 3001 GR30	OMC%	5,4		5,3		6,4	
	MDD(KG/M³)	2317		2311		2141	
C.B.R. SANS 3001 GR40	COMP MC	5,4		5,3		6,3	
	% SWELL	0,0	≤ 0.5	1,13	1,50	1,42	1,50
	100%	150	-	27	-	21	-
	98%	125	-	20	-	16	-
	97%	110	-	18	-	14	-
	95%	90	45	14	-	11	-
	93%	72	-	10	10	8	7
	90%	53	-	7	-	5	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

NOTE: All tests marked with (*) means that those test methods are not accredited.



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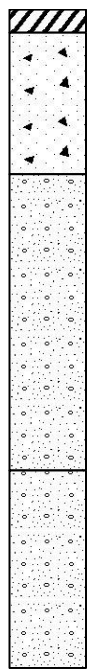
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JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 18.250, RHS	Test Hole No:	Km 18.250, RHS
GPS / WGS8:	S33°41'33" E22°16'31"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 35mm	Cape Seal, /	
35 - 250mm	Slightly Moist, Ligth Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G5	25739/21
250 - 700mm	Moist, Light OLIVE, Dense, Intact, Silty Sandy weathered Shale GRAVEL, Residual, HCL + / PHEN -, G8	25739/22
700 - 1000mm	Moist, Dark Reddish BROWN, Dense, Intact, Silty Sandy weathered Shale GRAVEL, Insitu, HCL - / PHEN -, G9	25739/23

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/21 taken at 35mm (Disturbed)
 Layer 3 Sample No. 25739/22 taken at 250mm (Disturbed)
 Layer 4 Sample No. 25739/23 taken at 700mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 21	SPEC	25739 / 22	SPEC	25739 / 23	SPEC
HOLE No. / SV. / CHAINAGE	Km 18.250, RHS	G5	Km 18.250, RHS	G8	Km 18.250, RHS	G9
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1	
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4	
DATE RECEIVED	26/01/23		26/01/23		26/01/23	
CLIENTS MARKING	-		-		-	
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble		Silty Sandy weathered Shale GRAVEL		Silty Sandy weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0581 0,04	< 1%	0,0355 0,06	< 1%	0,0436 0,06	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	99	100	99	100	99
	75,0	96	100	99	99	99
	63,0	95	99	99	99	99
	53,0	91	97	98	98	98
	37,5	79	-	92	-	-
	28,0	64	-	87	-	-
	20,0	52	-	79	-	-
	14,0	46	-	76	-	-
	5,00	32	-	59	-	-
	2,00	24	20-70	50	-	-
	0,425	16	-	40	-	-
0,075	8	-	27	-	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	SP	≤ 30	23	-	26
	P.I.	SP	≤ 10	7,3	≤ 12	9,6
	LS%	0,7	≤ 5	3,2	≤ 7	4,2
	GM	2,52	2.5≥ GM ≥ 1.5	2,03	2.7≥ GM ≥ 0.75	1,83
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	35	32	20		
	Fine sand	34	25	25		
	Coarse fine sand	13	10	7		
	Medium fine sand	12	8	9		
	Fine fine sand	8	7	9		
	Silt and clay	31	44	55		
	Coarse sand ratio	0,3	0,3	0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,4	7,5	6,4		
	MDD(KG/M ³)	2266	2247	2244		
C.B.R. SANS 3001 GR40	COMP MC	5,4	1,3	1,4		
	% SWELL	0,23	≤ 0.5	1,84		
	100%	170	-	23		
	98%	145	-	18		
	97%	140	-	15		
	95%	115	45	12		
	93%	95	-	9		
	90%	73	-	6		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND	

NOTE: All tests marked with (*) means that those test methods are not accredited.



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JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'30" E22°16'22"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 18.500, LHS</p> <p>Test Hole No: Km 18.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0
100
200
300
400
500
600
700
800
900
1 000
1 100

0 - 30mm	Cape Seal, /	
30 - 230mm	Slightly Moist, Light reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/19
230 - 1000mm	Moist, Light orange BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -, G8	25739/20

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/19 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/20 taken at 230mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 19	SPEC	25739 / 20	SPEC		
HOLE No. / SV. / CHAINAGE	Km 18.500, LHS	G5	Km 18.500, LHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	26/01/23		26/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0488 0,04	< 1%	0,0380 0,11	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	99			
	63,0	97	99			
	53,0	95	96			
	37,5	86	92	-		
	28,0	75	86	-		
	20,0	62	80	-		
	14,0	45	67	-		
	5,00	29	46	-		
	2,00	24	20-70	35	-	
	0,425	18	-	27	-	
0,075	8	-	17	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21	≤ 30	27,6	-	
	P.I.	3,9	≤ 10	8,1	≤ 12	
	LS%	1,4	≤ 5	3,9	≤ 7	
	GM	2,51	2.5 ≥ GM ≥ 1.5	2,21	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	27		24		
	Fine sand	41		27		
	Coarse fine sand	16		10		
	Medium fine sand	17		9		
	Fine fine sand	8		8		
	Silt and clay	32		50		
	Coarse sand ratio	0,3		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,5		
	MDD(KG/M ³)	2232		2250		
C.B.R. SANS 3001 GR40	COMP MC	5,2		6,5		
	% SWELL	0,0	≤ 0.5	1,02	1,50	
	100%	145	-	25	-	
	98%	110	-	20	-	
	97%	95	-	18	-	
	95%	72	45	14	-	
	93%	57	-	11	10	
90%	38	-	8	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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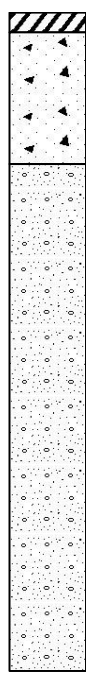
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'28" E22°16'13"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 18.750, RHS</p> <p>Test Hole No: Km 18.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm Cape Seal, /</p> <p>30 - 230mm Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -</p> <p>230 - 1000mm Moist, Light Yellowish BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL - / PHEN -</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/24 taken at 30mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/25 taken at 230mm (Disturbed)</p>	<p>25739/24</p> <p>25739/25</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 24	SPEC	25739 / 25	SPEC		
HOLE No. / SV. / CHAINAGE		Km 18.750, RHS	G5	Km 18.750, RHS	G8		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		27/01/23		27/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK		0,0453		0,0349			
		0,04	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		98			
	75,0	100		96			
	63,0	100		95			
	53,0	97		93			
	37,5	87	-	90	-		
	28,0	76	-	85	-		
	20,0	63	-	78	-		
	14,0	56	-	75	-		
	5,00	38	-	51	-		
	2,00	30	20-70	37	-		
	0,425	21	-	23	-		
	0,075	8	-	14	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20	≤ 30	23,3	-		
	P.I.	3,3	≤ 10	4,6	≤ 12		
	LS%	1,6	≤ 5	2,1	≤ 7		
	GM	2,40	2.5 ≥ GM ≥ 1.5	2,26	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	29		38			
	Fine sand	43		24			
	Coarse fine sand	16		9			
	Medium fine sand	16		8			
	Fine fine sand	11		7			
	Silt and clay	28		38			
	Coarse sand ratio	0,3		0,4			
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,4			
	MDD(KG/M ³)	2308		2237			
C.B.R. SANS 3001 GR40	COMP MC	5,3		6,4			
	% SWELL	0,0	≤ 0.5	4,14	1,50		
	100%	160	-	30	-		
	98%	125	-	23	-		
	97%	110	-	20	-		
	95%	90	45	15	-		
	93%	70	-	12	10		
90%	50	-	8	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



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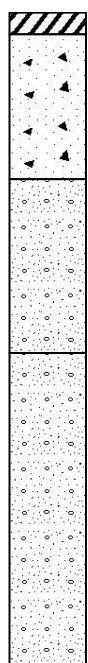
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JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 19.000, LHS	Test Hole No:	Km 19.000, LHS
GPS / WGS8:	S33°41'25" E22°16'04"	Excavation Metho	Pick Shovel & Breaker	Side Walls	Stable
Sampling Method	TMH5 Method MC1	Refusal	@900mm Due to Hard Rock	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	Cape Seal, /	
30 - 230mm	Slightly Moist, Ligth Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G5	25739/40
230 - 470mm	Slightly Moist, Light BROWN, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Imported, HCL - / PHEN -, G8	25739/41
470 - 900mm	Slightly Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Insitu, HCL - / PHEN -, G8	25739/42

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/40 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/41 taken at 230mm (Disturbed)
 Layer 4 Sample No. 25739/42 taken at 470mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000				PROJECT:	C1117: Pavement Strengthening of TR75/1
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 40	SPEC	25739 / 41	SPEC	25739 / 42	SPEC
HOLE No. / SV. / CHAINAGE		Km 19.000, LHS	G5	Km 19.000, LHS	G8	Km 19.000, LHS	G8
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		30/01/23		30/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble		Silty Sandy fine to coarse Weathered Shale GRAVEL		Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK		0,0513		0,0327		0,0508	
		0,04	< 1%	0,07	< 1%	0,00	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	98		100		100	
	75,0	97		99		98	
	63,0	94		99		95	
	53,0	92		97		91	
	37,5	83	-	94	-	80	-
	28,0	72	-	86	-	70	-
	20,0	60	-	79	-	61	-
	14,0	46	-	71	-	51	-
	5,00	30	-	48	-	29	-
	2,00	24	20-70	35	-	19	-
	0,425	18	-	23	-	10	-
0,075	10	-	15	-	6	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,1	≤ 30	24,4	-	24,2	-
	P.I.	2,8	≤ 10	6,8	≤ 12	4,5	≤ 12
	LS%	1,4	≤ 5	3,4	≤ 7	1,9	≤ 7
	GM	2,48	2.5≥ GM ≥ 1.5	2,27	2.7≥ GM ≥ 0.75	2,65	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		34		47	
	Fine sand	34		24		21	
	Coarse fine sand	18		8		9	
	Medium fine sand	8		9		6	
	Fine fine sand	8		7		6	
	Silt and clay	40		42		32	
	Coarse sand ratio	0,3		0,3		0,5	
MOD AASHTO SANS 3001 GR30	OMC%	6,2		6,5		5,5	
	MDD(KG/M ³)	2301		2217		2252	
C.B.R. SANS 3001 GR40	COMP MC	6,2		6,4		5,4	
	% SWELL	0,0	≤ 0.5	0,94	1,50	0,91	1,50
	100%	140	-	21	-	21	-
	98%	110	-	18	-	18	-
	97%	98	-	16	-	16	-
	95%	79	45	14	-	14	-
	93%	63	-	12	10	11	10
90%	47	-	9	-	8	-	
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

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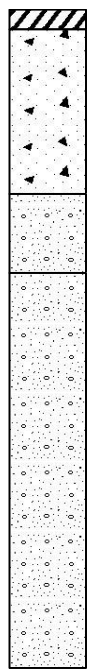
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Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 19.250, RHS	Test Hole No:	Km 19.250, RHS
GPS / WGS8:	S33°41'17" E22°16'06"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Depth (mm)

0 - 30mm	Cape Seal, /	
30 - 280mm	Slightly Moist, Light reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/26
280 - 400mm	Moist, Light BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Imported, HCL - / PHEN -, G9	25739/27
400 - 1000mm	Moist, Light OLIVE blotched Grey, Dense, Intact, Silty Sandy fine to coarse Shale GRAVEL, Residual, HCL - / PHEN -, G6	25739/28

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/26 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/27 taken at 280mm (Disturbed)
 Layer 4 Sample No. 25739/28 taken at 400mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 26	SPEC	25739 / 27	SPEC	25739 / 28	SPEC
HOLE No. / SV. / CHAINAGE		Km 19.250, RHS	G5	Km 19.250, RHS	G9	Km 19.250, RHS	G6
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		27/01/23		27/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL		Silty Sandy fine to coarse Shale GRAVEL	
REDUCTION FACTOR / RF CHECK		0,0480		0,0462		0,0490	
		0,04	< 1%	0,05	< 1%	0,05	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100		100	
	75,0	97		99		100	
	63,0	94		94		97	
	53,0	90		90		96	
	37,5	81	-	81	-	87	-
	28,0	71	-	74	-	81	-
	20,0	59	-	65	-	75	-
	14,0	48	-	60	-	70	-
	5,00	33	-	45	-	44	-
	2,00	27	20-70	39	-	32	-
	0,425	20	-	32	-	23	-
0,075	10	-	19	-	13	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,3	≤ 30	23,3	-	24,1	-
	P.I.	3,2	≤ 10	9,5	≤ 12	7,6	≤ 12
	LS%	1,7	≤ 5	4,7	≤ 7	3,6	≤ 5
	GM	2,43	2.5≥ GM ≥ 1.5	2,10	2.7≥ GM ≥ 0.75	2,31	2.6≥ GM ≥ 1.2
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	25		17		29	
	Fine sand	38		35		30	
	Coarse fine sand	13		12		11	
	Medium fine sand	14		12		9	
	Fine fine sand	10		11		10	
	Silt and clay	37		48		41	
	Coarse sand ratio	0,3		0,2		0,3	
MOD AASHTO SANS 3001 GR30	OMC%	5,2		6,4		6,4	
	MDD(KG/M ³)	2248		2157		2203	
C.B.R. SANS 3001 GR40	COMP MC	5,2		6,4		6,4	
	% SWELL	0,0	≤ 0.5	0,92	1,50	0,34	1,00
	100%	145	-	18	-	46	-
	98%	105	-	14	-	38	-
	97%	89	-	13	-	35	-
	95%	65	45	10	-	30	25
	93%	48	-	7	7	25	-
	90%	31	-	5	-	19	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

NOTE: All tests marked with (*) means that those test methods are not accredited.



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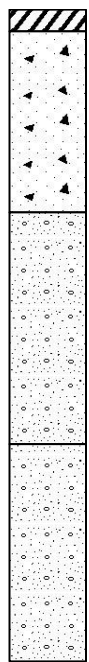
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°41'13" E22°16'16"	Stake Value:	Km 19.500, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 19.500, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	@900mm Due to Hard Bedrock
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	Cape Seal, /	
30 - 280mm	Slightly Moist, Light reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/43
280 - 600mm	Slightly Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Imported, HCL + / PHEN -, G8	25739/44
600 - 900mm	Moist, Light BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Insitu, HCL + / PHEN -, G8	25739/45
	SHALE BEDROCK BELOW	
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/43 taken at 30mm (Disturbed) Layer 3 Sample No. 25739/44 taken at 280mm (Disturbed) Layer 4 Sample No. 25739/45 taken at 600mm (Disturbed)		

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 43	SPEC	25739 / 44	SPEC	25739 / 45	SPEC	
HOLE No. / SV. / CHAINAGE	Km 19.500, LHS	G5	Km 19.500, LHS	G8	Km 19.500, LHS	G8	
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	30/01/23		30/01/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL		
REDUCTION FACTOR / RF CHECK	0,0515 0,00	< 1%	0,0478 0,06	< 1%	0,0460 0,05	< 1%	
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	96	96		
	75,0	99	100	95	95		
	63,0	95	99	94	94		
	53,0	91	97	91	91		
	37,5	81	-	83	-		
	28,0	69	-	77	-		
	20,0	58	-	71	-		
	14,0	49	-	64	-		
	5,00	34	-	45	-		
	2,00	28	20-70	35	-		
	0,425	21	-	23	-		
0,075	10	-	12	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,1	≤ 30	29,2	-	28,5	-
	P.I.	3,5	≤ 10	9,2	≤ 12	8,5	≤ 12
	LS%	1,7	≤ 5	4,5	≤ 7	4,2	≤ 7
	GM	2,41	2.5≥ GM ≥ 1.5	2,14	2.7≥ GM ≥ 0.75	2,29	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		29		34	
	Fine sand	38		32		32	
	Coarse fine sand	17		13		11	
	Medium fine sand	13		11		11	
	Fine fine sand	8		8		10	
	Silt and clay	36		39		35	
	Coarse sand ratio	0,3		0,3		0,3	
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,2		7,4	
	MDD(KG/M³)	2273		2077		2116	
C.B.R. SANS 3001 GR40	COMP MC	5,4		7,2		7,4	
	% SWELL	0,0	≤ 0.5	0,86	1,50	0,8	1,50
	100%	140	-	29	-	37	-
	98%	105	-	22	-	28	-
	97%	90	-	19	-	24	-
	95%	68	45	14	-	18	-
	93%	51	-	11	10	14	10
	90%	33	-	7	-	9	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

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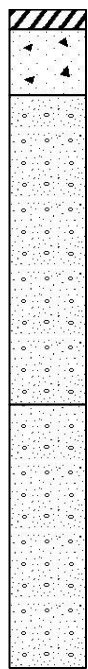
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'10" E22°16'25"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 19.750, RHS</p> <p>Test Hole No: Km 19.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm /</p> <p>30 - 130mm Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Abundant Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5</p> <p>130 - 600mm Slightly Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -, G8</p> <p>600 - 1000mm Moist, Light BROWN, Dense, Intact, Silty Sandy fine to coarse Shale GRAVEL, Insitu, HCL + / PHEN -, G6</p>	<p>25739/46</p> <p>25739/47</p> <p>25739/48</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/46 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/47 taken at 130mm (Disturbed)
 Layer 4 Sample No. 25739/48 taken at 600mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 46	SPEC	25739 / 47	SPEC	25739 / 48	SPEC
HOLE No. / SV. / CHAINAGE	Km 19. 750, RHS	G5	Km 19. 750, RHS	G8	Km 19. 750, RHS	G6
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	30/01/23		30/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Abundant Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL		Silty Sandy fine to coarse Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0415 0,06	< 1%	0,0406 0,06	< 1%	0,0505	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	100	100	
	75,0	100	99	100	100	
	63,0	99	99	99	99	
	53,0	99	96	96	96	
	37,5	94	-	91	88	-
	28,0	94	-	86	77	-
	20,0	86	-	79	71	-
	14,0	74	-	68	64	-
	5,00	52	-	46	46	-
	2,00	42	20-70	32	36	-
	0,425	29	-	19	25	-
0,075	14	-	9	16	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21,5	≤ 30	31,8	-	37,5
	P.I.	4,7	≤ 10	7,5	≤ 12	8,5
	LS%	1,9	≤ 5	3,7	≤ 7	4,2
	GM	2,15	2.5≥ GM ≥ 1.5	2,39	2.7≥ GM ≥ 0.75	2,23
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	29		41		31
	Fine sand	36		30		25
	Coarse fine sand	15		12		8
	Medium fine sand	10		10		9
	Fine fine sand	11		8		8
	Silt and clay	35		29		44
	Coarse sand ratio	0,3		0,4		0,3
MOD AASHTO SANS 3001 GR30	OMC%	6,3		9,2		5,4
	MDD(KG/M ³)	2250		1941		2145
C.B.R. SANS 3001 GR40	COMP MC	6,3		9,1		5,4
	% SWELL	0,0	≤ 0.5	0,26	1,50	0,95
	100%	101	-	25	-	42
	98%	76	-	20	-	34
	97%	65	-	18	-	30
	95%	48	45	14	-	25
	93%	36	-	11	10	20
	90%	23	-	8	-	15
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND	

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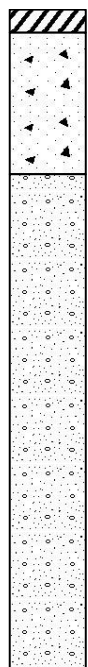
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'04" E22°16'30"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 20.000, LHS</p> <p>Test Hole No: Km 20.000, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 35mm Cape Seal, /</p> <p>35 - 250mm Slightly Moist, Dark Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>250 - 1000mm Moist, Light Greyish BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -</p>	<p>25739/49</p> <p>25739/50</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/49 taken at 35mm (Disturbed)
 Layer 3 Sample No. 25739/50 taken at 250mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 49	SPEC	25739 / 50				
HOLE No. / SV. / CHAINAGE	Km 20.000, LHS	G5	Km 20.000, LHS				
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	31/01/23		31/01/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse weathered Shale GRAVEL				
REDUCTION FACTOR / RF CHECK	0,0424		< 1%	0,0418			
				0,06			
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0		100	100			
	75,0		100	99			
	63,0	100	99				
	53,0	95	97				
	37,5	83	93				
	28,0	73	87				
	20,0	61	80				
	14,0	53	73				
	5,00	35	53				
	2,00	30	20-70	42			
	0,425	21	-	29			
0,075	10	-	18				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,9	≤ 30	27			
	P.I.	2,9	≤ 10	8,4			
	LS%	1,4	≤ 5	4,4			
	GM	2,39	2,5 ≥ GM ≥ 1,5	2,12			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	28		31			
	Fine sand	38		25			
	Coarse fine sand	16		9			
	Medium fine sand	14		8			
	Fine fine sand	9		8			
	Silt and clay	34		44			
	Coarse sand ratio	0,3		0,3			
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,4			
	MDD(KG/M ³)	2269		2112			
C.B.R. SANS 3001 GR40	COMP MC	6,4		7,4			
	% SWELL	0,0	≤ 0.5	0,85			
	100%	100	-	18			
	98%	76	-	13			
	97%	67	-	11			
	95%	51	45	8			
	93%	40	-	6			
90%	27	-	4				
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

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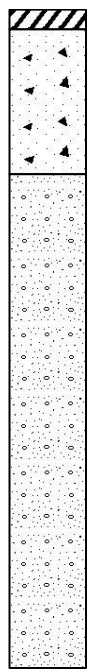
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JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°41'01" E22°16'23"	Stake Value:	Km 20.250, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 20.250, RHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
---------	------------	-------------	------------



0 - 30mm	Cape Seal, /	
30 - 250mm	Slightly Moist, Light reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -	25739/53
250 - 1000mm	Slightly Moist, Light OLIVE, Dense, Intact, Abundant Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN +	25739/54

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/53 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/54 taken at 250mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 53	SPEC	25739 / 54	SPEC		
HOLE No. / SV. / CHAINAGE	Km 20.250, RHS	G5	Km 20.250, RHS	G10		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	31/01/23		31/01/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0428		0,0376			
	0,04	< 1%	0,00	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	99	99			
	63,0	96	98			
	53,0	93	96			
	37,5	85	94	-		
	28,0	76	91	-		
	20,0	64	86	-		
	14,0	55	81	-		
	5,00	37	64	-		
	2,00	31	51	-		
	0,425	23	37	-		
0,075	12	23	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,2	≤ 30	35,4	-	
	P.I.	3,7	≤ 10	7,8	-	
	LS%	1,6	≤ 5	3,8	-	
	GM	2,34	2,5 ≥ GM ≥ 1,5	1,89	-	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		27		
	Fine sand	37		28		
	Coarse fine sand	16		9		
	Medium fine sand	12		10		
	Fine fine sand	9		8		
	Silt and clay	37		45		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,4		
	MDD(KG/M ³)	2252		2004		
C.B.R. SANS 3001 GR40	COMP MC	5,3		7,3		
	% SWELL	0,0	≤ 0.5	0,84	-	
	100%	140	-	14	-	
	98%	93	-	11	-	
	97%	80	-	10	-	
	95%	57	45	8	-	
	93%	40	-	6	-	
90%	25	-	4	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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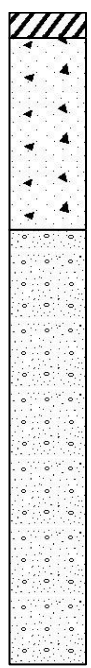
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'02" E22°16'13"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 20.500, LHS</p> <p>Test Hole No: Km 20.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Sunny & Hot Condition</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 35mm Cape Seal, /</p> <p>35 - 300mm Slightly Moist, Light Orange BROWN, Very Dense, Intact, Abundant Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G6</p> <p>300 - 900mm Slightly Moist, Light Reddish BROWN, Dense, Intact, Silty SAND with abundant Shale Gravel (weathered SHALE), Residual, HCL - / PHEN -, G8</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/51 taken at 35mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/52 taken at 300mm (Disturbed)</p>	<p>25739/51</p> <p>25739/52</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000			PROJECT: C1117: Pavement Strengthening of TR75/1		
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 51	SPEC	25739 / 52	SPEC		
HOLE No. / SV. / CHAINAGE		Km 20.500, LHS	G6	Km 20.500, LHS	G8		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		31/01/23		31/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Abundant Silty Sandy fine to coarse S/Stone GRAVEL		Silty SAND with abundant Shale Gravel (weathered SHALE)			
REDUCTION FACTOR / RF CHECK		0,0402		0,0474			
		0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100			
	75,0	100		100			
	63,0	99		100			
	53,0	97		98			
	37,5	88	-	94	-		
	28,0	79	-	89	-		
	20,0	69	-	84	-		
	14,0	59	-	79	-		
	5,00	42	-	63	-		
	2,00	35	-	52	-		
	0,425	26	-	38	-		
0,075	14	-	23	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,8	-	24,2	-		
	P.I.	5,1	≤ 12	10,3	≤ 12		
	LS%	2,4	≤ 5	5,4	≤ 7		
	GM	2,26	2.6 ≥ GM ≥ 1.2	1,87	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		27			
	Fine sand	35		30			
	Coarse fine sand	16		9			
	Medium fine sand	11		11			
	Fine fine sand	8		10			
	Silt and clay	39		43			
	Coarse sand ratio	0,3		0,3			
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,5			
	MDD(KG/M ³)	2252		2117			
C.B.R. SANS 3001 GR40	COMP MC	6,4		7,4			
	% SWELL	0,27	1,00	1,13	1,50		
	100%	75	-	30	-		
	98%	52	-	22	-		
	97%	44	-	19	-		
	95%	31	25	14	-		
	93%	22	-	10	10		
90%	13	-	7	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



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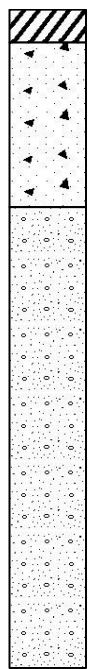
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Pass Africa 2nd Floor, Soetdoring, Cnr Lupin and Protea Street Doringkloof, Centurion 0157</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'03" E22°16'03"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 20.750, RHS</p> <p>Test Hole No: Km 20.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 50mm</p> <p>50 - 300mm</p> <p>300 - 1000mm</p>	<p>Cape Seal, /</p> <p>Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Clayey Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G6</p> <p>Moist, Light Orange BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL - / PHEN -, G8</p>	<p></p> <p>25739/55</p> <p>25739/56</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/55 taken at 50mm (Disturbed)
 Layer 3 Sample No. 25739/56 taken at 300mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Pass Africa 2nd Floor, Soetdoring, Cnr Lupin and Protea Street Doringkloof, Centurion 0157	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 55	SPEC	25739 / 56	SPEC		
HOLE No. / SV. / CHAINAGE	Km 20.750, RHS	G6	Km 20.750, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	01/02/23		01/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Clayey Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0489		0,0463			
	0,04	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	100			
	63,0	97	99			
	53,0	93	98			
	37,5	79	94	-		
	28,0	67	90	-		
	20,0	57	84	-		
	14,0	46	71	-		
	5,00	32	48	-		
	2,00	28	30	-		
	0,425	20	15	-		
0,075	11	7	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,7	-	33	-	
	P.I.	7,3	≤ 12	11,8	≤ 12	
	LS%	3,6	≤ 5	5,1	≤ 7	
	GM	2,41	2.6≥ GM ≥ 1.2	2,48	2.7≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	27		49		
	Fine sand	34		29		
	Coarse fine sand	15		11		
	Medium fine sand	11		10		
	Fine fine sand	8		8		
	Silt and clay	39		22		
	Coarse sand ratio	0,3		0,5		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,5		
	MDD(KG/M ³)	2275		2058		
C.B.R. SANS 3001 GR40	COMP MC	6,4		7,5		
	% SWELL	0,43	1,00	0,83	1,50	
	100%	63	-	30	-	
	98%	47	-	24	-	
	97%	40	-	20	-	
	95%	30	25	16	-	
	93%	21	-	13	10	
90%	14	-	9	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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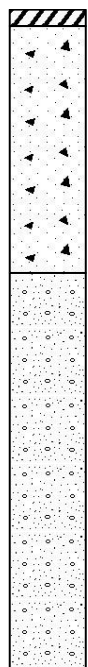
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 24/02/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°41'03" E22°16'54"	Stake Value:	Km 21.000, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 21.000, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Depth (mm)

0 - 25mm	/		
25 - 400mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5		25739/60
400 - 1000mm	Moist, Light Yellowish BROWN, Dense, Intact, Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -, G8		25739/61

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/60 taken at 25mm (Disturbed)
 Layer 3 Sample No. 25739/61 taken at 400mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 60	SPEC	25739 / 61	SPEC		
HOLE No. / SV. / CHAINAGE	Km 21.000, LHS	G5	Km 21.000, LHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	01/02/23		01/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0478		0,0796			
	0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	100			
	63,0	99	98			
	53,0	98	97			
	37,5	87	93	-		
	28,0	75	86	-		
	20,0	62	79	-		
	14,0	51	66	-		
	5,00	33	43	-		
	2,00	29	31	20-70	-	
	0,425	21	19	-	-	
0,075	10	11	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,8	≤ 30	35,2	-	
	P.I.	3,7	≤ 10	9	≤ 12	
	LS%	1,6	≤ 5	4,7	≤ 7	
	GM	2,40	2.5≥ GM ≥ 1.5	2,39	2.7≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	25		38		
	Fine sand	39		27		
	Coarse fine sand	13		10		
	Medium fine sand	15		11		
	Fine fine sand	10		7		
	Silt and clay	36		35		
	Coarse sand ratio	0,3		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	6,6		7,4		
	MDD(KG/M ³)	2190		2113		
C.B.R. SANS 3001 GR40	COMP MC	6,5		7,3		
	% SWELL	0,0	≤ 0.5	-1,03	1,50	
	100%	151	-	32	-	
	98%	120	-	24	-	
	97%	102	-	21	-	
	95%	79	45	16	-	
	93%	61	-	12	10	
90%	42	-	8	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



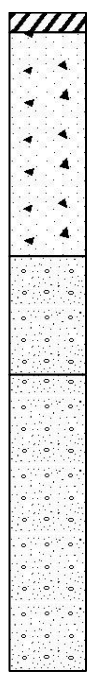
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JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 21.250, RHS	Test Hole No:	Km 21.250, RHS
GPS / WGS8:	S33°41'04" E22°15'45"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	Cape Seal, /	
30 - 370mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/57
370 - 550mm	Moist, Light Orange BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL + / PHEN -, G9	25739/58
550 - 1000mm	Moist, Light Orange BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL, Insitu, HCL + / PHEN -, G9	25739/59
Bedrock below		
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/57 taken at 30mm (Disturbed) Layer 3 Sample No. 25739/58 taken at 370mm (Disturbed) Layer 4 Sample No. 25739/59 taken at 550mm (Disturbed)		

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 57	SPEC	25739 / 58	SPEC	25739 / 59	SPEC	
HOLE No. / SV. / CHAINAGE	Km 21.250, RHS	G5	Km 21.250, RHS	G9	Km 21.250, RHS	G9	
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1		
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4		
DATE RECEIVED	01/02/23		01/02/23		01/02/23		
CLIENTS MARKING	-		-		-		
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL		Abundant Silty Sandy fine to coarse Weathered Shale GRAVEL		
REDUCTION FACTOR / RF CHECK	0,0363 0,05	< 1%	0,0304	< 1%	0,0474	< 1%	
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	100	100		
	75,0	99	98	96	96		
	63,0	98	96	94	94		
	53,0	95	94	91	91		
	37,5	87	-	84	84	-	
	28,0	76	-	78	78	-	
	20,0	63	-	74	74	-	
	14,0	51	-	71	71	-	
	5,00	31	-	54	54	-	
	2,00	26	20-70	45	45	-	
	0,425	19	-	34	34	-	
0,075	9	-	18	21	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,4	≤ 30	26,7	-	27,8	-
	P.I.	5,6	≤ 10	11,4	≤ 12	11,8	≤ 12
	LS%	1,1	≤ 5	5,5	≤ 7	5,8	≤ 7
	GM	2,47	2.5≥ GM ≥ 1.5	2,04	2.7≥ GM ≥ 0.75	2,00	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	29		25		25	
	Fine sand	38		34		29	
	Coarse fine sand	16		11		10	
	Medium fine sand	14		12		10	
	Fine fine sand	8		11		9	
	Silt and clay	33		40		46	
	Coarse sand ratio	0,3		0,3		0,3	
MOD AASHTO SANS 3001 GR30	OMC%	5,5		6,4		7,5	
	MDD(KG/M ³)	2219		2192		2179	
C.B.R. SANS 3001 GR40	COMP MC	5,4		6,3		7,5	
	% SWELL	0,0	≤ 0.5	0,99	1,50	1,22	1,50
	100%	180	-	16	-	22	-
	98%	140	-	13	-	17	-
	97%	120	-	11	-	14	-
	95%	91	45	9	-	10	-
	93%	70	-	7	7	8	7
	90%	45	-	5	-	5	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

NOTE: All tests marked with (*) means that those test methods are not accredited.



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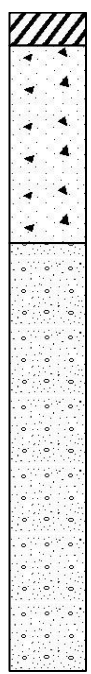
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'05" E22°15'34"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 21.500, LHS</p> <p>Test Hole No: Km 21.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Sunny & Hot Condition</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 50mm Cape Seal, /</p> <p>50 - 350mm Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G6</p> <p>350 - 1000mm Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL + / PHEN -, G9</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/62 taken at 50mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/63 taken at 350mm (Disturbed)</p>	<p>25739/62</p> <p>25739/63</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 62	SPEC	25739 / 63	SPEC		
HOLE No. / SV. / CHAINAGE	Km 21.500, LHS	G6	Km 21.500, LHS	G9		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	02/02/23		02/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,1019 0,00	< 1%	0,0449	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	99			
	63,0	82	97			
	53,0	79	94			
	37,5	68	88	-		
	28,0	52	80	-		
	20,0	31	74	-		
	14,0	25	64	-		
	5,00	17	45	-		
	2,00	15	34	-		
	0,425	12	23	-		
0,075	6	15	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,2	-	29,1	-	
	P.I.	4,4	≤ 12	8,5	≤ 12	
	LS%	2,9	≤ 5	4,9	≤ 7	
	GM	2,67	2.6 ≥ GM ≥ 1.2	2,28	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	21		33		
	Fine sand	37		24		
	Coarse fine sand	14		8		
	Medium fine sand	13		9		
	Fine fine sand	9		7		
	Silt and clay	42		43		
	Coarse sand ratio	0,2		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,2		
	MDD(KG/M ³)	2214		2161		
C.B.R. SANS 3001 GR40	COMP MC	6,5		7,3		
	% SWELL	0,0	1,00	0,91	1,50	
	100%	105	-	23	-	
	98%	90	-	17	-	
	97%	82	-	15	-	
	95%	70	25	11	-	
	93%	61	-	8	7	
90%	48	-	5	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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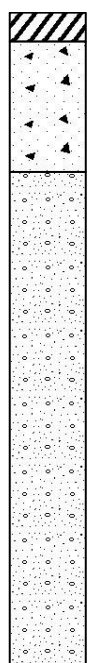
Email: admin@steynwilson.co.za

Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	24/02/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 21.750, RHS	Test Hole No:	Km 21.750, RHS
GPS / WGS8:	S33°41'04" E22°15'25"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 40mm	Cape Seal, /		
40 - 220mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/66	
220 - 900mm	Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL - / PHEN -, G9	25739/67	
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/66 taken at 40mm (Disturbed) Layer 3 Sample No. 25739/67 taken at 220mm (Disturbed)			

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000			PROJECT: C1117: Pavement Strengthening of TR75/1		
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 66	SPEC	25739 / 67	SPEC		
HOLE No. / SV. / CHAINAGE		Km 21.750, RHS	G5	Km 21.750, RHS	G9		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		02/02/23		02/02/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse Weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK		0,0538		0,0486			
		0,04	< 1%	0,00	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		97			
	75,0	99		95			
	63,0	96		92			
	53,0	96		90			
	37,5	83	-	84	-		
	28,0	67	-	76	-		
	20,0	55	-	66	-		
	14,0	46	-	50	-		
	5,00	31	-	30	-		
	2,00	25	20-70	20	-		
	0,425	16	-	11	-		
	0,075	8	-	7	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18	≤ 30	28,3	≤ 7		
	P.I.	4,9	≤ 10	10	≤ 12		
	LS%	1,8	≤ 5	4,6	-		
	GM	2,50	2.5 ≥ GM ≥ 1.5	2,62	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	35		44			
	Fine sand	32		23			
	Coarse fine sand	12		10			
	Medium fine sand	12		7			
	Fine fine sand	8		6			
	Silt and clay	33		32			
	Coarse sand ratio	0,4		0,4			
MOD AASHTO SANS 3001 GR30	OMC%	6,4		6,5			
	MDD(KG/M ³)	2260		2091			
C.B.R. SANS 3001 GR40	COMP MC	6,4		6,5			
	% SWELL	0,0	≤ 0.5	0,84	1,50		
	100%	175	-	21	-		
	98%	140	-	15	-		
	97%	120	-	13	-		
	95%	92	45	10	-		
	93%	71	-	7	7		
	90%	50	-	5	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



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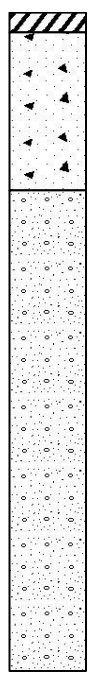
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°41'02" E22°15'16"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 22.000, LHS</p> <p>Test Hole No: Km 22.000, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm Cape Seal, /</p> <p>30 - 270mm Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>270 - 1000mm Slightly Moist, Light Olive BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -, G9</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/64 taken at 30mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/65 taken at 270mm (Disturbed)</p>	<p>25739/64</p> <p>25739/65</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 64	SPEC	25739 / 65	SPEC		
HOLE No. / SV. / CHAINAGE	Km 22.000, LHS	G5	Km 22.000, LHS	G9		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	02/02/23		02/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0385		0,0359			
	0,05	< 1%	0,00	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	98			
	75,0	100	96			
	63,0	99	92			
	53,0	98	91			
	37,5	89	84	-		
	28,0	79	77	-		
	20,0	64	70	-		
	14,0	54	67	-		
	5,00	38	50	-		
	2,00	31	37	-		
	0,425	21	24	-		
0,075	12	15	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,4	≤ 30	25,9	≤ 7	
	P.I.	4,1	≤ 10	9,4	≤ 12	
	LS%	2,6	≤ 5	4,7	-	
	GM	2,35	2.5 ≥ GM ≥ 1.5	2,24	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	32		34		
	Fine sand	29		25		
	Coarse fine sand	11		11		
	Medium fine sand	10		8		
	Fine fine sand	8		7		
	Silt and clay	39		41		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	6,3		6,4		
	MDD(KG/M ³)	2297		2224		
C.B.R. SANS 3001 GR40	COMP MC	6,3		6,4		
	% SWELL	0,0	≤ 0.5	0,97	1,50	
	100%	120	-	18	-	
	98%	105	-	13	-	
	97%	96	-	12	-	
	95%	82	45	8	-	
	93%	72	-	7	7	
90%	60	-	5	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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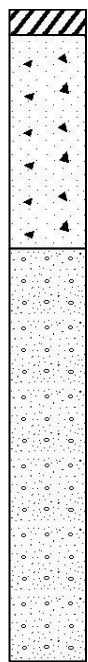
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°40'58" E22°15'06"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 22.250, RHS</p> <p>Test Hole No: Km 22.250, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal @900mm Due to Hard Bedrock</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 35mm Cape SEAL, /</p> <p>35 - 330mm Slightly Moist, Light reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5</p> <p>330 - 900mm Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL + / PHEN -, G8</p> <p>Refusal on SHALE BEDROCK</p>	<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/68 taken at 35mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/69 taken at 330mm (Disturbed)</p>	<p>25739/68</p> <p>25739/69</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 68	SPEC	25739 / 69	SPEC		
HOLE No. / SV. / CHAINAGE	Km 22.250, RHS	G5	Km 22.250, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	03/02/23		03/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0450		0,0440			
	0,04	< 1%	0,08	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	99	98			
	63,0	99	97			
	53,0	99	96			
	37,5	86	89	-		
	28,0	71	83	-		
	20,0	63	76	-		
	14,0	52	68	-		
	5,00	35	50	-		
	2,00	29	38	20-70	-	
	0,425	20	22	-	-	
0,075	10	13	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20	≤ 30	25,7	-	
	P.I.	5,1	≤ 10	7,3	≤ 12	
	LS%	2,2	≤ 5	3,5	≤ 7	
	GM	2,41	2.5 ≥ GM ≥ 1.5	2,27	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	31		42		
	Fine sand	35		23		
	Coarse fine sand	14		9		
	Medium fine sand	12		8		
	Fine fine sand	9		6		
	Silt and clay	35		36		
	Coarse sand ratio	0,3		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,3		
	MDD(KG/M ³)	2244		2184		
C.B.R. SANS 3001 GR40	COMP MC	5,5		6,3		
	% SWELL	0,0	≤ 0.5	0,95	1,50	
	100%	105	-	27	-	
	98%	76	-	21	-	
	97%	65	-	19	-	
	95%	48	45	15	-	
	93%	35	-	12	10	
90%	22	-	9	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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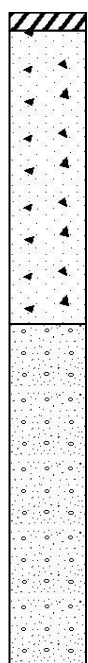
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°40'53" E22°15'00"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 22.500, LHS</p> <p>Test Hole No: Km 22.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal @900mm Due to Hard Bedrock</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Depth (mm)

0 - 25mm	Cape Seal, /	
25 - 430mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/72
430 - 900mm	Moist, Light OLIVE, Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Insitu, HCL + / PHEN -, G8	25739/73
	Refusal on SHALE BEDROCK	

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/72 taken at 25mm (Disturbed)
 Layer 3 Sample No. 25739/73 taken at 430mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 72	SPEC	25739 / 73	SPEC			
HOLE No. / SV. / CHAINAGE	Km 22.500, LHS	G5	Km 22.500, LHS	G8			
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	03/02/23		03/02/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Weathered Shale GRAVEL		
REDUCTION FACTOR / RF CHECK	0,0456		0,0552				
	0,06	< 1%	0,05	< 1%			
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100				
	75,0	100	99				
	63,0	100	96				
	53,0	99	93				
	37,5	89	91	-			
	28,0	75	84	-			
	20,0	68	75	-			
	14,0	60	64	-			
	5,00	46	43	-			
	2,00	39	32	20-70	-		
	0,425	26	20	-	-		
0,075	16	13	-	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,5	≤ 30	23	≤ 7		
	P.I.	4,6	≤ 10	6,1	≤ 12		
	LS%	2,1	≤ 5	3,8	-		
	GM	2,19	2.5 ≥ GM ≥ 1.5	2,34	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	32		37			
	Fine sand	27		23			
	Coarse fine sand	12		8			
	Medium fine sand	9		9			
	Fine fine sand	7		6			
	Silt and clay	41		40			
	Coarse sand ratio	0,3		0,4			
MOD AASHTO SANS 3001 GR30	OMC%	6,4		6,6			
	MDD(KG/M ³)	2331		2126			
C.B.R. SANS 3001 GR40	COMP MC	6,4		6,6			
	% SWELL	0,0	≤ 0.5	0,78	1,50		
	100%	155	-	23	-		
	98%	110	-	18	-		
	97%	92	-	16	-		
	95%	65	45	13	-		
	93%	46	-	10	10		
90%	28	-	7	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

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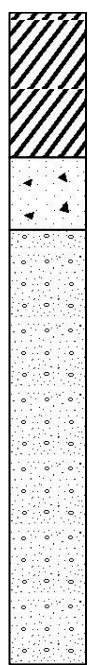
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 24/02/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°40'44" E22°14'58"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 22.750, RHS</p> <p>Test Hole No: Km 22.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal @900mm Due to Hard Bedrock</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0
100
200
300
400
500
600
700
800
900
1 000

Depth (mm)

0 - 200mm	Cape Seal + Asphalt Patch, /	
200 - 300mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/70
300 - 900mm	Moist, Light BROWN, Dense, Intact, Abundant Silty Sandy fine to coarse weathered Shale GRAVEL, Residual, HCL + / PHEN -, G7	25739/71
	Refusal on Shale BEDROCK	

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/70 taken at 200mm (Disturbed)
 Layer 3 Sample No. 25739/71 taken at 300mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 24/02/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 70	SPEC	25739 / 71	SPEC		
HOLE No. / SV. / CHAINAGE	Km 22.750, RHS	G5	Km 22.750, RHS	G7		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	03/02/23		03/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty Sandy fine to coarse weathered Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0491		0,0463			
	0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	100			
	63,0	96	98			
	53,0	90	96			
	37,5	79	92	-		
	28,0	68	86	-		
	20,0	62	81	-		
	14,0	57	78	-		
	5,00	46	61	-		
	2,00	38	50	-		
	0,425	27	33	-		
0,075	16	20	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,6	≤ 30	23,7	-	
	P.I.	3	≤ 10	6	≤ 12	
	LS%	1,2	≤ 5	3,2	≤ 7	
	GM	2,19	2.5 ≥ GM ≥ 1.5	1,97	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	28		33		
	Fine sand	31		28		
	Coarse fine sand	11		11		
	Medium fine sand	11		9		
	Fine fine sand	9		7		
	Silt and clay	41		40		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	7,5		6,3		
	MDD(KG/M ³)	2219		2144		
C.B.R. SANS 3001 GR40	COMP MC	7,5		6,3		
	% SWELL	0,0	≤ 0.5	0,36	1,50	
	100%	82	-	34	-	
	98%	63	-	27	-	
	97%	58	-	24	-	
	95%	46	45	18	-	
	93%	35	-	15	15	
90%	25	-	11	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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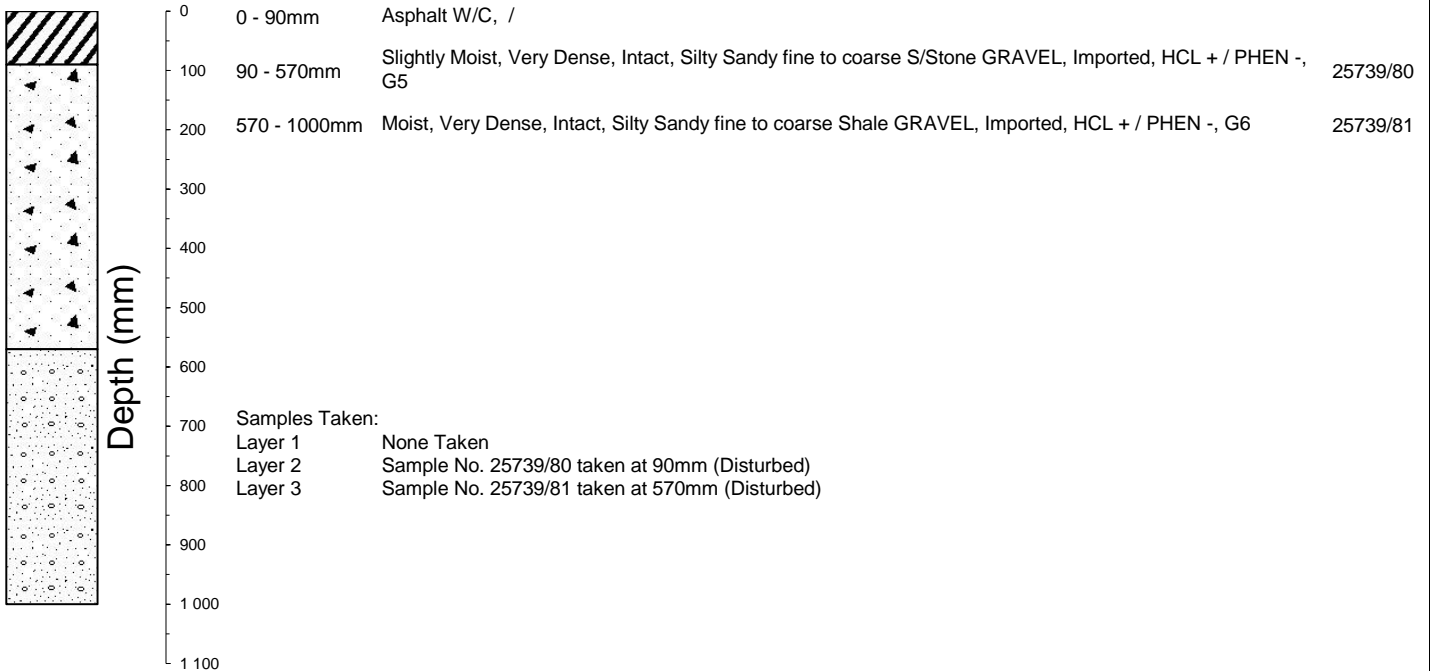
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 17/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°40'41" E22°14'50"	Stake Value:	Km 23.000, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 23.000, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 17/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 80	SPEC	25739 / 81	SPEC		
HOLE No. / SV. / CHAINAGE	Km 23.000, LHS	G5	Km 23.000, LHS	G6		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	06/02/23		06/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse Shale GRAVEL			
REDUCTION FACTOR / RF CHECK	0,0574		0,0452			
	0,04	< 1%	0,07	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	99			
	63,0	97	97			
	53,0	94	96			
	37,5	82	93	-		
	28,0	70	89	-		
	20,0	58	84	-		
	14,0	52	83	-		
	5,00	37	66	-		
	2,00	29	51	-		
	0,425	20	32	-		
0,075	14	14	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20	≤ 30	25,1	-	
	P.I.	5	≤ 10	5,5	≤ 12	
	LS%	2,1	≤ 5	2,1	≤ 5	
	GM	2,37	2.5≥ GM ≥ 1.5	2,04	2.6≥ GM ≥ 1.2	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		37		
	Fine sand	19		36		
	Coarse fine sand	9		16		
	Medium fine sand	9		11		
	Fine fine sand	1		9		
	Silt and clay	48		27		
	Coarse sand ratio	0,3		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	6,2		7,5		
	MDD(KG/M³)	2242		2144		
C.B.R. SANS 3001 GR40	COMP MC	6,2		7,4		
	% SWELL	0,0	≤ 0.5	0,58	1,00	
	100%	150	-	50	-	
	98%	110	-	38	-	
	97%	101	-	34	-	
	95%	80	45	26	25	
	93%	62	-	20	-	
90%	43	-	14	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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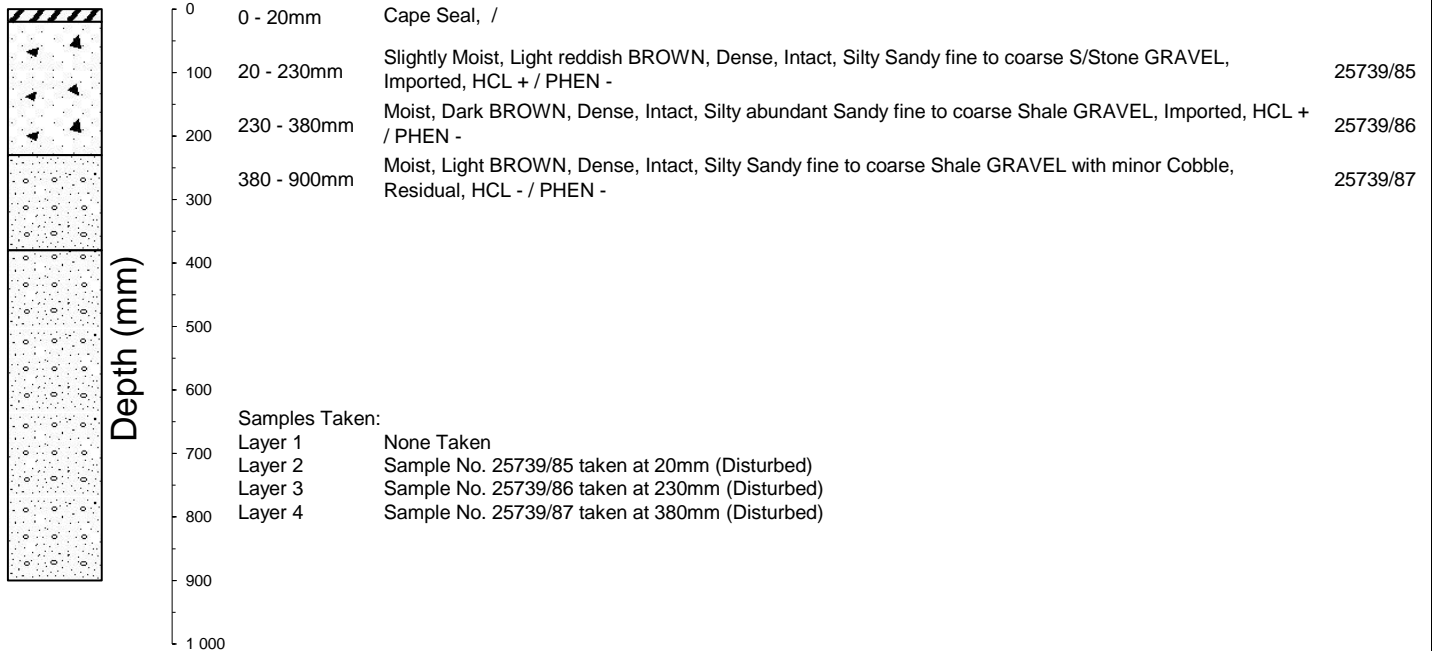
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Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 23.250, RHS	Test Hole No:	Km 23.250, RHS
GPS / WGS8:	S33°40'36" E22°14'41"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 85	SPEC	25739 / 86	SPEC	25739 / 87	SPEC
HOLE No. / SV. / CHAINAGE	Km 23.250, RHS	G5	Km 23.250, RHS	G8	Km 23.250, RHS	G7
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	06/02/23		06/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty abundant Sandy fine to coarse Shale GRAVEL		Silty Sandy fine to coarse Shale GRAVEL with minor Cobble	
REDUCTION FACTOR / RF CHECK	0,0482 0,04	< 1%	0,0578 0,06	< 1%	0,0384 0,06	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	96		
	75,0	100	100	93		
	63,0	99	99	93		
	53,0	96	97	91		
	37,5	84	93	88		
	28,0	72	89	83		
	20,0	62	84	76		
	14,0	56	79	70		
	5,00	42	66	48		
	2,00	36	57	37		
	0,425	25	42	26		
0,075	13	24	16			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19	21,6	23		
	P.I.	4	4,6	4,8		
	LS%	1,9	2	2,5		
	GM	2,27	1,77	2,22		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	31	26	31		
	Fine sand	33	31	26		
	Coarse fine sand	10	9	8		
	Medium fine sand	15	12	9		
	Fine fine sand	8	10	10		
	Silt and clay	36	43	43		
	Coarse sand ratio	0,3	0,3	0,3		
MOD AASHTO SANS 3001 GR30	OMC%	5,4	6,4	6,4		
	MDD(KG/M ³)	2327	2191	2267		
C.B.R. SANS 3001 GR40	COMP MC	5,4	6,4	6,4		
	% SWELL	0,0	0,0	1,50		
	100%	90	21	37		
	98%	69	19	30		
	97%	61	17	27		
	95%	48	15	22		
	93%	37	14	18		
	90%	26	11	13		
TEST TYPE	SANS - MOD.CBR.IND	SANS - MOD.CBR.IND	SANS - MOD.CBR.IND			

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JOB NO:	SWL25739	Ref.	-	DATE:	17/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 23.500, LHS	Test Hole No:	Km 23.500, LHS
GPS / WGS8:	S33°40'29" E22°14'37"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 17/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 82	SPEC	25739 / 83	SPEC	25739 / 84	SPEC	
HOLE No. / SV. / CHAINAGE	Km 23.500, LHS	G5	Km 23.500, LHS	G8	Km 23.500, LHS	G7	
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	06/02/23		06/02/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty fine to coarse grain SAND with minor Shale Gravel		Silty Sandy fine to coarse weathered Shale GRAVEL		
REDUCTION FACTOR / RF CHECK	0,0605 0,04	< 1%	0,0290 0,07	< 1%	0,0463 0,06	< 1%	
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	98			
	75,0	100	100	97			
	63,0	97	100	95			
	53,0	94	100	94			
	37,5	83	98	87			
	28,0	79	97	80			
	20,0	65	95	73			
	14,0	55	90	64			
	5,00	39	78	56			
	2,00	32	20-70	48			
	0,425	21	-	39			
0,075	13	-	24				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19	≤ 30	23	-	24,6	-
	P.I.	5	≤ 10	9,8	≤ 12	6	≤ 12
	LS%	2,1	≤ 5	4,5	≤ 7	3,3	≤ 7
	GM	2,34	2.5≥ GM ≥ 1.5	1,66	2.7≥ GM ≥ 0.75	1,89	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	34	24	19			
	Fine sand	27	57	31			
	Coarse fine sand	11	24	11			
	Medium fine sand	9	17	9			
	Fine fine sand	7	15	11			
	Silt and clay	40	19	50			
	Coarse sand ratio	0,3	0,2	0,2			
MOD AASHTO SANS 3001 GR30	OMC%	6,3	10,1	6,3			
	MDD(KG/M³)	2248	2089	2249			
C.B.R. SANS 3001 GR40	COMP MC	6,3	10,1	6,3			
	% SWELL	0,0	≤ 0.5	0,55	1,50	0,36	1,50
	100%	140	-	32	-	31	-
	98%	115	-	23	-	25	-
	97%	105	-	20	-	23	-
	95%	90	45	15	-	19	-
	93%	75	-	11	10	15	15
	90%	60	-	7	-	12	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

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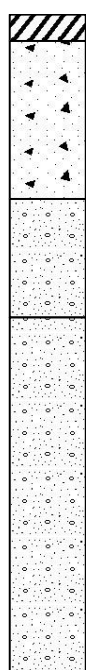
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°40'21" E22°14'32"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 23.750, RHS</p> <p>Test Hole No: Km 23.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 40mm</p> <p>40 - 280mm</p> <p>280 - 460mm</p> <p>460 - 1000mm</p>	<p>CAPE SEAL, /</p> <p>Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -</p> <p>Moist, Light BROWN, Dense, Intact, Silty fine to coarse grain SAND with abundant Shale Gravel, Imported, HCL + / PHEN -</p> <p>Moist, Light Yellowish BROWN, Very Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL - / PHEN -</p> <p>BEDROCK BELOW</p>	<p>25739/88</p> <p>25739/89</p> <p>25739/90</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/88 taken at 40mm (Disturbed)
 Layer 3 Sample No. 25739/89 taken at 280mm (Disturbed)
 Layer 4 Sample No. 25739/90 taken at 460mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 88	SPEC	25739 / 89	SPEC	25739 / 90	SPEC
HOLE No. / SV. / CHAINAGE	Km 23.750, RHS	G6	Km 23.750, RHS	G8	Km 23.750, RHS	G7
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	07/02/23		07/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty fine to coarse grain SAND with abundant Shale Gravel		Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0516 0,05	< 1%	0,0412 0,06	< 1%	0,0594 0,04	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100	95		
	75,0	100	100	90		
	63,0	97	100	87		
	53,0	95	99	76		
	37,5	87	96	68		
	28,0	78	91	59		
	20,0	68	86	53		
	14,0	65	83	51		
	5,00	52	74	38		
	2,00	44	66	30		
	0,425	30	55	21		
0,075	17	28	11			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,6	24,2	24,9		
	P.I.	5,2	5,9	8,6		
	LS%	2,8	2,5	4,1		
	GM	2,09	1,51	2,37		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	32	16	30		
	Fine sand	29	42	32		
	Coarse fine sand	10	16	11		
	Medium fine sand	11	13	12		
	Fine fine sand	9	13	9		
	Silt and clay	39	42	38		
	Coarse sand ratio	0,3	0,2	0,3		
MOD AASHTO SANS 3001 GR30	OMC%	5,3	6,5	6,4		
	MDD(KG/M ³)	2224	2236	2269		
C.B.R. SANS 3001 GR40	COMP MC	5,3	6,4	6,4		
	% SWELL	0,0	0,67	0,81		
	100%	63	27	36		
	98%	53	22	29		
	97%	50	19	25		
	95%	43	15	20		
	93%	35	13	16		
	90%	30	9	12		
TEST TYPE	SANS - MOD.CBR.IND	SANS - MOD.CBR.IND	SANS - MOD.CBR.IND			

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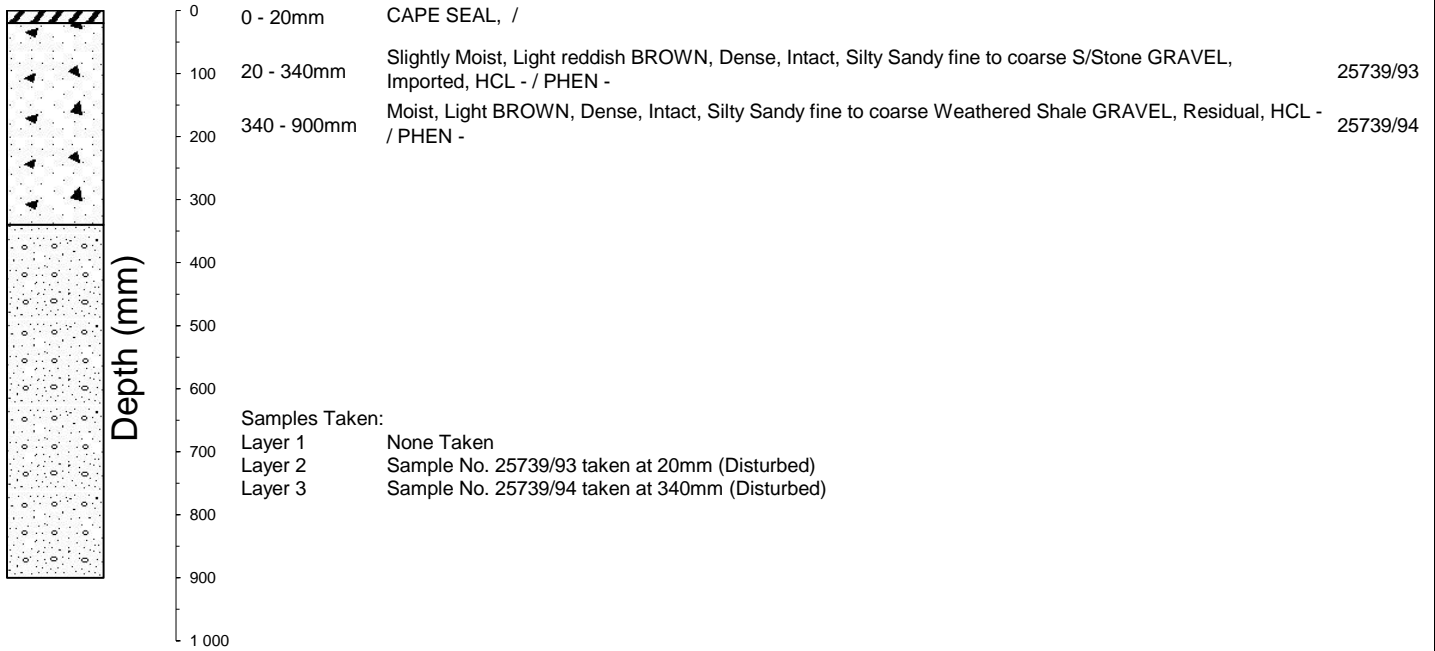
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 17/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°40'14" E22°14'28"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 24.000, LHS</p> <p>Test Hole No: Km 24.000, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 17/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 93	SPEC	25739 / 94	SPEC		
HOLE No. / SV. / CHAINAGE	Km 24.000, LHS	G5	Km 24.000, LHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	07/02/23		07/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0460		0,0572			
	0,05	< 1%		< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	99			
	63,0	99	97			
	53,0	95	93			
	37,5	84	84	-		
	28,0	69	76	-		
	20,0	58	66	-		
	14,0	51	65	-		
	5,00	36	48	-		
	2,00	30	38	20-70	-	
	0,425	20	26	-	-	
0,075	10	15	-	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19	≤ 30	24,5	-	
	P.I.	5,6	≤ 10	6,1	≤ 12	
	LS%	2,9	≤ 5	3,2	≤ 7	
	GM	2,40	2.5 ≥ GM ≥ 1.5	2,21	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		30		
	Fine sand	32		30		
	Coarse fine sand	12		8		
	Medium fine sand	11		10		
	Fine fine sand	9		11		
	Silt and clay	35		40		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,3		
	MDD(KG/M ³)	2290		2207		
C.B.R. SANS 3001 GR40	COMP MC	6,3		7,3		
	% SWELL	0,0	≤ 0.5	0,35	1,50	
	100%	98	-	28	-	
	98%	78	-	21	-	
	97%	69	-	19	-	
	95%	53	45	15	-	
	93%	42	-	11	10	
90%	30	-	7	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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Fax: 086 499 9482

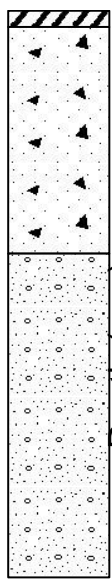
Email: admin@steynwilson.co.za

Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 24.250, RHS	Test Hole No:	Km 24.250, RHS
GPS / WGS84	S33°40'05" E22°14'25"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	@700mm Due to Hard Rock	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 20mm	CAPE SEAL, /	
20 - 300mm	Slightly Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/91
300 - 700mm	Moist, Light Olive BROWN, Very Dense, Intact, Silty Sandy fine to coarse Weathered Shale GRAVEL, Residual, HCL - / PHEN -, G8	25739/92
Refusal on BEDROCK		
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/91 taken at 20mm (Disturbed) Layer 3 Sample No. 25739/92 taken at 300mm (Disturbed)		

Water infiltration @ 0,7m (next to V-Drain)



Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 91	SPEC	25739 / 92	SPEC		
HOLE No. / SV. / CHAINAGE	Km 24.250, RHS	G5	Km 24.250, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	07/02/23		07/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Silty Sandy fine to coarse Weathered Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0553		0,0569			
	0,04	< 1%	0,05	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	100	99			
	63,0	100	95			
	53,0	96	92			
	37,5	87	83	-		
	28,0	71	74	-		
	20,0	61	66	-		
	14,0	57	58	-		
	5,00	42	41	-		
	2,00	35	32	-		
	0,425	26	23	-		
0,075	14	14	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,1	≤ 30	25	-	
	P.I.	6,1	≤ 10	8,9	≤ 12	
	LS%	3,8	≤ 5	4,6	≤ 7	
	GM	2,25	2.5 ≥ GM ≥ 1.5	2,31	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	26		29		
	Fine sand	35		27		
	Coarse fine sand	10		10		
	Medium fine sand	13		9		
	Fine fine sand	11		8		
	Silt and clay	39		44		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,4		
	MDD(KG/M ³)	2272		2245		
C.B.R. SANS 3001 GR40	COMP MC	5,4		7,4		
	% SWELL	0,0	≤ 0.5	0,35	1,50	
	100%	130	-	32	-	
	98%	100	-	24	-	
	97%	90	-	20	-	
	95%	70	45	15	-	
	93%	56	-	11	10	
90%	40	-	7	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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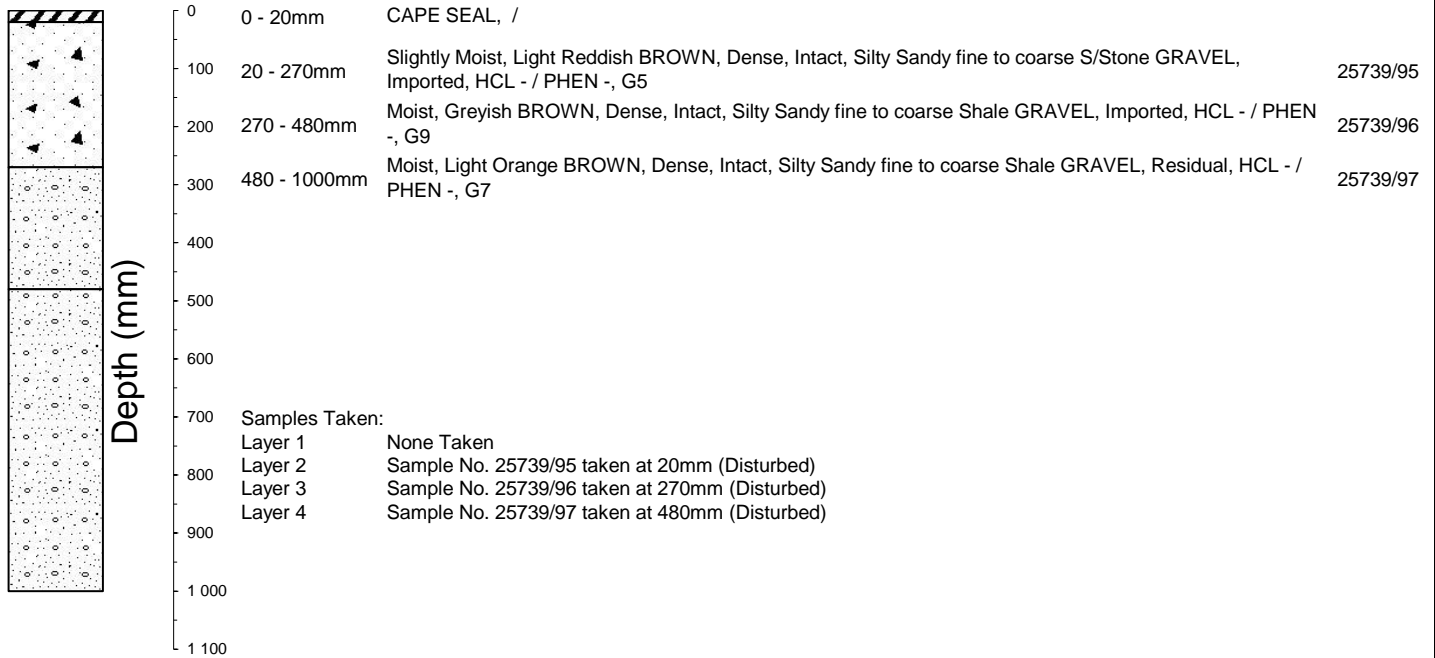
Email: admin@steynwilson.co.za

Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 24.500, LHS	Test Hole No:	Km 24.500, LHS
GPS / WGS8:	S33°39'57" E22°14'24"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual

Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1				
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 95	SPEC	25739 / 96	SPEC	25739 / 97	SPEC
HOLE No. / SV. / CHAINAGE		Km 24.500, LHS	G5	Km 24.500, LHS	G9	Km 24.500, LHS	G7
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		08/02/23		08/02/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse Shale GRAVEL		Silty Sandy fine to coarse Shale GRAVEL	
REDUCTION FACTOR / RF CHECK		0,0511		0,0561		0,0551	
		0,04	< 1%	0,04	< 1%	0,05	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		98		100	
	75,0	100		95		97	
	63,0	98		93		94	
	53,0	92		88		90	
	37,5	82	-	77	-	83	-
	28,0	71	-	69	-	76	-
	20,0	61	-	62	-	68	-
	14,0	54	-	51	-	62	-
	5,00	38	-	27	-	39	-
	2,00	32	20-70	19	-	28	-
	0,425	21	-	13	-	18	-
0,075	6	-	7	-	10	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,1	≤ 30	28,6	-	26,3	-
	P.I.	4,9	≤ 10	7,6	≤ 12	7,8	≤ 12
	LS%	2,3	≤ 5	3,7	≤ 7	4,1	≤ 7
	GM	2,41	2.5≥ GM ≥ 1.5	2,61	2.7≥ GM ≥ 0.75	2,43	2.7≥ GM ≥ 0.75
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		32		34	
	Fine sand	47		31		28	
	Coarse fine sand	19		12		11	
	Medium fine sand	17		10		9	
	Fine fine sand	11		8		9	
	Silt and clay	19		37		37	
	Coarse sand ratio	0,3		0,3		0,3	
MOD AASHTO SANS 3001 GR30	OMC%	6,5		6,4		6,2	
	MDD(KG/M³)	2278		2167		2211	
C.B.R. SANS 3001 GR40	COMP MC	6,4		6,3		6,1	
	% SWELL	0,0	≤ 0.5	0,63	1,50	0,69	1,50
	100%	155	-	20	-	23	-
	98%	125	-	16	-	27	-
	97%	105	-	14	-	24	-
	95%	85	45	11	-	19	-
	93%	65	-	9	7	15	15
	90%	45	-	6	-	11	-
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND		

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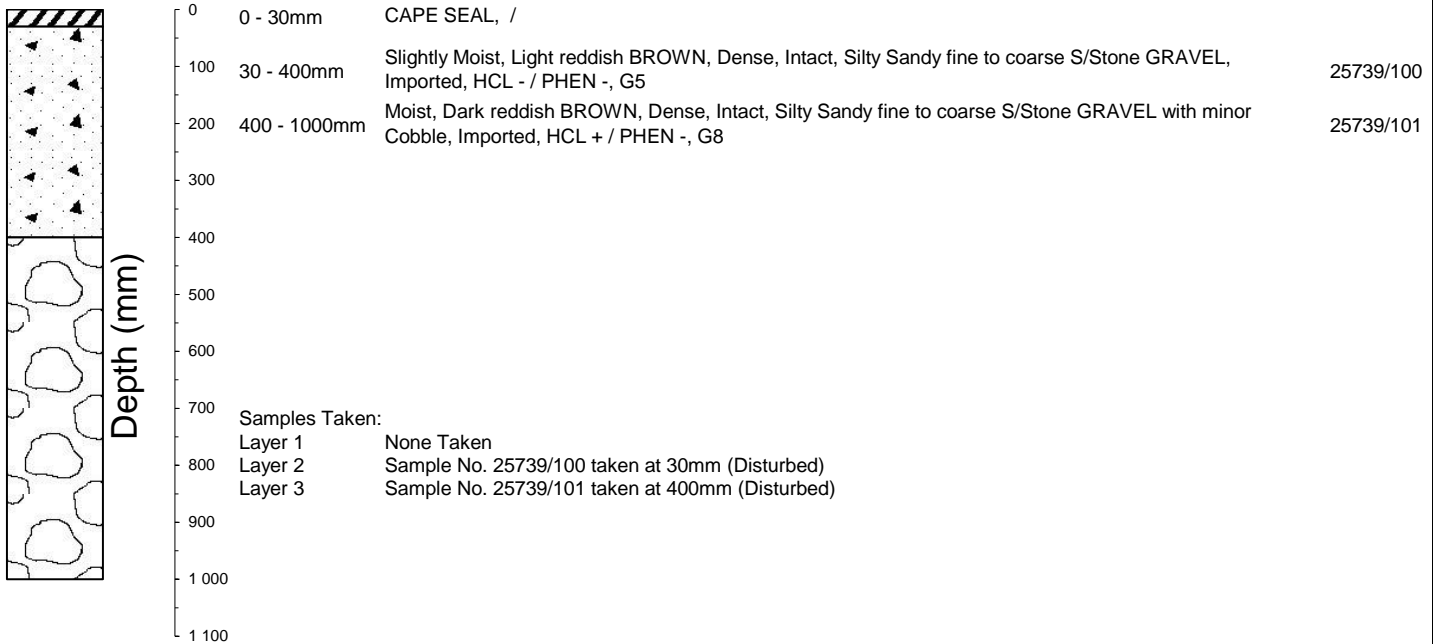
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 17/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°39'48" E22°14'19"	Stake Value:	Km 24.750, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 24.750, RHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 17/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 100	SPEC	25739 / 101	SPEC		
HOLE No. / SV. / CHAINAGE	Km 24.750, RHS	G5	Km 24.750, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	08/02/23		08/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble			
REDUCTION FACTOR / RF CHECK	0,0547		0,0477			
	0,04	< 1%	0,04	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	81			
	75,0	99	80			
	63,0	99	77			
	53,0	97	74			
	37,5	85	65	-		
	28,0	67	60	-		
	20,0	55	55	-		
	14,0	47	50	-		
	5,00	32	42	-		
	2,00	27	36	-		
	0,425	18	24	-		
0,075	10	11	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18	≤ 30	32	-	
	P.I.	4,7	≤ 10	9,6	≤ 12	
	LS%	2,4	≤ 5	4,6	≤ 7	
	GM	2,46	2.5 ≥ GM ≥ 1.5	2,29	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	34		33		
	Fine sand	29		37		
	Coarse fine sand	11		15		
	Medium fine sand	11		12		
	Fine fine sand	7		11		
	Silt and clay	37		29		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		7,5		
	MDD(KG/M ³)	2168		2083		
C.B.R. SANS 3001 GR40	COMP MC	6,4		7,4		
	% SWELL	0,0	≤ 0.5	0,34	1,50	
	100%	140	-	22	-	
	98%	100	-	18	-	
	97%	88	-	16	-	
	95%	68	45	13	-	
	93%	52	-	10	10	
90%	35	-	7	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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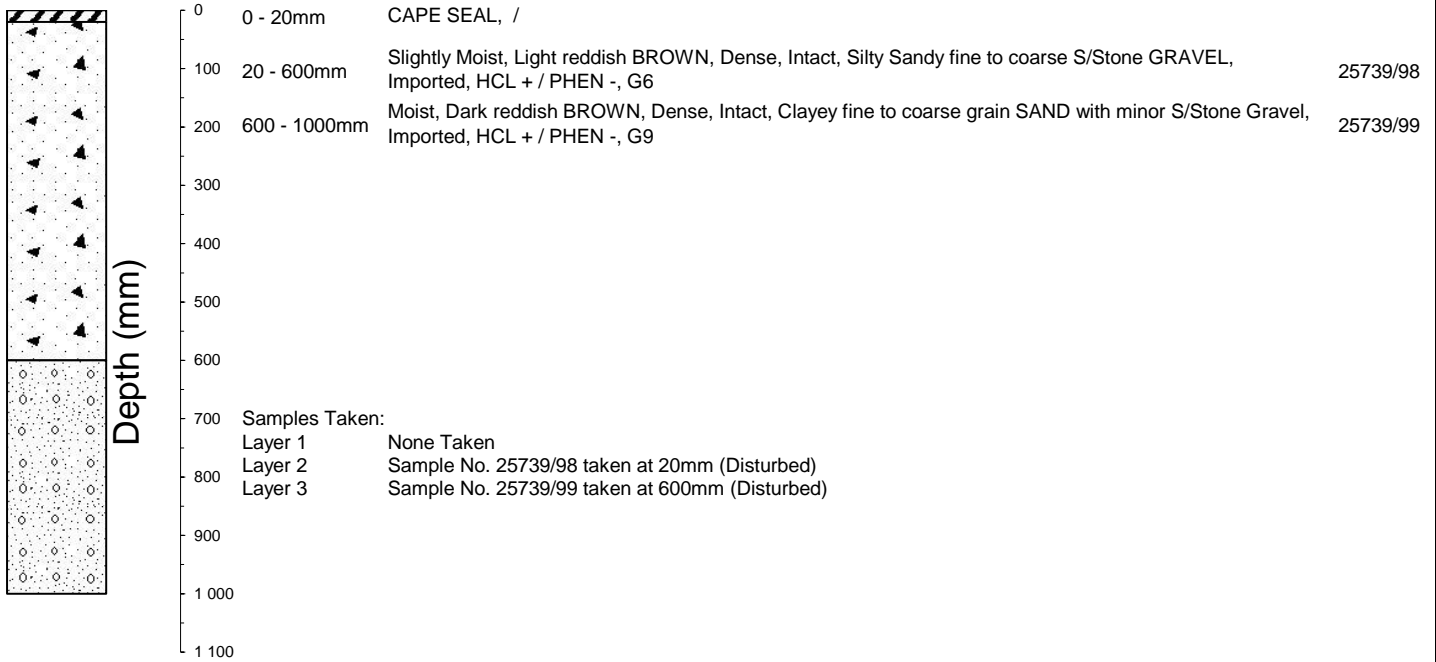
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Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	17/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 25.000, LHS	Test Hole No:	Km 25.000, LHS
GPS / WGS8:	S33°39'43" E22°14'18"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 17/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 98	SPEC	25739 / 99	SPEC		
HOLE No. / SV. / CHAINAGE	Km 25.000, LHS	G6	Km 25.000, LHS	G9		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	08/02/23		08/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL				Clayey fine to coarse grain SAND with minor S/Stone Gravel	
REDUCTION FACTOR / RF CHECK	0,0410		0,0423			
	0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	99	98			
	63,0	98	98			
	53,0	96	96			
	37,5	87	92	-		
	28,0	73	89	-		
	20,0	63	86	-		
	14,0	55	84	-		
	5,00	39	73	-		
	2,00	32	66	-		
	0,425	22	56	-		
0,075	9	23	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,4	-	27	-	
	P.I.	4,1	≤ 12	8,5	≤ 12	
	LS%	2,3	≤ 5	4,2	≤ 7	
	GM	2,37	2.6≥ GM ≥ 1.2	1,54	2.7≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		15		
	Fine sand	40		50		
	Coarse fine sand	15		20		
	Medium fine sand	13		16		
	Fine fine sand	12		14		
	Silt and clay	28		35		
	Coarse sand ratio	0,3		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,5		
	MDD(KG/M ³)	2142		2092		
C.B.R. SANS 3001 GR40	COMP MC	5,4		7,4		
	% SWELL	0,0	1,00	0,79	1,50	
	100%	85	-	20	-	
	98%	64	-	16	-	
	97%	58	-	14	-	
	95%	44	25	12	-	
	93%	34	-	9	7	
90%	23	-	7	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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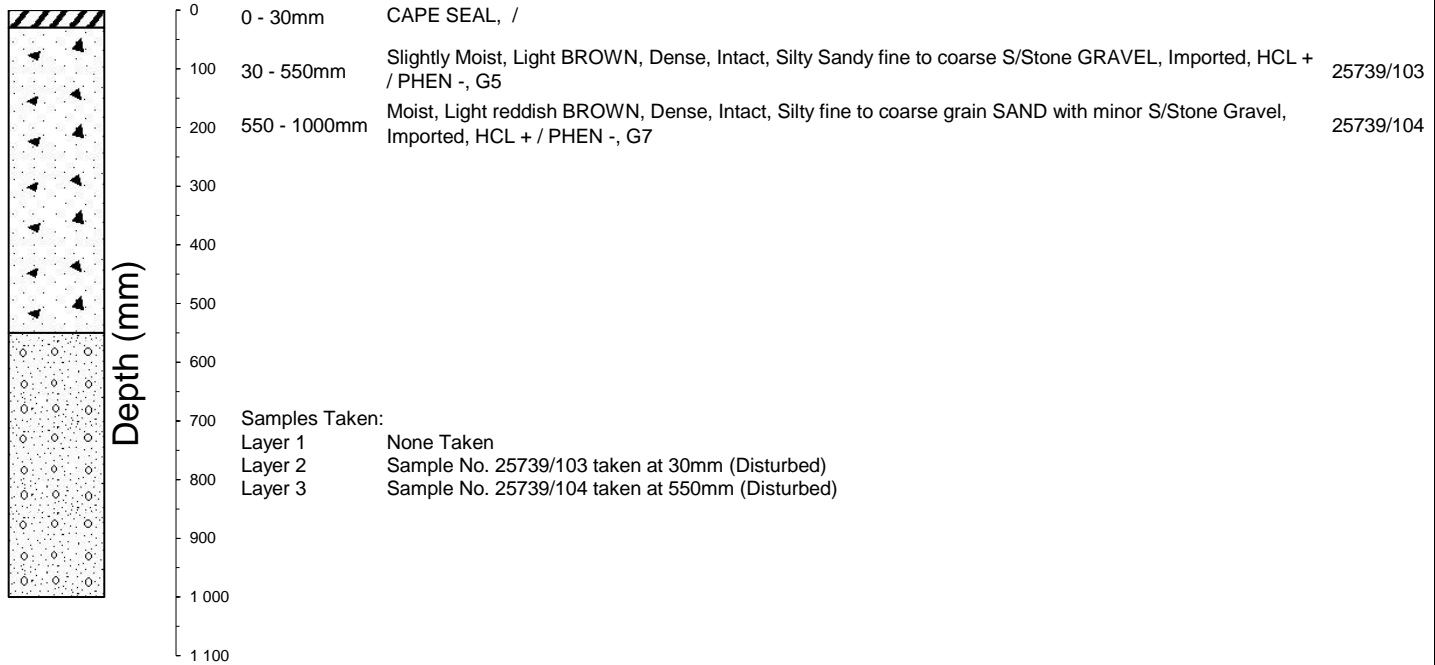
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 23/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°39'34" E22°14'18"	Stake Value:	Km 25.250, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 25.250, RHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

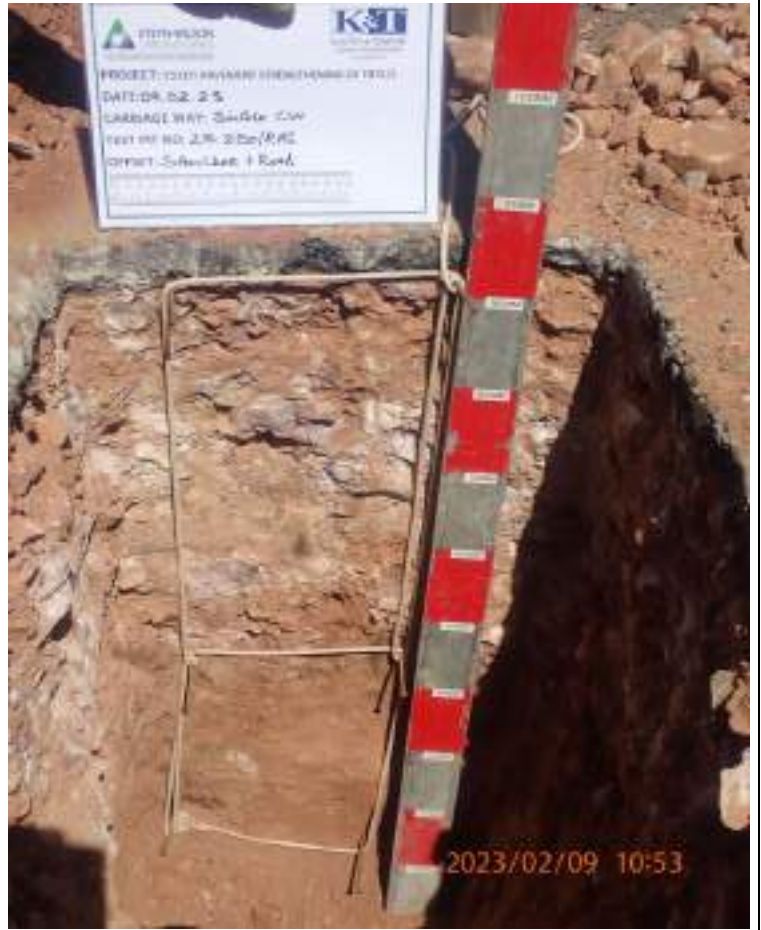
PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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JOB NO:	SWL25739	Your Ref	-	Date	23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT:				C1117: Pavement Strengthening of TR75/1
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 103	SPEC	25739 / 104	SPEC		
HOLE No. / SV. / CHAINAGE		Km 25.250, RHS	G5	Km 25.250, RHS	G7		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		09/02/23		09/02/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty fine to coarse grain SAND with minor S/Stone Gravel			
REDUCTION FACTOR / RF CHECK		0,0671		0,0467			
		0,04	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100			
	75,0	100		99			
	63,0	99		99			
	53,0	95		99			
	37,5	83	-	96	-		
	28,0	68	-	93	-		
	20,0	55	-	88	-		
	14,0	50	-	79	-		
	5,00	37	-	61	-		
	2,00	30	20-70	50	-		
	0,425	19	-	37	-		
0,075	10	-	18	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20,5	≤ 30	24	-		
	P.I.	5,8	≤ 10	6,4	≤ 12		
	LS%	2,3	≤ 5	3,2	≤ 7		
	GM	2,41	2.5 ≥ GM ≥ 1.5	1,95	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	34		26			
	Fine sand	32		38			
	Coarse fine sand	11		13			
	Medium fine sand	12		13			
	Fine fine sand	9		12			
	Silt and clay	34		36			
	Coarse sand ratio	0,3		0,3			
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,5			
	MDD(KG/M ³)	2276		2207			
C.B.R. SANS 3001 GR40	COMP MC	5,4		7,5			
	% SWELL	0,0	≤ 0.5	0,0	1,50		
	100%	140	-	37	-		
	98%	110	-	29	-		
	97%	98	-	26	-		
	95%	79	45	20	-		
	93%	63	-	16	15		
90%	47	-	11	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



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CIVIL ENGINEERING TESTING LABORATORIES

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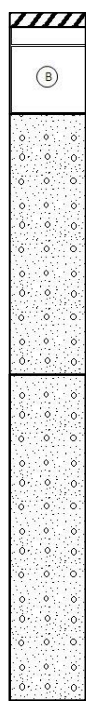
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°39'28" E22°14'12"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 25.500, LHS</p> <p>Test Hole No: Km 25.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 20mm CAPE SEAL, /</p> <p>20 - 140mm Dry, Dark GREY, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL (ETB / BSM), Imported, HCL - / PHEN -</p> <p>140 - 500mm Slightly Moist, Light Orange BROWN, Dense, Intact, Silty abundant Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G6</p> <p>500 - 950mm Moist, Dark Reddish BROWN, Dense, Intact, Silty fine to medium grain SAND with minor S/Stone Gravel, Imported, HCL + / PHEN -, G10</p>	<p>25739/107</p> <p>25739/108</p> <p>25739/109</p>
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Samples Taken:

Layer 1 None Taken

Layer 2 Sample No. 25739/107 taken at 20mm (Disturbed)

Layer 3 Sample No. 25739/108 taken at 140mm (Disturbed)

Layer 4 Sample No. 25739/109 taken at 500mm (Disturbed)

Surface Visual

Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 107	SPEC	25739 / 108	SPEC	25739 / 109	SPEC
HOLE No. / SV. / CHAINAGE	Km 25.500, LHS		Km 25.500, LHS		Km 25.500, LHS	
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1	
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4	
DATE RECEIVED	24/01/23		24/01/23		24/01/23	
CLIENTS MARKING	-		-		-	
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL (ETB / BSM)		Silty abundant Sandy fine to coarse S/Stone GRAVEL		Silty fine to medium grain SAND with minor S/Stone Gravel	
REDUCTION FACTOR / RF CHECK	0,2498		0,0535		0,0374	
	0,04	< 1%	0,05	< 1%	0,07	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100		100	
	75,0	100	99		100	
	63,0	98	97		100	
	53,0	98	96		99	
	37,5	94	85	-	97	-
	28,0	81	75	-	93	-
	20,0	64	66	-	90	-
	14,0	55	63	-	88	-
	5,00	28	50	-	83	-
	2,00	15	43	-	78	-
	0,425	7	29	-	73	-
0,075	3	14	-	17	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	29,8	19,2	-	26,7	-
	P.I.	7	5,3	≤ 12	9,5	-
	LS%	3,5	2	≤ 5	5,4	-
	GM	2,74	2,15	2,6 ≥ GM ≥ 1,2	1,32	-
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	54	33		7	
	Fine sand	26	35		71	
	Coarse fine sand	10	13		45	
	Medium fine sand	10	12		13	
	Fine fine sand	6	10		14	
	Silt and clay	20	31		21	
	Coarse sand ratio	0,5	0,3		0,1	
MOD AASHTO SANS 3001 GR30	OMC%		6,4		7,4	
	MDD(KG/M ³)		2243		2109	
C.B.R. SANS 3001 GR40	COMP MC		6,4		7,4	
	% SWELL		0,01	1,00	-2,67	-
	100%		43	-	14	-
	98%		35	-	12	-
	97%		32	-	10	-
	95%		26	25	8	-
	93%		21	-	6	-
	90%		16	-	5	-
TEST TYPE	SANS - INDICATOR		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND	

NOTE: All tests marked with (*) means that those test methods are not accredited.



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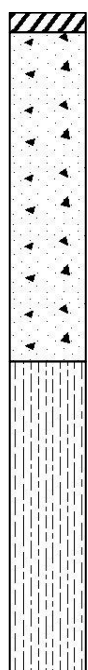
Email: admin@steynwilson.co.za

Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 25.750, RHS	Test Hole No:	Km 25.750, RHS
GPS / WGS8:	S33°39'23" E22°14'05"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	CAPE SEAL, /	
30 - 530mm	Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -	25739/105
530 - 1000mm	Moist, Dark Reddish BROWN, Medium Dense, Intact, Abundant Silty SAND with minor Gravel, Residual, HCL - / PHEN -	25739/106
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/105 taken at 30mm (Disturbed) Layer 3 Sample No. 25739/106 taken at 530mm (Disturbed)		

Surface Visual

Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000			PROJECT: C1117: Pavement Strengthening of TR75/1		
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 105	SPEC	25739 / 106	SPEC		
HOLE No. / SV. / CHAINAGE		Km 25.750, RHS	G5	Km 25.750, RHS	G10		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		24/01/23		24/01/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty SAND with minor Gravel			
REDUCTION FACTOR / RF CHECK		0,0416		0,0451			
		-10,55	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100			
	75,0	100		100			
	63,0	100		100			
	53,0	96		98			
	37,5	87	-	95	-		
	28,0	75	-	89	-		
	20,0	65	-	83	-		
	14,0	59	-	83	-		
	5,00	46	-	79	-		
	2,00	39	20-70	76	-		
	0,425	27	-	72	-		
0,075	14	-	40	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	27,6	≤ 30	29,9	-		
	P.I.	9,3	≤ 10	12,2	-		
	LS%	4	≤ 5	6,3	-		
	GM	2,20	2,5 ≥ GM ≥ 1,5	1,12	-		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	31		6			
	Fine sand	34		41			
	Coarse fine sand	10		17			
	Medium fine sand	12		11			
	Fine fine sand	12		13			
	Silt and clay	34		53			
	Coarse sand ratio	0,3		0,1			
MOD AASHTO SANS 3001 GR30	OMC%	5,5		6,5			
	MDD(KG/M ³)	2154		2183			
C.B.R. SANS 3001 GR40	COMP MC	5,4		6,5			
	% SWELL	0,0	≤ 0.5	0,91	-		
	100%	115	-	8	-		
	98%	92	-	7	-		
	97%	82	-	6	-		
	95%	67	45	5	-		
	93%	53	-	4	-		
90%	39	-	3	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

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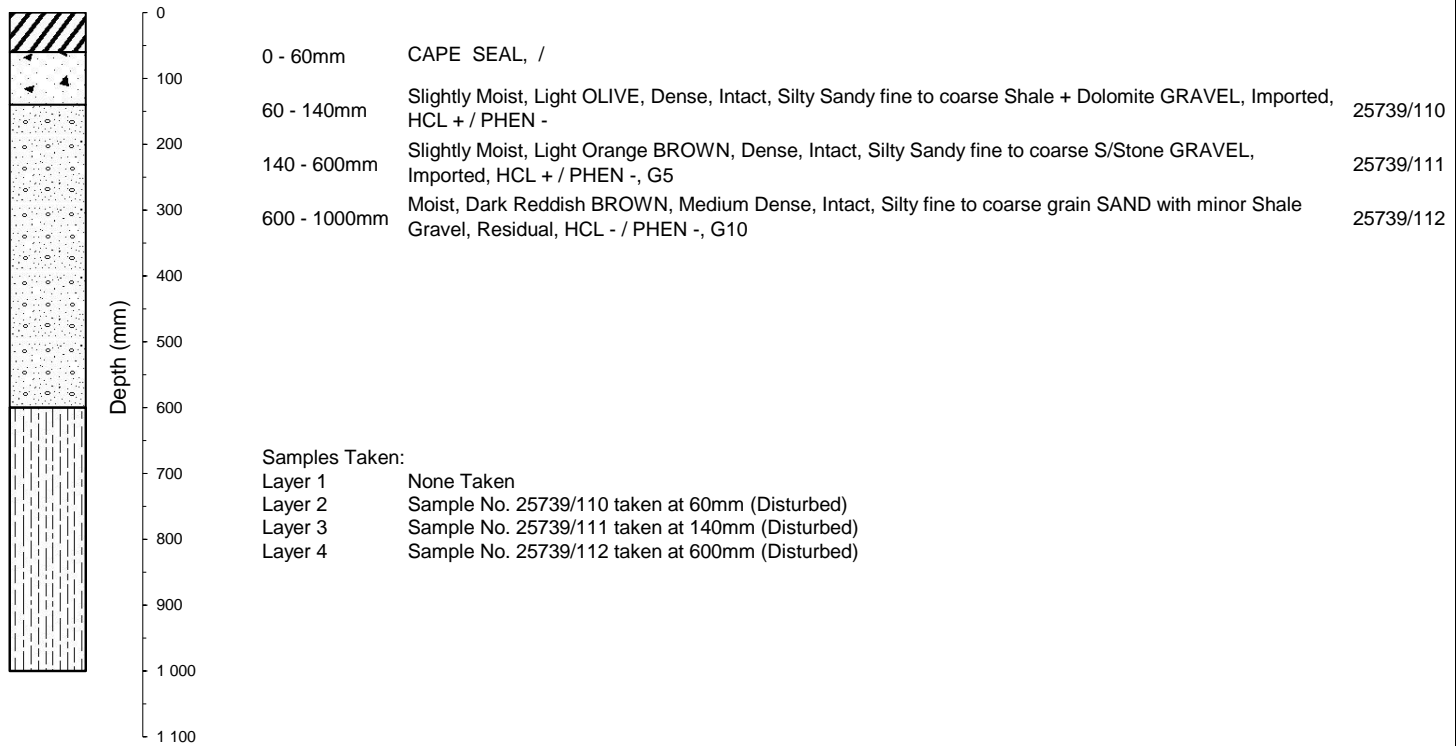
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 23/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS8:	S33°39'21" E22°13'56"	Stake Value:	Km 26.000, LHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 26.000, LHS
		Side Walls	Stable
		Excavation Metho	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Enviromental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 110	SPEC	25739 / 111	SPEC	25739 / 112	SPEC
HOLE No. / SV. / CHAINAGE	Km 26.000, LHS		Km 26.000, LHS		Km 26.000, LHS	
ROAD No. OR NAME	TR75 / 1		TR75 / 1		TR75 / 1	
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3		Layer 4	
DATE RECEIVED	10/02/23		10/02/23		10/02/23	
CLIENTS MARKING	-		-		-	
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse Shale + Dolomite GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL	G5	Silty fine to coarse grain SAND with minor Shale Gravel	G10
REDUCTION FACTOR / RF CHECK	0,3489		0,0615		0,0524	
	0,06	< 1%	0,04	< 1%	0,06	< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100		100	
	75,0	100	100		100	
	63,0	100	98		100	
	53,0	100	94		99	
	37,5	100	79	-	99	-
	28,0	91	68	-	96	-
	20,0	84	60	-	91	-
	14,0	75	52	-	90	-
	5,00	51	35	-	84	-
	2,00	36	29	20-70	79	-
	0,425	22	22	-	74	-
0,075	11	13	-	41	-	
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21	24	≤ 30	27,6	-
	P.I.	4,6	9,2	≤ 10	10,1	-
	LS%	2,3	4,3	≤ 5	5,1	-
	GM	2,31	2,36	2,5≥ GM ≥ 1,5	1,05	-
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	39	25		7	
	Fine sand	31	31		41	
	Coarse fine sand	9	11		17	
	Medium fine sand	10	10		13	
	Fine fine sand	12	10		11	
	Silt and clay	30	44		52	
	Coarse sand ratio	0,4	0,3		0,1	
MOD AASHTO SANS 3001 GR30	OMC%		6,3		6,3	
	MDD(KG/M ³)		2223		2188	
C.B.R. SANS 3001 GR40	COMP MC		6,3		6,2	
	% SWELL		0,0	≤ 0,5	1,88	-
	100%		125	-	4	-
	98%		93	-	3	-
	97%		82	-	3	-
	95%		63	45	3	-
	93%		50	-	2	-
	90%		34	-	2	-
TEST TYPE	SANS - INDICATOR		SANS - MOD.CBR.IND		SANS - MOD.CBR.IND	

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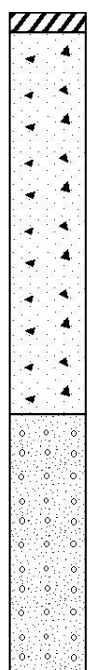
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JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 26.250, RHS	Test Hole No:	Km 26.250, RHS
GPS / WGS8:	S33°39'18" E22°13'46"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

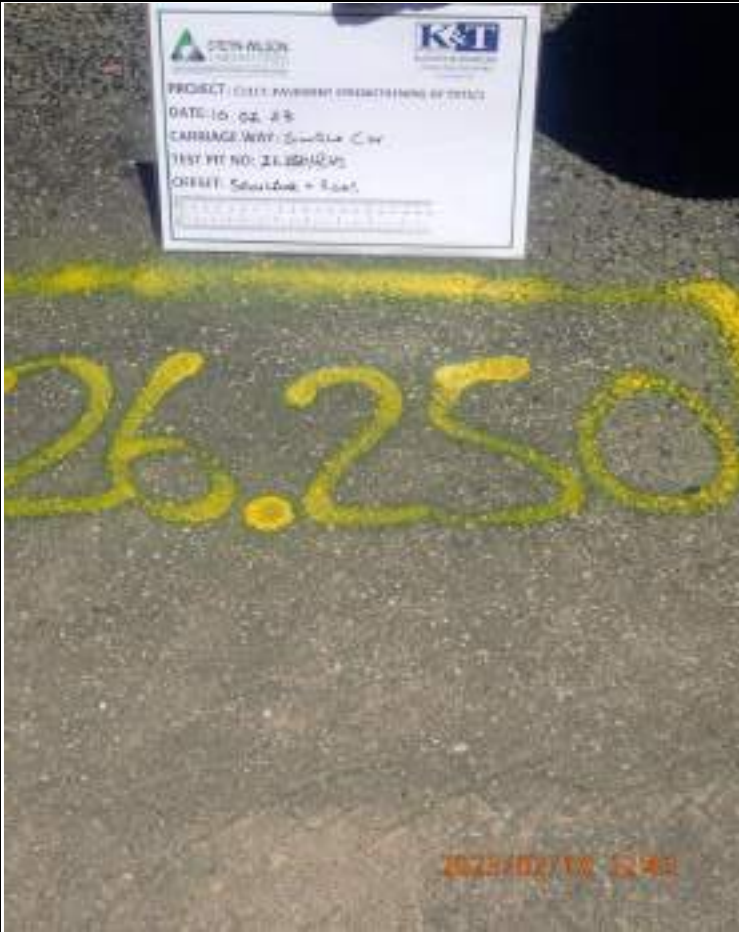
SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	CAPE SEAL, /	
30 - 610mm	Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/114
610 - 1000mm	Moist, Dark Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone + Shale GRAVEL, Imported, HCL - / PHEN -, G5	25739/115
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/114 taken at 30mm (Disturbed) Layer 3 Sample No. 25739/115 taken at 610mm (Disturbed)		

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO:	SWL25739	Your Ref	-	Date	23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000			PROJECT: C1117: Pavement Strengthening of TR75/1		
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 114	SPEC	25739 / 115	SPEC		
HOLE No. / SV. / CHAINAGE		Km 26.250, RHS	G5	Km 26.250, RHS	G5		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		10/02/23		10/02/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone + Shale GRAVEL			
REDUCTION FACTOR / RF CHECK		0,0617		0,0487			
		0,04	< 1%	0,04	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100			
	75,0	97		99			
	63,0	97		98			
	53,0	96		96			
	37,5	85	-	87	-		
	28,0	70	-	74	-		
	20,0	59	-	65	-		
	14,0	58	-	51	-		
	5,00	45	-	36	-		
	2,00	38	20-70	29	20-70		
	0,425	27	-	20	-		
0,075	14	-	12	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18	≤ 30	18,7	≤ 30		
	P.I.	4,8	≤ 10	5,1	≤ 10		
	LS%	2	≤ 5	2,3	≤ 5		
	GM	2,21	2,5 ≥ GM ≥ 1,5	2,38	2,5 ≥ GM ≥ 1,5		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	29		31			
	Fine sand	34		28			
	Coarse fine sand	13		10			
	Medium fine sand	12		10			
	Fine fine sand	9		8			
	Silt and clay	37		41			
	Coarse sand ratio	0,3		0,3			
MOD AASHTO SANS 3001 GR30	OMC%	5,4		5,4			
	MDD(KG/M ³)	2266		2253			
C.B.R. SANS 3001 GR40	COMP MC	5,4		5,3			
	% SWELL	0,1	≤ 0.5	0,25	≤ 0.5		
	100%	120	-	110	-		
	98%	92	-	80	-		
	97%	81	-	70	-		
	95%	62	45	52	45		
	93%	48	-	39	-		
	90%	32	-	26	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



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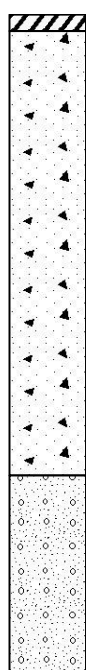
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JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°39'12" E22°13'41"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 26.500, LHS</p> <p>Test Hole No: Km 26.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Sunny & Hot Condition</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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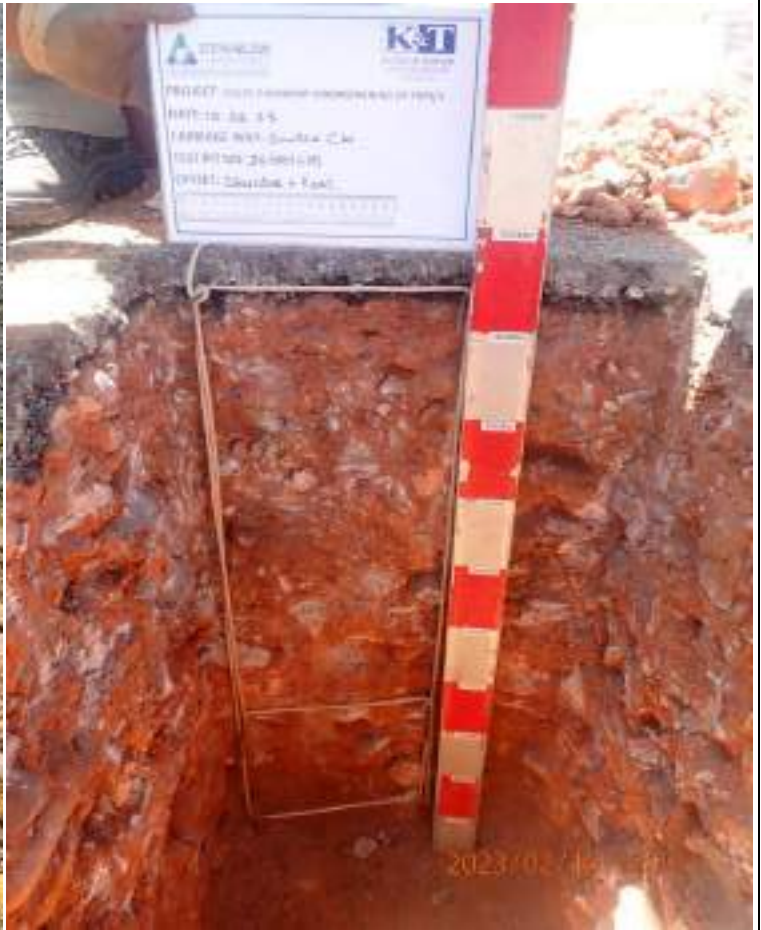


<p>0 - 25mm CAPE SEAL, /</p> <p>25 - 700mm Slightly Moist, Dark Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>700 - 1000mm Moist, Light Orange BROWN, Very Dense, Intact, Silty fine to coarse grain SAND with abundant S/Stone Gravel, Imported, HCL - / PHEN -, G10</p>	<p>Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/113 taken at 25mm (Disturbed) Layer 3 Sample No. 25739/116 taken at 700mm (Disturbed)</p>	<p>25739/113</p> <p>25739/116</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 113	SPEC	25739 / 116	SPEC		
HOLE No. / SV. / CHAINAGE	Km 26.500, LHS	G5	Km 26.500, LHS	G10		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	10/02/23		10/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty fine to coarse grain SAND with abundant S/Stone Gravel			
REDUCTION FACTOR / RF CHECK	0,0412		0,0346			
	0,05	< 1%	0,07	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	97	100			
	63,0	96	100			
	53,0	94	99			
	37,5	84	98	-		
	28,0	73	97	-		
	20,0	63	95	-		
	14,0	58	91	-		
	5,00	46	77	-		
	2,00	39	20-70	66	-	
	0,425	28	-	55	-	
0,075	16	-	23	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20	≤ 30	29,2	-	
	P.I.	5,8	≤ 10	12,4	-	
	LS%	2,8	≤ 5	5,6	-	
	GM	2,16	2,5 ≥ GM ≥ 1,5	1,56	-	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	28		16		
	Fine sand	31		49		
	Coarse fine sand	12		18		
	Medium fine sand	10		15		
	Fine fine sand	9		16		
	Silt and clay	41		34		
	Coarse sand ratio	0,3		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		7,5		
	MDD(KG/M ³)	2272		2083		
C.B.R. SANS 3001 GR40	COMP MC	5,3		7,4		
	% SWELL	0,0	≤ 0.5	1,63	-	
	100%	105	-	11	-	
	98%	82	-	8	-	
	97%	73	-	7	-	
	95%	60	45	5	-	
	93%	46	-	4	-	
90%	32	-	3	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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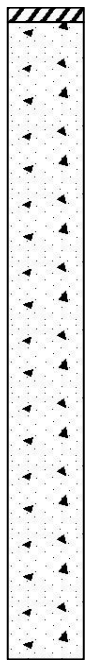
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°39'06" E22°13'40"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 26.750, RHS</p> <p>Test Hole No: Km 26.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal @ 900mm Due to Sandstone Cobbles and Boulders</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0</p> <p>100</p> <p>200</p> <p>300</p> <p>400</p> <p>500</p> <p>600</p> <p>700</p> <p>800</p> <p>900</p> <p>1 000</p>	<p>0 - 20mm CAPE SEAL, /</p> <p>20 - 900mm Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G6</p> <p>REFUSAL ON S/STONE BOULDERS</p> <p>Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/126 taken at 20mm (Disturbed)</p>	<p>25739/126</p>
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Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 126	SPEC				
HOLE No. / SV. / CHAINAGE	Km 26.750, RHS	G6				
ROAD No. OR NAME	TR75 / 1					
LAYER TESTED / SAMPLED FROM	Layer 2					
DATE RECEIVED	13/02/23					
CLIENTS MARKING	-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble					
REDUCTION FACTOR / RF CHECK	0,0541					
	0,04	< 1%				
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	94				
	75,0	85				
	63,0	84				
	53,0	82				
	37,5	75	-			
	28,0	66	-			
	20,0	58	-			
	14,0	50	-			
	5,00	38	-			
	2,00	31	-			
	0,425	21	-			
0,075	11	-				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	20,4	-			
	P.I.	4,5	≤ 12			
	LS%	2,2	≤ 5			
	GM	2,36	2,6 ≥ GM ≥ 1,2			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	32				
	Fine sand	31				
	Coarse fine sand	10				
	Medium fine sand	14				
	Fine fine sand	8				
	Silt and clay	37				
	Coarse sand ratio	0,3				
MOD AASHTO SANS 3001 GR30	OMC%	5,3				
	MDD(KG/M ³)	2153				
C.B.R. SANS 3001 GR40	COMP MC	5,3				
	% SWELL	0,0	1,00			
	100%	44	-			
	98%	34	-			
	97%	30	-			
	95%	25	25			
	93%	21	-			
90%	17	-				
TEST TYPE	SANS - MOD.CBR.IND					

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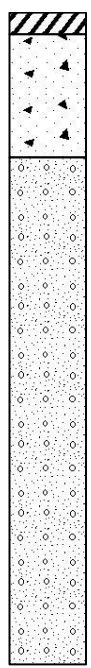
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°38'56" E22°13'35"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 27.000, LHS</p> <p>Test Hole No: Km 27.000, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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<p>0 - 30mm</p> <p>30 - 200mm</p> <p>200 - 900mm</p>	<p>CAPE SEAL, /</p> <p>Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5</p> <p>Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G7</p>	<p>25739/129</p> <p>25739/130</p>
<p>Samples Taken:</p> <p>Layer 1 None Taken</p> <p>Layer 2 Sample No. 25739/129 taken at 30mm (Disturbed)</p> <p>Layer 3 Sample No. 25739/130 taken at 200mm (Disturbed)</p>		

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 129	SPEC	25739 / 130	SPEC			
HOLE No. / SV. / CHAINAGE	Km 27.000, LHS	G5	Km 27.000, LHS	G7			
ROAD No. OR NAME	TR75 / 1		TR75 / 1				
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3				
DATE RECEIVED	13/02/23		13/02/23				
CLIENTS MARKING	-		-				
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble				
REDUCTION FACTOR / RF CHECK	0,0503		0,0565				
	0,04	< 1%	0,04	< 1%			
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100				
	75,0	97	95				
	63,0	95	93				
	53,0	93	87				
	37,5	84	77	-			
	28,0	72	68	-			
	20,0	64	61	-			
	14,0	55	53	-			
	5,00	37	34	-			
	2,00	31	28	20-70	-		
	0,425	19	19	-	-		
0,075	9	11	-	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	17,7	≤ 30	23,9	-		
	P.I.	4,6	≤ 10	6,7	≤ 12		
	LS%	2,6	≤ 5	3,8	≤ 7		
	GM	2,41	2.5 ≥ GM ≥ 1.5	2,43	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	37		32			
	Fine sand	34		29			
	Coarse fine sand	13		11			
	Medium fine sand	12		10			
	Fine fine sand	9		8			
	Silt and clay	29		39			
	Coarse sand ratio	0,4		0,3			
MOD AASHTO SANS 3001 GR30	OMC%	5,4		6,4			
	MDD(KG/M ³)	2259		2243			
C.B.R. SANS 3001 GR40	COMP MC	5,4		6,4			
	% SWELL	0,0	≤ 0.5	0,0	1,50		
	100%	100	-	38	-		
	98%	80	-	30	-		
	97%	70	-	27	-		
	95%	55	45	23	-		
	93%	42	-	17	15		
90%	30	-	13	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

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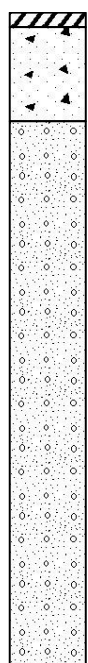
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Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 27.250, RHS	Test Hole No:	Km 27.250, RHS
GPS / WGS8:	S33°38'49" E22°13'31"	Side Walls	Stable	Excavation Metho	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Enviromental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 20mm	CAPE SEAL, /	
20 - 150mm	Slightly Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/127
150 - 900mm	Moist, Dark Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G7	25739/128
Samples Taken: Layer 1 None Taken Layer 2 Sample No. 25739/127 taken at 20mm (Disturbed) Layer 3 Sample No. 25739/128 taken at 150mm (Disturbed)		

Surface Visual



Profile Measurement



Spoils





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JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 127	SPEC	25739 / 128	SPEC		
HOLE No. / SV. / CHAINAGE	Km 27.250, RHS	G5	Km 27.250, RHS	G7		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	13/02/23		13/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble			
REDUCTION FACTOR / RF CHECK	0,0625		0,0518			
	0,05	< 1%	0,04	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	91			
	75,0	100	81			
	63,0	100	75			
	53,0	99	73			
	37,5	92	67	-		
	28,0	80	61	-		
	20,0	70	56	-		
	14,0	64	52	-		
	5,00	50	41	-		
	2,00	43	20-70	34	-	
	0,425	28	-	22	-	
0,075	14	-	11	-		
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,7	≤ 30	22,6	-	
	P.I.	4,7	≤ 10	5,1	≤ 12	
	LS%	2,7	≤ 5	3	≤ 7	
	GM	2,16	2.5 ≥ GM ≥ 1.5	2,33	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	35		36		
	Fine sand	32		33		
	Coarse fine sand	12		10		
	Medium fine sand	12		13		
	Fine fine sand	8		10		
	Silt and clay	33		32		
	Coarse sand ratio	0,4		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	5,3		6,3		
	MDD(KG/M ³)	2185		2251		
C.B.R. SANS 3001 GR40	COMP MC	5,4		6,3		
	% SWELL	0,0	≤ 0.5	0,0	1,50	
	100%	115	-	41	-	
	98%	86	-	31	-	
	97%	72	-	27	-	
	95%	55	45	20	-	
	93%	41	-	16	15	
90%	27	-	10	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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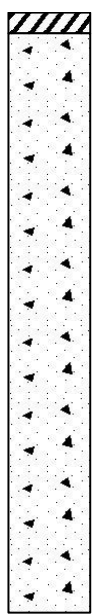
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°38'41" E22°13'29"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 27.500, LHS</p> <p>Test Hole No: Km 27.500, LHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal @580mm Due to Sandstone Cobbles and Boulders</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.



<p>0</p> <p>100</p> <p>200</p> <p>300</p> <p>400</p> <p>500</p> <p>600</p> <p>700</p>	<p>0 - 20mm CAPE SEAL, /</p> <p>20 - 580mm Slightly Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -</p> <p>REFUSAL ON S/STONE BOULDERS</p>	<p>25739/131</p>
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Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/131 taken at 20mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 131	SPEC				
HOLE No. / SV. / CHAINAGE	Km 27.500, LHS	G5				
ROAD No. OR NAME	TR75 / 1					
LAYER TESTED / SAMPLED FROM	Layer 2					
DATE RECEIVED	14/02/23					
CLIENTS MARKING	-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble					
REDUCTION FACTOR / RF CHECK	0,0444					
	0,04	< 1%				
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	81				
	75,0	74				
	63,0	73				
	53,0	72				
	37,5	67	-			
	28,0	57	-			
	20,0	51	-			
	14,0	46	-			
	5,00	33	-			
	2,00	27	20-70			
	0,425	17	-			
0,075	7	-				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	24,2	≤ 30			
	P.I.	6,5	≤ 10			
	LS%	3,2	≤ 5			
	GM	2,49	2,5 ≥ GM ≥ 1,5			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	38				
	Fine sand	37				
	Coarse fine sand	14				
	Medium fine sand	12				
	Fine fine sand	11				
	Silt and clay	25				
	Coarse sand ratio	0,4				
MOD AASHTO SANS 3001 GR30	OMC%	6,4				
	MDD(KG/M ³)	2304				
C.B.R. SANS 3001 GR40	COMP MC	6,4				
	% SWELL	0,0	≤ 0.5			
	100%	120	-			
	98%	90	-			
	97%	80	-			
	95%	61	45			
	93%	47	-			
90%	32	-				
TEST TYPE	SANS - MOD.CBR.IND					

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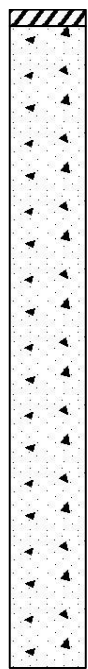
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

<p>Client Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000</p> <p>Attention: Mr Andrew Smith</p> <p>GPS / WGS8: S33°38'33" E22°13'28"</p> <p>Sampling Method TMH5 Method MC1</p>	<p>Project: C1117: Pavement Strengthening of TR75/1</p> <p>Site / Road: TR75/1</p> <p>Stake Value: Km 27.750, RHS</p> <p>Test Hole No: Km 27.750, RHS</p> <p>Side Walls Stable</p> <p>Excavation Metho Pick Shovel & Breaker</p> <p>Refusal None</p> <p>Water table None</p> <p>Enviromental Condition Sunny & Hot</p>
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SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Depth (mm)

0 - 25mm	CAPE SEAL, /	
25 - 1000mm	Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G5	25739/134

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/134 taken at 25mm (Disturbed)

Surface Visual

Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 134	SPEC				
HOLE No. / SV. / CHAINAGE	Km 27.750, RHS	G5				
ROAD No. OR NAME	TR75 / 1					
LAYER TESTED / SAMPLED FROM	Layer 2					
DATE RECEIVED	14/02/23					
CLIENTS MARKING	-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble					
REDUCTION FACTOR / RF CHECK	0,0457					
	0,04	< 1%				
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100				
	75,0	98				
	63,0	98				
	53,0	97				
	37,5	88	-			
	28,0	75	-			
	20,0	65	-			
	14,0	55	-			
	5,00	36	-			
	2,00	28	20-70			
	0,425	18	-			
0,075	9	-				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	18,9	≤ 30			
	P.I.	4,8	≤ 10			
	LS%	1,9	≤ 5			
	GM	2,44	2,5 ≥ GM ≥ 1,5			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	35				
	Fine sand	32				
	Coarse fine sand	12				
	Medium fine sand	10				
	Fine fine sand	10				
	Silt and clay	33				
	Coarse sand ratio	0,4				
MOD AASHTO SANS 3001 GR30	OMC%	6,4				
	MDD(KG/M ³)	2164				
C.B.R. SANS 3001 GR40	COMP MC	6,4				
	% SWELL	0,25	≤ 0.5			
	100%	100	-			
	98%	80	-			
	97%	70	-			
	95%	55	45			
	93%	43	-			
90%	30	-				
TEST TYPE	SANS - MOD.CBR.IND					

NOTE: All tests marked with (*) means that those test methods are not accredited.



CIVIL ENGINEERING TESTING LABORATORIES

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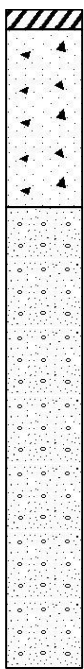
Email: admin@steynwilson.co.za

Web: www.steynwilson.co.za

JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 28.000, LHS	Test Hole No:	Km 28.000, LHS
GPS / WGS84	S33°38'26" E22°13'23"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	CAPE SEAL, /		
30 - 300mm	Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/132	
300 - 1000mm	Moist, Dark Reddish BROWN, Medium Dense, Intact, Abundant Silty fine to coarse grain SAND with minor Gravel, Residual, HCL + / PHEN -, G9	25739/133	

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/132 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/133 taken at 300mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 132	SPEC	25739 / 133	SPEC		
HOLE No. / SV. / CHAINAGE	Km 28.000, LHS	G5	Km 28.000, LHS	G9		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	14/02/23		14/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Abundant Silty fine to coarse grain SAND with minor Gravel			
REDUCTION FACTOR / RF CHECK	0,0463		0,0416			
	-0,02	< 1%	0,07	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	99	99			
	63,0	99	99			
	53,0	97	99			
	37,5	87	97	-		
	28,0	75	96	-		
	20,0	66	94	-		
	14,0	59	92	-		
	5,00	42	89	-		
	2,00	34	84	-		
	0,425	22	69	-		
0,075	12	38	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	16,9	≤ 30	23	-	
	P.I.	3,3	≤ 10	6,4	≤ 12	
	LS%	1,7	≤ 5	2,9	≤ 7	
	GM	2,32	2.5 ≥ GM ≥ 1.5	1,08	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	36		18		
	Fine sand	27		37		
	Coarse fine sand	10		10		
	Medium fine sand	10		16		
	Fine fine sand	8		12		
	Silt and clay	36		45		
	Coarse sand ratio	0,4		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	5,3		7,4		
	MDD(KG/M ³)	2277		1991		
C.B.R. SANS 3001 GR40	COMP MC	5,3		7,3		
	% SWELL	0,0	≤ 0.5	0,7	1,50	
	100%	125	-	30	-	
	98%	93	-	21	-	
	97%	81	-	18	-	
	95%	62	45	13	-	
	93%	47	-	9	7	
90%	31	-	6	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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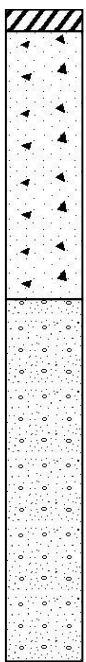
Web: www.steynwilson.co.za

JOB NO: SWL25739 Ref. - DATE: 23/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS84	S33°38'19" E22°13'18"	Stake Value:	Km 28.250, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 28.250, RHS
		Side Walls	Stable
		Excavation Method	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Environmental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	CAPE SEAL, /	
30 - 400mm	Slightly Moist, Light Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5	25739/135
400 - 900mm	Moist, Dark BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL + / PHEN -, G5	25739/136

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/135 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/136 taken at 400mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 135	SPEC	25739 / 136	SPEC		
HOLE No. / SV. / CHAINAGE	Km 28.250, RHS	G5	Km 28.250, RHS	G5		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	15/02/23		15/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble			
REDUCTION FACTOR / RF CHECK	0,0379		0,0551			
	0,60	< 1%	0,04	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	100			
	75,0	98	92			
	63,0	98	88			
	53,0	96	85			
	37,5	90	75	-		
	28,0	78	66	-		
	20,0	68	59	-		
	14,0	60	51	-		
	5,00	44	39	-		
	2,00	35	32	20-70		
	0,425	24	21	-		
0,075	12	11	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	16	≤ 30	17,2	≤ 30	
	P.I.	2,6	≤ 10	5,8	≤ 10	
	LS%	1,3	≤ 5	2,9	≤ 5	
	GM	2,28	2,5 ≥ GM ≥ 1,5	2,35	2,5 ≥ GM ≥ 1,5	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		34		
	Fine sand	32		32		
	Coarse fine sand	11		14		
	Medium fine sand	8		10		
	Fine fine sand	13		9		
	Silt and clay	35		34		
	Coarse sand ratio	0,3		0,3		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		6,4		
	MDD(KG/M ³)	2266		2221		
C.B.R. SANS 3001 GR40	COMP MC	6,3		6,3		
	% SWELL	0,0	≤ 0.5	0,35	≤ 0.5	
	100%	110	-	105	-	
	98%	91	-	80	-	
	97%	80	-	70	-	
	95%	63	45	52	45	
	93%	51	-	40	-	
	90%	36	-	26	-	
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 28.500, LHS	Test Hole No:	Km 28.500, LHS
GPS / WGS84	S33°38'13" E22°13'11"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	@1.0m Due to Sandstone Cobbles and Boulders	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm CAPE SEAL, /

30 - 1000mm Moist, Light Reddish BROWN, Dense, Intact, Clayey Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G6

REFUSAL ON S/STONE BOULDERS

25739/139

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/139 taken at 30mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 139	SPEC				
HOLE No. / SV. / CHAINAGE	Km 28.500, LHS	G6				
ROAD No. OR NAME	TR75 / 1					
LAYER TESTED / SAMPLED FROM	Layer 2					
DATE RECEIVED	15/02/23					
CLIENTS MARKING	-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Clayey Sandy fine to coarse S/Stone GRAVEL with minor Cobble					
REDUCTION FACTOR / RF CHECK	0,0434					
	0,04	< 1%				
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	89				
	75,0	84				
	63,0	80				
	53,0	78				
	37,5	69	-			
	28,0	60	-			
	20,0	51	-			
	14,0	45	-			
	5,00	33	-			
	2,00	27	-			
	0,425	19	-			
0,075	12	-				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	23	-			
	P.I.	4,4	≤ 12			
	LS%	1,7	≤ 5			
	GM	2,42	2,6 ≥ GM ≥ 1,2			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	30				
	Fine sand	27				
	Coarse fine sand	11				
	Medium fine sand	8				
	Fine fine sand	8				
	Silt and clay	43				
	Coarse sand ratio	0,3				
MOD AASHTO SANS 3001 GR30	OMC%	6,4				
	MDD(KG/M ³)	2282				
C.B.R. SANS 3001 GR40	COMP MC	6,4				
	% SWELL	0,0	1,00			
	100%	49	-			
	98%	38	-			
	97%	34	-			
	95%	26	25			
	93%	21	-			
90%	15	-				
TEST TYPE	SANS - MOD.CBR.IND					

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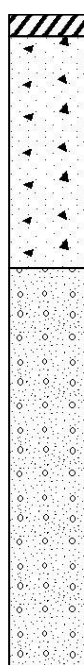
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JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 28.750, RHS	Test Hole No:	Km 28.750, RHS
GPS / WGS84	S33°38'06" E22°13'06"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 30mm	CAPE SEAL, /	
30 - 350mm	Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G5	25739/137
350 - 900mm	Moist, Dark Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with abundant Cobble, Imported, HCL - / PHEN -, G7	25739/138

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/137 taken at 30mm (Disturbed)
 Layer 3 Sample No. 25739/138 taken at 350mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 137	SPEC	25739 / 138	SPEC		
HOLE No. / SV. / CHAINAGE	Km 28.750, RHS	G5	Km 28.750, RHS	G7		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	15/02/23		15/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble				Silty Sandy fine to coarse S/Stone GRAVEL with abundant Cobble	
REDUCTION FACTOR / RF CHECK	0,0531		0,0455			
	0,04	< 1%	0,05	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	98	100			
	75,0	95	95			
	63,0	92	91			
	53,0	85	88			
	37,5	76	79	-		
	28,0	67	71	-		
	20,0	60	62	-		
	14,0	53	53	-		
	5,00	38	36	-		
	2,00	31	29	-		
	0,425	21	16	-		
0,075	13	9	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21	≤ 30	21	-	
	P.I.	5,4	≤ 10	5,3	≤ 12	
	LS%	2,4	≤ 5	2,3	≤ 7	
	GM	2,35	2.5 ≥ GM ≥ 1.5	2,46	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	33		43		
	Fine sand	23		27		
	Coarse fine sand	5		14		
	Medium fine sand	9		7		
	Fine fine sand	9		6		
	Silt and clay	43		30		
	Coarse sand ratio	0,3		0,4		
MOD AASHTO SANS 3001 GR30	OMC%	5,4		5,3		
	MDD(KG/M ³)	2265		2289		
C.B.R. SANS 3001 GR40	COMP MC	5,4		5,2		
	% SWELL	0,15	≤ 0.5	0,1	1,50	
	100%	120	-	45	-	
	98%	90	-	32	-	
	97%	73	-	28	-	
	95%	53	45	20	-	
	93%	40	-	15	15	
90%	24	-	9	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

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JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 29.000, LHS	Test Hole No:	Km 29.000, LHS
GPS / WGS84	S33°37'59" E22°13'04"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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Depth (mm)

0 - 25mm CAPE SEAL, /
 25 - 900mm Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL + / PHEN -, G5 25739/140

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/140 taken at 25mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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CIVIL ENGINEERING TESTING LABORATORIES

JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 140	SPEC				
HOLE No. / SV. / CHAINAGE	Km 29.000, LHS	G5				
ROAD No. OR NAME	TR75 / 1					
LAYER TESTED / SAMPLED FROM	Layer 2					
DATE RECEIVED	16/02/23					
CLIENTS MARKING	-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL					
REDUCTION FACTOR / RF CHECK	0,0417 0,05		< 1%			
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100				
	75,0	100				
	63,0	100				
	53,0	100				
	37,5	92	-			
	28,0	77	-			
	20,0	68	-			
	14,0	58	-			
	5,00	43	-			
	2,00	37	20-70			
	0,425	25	-			
0,075	14	-				
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	19,4	≤ 30			
	P.I.	5,4	≤ 10			
	LS%	2,4	≤ 5			
	GM	2,24	2,5 ≥ GM ≥ 1,5			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	31				
	Fine sand	32				
	Coarse fine sand	15				
	Medium fine sand	10				
	Fine fine sand	8				
	Silt and clay	37				
	Coarse sand ratio	0,3				
MOD AASHTO SANS 3001 GR30	OMC%	6,4				
	MDD(KG/M³)	2251				
C.B.R. SANS 3001 GR40	COMP MC	6,3				
	% SWELL	0,0	≤ 0.5			
	100%	110	-			
	98%	85	-			
	97%	72	-			
	95%	57	45			
	93%	42	-			
90%	28	-				
TEST TYPE	SANS - MOD.CBR.IND					

NOTE: All tests marked with (*) means that those test methods are not accredited.



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CIVIL ENGINEERING TESTING LABORATORIES

11 Gooderson Road Blackheath

PO Box 58 Blackheath 7581

Tel: 021 905 0435

Fax: 086 499 9482

Email: admin@steynwilson.co.za

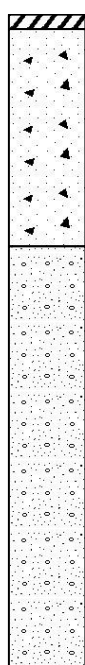
Web: www.steynwilson.co.za

JOB NO: SWL25739 **Ref.:** - **DATE:** 23/03/23

Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1
Attention:	Mr Andrew Smith	Site / Road:	TR75/1
GPS / WGS84	S33°37'51" E22°13'08"	Stake Value:	Km 29.250, RHS
Sampling Method	TMH5 Method MC1	Test Hole No:	Km 29.250, RHS
		Side Walls	Stable
		Excavation Method	Pick Shovel & Breaker
		Refusal	None
		Water table	None
		Environmental Condition	Sunny & Hot

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
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0 - 20mm	CAPE SEAL, /	
20 - 320mm	Slightly Moist, Light Orange BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with traces of Calcrete, HCL + / PHEN -, G5	25739/143
320 - 900mm	Moist, Dark Reddish BROWN, Dense, Intact, Silty Sandy fine to coarse S/Stone + Shale GRAVEL , HCL + / PHEN -, G8	25739/144

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/143 taken at 20mm (Disturbed)
 Layer 3 Sample No. 25739/144 taken at 320mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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JOB NO: SWL25739	Your Ref -	Date 23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	PROJECT: C1117: Pavement Strengthening of TR75/1	
ATTENTION: Mr Andrew Smith		

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	25739 / 143	SPEC	25739 / 144	SPEC		
HOLE No. / SV. / CHAINAGE	Km 29.250, RHS	G5	Km 29.250, RHS	G8		
ROAD No. OR NAME	TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM	Layer 2		Layer 3			
DATE RECEIVED	16/02/23		16/02/23			
CLIENTS MARKING	-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Silty Sandy fine to coarse S/Stone GRAVEL with traces of Calcrete				Silty Sandy fine to coarse S/Stone + Shale GRAVEL	
REDUCTION FACTOR / RF CHECK	0,0573		0,0414			
	0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	98			
	75,0	98	97			
	63,0	96	94			
	53,0	94	92			
	37,5	82	86	-		
	28,0	70	80	-		
	20,0	61	74	-		
	14,0	53	69	-		
	5,00	39	55	-		
	2,00	33	48	-		
	0,425	25	37	-		
0,075	14	20	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21,2	≤ 30	25,5	≤ 7	
	P.I.	5	≤ 10	8,3	≤ 12	
	LS%	2,4	≤ 5	3,9	-	
	GM	2,29	2.5 ≥ GM ≥ 1.5	1,94	2.7 ≥ GM ≥ 0.75	
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	25		23		
	Fine sand	33		35		
	Coarse fine sand	13		22		
	Medium fine sand	10		5		
	Fine fine sand	9		8		
	Silt and clay	42		42		
	Coarse sand ratio	0,3		0,2		
MOD AASHTO SANS 3001 GR30	OMC%	6,4		6,5		
	MDD(KG/M ³)	2245		2210		
C.B.R. SANS 3001 GR40	COMP MC	6,4		6,5		
	% SWELL	0,14	≤ 0.5	0,65	1,50	
	100%	105	-	36	-	
	98%	82	-	27	-	
	97%	72	-	23	-	
	95%	58	45	17	-	
	93%	45	-	13	10	
90%	31	-	8	-		
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND			

NOTE: All tests marked with (*) means that those test methods are not accredited.



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JOB NO:	SWL25739	Ref.	-	DATE:	23/03/23
Client	Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000	Project:	C1117: Pavement Strengthening of TR75/1	Site / Road:	TR75/1
Attention:	Mr Andrew Smith	Stake Value:	Km 29.500, LHS	Test Hole No:	Km 29.500, LHS
GPS / WGS84	S33°37'44" E22°13'13"	Side Walls	Stable	Excavation Method	Pick Shovel & Breaker
Sampling Method	TMH5 Method MC1	Refusal	None	Water table	None
		Environmental Condition	Sunny & Hot		

SOIL PROFILE - GRONDPROFIEL

PROFILE	DEPTH (mm)	DESCRIPTION	SAMPLE No.
---------	------------	-------------	------------



0
100
200
300
400
500
600
700
800
900
1 000

Depth (mm)

0 - 20mm	CAPE SEAL, /	
20 - 250mm	Slightly Moist, Dark Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL, Imported, HCL - / PHEN -, G5	25739/141
250 - 900mm	Moist, Light Reddish BROWN, Very Dense, Intact, Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble, Imported, HCL - / PHEN -, G7	25739/142

Samples Taken:
 Layer 1 None Taken
 Layer 2 Sample No. 25739/141 taken at 20mm (Disturbed)
 Layer 3 Sample No. 25739/142 taken at 250mm (Disturbed)

Surface Visual



Profile Measurement



Spoils





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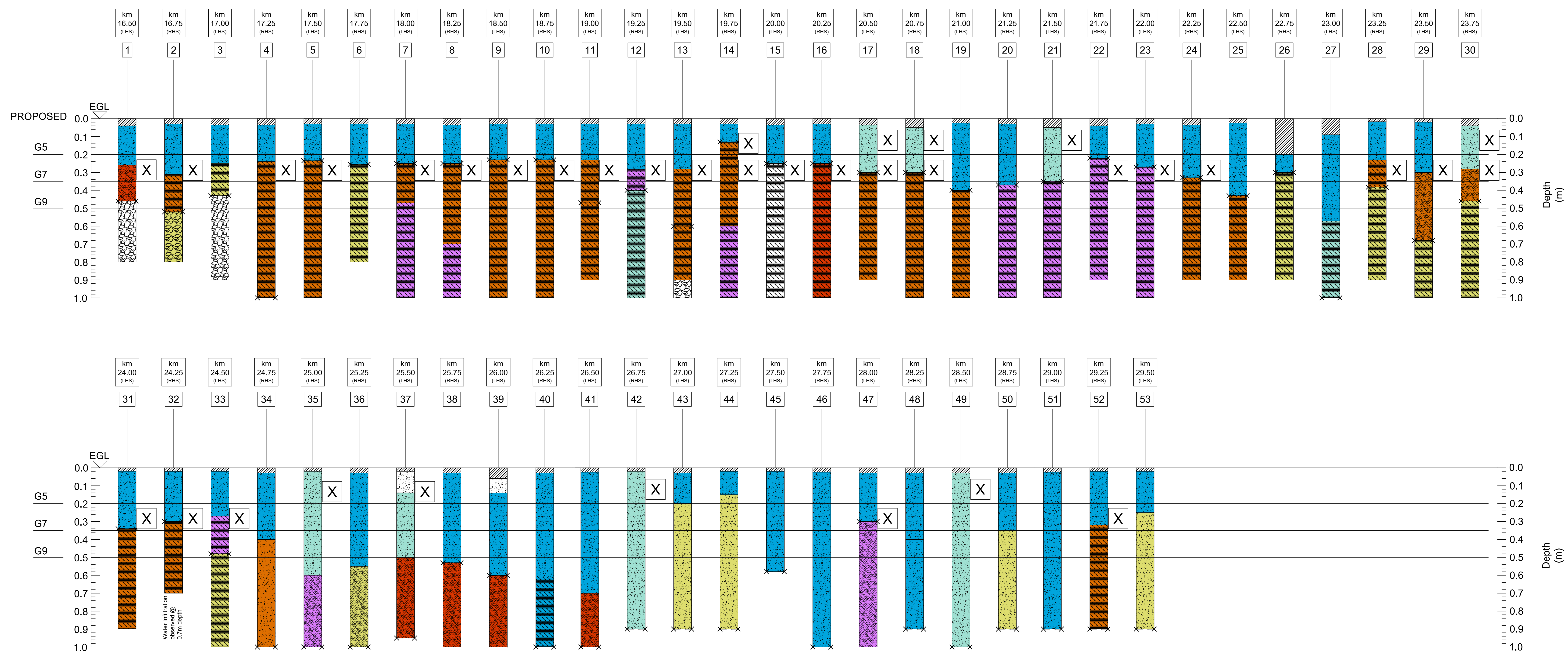
JOB NO:	SWL25739	Your Ref	-	Date	23/03/23
Kantey & Templer (Pty) Ltd P.O. Box 3132 Cape Town 8000			PROJECT: C1117: Pavement Strengthening of TR75/1		
ATTENTION:	Mr Andrew Smith				

TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR30, GR40

The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		25739 / 141	SPEC	25739 / 142	SPEC		
HOLE No. / SV. / CHAINAGE		Km 29.500, LHS	G5	Km 29.500, LHS	G7		
ROAD No. OR NAME		TR75 / 1		TR75 / 1			
LAYER TESTED / SAMPLED FROM		Layer 2		Layer 3			
DATE RECEIVED		16/02/23		16/02/23			
CLIENTS MARKING		-		-			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Silty Sandy fine to coarse S/Stone GRAVEL		Silty Sandy fine to coarse S/Stone GRAVEL with minor Cobble			
REDUCTION FACTOR / RF CHECK		0,0495		0,0423			
		0,05	< 1%	0,06	< 1%		
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		100			
	75,0	100		98			
	63,0	100		97			
	53,0	100		95			
	37,5	99	-	92	-		
	28,0	89	-	81	-		
	20,0	76	-	72	-		
	14,0	65	-	63	-		
	5,00	45	-	52	-		
	2,00	36	20-70	46	-		
	0,425	23	-	35	-		
0,075	8	-	19	-			
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL%	21	≤ 30	24	-		
	P.I.	5	≤ 10	6,6	≤ 12		
	LS%	2,4	≤ 5	3,2	≤ 7		
	GM	2,33	2.5 ≥ GM ≥ 1.5	2,00	2.7 ≥ GM ≥ 0.75		
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	38		25			
	Fine sand	40		33			
	Coarse fine sand	15		14			
	Medium fine sand	14		11			
	Fine fine sand	11		8			
	Silt and clay	22		42			
	Coarse sand ratio	0,4		0,2			
MOD AASHTO SANS 3001 GR30	OMC%	6,3		6,4			
	MDD(KG/M ³)	2212		2250			
C.B.R. SANS 3001 GR40	COMP MC	6,2		6,3			
	% SWELL	0,0	≤ 0.5	0,0	1,50		
	100%	110	-	33	-		
	98%	93	-	27	-		
	97%	87	-	24	-		
	95%	70	45	20	-		
	93%	60	-	16	15		
90%	44	-	13	-			
TEST TYPE	SANS - MOD.CBR.IND		SANS - MOD.CBR.IND				

NOTE: All tests marked with (*) means that those test methods are not accredited.



LEGEND									
1	150mm G2	G2	G7	SURFACING	SILTY/CLAYEY SAND	✕ — ✕	LEVEL OF IMPORTED MATERIAL		
TRIAL HOLE NUMBER	200mm C4	G4	G8	SANDSTONE GRAVEL	SHALE BEDROCK	X	NON-CONFORMING MATERIAL		
	150mm G7	G5	G9	SHALE GRAVEL					
	150mm G9	G6	G10						

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	PRE	DESIGNED BY:	A SAUER
A	01/03/2023	CONCEPT & VIABILITY REPORT			DRAWN BY:	T SHOTO
					CHECKED BY:	A SMITH
					APPROVED BY:	P BARKHUIZEN



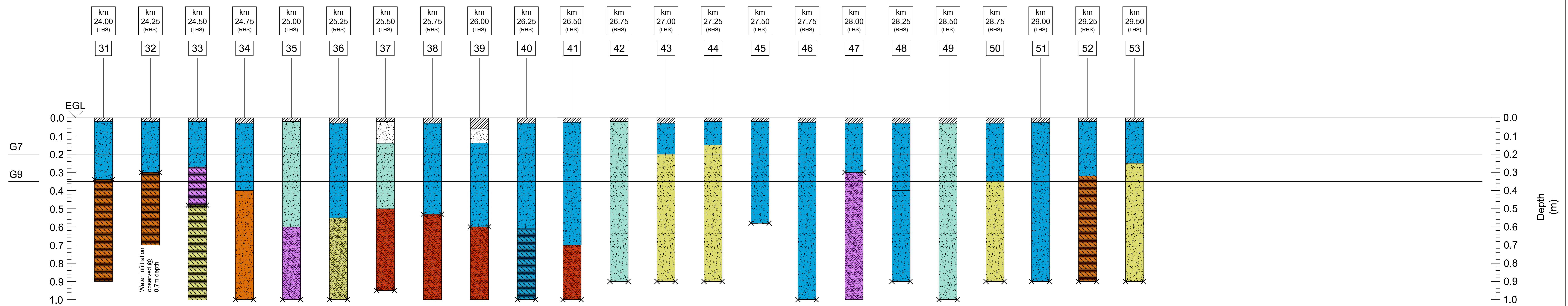
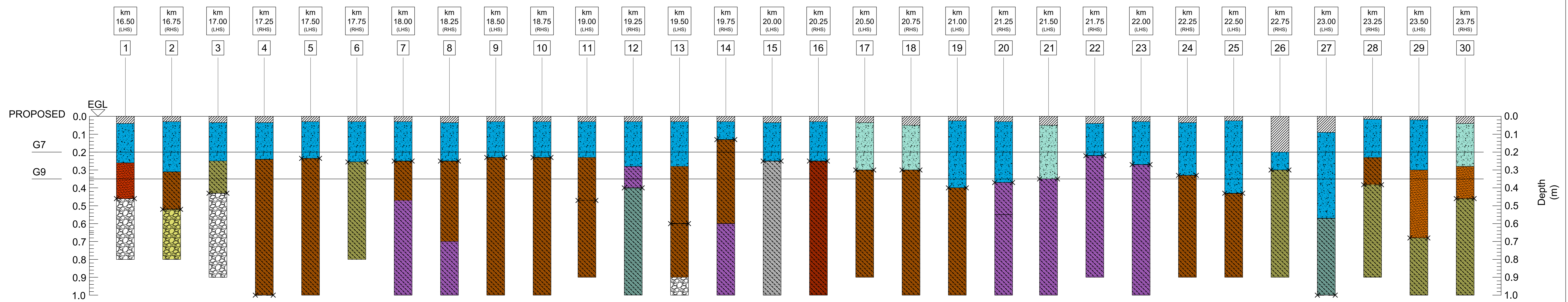
CONSULTING ENGINEERS
DATE _____



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PROVINCIAL ROADS ENGINEER
DATE _____

CONTRACT NO C1117: PAVEMENT STRENGTHENING OF TR75/1 (KM 16.50 TO KM 31.22) NEAR OUDTSHOORN
CENTERLINE SOILS INVESTIGATION
OPTION 1 : EXISTING BASE AS NEW STABILIZED SUBBASE

0mm 50mm 100mm 100mm at A0 size		P.R.E.'s FILE No. TPW16/6/4/1/3-TR7501-C1117	SCALE NTS
		CONTRACT No. C1117	WCG STRUCTURE PLAN
		CONSULTANTS DWG No. 15675-GG-01	WCG INDEX No. VER A



LEGEND

<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">1</div> <p>TRIAL HOLE NUMBER</p>	<table border="0"> <tr><td style="border: 1px solid black; width: 20px; height: 10px;"></td><td>150mm G2</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 10px;"></td><td>200mm C4</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 10px;"></td><td>150mm G7</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 10px;"></td><td>150mm G9</td></tr> </table>		150mm G2		200mm C4		150mm G7		150mm G9	<table border="0"> <tr><td style="width: 15px; height: 15px; background-color: #00FF00;"></td><td>G2</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #00FF00;"></td><td>G4</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #00FF00;"></td><td>G5</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #00FF00;"></td><td>G6</td></tr> </table>		G2		G4		G5		G6	<table border="0"> <tr><td style="width: 15px; height: 15px; background-color: #FFFF00;"></td><td>G7</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #FFA500;"></td><td>G8</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #FF00FF;"></td><td>G9</td></tr> <tr><td style="width: 15px; height: 15px; background-color: #FF0000;"></td><td>G10</td></tr> </table>		G7		G8		G9		G10	<table border="0"> <tr><td style="border: 1px solid black; width: 20px; height: 20px; background-image: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></td><td>SURFACING</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px; background-image: radial-gradient(circle, black 1px, transparent 1px); background-size: 4px 4px;"></td><td>SANDSTONE GRAVEL</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px; background-image: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%); background-size: 4px 4px;"></td><td>SHALE GRAVEL</td></tr> </table>		SURFACING		SANDSTONE GRAVEL		SHALE GRAVEL	<table border="0"> <tr><td style="border: 1px solid black; width: 20px; height: 20px; background-image: radial-gradient(circle, black 1px, transparent 1px); background-size: 4px 4px;"></td><td>SILTY/CLAYEY SAND</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px; background-image: radial-gradient(circle, black 1px, transparent 1px); background-size: 4px 4px;"></td><td>SHALE BEDROCK</td></tr> </table>		SILTY/CLAYEY SAND		SHALE BEDROCK	<table border="0"> <tr><td style="text-align: center;">X — X</td><td>LEVEL OF IMPORTED MATERIAL</td></tr> <tr><td style="text-align: center;">X</td><td>NON-CONFORMING MATERIAL</td></tr> </table>	X — X	LEVEL OF IMPORTED MATERIAL	X	NON-CONFORMING MATERIAL
	150mm G2																																											
	200mm C4																																											
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NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED		DESIGNED BY:	A SAUER
			CONS.	PRE		
A	01/03/2023	CONCEPT & VIABILITY REPORT			DRAWN BY:	T TSHOTO
					CHECKED BY:	A SMITH
					APPROVED BY:	P BARKHUIZEN



CONSULTING ENGINEERS
DATE:



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PROVINCIAL ROADS ENGINEER
DATE:

CONTRACT NO C1117: PAVEMENT STRENGTHENING OF TR75/1
(KM 16.50 TO KM 31.22) NEAR OUDTSHOORN
CENTERLINE SOILS INVESTIGATION
OPTION 2: EXISTING BASE AS NEW UPPER SSG

P.R.E.'s FILE No. TPW16/64/1/3-TR7501-C1117	SCALE NTS
CONTRACT No. C1117	WCG STRUCTURE PLAN
CONSULTANTS DWG No. 15675-GG-02	WCG INDEX No. VER A

Annexure 3
LOCALISED CROSS SECTION IMPROVEMENTS

Class 3 - Existing alignment					Class 3 - Locally adjusted alignment		
Start SV	End SV	Length (m)	Cut [m ³]	Fill [m ³]	Cut [m ³]	Fill [m ³]	Comment / Mitigation Measure
18500	19400	900	4 300	400	2 600	900	Offset horizontally ±2m to LHS
19400	20500	1100	17 800	600	3 900	700	1.2m Kerb & Channel (K&C) with 1:0.5 Cut slope
21500	22500	1000	1 400	12 400	1 000	300	Offset horizontally ±2m to RHS & 0.6m K&C with 1:0.5 Cut slope
22500	23500	1000	9 200	6 700	1 200	1 300	Offset horizontally ±3m to RHS & 1.2m K&C with 1:0.5 Cut slope Earth Retaining wall (LHS Fill) proposed SV22900 to SV22980
23500	25500	2000	9 000	5 700	6 000	8 100	Offset horizontally ±2m to LHS & match existing cut slope
25500	27500	2000	20 800	5 800	4 900	5 400	Offset horizontally ±1.5m to RHS & match existing cut slope 1.2m K&C with 1:0.5 Cut slope where applicable
27500	29420	1920	9 300	2 400	3 900	2 900	Offset horizontally ±2m to LHS&RHS & match existing cut slope 1.2m K&C with 1:0.5 Cut slope where applicable

Class 2 - Locally adjusted alignment							
Start SV	End SV	Length (m)	Cut [m ³]	Fill [m ³]	Comment / Mitigation Measure		
18500	19400	900	3500	1400	Offset horizontally ±2m to LHS		
19400	20500	1100	4700	1000	Increase hairpin bend curve radius slightly (121mR to 122mR) Fill inside of curve only Match existing cut slope (1:1) from SV20080 - SV20260		
20500	21500	1000	1300	500	Offset horizontally ±1m to RHS, Avoid high fill thus cut RHS only		
21500	22400	900	1400	300	Increase curve radius (C21) to 820mR, thus shifting closer to cut face 0.6mK&C and 1:0.5Slope Retaining structure from SV22250 - SV22350 (LHS)		
22400	23500	1100	1200	2000	1.2m K&C with 1:0.5 cut slope Retaining structure from SV22470 - SV22580 (LHS) Retaining structure from SV22900 - SV22970 & SV23040 - SV23070 (LHS) Due to high cut (RHS) & high fill (LHS) with railway at toe		
23500	24500	1000	6900	4300	6m High cut RHS 5m High fill LHS		
24500	25500	1000	4300	2900	High cut RHS (8m max) and high fills LHS (7m max)		
25500	27500	2000	7400	6800	Offset horizontally ±1.5m to RHS & match existing cut slope 1.2m K&C with 1:0.5 Cut slope where applicable High fills both sides		
27500	28500	1000	2900	1600	Offset horizontally ±2m to LHS&RHS & match existing cut slope 1.2m K&C with 1:0.5 Cut slope where applicable		
28500	29420	920	1800	2600	High cut RHS (7m max) and high fills BOTH (8m max)		

Annexure 3
LOCALISED CROSS SECTION IMPROVEMENTS

Class 1 - Locally adjusted alignment					
Start SV	End SV	Length (m)	Cut [m ³]	Fill [m ³]	Comment / Mitigation Measure
16500	18500	2000	1000	2200	Higher and wider fills (Class 3 -759C&1097F; Class 2 - 820C&1490F)
18500	19400	900	4100	2600	Offset horizontally ±2m to LHS
19400	20500	1100	5600	2400	Increase hairpin bend curve radius slightly (121mR to 122.25mR) Fill inside of curve only Match existing cut slope (1:1) from SV20080 - SV20260
20500	21500	1000	2100	800	Offset horizontally ±1m to RHS, Avoid high fill thus cut RHS only
21500	22400	900	2800	300	Increase curve radius (C21) to 820mR, thus shifting closer to cut face 0.6mK&C and 1:0.5Slope Retaining structure from SV22250 - SV22350 (LHS)
22400	23500	1100	4400	3500	1.2m/0.6m K&C with 1:0.5 cut slope where applicable Retaining structure from SV22470 - SV22590 (LHS) Retaining structure from SV22900 - SV22970 & SV23040 - SV23080 (LHS) Due to 12m high cut (RHS) & 10m high fill(LHS)
23500	24500	1000	6500	2500	6m High cut RHS 6m High fill LHS
24500	25500	1000	5900	3400	High cut RHS (8m max) and high fills LHS (8m max)
25500	26500	1000	6100	4300	Offset horizontally ±1.5m to RHS & match existing cut slope 1.2m K&C with 1:0.5 Cut slope where applicable High fills both sides
26500	27500	1000	7800	3900	Offset horizontally ±1.5m to RHS & match existing cut slope Reduce curve radius (C33) from 410mR to 400mR 1.2m K&C with 1:0.5 Cut slope where applicable High cut RHS side (Max 9m) & High fill (10m max)
27500	28500	1000	4100	2400	Offset horizontally ±2m to LHS&RHS & match existing cut slope 7m High cuts RHS 1.2m K&C with 1:0.5 Cut slope where applicable
28500	29420	920	2700	3100	High cut RHS (7m max) - cut slope to match existing Retaining structure from SV28520 - SV28620 (LHS) Retaining structure from SV28540 - SV28610 (RHS)

Annexure 4.1
CATCHMENT AREA CHARACTERISTICS

Catchment characteristics		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Culvert no.															
Stake Value	km	16.63	16.77	16.90	17.14	17.27	17.42	17.98	18.16	18.30	18.53	18.87	19.12	19.28	19.44
Description		RHS	RHS	RHS	LHS	LHS	LHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS
Catchment area	km ²	0.032	0.014	0.116	0.005	0.005	0.008	0.249	0.077	0.089	0.069	0.019	0.039	0.011	0.039
Longest watercourse	km	0.365	0.389	0.591	0.20	0.232	0.295	0.703	0.470	0.348	0.372	0.309	0.450	0.177	0.39
Height difference (85/10)	m	14.40	25.94	25.79	8.46	8.70	8.09	49.32	48.98	46.54	52.50	26.62	29.76	23.68	48.20
Average slope	m/m	0.04	0.09	0.06	0.06	0.05	0.04	0.094	0.14	0.18	0.19	0.11	0.09	0.18	0.16
Return period	yr	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Design flood															
Rational Alternative 3	m ³ /s	0.119	0.162	0.467	0.029	0.030	0.037	1.013	0.387	0.511	0.434	0.117	0.182	0.078	0.211
SDF	m ³ /s	0.360	0.124	1.246	0.062	0.057	0.096	2.727	0.955	1.097	0.855	0.237	0.472	0.084	0.488
Difference	m ³ /s	0.241	-0.038	0.779	0.033	0.027	0.059	1.714	0.568	0.586	0.421	0.120	0.290	0.006	0.277
% Difference		67%	-31%	63%	54%	48%	62%	63%	60%	53%	49%	51%	62%	7%	57%

Catchment characteristics		15	16	17	18	19	20	21	22	23	24	25	26	27	28
Culvert no.															
Stake Value	km	19.75	19.92	20.06	20.57	20.76	20.91	21.06	21.26	21.43	21.56	21.74	21.88	22.06	22.23
Description		RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS
Catchment area	km ²	0.086	0.052	0.572	0.274	0.041	0.030	0.030	0.243	0.036	0.034	0.026	0.037	0.014	0.010
Longest watercourse	km	0.408	0.418	1.206	0.79	0.514	0.372	0.419	1.156	0.349	0.300	0.278	0.246	0.140	0.21
Height difference (85/10)	m	76.18	98.14	103.86	95.74	101.55	100.02	94.98	118.58	78.64	81.11	78.20	72.04	43.76	28.06
Average slope	m/m	0.25	0.31	0.11	0.16	0.26	0.36	0.302	0.14	0.30	0.36	0.37	0.39	0.42	0.18
Return period	yr	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Design flood															
Rational Alternative 3	m ³ /s	0.497	0.302	2.005	1.249	0.218	0.184	0.179	0.896	0.221	0.227	0.175	0.267	0.101	0.061
SDF	m ³ /s	1.058	0.628	5.406	3.132	0.514	0.338	0.364	2.408	0.411	0.328	0.225	0.250	0.119	0.096
Difference	m ³ /s	0.561	0.326	3.401	1.883	0.296	0.154	0.185	1.512	0.190	0.101	0.050	-0.017	0.018	0.035
% Difference		53%	52%	63%	60%	58%	45%	51%	63%	46%	31%	22%	-7%	15%	37%

Catchment characteristics		29	30	31	32	33	34	35	36	37	38	39	40	41	42
Culvert no.															
Stake Value	km	22.70	22.76	23.33	23.48	23.65	23.90	24.11	24.23	24.54	24.74	25.01	25.35	25.44	25.53
Description		RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS
Catchment area	km ²	0.448	0.649	1.309	0.007	0.216	0.024	0.149	1.172	0.167	0.830	0.122	0.087	0.019	0.198
Longest watercourse	km	1.321	2.349	2.289	0.16	1.006	0.356	0.804	2.128	0.831	1.559	0.602	0.549	0.255	0.88
Height difference (85/10)	m	112.86	119.00	103.57	26.31	103.93	48.51	74.47	156.98	75.10	164.16	107.00	83.56	63.19	111.58
Average slope	m/m	0.11	0.07	0.06	0.22	0.14	0.18	0.124	0.10	0.12	0.14	0.24	0.20	0.33	0.17
Return period	yr	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Design flood															
Rational Alternative 3	m ³ /s	1.487	1.677	3.330	0.054	0.810	0.137	0.784	3.363	0.664	2.726	0.597	0.445	0.134	0.824
SDF	m ³ /s	4.101	4.099	8.134	0.031	2.289	0.296	1.634	8.455	1.807	7.384	1.517	1.083	0.159	2.213
Difference	m ³ /s	2.614	2.422	4.804	-0.023	1.479	0.159	0.850	5.092	1.143	4.658	0.920	0.638	0.025	1.389
% Difference		64%	59%	59%	-74%	65%	54%	52%	60%	63%	63%	61%	59%	16%	63%

Annexure 4.1
CATCHMENT AREA CHARACTERISTICS

Catchment characteristics		43	44	45	46	47	48	49	50	51	52	53	54	55	56
Culvert no.															
Stake Value	km	25.61	25.69	25.92	26.04	26.39	26.49	26.71	26.97	27.12	27.39	27.56	27.76	27.96	28.16
Description		RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS	RHS
Catchment area	km ²	0.005	0.021	0.012	1.388	0.030	0.154	0.028	1.650	0.029	0.225	0.136	0.091	0.581	0.126
Longest watercourse	km	0.213	0.259	0.328	3.79	0.342	0.781	0.204	3.023	0.262	1.001	0.828	0.562	1.499	0.65
Height difference (85/10)	m	57.69	67.77	49.06	163.00	61.15	99.16	65.29	93.23	41.30	55.67	51.58	37.86	67.74	78.05
Average slope	m/m	0.36	0.35	0.20	0.06	0.24	0.17	0.427	0.04	0.21	0.07	0.08	0.09	0.06	0.16
Return period	yr	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Design flood															
Rational Alternative 3	m ³ /s	0.040	0.144	0.072	2.924	0.175	0.653	0.214	3.615	0.181	0.763	0.506	0.396	1.819	0.578
SDF	m ³ /s	0.026	0.169	0.144	6.615	0.354	1.776	0.069	8.101	0.312	2.101	1.388	1.052	4.395	1.504
Difference	m ³ /s	-0.014	0.025	0.072	3.691	0.179	1.123	-0.145	4.486	0.131	1.338	0.882	0.656	2.576	0.926
% Difference		-54%	15%	50%	56%	51%	63%	-211%	55%	42%	64%	64%	62%	59%	62%

Catchment characteristics		57	58	59	60	61	62	63
Culvert no.								
Stake Value	km	28.26	28.41	28.59	28.80	29.01	29.26	29.41
Description		RHS	RHS	RHS	RHS	RHS	RHS	RHS
Catchment area	km ²	0.037	0.012	0.894	0.032	0.040	0.096	0.175
Longest watercourse	km	0.256	0.200	2.404	0.23	0.333	0.597	0.910
Height difference (85/10)	m	36.81	38.36	119.21	36.63	34.31	46.89	58.52
Average slope	m/m	0.19	0.26	0.07	0.21	0.14	0.10	0.086
Return period	yr	20	20	20	20	20	20	20
Design flood								
Rational Alternative 3	m ³ /s	0.226	0.084	2.279	0.208	0.212	0.422	0.646
SDF	m ³ /s	0.400	0.080	5.547	0.320	0.493	1.115	1.738
Difference	m ³ /s	0.174	-0.004	3.268	0.112	0.281	0.693	1.092
% Difference		43%	-5%	59%	35%	57%	62%	63%

Annexure 4.2
CULVERT CAPACITY SUMMARY

Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Catchment Area [km ²]	Left invert	Right invert	Culvert length	Culvert Slope [%]	CAPACITY [m ³ /s]	DESIGN FLOOD [m ³ /s]	
												Rat Alt 3	SDF
C1	16.63	RHS	PC	1	600	0.023	508.56	508.87	15.40	2.01%	0.44	0.119	0.360
C2	16.77	RHS	PC	1	600	0.032	502.40	502.87	14.27	3.29%	0.45	0.162	0.124
C3	16.90	RHS	PC	1	600	0.116	496.82	496.47	14.71	2.38%	0.44	0.467	1.246
C4	17.14	RHS	PC	1	600	0.005	483.25	483.45	15.92	1.26%	0.42	0.029	0.062
C5	17.27	RHS	PC	1	600	0.005	477.67	477.27	14.98	2.67%	0.44	0.030	0.057
C6	17.42		PC	1	600	0.008	472.83	472.09	14.70	5.03%	0.46	0.037	0.096
C7	17.98		BC	1	1200 x 1200	0.249	456.44	456.78	13.72	2.48%	3.25	1.013	2.727
C8	18.16		PC	1	600	0.077	456.01	456.66	14.24	4.57%	0.45	0.387	0.955
C9	18.30		PC	1	600	0.089	456.35	457.17	14.83	5.53%	0.46	0.511	1.097
C10	18.53		PC	2	600	0.069	453.36	454.11	17.10	4.39%	0.90	0.434	0.855
	18.69	RHS	PC	1	600	Not surveyed - Details TBC during Stage 3							
C11	18.87	RHS	PC	1	600	0.019	453.20	455.10	18.23	10.42%	0.47	0.117	0.237
C12	19.12	RHS	PC	1	600	0.039	449.80	450.59	16.33	4.84%	0.45	0.182	0.472
C13	19.28	RHS	PC	1	600	0.011	444.56	444.94	13.64	2.79%	0.44	0.078	0.084
C14	19.44	RHS	PC	1	600	0.039	435.02	435.41	13.45	2.90%	0.44	0.211	0.488
C15	19.75	RHS	PC	1	450	0.086	415.93	416.77	12.54	6.70%	0.23	0.497	1.058
C16	19.92	RHS	PC	1	600	0.052	405.37	406.47	12.52	8.79%	0.47	0.302	0.628
C17	20.06		BC	1	1800 x 1200	0.572	394.00	394.38	33.69	1.13%	4.87	2.005	5.406
	20.41		PC	1	600	Not surveyed - Details TBC during Stage 3							
C18	20.57		BC	1	1200 x 1200	0.274	385.69	386.08	15.24	2.56%	3.25	1.249	3.132
C19	20.76		PC	1	600	0.041	378.85	379.47	12.61	4.92%	0.45	0.218	0.514

Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Catchment Area [km ²]	Left invert	Right invert	Culvert length	Culvert Slope [%]	CAPACITY [m ³ /s]	DESIGN FLOOD [m ³ /s]	
												Rat Alt 3	SDF
C20	20.91		PC	1	600	0.030	371.59	372.37	12.66	6.16%	0.46	0.184	0.338
C21	21.06		PC	1	600	0.030	367.72	368.04	11.68	2.74%	0.44	0.179	0.364
C22	21.26		BC	1	1200 x 1200	0.243	362.41	363.05	14.53	4.40%	3.25	0.896	2.408
C23	21.43		PC	1	600	0.036	359.32	359.91	12.67	4.66%	0.45	0.221	0.411
C24	21.56		PC	1	600	0.034	356.66	357.27	12.76	4.78%	0.45	0.227	0.328
C25	21.74		PC	1	600	0.026	356.40	357.12	12.61	5.71%	0.46	0.175	0.225
C26	21.88		PC	1	600	0.037	355.17	356.50	12.99	10.24%	0.47	0.267	0.250
C27	22.06		PC	1	600	0.014	356.66	356.94	12.00	2.33%	0.44	0.101	0.119
C28	22.23		PC	1	600	0.010	355.01	355.28	10.77	2.51%	0.44	0.061	0.096
C29	22.70		BC	1	2450 x 2450	0.448	329.42	332.09	47.65	5.60%	19.34	1.487	4.101
C30	22.76		BC	1	1800 x 1800	0.649	327.31	330.38	33.92	9.05%	8.95	1.677	4.099
C31	23.33		BC	1	2400 x 2400	1.309	331.31	331.58	27.55	0.98%	18.37	3.330	8.134
C32	23.48		PC	1	600	0.007	331.92	332.70	13.53	5.76%	0.46	0.054	0.031
C33	23.65	LHS	BC	1	1200 x 1200	0.216	327.56	328.18	16.57	3.74%	3.25	0.810	2.289
C34	23.90	LHS	PC	2	600	0.024	326.11	327.25	19.69	5.79%	0.92	0.137	0.296
C35	24.11	LHS	BC	1	1200 x 1200	0.149	320.79	321.67	16.89	5.21%	3.25	0.784	1.634
C36	24.23	LHS	BC	1	2500 x 2500	1.172	319.74	320.22	16.93	2.84%	20.34	3.363	8.455
C37	24.54	LHS	PC	2	600	0.167	318.55	319.64	19.69	5.53%	0.92	0.664	1.807
C38	24.74	LHS	BC	1	1800 x 1800	0.830	318.73	320.33	19.36	8.26%	8.95	2.726	7.384
	24.86	LHS	PC	1	600	Not surveyed - Details TBC during Stage 3							
C39	25.01		BC	1	1200 x 1200	0.122	322.89	322.09	24.57	3.26%	3.25	0.597	1.517

Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Catchment Area [km ²]	Left invert	Right invert	Culvert length	Culvert Slope [%]	CAPACITY [m ³ /s]	DESIGN FLOOD [m ³ /s]	
												Rat Alt 3	SDF
C40	25.35		BC	1	1200 x 1200	0.087	337.61	338.03	15.69	2.68%	3.25	0.445	1.083
C41	25.44	RHS	PC	2	600	0.019	333.49	336.21	25.07	10.85%	0.95	0.134	0.159
C42	25.53	RHS	BC	1	1200 x 1200	0.198	335.83	336.59	18.38	4.13%	3.25	0.824	2.213
C43	25.61	RHS	PC	1	600	0.005	339.15	340.92	15.17	11.67%	0.47	0.040	0.026
C44	25.69	RHS	PC	2	600	0.021	341.06	342.51	15.06	9.63%	0.94	0.144	0.169
C45	25.92	RHS	PC	1	600	0.012	337.02	335.73	16.95	7.61%	0.46	0.072	0.144
C46	26.04		BC	1	2500 x 2500	1.388	324.61	324.95	23.81	1.43%	20.34	2.924	6.615
C47	26.39	LHS	PC	1	600	0.030	320.55	321.67	16.30	6.87%	0.46	0.175	0.354
C48	26.49	LHS	PC	2	600	0.154	320.51	320.97	15.22	3.02%	0.89	0.653	1.776
C49	26.71	LHS	PC	1	600	0.028	316.37	320.10	20.47	18.22%	0.49	0.214	0.069
C50	26.97		BC	1	2400 x 2400	1.650	304.54	305.43	34.29	2.60%	18.37	3.615	8.101
C51	27.12		PC	1	600	0.029	318.18	318.72	15.31	3.53%	0.45	0.181	0.312
C52	27.39		BC	1	1800 x 1800	0.225	305.31	306.99	30.34	5.54%	8.95	0.763	2.101
C53	27.56		BC	1	1200 x 1200	0.136	307.94	308.78	23.01	3.65%	3.25	0.506	1.388
C54	27.76	RHS	BC	1	2000 x 1200	0.091	307.71	308.45	13.39	5.53%	5.41	0.396	1.052
C55	27.96	RHS	BC	1	2400 x 2400	0.581	304.55	304.62	12.02	0.58%	18.37	1.819	4.395
C56	28.16	RHS	BC	1	2500 x 1200	0.126	304.63	304.61	10.84	0.18%	6.77	0.578	1.504
C57	28.26	RHS	BC	1	1200 x 1200	0.037	303.32	304.05	12.66	5.77%	3.25	0.226	0.400
C58	28.41		PC	1	600	0.012	302.90	303.81	13.43	6.77%	0.46	0.084	0.080
C59	28.59		BC	1	2400 x 2400	0.894	296.08	297.58	26.43	5.68%	18.37	2.279	5.547
C60	28.80		PC	2	600	0.032	305.37	307.52	21.96	9.79%	0.94	0.208	0.320
C61	29.01		BC	1	1200 x 1200	0.040	312.17	312.47	17.43	1.72%	3.25	0.212	0.493
C62	29.26		PC	2	600	0.096	306.22	306.77	17.36	3.17%	0.89	0.422	1.115
C63	29.41		BC	1	2400 x 1200	0.175	298.84	299.24	11.35	3.53%	6.49	0.646	1.738

**Annexure 4.3
PROPOSED REMEDIAL ACTIONS**

Type 1	Type 1
Type 2	Type 2
Type 3	Type 3
Type 4/5	Type 4/5

Type 1	Type 1
Type 2	Type 2
Type 3	Type 3
Type 4/5	Type 4/5




Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Culvert Extension Required (Yes/No)	INLET					OUTLET				
							Velocity [m/s]	Freud	Protection required?	Protection type	Action	Velocity [m/s]	Freud	Protection required?	Protection type	Action
C1	16.63	RHS	PC	1	600	Yes	1.36	1.52	No		Extend culvert; Replace HW	2.01	1.65	No		Extend culvert; Replace HW
C2	16.77	RHS	PC	1	600	Yes	1.57	1.80	No		Extend culvert; Replace HW	2.63	2.11	No		Extend culvert; Replace HW
C3	16.90	RHS	PC	1	600	Yes	2.34	1.65	No		Extend culvert; Replace HW	3.15	1.81	No		Extend culvert; Replace HW
C4	17.14	RHS	PC	1	600	Yes	1.27	1.44	No		Extend culvert; Replace HW	1.09	1.22	No		Extend culvert; Replace HW
C5	17.27	RHS	PC	1	600	Yes	1.31	1.50	No		Extend culvert; Replace HW	1.44	1.75	No		Extend culvert; Replace HW
C6	17.42		PC	1	600	No	1.05	1.23	Repair		Formalise HW	1.93	2.39	No		Replace HW
C7	17.98		BC	1	1200 x 1200	No	2.53	1.30	No		Clear siltation and debris	3.48	2.26	No		Clear siltation and debris
C8	18.16		PC	1	600	No	3.08	2.37	Repair	Type 2	Replace HW	3.81	2.53	Yes	Type 2	Replace HW
C9	18.30		PC	1	600	No	3.57	2.89	No		Replace HW	3.29	1.86	Yes	Type 2	Replace HW
C10	18.53		PC	2	600	No	3.42	2.62	No		Replace HW	3.17	1.87	No		Replace HW
	18.69	RHS	PC	1	600	Yes	Not surveyed - Details TBC during Stage 3				Extend culvert; Replace HW	Not surveyed - Details TBC during Stage 3				Extend culvert; Replace HW
C11	18.87	RHS	PC	1	600	Yes	2.03	2.19	No		Extend culvert; Replace HW	3.77	3.67	No		Extend culvert; Replace HW
C12	19.12	RHS	PC	1	600	Yes	1.76	2.01	Repair		Extend culvert; Replace HW	3.11	2.56	No		Extend culvert; Replace HW
C13	19.28	RHS	PC	1	600	Yes	2.06	2.41	No		Extend culvert; Replace HW	2.01	1.90	Repair		Extend culvert; Replace HW
C14	19.44	RHS	PC	1	600	Yes	2.51	2.65	No		Extend culvert; Replace HW	2.73	2.01	Yes	Type 2	Extend culvert; Replace HW; Embankment protection
C15	19.75	RHS	PC	1	450	Yes	4.07	3.27	Yes	Type 3	Extend culvert; Replace HW	4.69	2.79	Yes	Type 3	Extend culvert; Replace HW
C16	19.92	RHS	PC	1	600	Yes	3.54	3.32	Yes	Type 3	Extend culvert; Replace HW	4.49	3.48	Yes	Type 3	Extend culvert; Replace HW
C17	20.06		BC	1	1800 x 1200	No	4.21	2.39	Repair		Crack seal & spalling repair	3.08	1.63	No		Crack seal & spalling repair
	20.41		PC	1	600	No	Not surveyed - Details TBC during Stage 3				Replace HW	Not surveyed - Details TBC during Stage 3				Replace HW
C18	20.57		BC	1	1200 x 1200	No	3.63	2.36	Repair		Clear siltation and debris	3.73	2.28	Yes	Type 2	Clear siltation and debris; Construct erosion protection
C19	20.76		PC	1	600	No	2.94	2.86	No		Replace HW	3.32	2.60	Yes	Type 2	Replace HW
C20	20.91		PC	1	600	No	3.05	3.40	No		Replace HW	3.39	2.87	Yes	Type 3	Replace HW
C21	21.06		PC	1	600	No	3.01	3.36	No		Replace HW	2.56	1.95	Yes	Type 2	Replace HW
C22	21.26		BC	1	1200 x 1200	No	3.72	2.60	No		Clear siltation and debris; Crack seal	3.92	2.99	Yes	Type 3	Clear siltation and debris; Construct erosion protection
C23	21.43		PC	1	600	No	3.04	3.35	No		Clear siltation and debris	3.27	2.53	Yes	Type 2	Clear siltation and debris; Construct erosion protection
C24	21.56		PC	1	600	No	3.40	3.46	No		Clear debris	3.33	2.57	No		Clear debris
C25	21.74		PC	1	600	No	3.22	3.52	No		Clear siltation and debris	3.26	2.76	Yes	Type 2	Clear siltation and debris; Construct erosion protection
C26	21.88		PC	1	600	No	3.25	3.69	Repair		Clear siltation and debris	4.53	3.72	Yes	Type 3	Clear siltation and debris; Construct erosion protection
C27	22.06		PC	1	600	No	3.09	3.81	No		Replace HW	2.02	1.76	No		Replace HW; Possible repair of stone pitching
C28	22.23		PC	1	600	No	2.19	3.96	No		Clear siltation and debris	1.76	1.77	No		Clear siltation and debris
C29	22.70		BC	1	2450 x 2450	No	4.01	2.10	No		See measures proposed in Annexure 5.3	4.17	3.60	No		See measures proposed in Annexure 5.3

Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Culvert Extension Required (Yes/No)	INLET					OUTLET				
							Velocity [m/s]	Freud	Protection required?	Protection type	Action	Velocity [m/s]	Freud	Protection required?	Protection type	Action
C30	22.76		BC	1	1800 x 1800	No	3.67	2.09	No		Crack seal & spalling repair; clear debris	5.62	4.51	No		Crack seal & spalling repair; clear debris
C31	23.33		BC	1	2400 x 2400	No	6.39	3.19	Yes	Type 3	See measures proposed in Annexure 5.3	3.20	1.59	Yes	Type 2	See measures proposed in Annexure 5.3
C32	23.48		PC	1	600	No	1.89	2.75	Yes	Type 1	Clear siltation and debris; Replace HW; Shape waterway	2.23	2.59	Yes	Type 1	Clear siltation and debris; Replace HW; Shape waterway
C33	23.65	LHS	BC	1	1200 x 1200	Yes	3.33	2.42	No		Clear debris, siltation and vegetation	3.59	2.76	No		Clear debris, siltation and vegetation
C34	23.90	LHS	PC	2	600	Yes	2.33	2.68	No		Replace HW	2.39	2.62	No		Replace HW
C35	24.11	LHS	BC	1	1200 x 1200	Yes	3.15	2.53	Repair		Clear debris and vegetation	3.96	2.25	No		Clear debris and vegetation
C36	24.23	LHS	BC	1	2500 x 2500	Yes	5.35	2.73	Yes	Type 3	See measures proposed in Annexure 5.3	4.50	2.71	Yes	Type 3	See measures proposed in Annexure 5.3
C37	24.54	LHS	PC	2	600	Yes	2.80	2.45	No		Replace HW	3.90	2.78	Yes	Type 3	Replace HW; Construct erosion protection
C38	24.74	LHS	BC	1	1800 x 1800	Yes	4.77	2.96	Yes	Type 3	Clear vegetation; Crack seal; Construct erosion protection	6.40	4.37	Yes	Type 4	Clear vegetation; Crack seal; Construct erosion protection; Possible replacement of HW (overturning) - recommended to install crack width ruler to monitor, as well as follow-up inspection prior to Detailed design to reassess structure
	24.86	LHS	PC	1	600	Yes	Not surveyed - Details TBC during Stage 3				Extend culvert; Replace HW	Not surveyed - Details TBC during Stage 3				Extend culvert; Replace HW
C39	25.01		BC	1	1200 x 1200	No	3.23	3.14	No		Clear siltation and debris; Repair cracks and spalling	3.10	2.57	Yes	Type 2	Clear debris, construct erosion protection
C40	25.35		BC	1	1200 x 1200	No	3.13	3.10	No		Clear siltation and debris	2.65	2.33	No		Clear siltation and debris
C41	25.44	RHS	PC	2	600	Yes	2.93	3.39	No		Extend culvert; Replace HW; Clear debris, siltation and vegetation in waterway	2.98	3.54	No		Extend culvert; Replace HW; Clear vegetation and shape embankments of waterway
C42	25.53	RHS	BC	1	1200 x 1200	Yes	3.16	2.99	No		Clear siltation; Crack sealing on wingwall	3.73	2.90	Yes	Type 3	Construct scour protection; Clear vegetation in waterway and shape
C43	25.61	RHS	PC	1	600	Yes	2.09	3.41	No		Clear debris, siltation and vegetation; shape embankments; Extend culvert & replace HW	2.76	3.60	No		Clear debris, siltation and vegetation; shape embankments; Extend culvert & replace HW
C44	25.69	RHS	PC	2	600	Yes	2.47	3.52	No		Extend culvert & replace HW	2.91	3.35	No		Extend culvert & replace HW
C45	25.92	RHS	PC	1	600	Yes	2.04	2.72	No		Extend culvert & replace HW	2.68	3.00	Yes	Type 2	Extend culvert & replace HW; Construct erosion protection
C46	26.04		BC	1	2500 x 2500	No	4.08	1.94	Yes	Type 3	See measures proposed in Annexure 5.3	3.39	1.92	Yes	Type 2	See measures proposed in Annexure 5.3
C47	26.39	LHS	PC	1	600	Yes	2.63	3.04	No		Extend culvert; Replace HW	3.48	3.02	No		Extend culvert; Replace HW; clear barrel of debris, siltation and vegetation
C48	26.49	LHS	PC	2	600	Yes	3.64	2.77	Yes	Type 2	Extend culvert; Replace HW	3.14	2.06	Yes	Type 2	Extend culvert; Replace HW; Clear debris, siltation and vegetation
C49	26.71	LHS	PC	1	600	No	3.68	3.95	Yes	Type 2	Extend culvert; Replace HW; Shape waterway and clear debris	5.30	4.88	Yes	Type 4	Extend culvert; Replace HW; Shape waterway and clear debris & vegetation
C50	26.97		BC	1	2400 x 2400	No	4.07	1.73	Yes	Type 3	See measures proposed in Annexure 5.3	4.48	2.58	Yes	Type 3	See measures proposed in Annexure 5.3

Culvert No.	SV [km]	Aux Lane side	Type	Number	Size [mm]	Culvert Extension	INLET					OUTLET				
						Required (Yes/No)	Velocity [m/s]	Freud	Protection required?	Protection type	Action	Velocity [m/s]	Freud	Protection required?	Protection type	Action
C51	27.12		PC	1	600	No	2.53	2.82	Repair		Replace HW	2.79	2.20	Yes	Type 2	Replace HW, clear debris in waterway and shape
C52	27.39		BC	1	1800 x 1800	No	2.94	1.81	No		Clear debris and vegetation; Seal cracks	3.55	3.42	No		Clear debris and vegetation; Seal cracks; Reinstate wingwall joint - possible replacement of HW
C53	27.56		BC	1	1200 x 1200	No	2.56	2.05	No		Clear siltation, debris and vegetation	3.07	2.71	No		Clear siltation, debris and vegetation
C54	27.76	RHS	BC	1	2000 x 1200	Yes	2.67	2.15	No		Clear siltation, debris and vegetation; Extend culvert and replace HW	2.69	3.27	Yes	Type 3	Clear siltation, debris and vegetation; Extend culvert and replace HW; Construct erosion protection
C55	27.96	RHS	BC	1	2400 x 2400	Yes	3.49	2.59	No		See measures proposed in Annexure 5.3	2.16	1.22	No		See measures proposed in Annexure 5.3
C56	28.16	RHS	BC	1	2500 x 1200	Yes	2.89	2.89	Repair		See measures proposed in Annexure 5.3	1.00	0.67	Yes	Type 2	See measures proposed in Annexure 5.3
C57	28.26	RHS	BC	1	1200 x 1200	Yes	2.48	2.78	No		Clear debris and siltation; Seal cracks; Extend culvert and replace HW	2.64	3.24	No		Clear debris and siltation; Seal cracks; Extend culvert and replace HW
C58	28.41		PC	1	600	Yes	2.47	2.89	No		Clear debris and vegetation	2.71	2.87	No		Clear debris and vegetation; Shape waterway
C59	28.59		BC	1	2400 x 2400	No	3.66	2.20	No		See measures proposed in Annexure 5.3	4.89	3.69	No		See measures proposed in Annexure 5.3
C60	28.80		PC	2	600	No	2.45	2.21	No		Clear debris and vegetation; Replace HW	3.29	3.45	Yes	Type 3	Clear debris and vegetation; Replace HW; Construct erosion protection
C61	29.01		BC	1	1200 x 1200	No	2.04	2.27	No		Clear debris; Crack seal and spalling repairs	1.75	1.82	No		Clear debris; Crack seal and spalling repairs
C62	29.26		PC	2	600	No	2.43	2.10	No		Clear debris and vegetation; Replace HW	2.83	2.10	No		Clear debris and vegetation; Replace HW
C63	29.41		BC	1	2400 x 1200	No	2.68	2.16	No		See measures proposed in Annexure 5.3	2.64	2.73	No		See measures proposed in Annexure 5.3
C64	30.41		BC	1	1200 x 1200	No	Culvert appears to function as service duct.				Clear siltation and debris.	Culvert appears to function as service duct.				Clear siltation and debris.
C65	30.71		BC	1	1200 x 1200	No	Culvert appears to function as service duct.				Clear siltation and debris.	Culvert appears to function as service duct.				Clear siltation and debris.
C66	30.88		BC	1	1200 x 1200	No	Culvert appears to function as service duct.				Clear siltation and debris.	Culvert appears to function as service duct.				Clear siltation and debris.
C67	31.04		BC	1	1800 x 1200	No	Culvert appears to facilitate private leiwater.				No action.	Culvert appears to facilitate private leiwater.				No action.

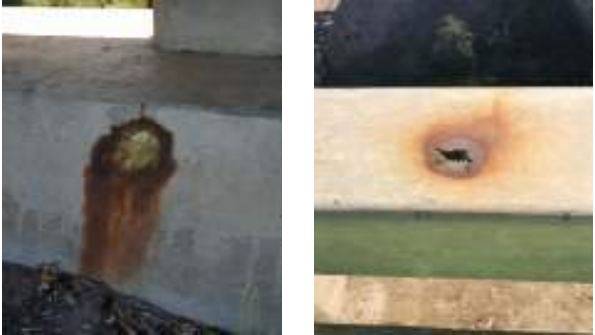

Annexure 5.1

BRIDGE B4691 - REMEDIAL ACTIVITIES

Item	Description	Photographs from Visual Inspection	WCG comments & other remarks	Proposed Remedial activities
1	Deck Surfacing		Surfacing at end of service life, done prior to joint remedial in 2008	Mill reseal and original asphalt and replace with new asphalt surfacing.
2	Deck Expansion joints		Additional clarification for proposed joint solution required	Provide new asphaltic plug joints or replace neoprene seal dependent on condition after milling operation. Refer to discussion and recommendation in Section 10.2.3 of the CV report.
3	Honey combing at abutment		To be included if detrimental to long term.	No remedial activities recommended.

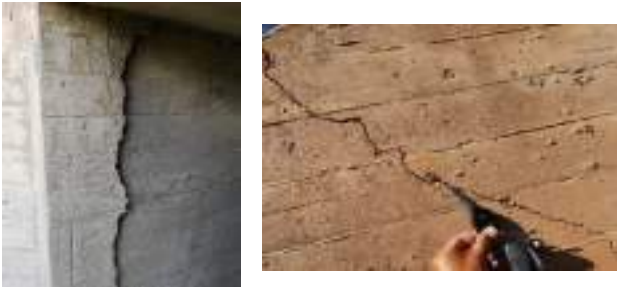


Annexure 5.1

BRIDGE B4691 - REMEDIAL ACTIVITIES

Item	Description	Photographs from Visual Inspection	WCG comments & other remarks	Proposed Remedial activities
4	Balustrade cracking, rebar corrosion & spalling		Localized rebar corrosion Spalling and staining of concrete surface	Patch repairs including rebar corrosion protection. Seal fine cracking at post base. Possible aesthetic surface coating to be confirmed during Detail design stage.
5	Approach fill cracking and settlement at abutment		Local settlement and cracking adjacent to abutment joints	Remedial activities which include removal of deformed area, asphaltic base backfill and surfacing to be replaced with new asphalt.



Annexure 5.2

MAJOR CULVERTS - REMEDIAL ACTIVITIES

Item	Description	Photographs from Visual Inspection	WCG comments & other remarks	Proposed Remedial activities
1	Diagonal and vertical cracks at inlet / outlet wingwalls		Repairs needed if structural capacity affected.	Assess wingwall stability & strengthen / tie back if necessary. Repair crack (Surface and grout fill).
2	Vertical cracks in barrel walls		These cracks are shrinkage related due to length of cast and minimal distribution steel.	No remedial action required.
3	Spalling and longitudinal cracking of roof slab		To be included if detrimental to long term. Repairs needed if structural capacity affected.	Assess structural impact. Repair corroded rebar & spalling. Inject cracks if structural. Consider widening method and related tie-in.

Annexure 5.2

MAJOR CULVERTS - REMEDIAL ACTIVITIES

Item	Description	Photographs from Visual Inspection	WCG comments & other remarks	Proposed Remedial activities
4	Scour in barrels and inlets/outlets		Erosion protection measures to be considered.	New invert slab with cut-offs. Protection at inlet wingwalls. Protection at outlet. Consider widening method which may incorporate some of these measures.
5	Miscellaneous defects		Various items related to maintenance and safe operation of the structures.	Clear boulders and debris from water way. Shape and trim embankments. Reinstate fencing. Hazard signage or guardrails as warranted.

Annexure 5.3

CULVERT SPECIFIC REMEDIAL ACTIONS

Location (approx km)	Structure No	Geometric details (no.cells / free span x height)	Key observed defects & other remarks	Proposed repairs, improvements & other remarks
22.70	C12465	1/2.45 x 2.45 (No extension)	Large vertical crack at inlet wingwall/ cell wall interface. Scour towards outlet. Large boulders from embankment blocking flow.	Assess wingwall stability & strengthen / tie back if necessary. Repair crack (Surface and grout fill). New invert slab with cut-offs. Clear boulders and debris from water way.
23.33	C12466	1/2.40 x 2.40 (No extension)	Shrinkage cracks in culvert wall and deck slab. Scour in barrel and at outlet wingwall, rock founding limits further damage, outlet wall vulnerable. Vegetation blocking inlet and outlet. No hazard signage on right side.	New invert slab with cut-offs. Clear vegetation. Hazard signage or guardrails as warranted.
24.23	C12467	1/2.50 x 2.50 (Extend both sides)	Wingwall diagonal cracks due to forward movement relative to barrel walls. Local spalling culvert at outlet headwall. Shrinkage cracks and spalling on culvert wall. Spalling with exposed rebar to culvert slab soffit. Limited scour in barrel. Vegetation blocking inlet and outlet.	Extend both sides & replace wingwalls. Repair corroded rebar & spalling. Inject cracks if structural. Clear vegetation. Hazard signage or guardrails as warranted.
26.04	C12468	1/2.50 x 2.50 (Extend right side)	Culvert wingwall heights at inlet problematic. Shrinkage cracks on culvert wall. Spalling/cracking of culvert inlet headwall. Scour in outlet wingwall. Damaged road reserve fencing at inlet.	Extend right side & confirm left side fill profile Grouted stone pitch at wingwalls Shape and trim embankments Reinstate fencing Hazard signage or guardrails as warranted


Annexure 5.3

CULVERT SPECIFIC REMEDIAL ACTIONS

Location (approx km)	Structure No	Geometric details (no.cells / free span x height)	Key observed defects & other remarks	Proposed repairs, improvements & other remarks
26.97	C12469	1/2.40 x 2.40 (No extension)	Scour in cell but functional. Wingwall cracking. Spalling/cracking of culvert inlet headwall. Shrinkage cracks on culvert wall. Scour to outlet waterway. No guardrails.	Assess wingwall stability& strengthen / tie back if necessary. New invert slab with cut-offs. Repair corroded rebar & spalling. Hazard signage or guardrails as warranted. Clear vegetation. Hazard signage or guardrails as warranted.
27.96	C12470	1/2.40 x 2.40 (Extend both sides)	Shrinkage cracks barrel wall. Limited scour in barrel. No guardrails.	Extend both sides. New invert slab with cut-offs. Hazard signage or guardrails as warranted.
28.16	C12471	1/2.50 x 1,20 (Extend both sides)	Wingwalls too low, but functional. Shrinkage cracks on culvert wall. Scour to outlet waterway. -No Hazard signs or guardrails	Extend both sides. Erosion protection at outlet. Hazard signage.
28.59	C12472	1/2.40 x 2.40 (Extend left side)	Shrinkage cracks on culvert wall. Crack on culvert soffit (midway).	Extend left side. Hazard signage or guardrails as warranted.
29.41	C12473	1/2.40 x 1,20 (Extend right side)	Wingwall cracks and spalling at outlet. Spalling/cracking culvert cell. Abrasion of culvert wall (surface only, not further action required).	Extend right side. Hazard signage.


Annexure 6
ACCESSES / INTERSECTIONS EVALUATION

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
16.50	LHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m	FORMAL REST AREA			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Formalise rest area.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
17.06	LHS X 2		X		X			X
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	X	Main Farm		>50 vpd			Intersection	



Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
17.06	RHS		X		X			X
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	



Impacted by auxiliary lane: Yes
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
18.13	LHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	
<p><u>Impacted by auxiliary lane:</u> No <u>Proposed Action:</u> Reconstruct minor farm access.</p>								



Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
18.13	RHS		X			X	Private	x
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	
<p><u>Impacted by auxiliary lane:</u> No <u>Proposed Action:</u> Reconstruct minor farm access.</p>								




Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
19.92	LHS		X		X		Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m	Very seldom used			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	
<p><u>Impacted by auxiliary lane:</u> No <u>Proposed Action:</u> Close access – to confirm with DRE and landowner.</p>								



Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
19.92	RHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	
<p><u>Impacted by auxiliary lane:</u> Yes <u>Proposed Action:</u> Reconstruct minor farm access.</p>								




Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
21.20	LHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m	PERDESKOENDRAAI			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	x	>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Construct major farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
22.57	RHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m	FORMAL REST AREA			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Close rest area and reinstate road reserve.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
22.80	RHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m	STOPPING PLACE			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Close rest area and reinstate road reserve.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
23.49	RHS		X		X		Private	x
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
23.51	LHS		X		X		Private	x
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
23.53	LHS		X	X			Private	
							Public	
Sight Distance(100km/h)		Access	RHS	>300m	STOPPING PLACE			
			LHS	300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Close rest area.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
24.09	LHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Construct main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
24.09	RHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Construct main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
24.59	LHS	X		X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m	CHANDELIER			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Minimum Action: Construct main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
24.67	RHS		X			X	Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	170m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Relocate access to km 24.61 (opposite Chandelier).

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
25.72	LHS		X			X	Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	<150m				
			LHS	<150m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Close – to confirm with DRE and landowner.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
26.29	LHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	180m	FRISCHGEWAAGD			
			LHS	260m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Construct main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
26.46	LHS		X		X		Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	180m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: Yes
Proposed Action: Close – to confirm with DRE and landowner.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
26.50	RHS		X			X	Private	x
							Public	
Sight Distance(100km/h)		Access	RHS	<100m				
			LHS	<100m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Close – to confirm with DRE and landowner.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
27.01	RHS		X			X	Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	<120m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
28.01	LHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300	FORMAL REST AREA			
			LHS	>300				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd		Intersection		




Impacted by auxiliary lane: No
Proposed Action: Close rest area and reinstate road reserve.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
28.14	RHS		X		X			X
Sight Distance(100km/h)		Access	RHS	>300				
			LHS	>300				
Access Details (WCS/11/2/C1)								
Minor Farm	X	Main Farm		>50 vpd		Intersection		




Impacted by auxiliary lane: Yes
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
28.22	LHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd		Intersection		




Impacted by auxiliary lane: No
Proposed Action: Construct main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
28.26	RHS		X	X				x
Sight Distance(100km/h)		Access	RHS	>300m	INFORMAL REST AREA			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd		Intersection		




Impacted by auxiliary lane: Yes
Proposed Action: Close rest area and reinstate road reserve.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
29.16	LHS		X	X				x
Sight Distance(100km/h)		Access	RHS	160m	LABOURER COTTAGES			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	X	Main Farm		>50 vpd		Intersection		




Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
29.27	RHS		X	X				X
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	110m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd		Intersection		




Impacted by auxiliary lane: No
Proposed Action: Reconstruct minor farm access.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
29.56	LHS	X		X				X
Sight Distance(100km/h)		Access	RHS	>300m	DRI 672 BAKENSKRAAL			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	X




Impacted by auxiliary lane: No
Proposed Action: Surfacing in poor condition. Resurface.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
29.56	RHS	X		X				X
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Surfacing in poor condition. Resurface.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused	Private	Public
30.35	RHS					X		
Sight Distance(100km/h)		Access	RHS					
			LHS					
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: None

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
30.61	LHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m	KAROO VALLEY FARMS			
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm		Main Farm	X	>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Upgrade to main farm access as per standard plan.

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
30.61	RHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: Install concrete edge beam

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
30.70	RHS		X		X		Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	




Impacted by auxiliary lane: No
Proposed Action: None – potentially disused

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
30.81	RHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	



Impacted by auxiliary lane: No
Proposed Action: Install concrete edge beam

Location		Type		Use			Destination	
Km	Side	Surf.	Gravel	Freq.	Seldom	Disused		
30.82	RHS		X	X			Private	X
							Public	
Sight Distance(100km/h)		Access	RHS	>300m				
			LHS	>300m				
Access Details (WCS/11/2/C1)								
Minor Farm	x	Main Farm		>50 vpd			Intersection	



Impacted by auxiliary lane: No
Proposed Action: Install concrete edge beam.

**ROAD AND TRANSPORT MANAGEMENT BRANCH
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS
WESTERN CAPE GOVERNMENT**

CONTRACT NO. : C1117

FENCING

START KM	END KM	SIDE	TYPE	CONDITION	COMMENTS
16.50	17.06	LHS	Verminproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
16.50	25.63	RHS	Stockproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
17.06	17.93	LHS	Stockproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
17.93	22.24	LHS	Game fencing	Good	<ul style="list-style-type: none"> Fence mainly in good condition
22.24	26.00	LHS	Stockproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
25.63	27.39	RHS	Verminproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard

**ROAD AND TRANSPORT MANAGEMENT BRANCH
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS
WESTERN CAPE GOVERNMENT**

CONTRACT NO. : C1117

START KM	END KM	SIDE	TYPE	CONDITION	COMMENTS
26.00	26.15	LHS	Verminproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
26.15	26.90	LHS	Stockproof fencing	Fair/Poor	<ul style="list-style-type: none"> Fence mainly in fair to poor condition but functioning Materials used for fence not standard
26.90	30.00	LHS	Stockproof fencing	Poor	<ul style="list-style-type: none"> Fence mainly in poor condition Materials used for fence not standard Sections with no fencing
27.39	29.56	RHS	Game fencing	Fair	<ul style="list-style-type: none"> Fence mainly in fair condition
29.56	31.22	RHS	Stockproof fencing	Good	<ul style="list-style-type: none"> Fence mainly in good condition
30.00	31.00	LHS	Private fencing	Good	<ul style="list-style-type: none"> Fence mainly in good condition

ROAD AND TRANSPORT MANAGEMENT BRANCH
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS
WESTERN CAPE GOVERNMENT

CONTRACT NO. : C1117

START KM	END KM	SIDE	TYPE	CONDITION	COMMENTS
31.00	31.22	LHS	Stockproof fencing	Good	<ul style="list-style-type: none">Fence mainly in good condition

Annexure 7.2
GUARDRAILS

Existing TR75/1

Start Km	End Km	Length (m)	Side	Description (Culvert, High fill, Obstruction)
18.950	19.370	420	L	High fill, Sharp curve
19.940	20.110	170	R	High fill, Sharp curve
19.940	20.110	170	L	High fill, Sharp curve
21.520	21.870	350	L	High fill, Sharp curve
22.240	22.370	130	L	High fill, Sharp curve
22.490	22.850	360	L	High fill, Sharp curve
22.940	23.010	70	L	High fill, Sharp curve
23.180	23.380	200	L	High fill, Sharp curve
25.370	25.390	20	L	Tree
26.340	26.470	130	L	High fill
29.590	30.420	830	R	High fill
29.590	30.390	800	L	High fill

Total: 3650

*Existing spacer blocks not to standard detail

*Existing poles weathered and dry

*Many splice bolts missing

Warrants ito WCG GDM 2-219

Start Km	End Km	Length (m)	Side	Description (Culvert, High fill, Obstruction)	GDM Warrant 1			GDM Warrant 2	Warranted? (YES / NO)	Stone Masonry wall (YES / NO)
					Min Height	Actual Height	Check Warrant 1	Check Warrant 2		
18.650	18.950	300	L	High fill	3.5	5	Yes		Yes	No
18.950	19.120	170	L	Existing	3.5	5	Yes		Yes	No
19.120	19.850	730	L	High fill, Auxiliary Lane	3.5	4	Yes	Yes	Yes	No
19.940	20.130	190	L	Moderate fill, sharp curve	3.5	4	Yes		Yes	No
19.940	20.110	170	R	Moderate to High fill, sharp curve	3.5	4	Yes		Yes	No
20.370	20.450	80	L	Moderate fill	3.5	3.6	Yes		Yes	No
20.920	21.050	130	L	Moderate to High fill	3.5	4	Yes		Yes	No
21.400	21.550	150	L	Moderate to High fill	3.5	7	Yes		Yes	No
21.550	21.650	100	L	Moderate to High fill	3.5	3	No	Yes	Yes	No
21.650	21.750	100	L	Moderate to High fill	3.5	3	No	Yes	Yes	No
21.750	21.850	100	L	Moderate to High fill	3.5	3	No	Yes	Yes	No
21.850	22.100	250	L	Moderate to High fill	3.5	3	No	Yes	Yes	No

Start Km	End Km	Length (m)	Side	Description (Culvert, High fill, Obstruction)	GDM Warrant 1			GDM Warrant 2	Warranted? (YES / NO)	Stone Masonry wall (YES / NO)
					Min Height	Actual Height	Check Warrant 1	Check Warrant 2		
22.100	22.400	300	L	High fill	3.5	4	Yes		Yes	Yes
22.520	22.850	330	L	High fill	3.5	5	Yes		Yes	Yes to km 23
22.950	23.500	550	L	High fill	3.5	4	Yes		Yes	No
23.320	23.470	150	R	Moderate fill	3.5	3.8	Yes		Yes	No
24.250	24.300	50	L	Moderate fill, culvert @ 24.30	3.5	4	Yes		Yes	No
24.740	24.790	50	L	Moderate fill, culvert @ 24.77	3.5	4	Yes		Yes	No
26.020	26.070	50	R	Moderate fill, culvert @ 26.07	3.5	4	Yes		Yes	No
26.060	26.150	90	L	Moderate fill, culvert @ 26.07	3.5	5	Yes		Yes	No
26.350	26.450	100	L	Moderate fill, auxiliary lane	3.5	4	Yes		Yes	No
26.590	26.850	260	L	Moderate fill	3.5	4	Yes		Yes	No
26.950	27.070	120	L	High fill	3.5	4	Yes		Yes	No
26.960	27.010	50	R	Moderate fill	3.5	4	Yes		Yes	No
27.300	27.450	150	L	High fill	3.5	5	Yes		Yes	No
27.400	27.425	25	R	High fill at culvert @ 27.41	3.5	5	Yes		Yes	No
28.580	28.650	70	L	Moderate fill	3.5	4	Yes		Yes	No
28.585	28.650	65	R	Moderate fill	3.5	4	Yes		Yes	No
29.210	29.280	70	L	Moderate fill	3.5	4	Yes		Yes	No

Total:

4950

**ROAD AND TRANSPORT MANAGEMENT BRANCH
DEPARTMENT OF TRANSPORT AND PUBLIC WORKS
WESTERN CAPE GOVERNMENT**

CONTRACT NO. : C1117

SERVICES

START KM	END KM	SIDE	DISCRIPTION	OWNER	INDICATED ON ROAD LOG
16.50	22.00	RHS	Overhead line outside road reserve	Telkom	Yes
16.65		RHS	Counting station	WCG	No
22.73	29.50	RHS	Overhead line outside road reserve	Telkom	Yes
23.87		Across	Overhead line across road	Telkom	Yes
26.29		Across	Overhead line across road	Telkom	Yes
27.87		Across	Overhead line across road	Telkom	Yes
28.88		Across	Overhead line across road	Telkom	Yes
29.01		Across	Overhead line across road	Telkom	Yes
29.01		Across	Pipe through culvert	Unknown	No
29.11		Across	Overhead line across road	Telkom	Yes
29.31		Across	Overhead line across road	Telkom	Yes
29.52		Across	Overhead line across road	Telkom	Yes
29.53	30.38	LHS	Overhead line inside road reserve	Telkom	Yes
29.93		Across	Underground line across below road	Eskom	No
30.30		Across	Overhead line across road	Telkom	Yes
30.40		Across	Overhead line across road	Telkom	Yes
30.41		Across	Irrigation canal underneath road	Unknown	Yes
30.43	31.21	RHS	Overhead line inside road reserve	Telkom	Yes
30.52	31.21	LHS	Overhead line inside road reserve	Eskom	Yes
30.52		LHS	Start of Spoornet rails	Spoornet	Yes
30.71		Across	Irrigation canal underneath road with pipe inside	Unknown	No
30.88		Across	Irrigation canal underneath road with pipe inside	Unknown	No
31.04		Across	Irrigation canal underneath road with pipe inside	Unknown	No
31.15		Across	Overhead line across road	Telkom	Yes

C1117: PAVEMENT STRENGTHENING OF TR75/1 GEORGE TO OUDTSHOORN: (KM 16.50 TO KM 31.22)		CLASS 3			
Unit	Qty	Rate	Amount	% of Schedule Totals	
SCHEDULE A: GENERAL					
1200	GENERAL REQUIREMENTS AND PROVISIONS			R 875 000.00 0.83%	
1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS			R 14 775 000.00 14.04%	
1300	CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS			R 90 000.00 0.09%	
1400	HOUSING, OFFICES AND LABORATORY FOR THE ENGINEER'S SITE PERSONNEL			R 630 000.00 0.60%	
TOTAL SCHEDULE A: GENERAL			R 16 370 000.00	15.56%	
SCHEDULE B: ROADWORKS					
1500	ACCOMMODATION OF TRAFFIC			R 9 350 000.00 8.89%	
1600	OVERHAUL			R 33 800.00 0.03%	
1700	CLEARING AND GRUBBING			R 91 350.00 0.09%	
	C&G at inlets and outlets of hydraulic structures	m2	700	87	R 60 900.00
	Clearing out of hydraulic structures	m3	35	870	R 30 450.00
1800	DAYWORKS			R 313 200.00 0.30%	
2100	DRAINS			R 1 015 000.00 0.96%	
	Shaping existing earth side drains	m3	0	52	R 0.00
	Subsoil drains at selected cuttings	m	1250	812	R 1 015 000.00
2200	PREFABRICATED CULVERTS			R 87 000.00 0.08%	
	Repair work to inlet/outlet structures & extending at auxiliary lanes	L/Sum	1	87000	R 87 000.00
2300	CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES, AND CONCRETE LININGS			R 5 595 904.76 5.32%	
	Lined trapezoidal drains	m	476	550	R 261 904.76
	1.8m concrete side drains	m	3500	990	R 3 465 000.00
	1.2m concrete side drains with kerb	m	2100	890	R 1 869 000.00
3300	MASS EARTHWORKS			R 3 893 734.22 3.70%	
	Cut to fill	m3	21800	155	R 3 379 000.00
	Cut to spoil	m3	2800	49	R 137 200.00
	Intermediate excavation	m3	654	62	R 40 548.00
	Hard excavation	m3	137	133	R 18 266.22
	Overhaul on mass earthworks	m3.km	49800	6.4	R 318 720.00
3400	PAVEMENT LAYERS OF GRAVEL MATERIAL			R 23 440 450.80 22.28%	
	Import 200mm G5 for C4 subbase	m3	27700	610	R 16 897 000.00
	In situ reconstruct base layer as 150mm G7 selected subgrade	m3	13076	128	R 1 673 779.20
	Import 150mm G7 USSG	m3	8274	406	R 3 359 081.60
	Import 150mm G9 LSSG	m3	1750	390	R 682 500.00
	Upgrade of main farm accesses	m3	630	633	R 398 790.00
	Import Gravel WC at freq. used minor farm accesses	m3	540	795	R 429 300.00
	Import Gravel WC on unpaved shoulders	m3	0	545	R 0.00
3500	STABILIZATION			R 4 098 314.72 3.89%	
	200mm C4 subbase	m3	27700	32	R 886 400.00
	150mm Gravel wearing Course	m3	0	34.8	R 0.00
	Cem II cement	ton	1629	1972	R 3 211 914.72
3600	CRUSHED STONE BASE			R 17 400 000.00 16.54%	
	150mm G2 base	m3	20000	870	R 17 400 000.00
3800	BREAKING UP EXISTING PAVEMENT LAYERS			R 16 089.08 0.02%	
	Milling for patching	m3	50	319	R 16 089.08
4100	PRIME COAT			R 1 094 299.92 1.04%	
	Prime coat	litre	94336	11.6	R 1 094 299.92
4200	ASPHALT BASE AND SURFACING			R 193 303.03 0.18%	
	AC patching - 5m2 to 100m2	ton	81	2395.4	R 193 303.03
4400/4500	SURFACING SEALS			R 10 754 822.88 10.22%	
	20mm + double 7mm	m2	155058	64.96	R 10 072 567.68
	Fog spray	litre	124046	5.5	R 682 255.20
4800	TREATMENT OF AN EXISTING SURFACE EXHIBITING CERTAIN DEFECTS			R 806 201.16 0.77%	
	Texture slurry	m3	203	3712	R 753 239.04
	Fog spray	litre	10146	5.22	R 52 962.12
5100	PITCHING, STONEMWORK AND PROTECTION AGAINST EROSION			R 208 800.00 0.20%	
	Minor repairs and erosion protection at minor culverts	m2	300	696	R 208 800.00
5400	GUARDRAILS			R 2 772 000.00 2.63%	
	Install new	m	4620	600	R 2 772 000.00
5500	FENCING			R 30 625.00 0.03%	
	Remove existing and install new	km	1	30625	R 30 625.00
5600	ROAD SIGNS			R 260 000.00 0.25%	
	Revision / upgrade of signage	L/Sum	1	260000	R 260 000.00
5700	ROAD MARKINGS			R 1 620 000.00 1.54%	
5800	LANDSCAPING AND PLANTING PLANTS			R 130 000.00 0.12%	
5900	FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS			R 175 000.00 0.17%	
TOTAL SCHEDULE B: ROADWORKS			R 83 379 895.58	79.24%	
SCHEDULE C: STRUCTURES					
PART 1	BRIDGE No. 4691 AT KM 30.02 ON TR75/1			R 1 682 677.86 1.60%	
	Preparing and painting handrails	L/Sum	1	174000	R 174 000.00
	Patching spalling and cracking	L/Sum	1	162400	R 162 400.00
	Asphaltic plug joints	L/Sum	1	780000	R 780 000.00
	Milling bridge surfacing	m3	115	319	R 36 729.66
	AC surfacing on bridge deck	ton	221	2395.4	R 529 548.20
PART 2	MAJOR CULVERTS			R 1 192 200.00 1.13%	
	Patching spalling and cracking	L/Sum	1	139200	R 139 200.00
	Extension of existing major culverts	L/Sum	0.6	1755000	R 1 053 000.00
PART 3	EARTH RETAINING STRUCTURES			R 416 000.00 0.40%	
	Earth retaining structures at fill	m	80	5200	R 416 000.00
PART 4	STONE MASONRY WALLS			R 2 184 000.00 2.08%	
	Earth retaining structures at fill	m	780	2800	R 2 184 000.00
TOTAL SCHEDULE C: STRUCTURES			R 5 474 877.86	5.20%	
SUBTOTAL 1 - TOTAL OF SCHEDULES:			R 105 224 773.44	100.00%	

CLASS 2		Amount	% of Schedule Totals
Unit	Qty	Amount	% of Schedule Totals
SCHEDULE A: GENERAL			
		R 875 000.00	0.72%
		R 16 950 000.00	13.97%
		R 90 000.00	0.07%
		R 875 000.00	0.72%
TOTAL SCHEDULE A: GENERAL		R 18 790 000.00	15.49%
SCHEDULE B: ROADWORKS			
		R 11 220 000.00	9.25%
		R 33 800.00	0.03%
		R 91 350.00	0.08%
m2	700	R 60 900.00	
m3	35	R 30 450.00	
		R 313 200.00	0.26%
		R 1 015 000.00	0.84%
m3	0	R 0.00	
m	1250	R 1 015 000.00	
		R 95 700.00	0.08%
L/Sum	1	R 95 700.00	
		R 7 212 095.24	5.95%
m	476	R 1 878 095.24	
m	3500	R 3 465 000.00	
m	2100	R 1 869 000.00	
		R 5 368 047.50	4.43%
m3	25000	R 3 875 000.00	
m3	11200	R 548 800.00	
m3	750	R 46 500.00	
m3	158	R 20 947.50	
m3.km	137000	R 876 800.00	
		R 26 440 750.80	21.80%
m3	30800	R 18 788 000.00	
m3	13076	R 1 673 779.20	
m3	10574	R 4 292 881.60	
m3	2200	R 858 000.00	
m3	630	R 398 790.00	
m3	540	R 429 300.00	
m3	0	R 0.00	
		R 4 556 970.88	3.76%
m3	30800	R 985 600.00	
m3	0	R 0.00	
ton	1811	R 3 571 370.88	
		R 19 401 000.00	16.00%
m3	22300	R 19 401 000.00	
		R 16 089.08	0.01%
m3	50	R 16 089.08	
		R 1 219 218.00	1.01%
litre	105105	R 1 219 218.00	
		R 193 303.03	0.16%
ton	81	R 193 303.03	
		R 11 821 857.12	9.75%
m2	170442	R 11 071 912.32	
litre	136354	R 749 944.80	
		R 806 201.16	0.66%
m3	203	R 753 239.04	
litre	10146	R 52 962.12	
		R 208 800.00	0.17%
m2	300	R 208 800.00	
		R 3 132 000.00	2.58%
m	5220	R 3 132 000.00	
		R 61 250.00	0.05%
km	2	R 61 250.00	
		R 260 000.00	0.21%
L/Sum	1	R 260 000.00	
		R 1 620 000.00	1.34%
		R 130 000.00	0.11%
		R 175 000.00	0.14%
TOTAL SCHEDULE B: ROADWORKS		R 95 391 632.81	78.65%
SCHEDULE C: STRUCTURES			
		R 1 682 677.86	1.39%
L/Sum	1	R 174 000.00	
L/Sum	1	R 162 400.00	
L/Sum	1	R 780 000.00	
m3	115	R 36 729.66	
ton	221	R 529 548.20	
		R 1 630 950.00	1.34%
L/Sum	1	R 139 200.00	
L/Sum	0.85	R 1 491 750.00	
		R 1 612 000.00	1.33%
m	310	R 1 612 000.00	
		R 2 184 000.00	1.80%
m	780	R 2 184 000.00	
TOTAL SCHEDULE C: STRUCTURES		R 7 109 627.86	5.86%
SUBTOTAL 2 - TOTAL OF SCHEDULES:		R 121 291 260.68	100.00%

CLASS 1		Amount	% of Schedule Totals
Unit	Qty	Amount	% of Schedule Totals
SCHEDULE A: GENERAL			
		R 875 000.00	0.62%
		R 18 950 000.00	13.54%
		R 90 000.00	0.06%
		R 940 000.00	0.67%
TOTAL SCHEDULE A: GENERAL		R 20 900 000.00	14.89%
SCHEDULE B: ROADWORKS			
		R 12 903 000.00	9.19%
		R 33 800.00	0.02%
		R 91 350.00	0.07%
m2	700	R 60 900.00	
m3	35	R 30 450.00	
		R 313 200.00	0.22%
		R 1 015 000.00	0.72%
m3	0	R 0.00	
m	1250	R 1 015 000.00	
		R 104 400.00	0.07%
L/Sum	1	R 104 400.00	
		R 7 212 095.24	5.14%
m	476	R 1 878 095.24	
m	3500	R 3 465 000.00	
m	2100	R 1 869 000.00	
		R 7 643 783.85	5.45%
m3	31500	R 4 882 500.00	
m3	21900	R 1 073 100.00	
m3	945	R 58 590.00	
m3	198	R 26 393.85	
m3.km	250500	R 1 603 200.00	
		R 29 458 850.80	20.99%
m3	33800	R 20 618 000.00	
m3	13076	R 1 673 779.20	
m3	12924	R 5 246 981.60	
m3	2800	R 1 092 000.00	
m3	630	R 398 790.00	
m3	540	R 429 300.00	
m3	0	R 0.00	
		R 5 000 831.68	3.56%
m3	33800	R 1 081 600.00	
m3	0	R 0.00	
ton	1987	R 3 919 231.68	
		R 25 651 080.00	18.28%
m3	24570	R 25 651 080.00	
		R 16 089.08	0.01%
m3	50	R 16 089.08	
		R 1 385 775.44	0.99%
litre	119463	R 1 385 775.44	
		R 193 303.03	0.14%
ton	81	R 193 303.03	
		R 13 244 569.44	9.44%
m2	190954	R 12 404 371.84	
litre	152763	R 840 197.60	
		R 806 201.16	0.57%
m3	203	R 753 239.04	
litre	10146	R 52 962.12	
		R 208 800.00	0.15%
m2	300	R 208 800.00	
		R 3 372 000.00	2.40%
m	5620	R 3 372 000.00	
		R 76 562.50	0.05%
km	3	R 76 562.50	
		R 260 000.00	0.19%
L/Sum	1	R 260 000.00	
		R 1 620 000.00	1.15%
		R 130 000.00	0.09%
		R 175 000.00	0.12%
TOTAL SCHEDULE B: ROADWORKS		R 110 915 692.22	79.04%
SCHEDULE C: STRUCTURES			
		R 1 682 677.86	1.20%
L/Sum	1	R 174 000.00	
L/Sum	1	R 162 400.00	
L/Sum	1	R 780 000.00	

ID	Task Name	Duration	Start	Finish	Preced	2023												2024											
						S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
1	SERVICE PROVIDER	204 days	Tue 25/10/22	Thu 24/08/23		SERVICE PROVIDER																							
2	Appoint EAP	1 mon	Mon 31/10/22	Fri 25/11/22		Appoint EAP																							
3	Undertake BAR	9 mons	Mon 28/11/22	Thu 24/08/23	2	Undertake BAR																							
4	Appoint surveyor	1 day	Tue 25/10/22	Tue 25/10/22		Appoint surveyor																							
5	Survey (km 16.5 to km 29.32)	3 mons	Tue 08/11/22	Fri 17/02/23	4	Survey (km 16.5 to km 29.32)																							
6	Appoint materials laboratory	1 mon	Mon 31/10/22	Fri 25/11/22		Appoint materials laboratory																							
7	Materials Investigation (km 16.5 to km 29.32)	3.15 mons	Wed 11/01/23	Fri 07/04/23	6	Materials Investigation (km 16.5 to km 29.32)																							
8	Health & Safety (Only in DD due to nature)	1.9 mons	Thu 02/03/23	Mon 29/05/23	10	Health & Safety (Only in DD due to nature)																							
9	Empowerment (Only in DD due to nature)	1.8 mons	Thu 02/03/23	Fri 26/05/23	10	Empowerment (Only in DD due to nature)																							
10	STAGE 2: CONCEPT & VIABILITY	79 days	Mon 24/10/22	Wed 01/03/23		STAGE 2: CONCEPT & VIABILITY																							
11	Compile Report	7.8 wks	Mon 24/10/22	Thu 15/12/22		Compile Report																							
12	Approval and instuction to proceed to Stage 3	8 wks	Thu 05/01/23	Wed 01/03/23	11	Approval and instuction to proceed to Stage 3																							
13	SCENARIO 1: STAGE 4 START AFTER BAR	199 days	Mon 10/04/23	Wed 31/01/24		SCENARIO 1: STAGE 4 START AFTER BAR																							
14	STAGE 3: DESIGN DEVELOPMENT	100 days	Mon 10/04/23	Fri 25/08/23	10	STAGE 3: DESIGN DEVELOPMENT																							
15	Design (Materials then Geometry)	3 mons	Mon 10/04/23	Fri 30/06/23	10.7	Design (Materials then Geometry)																							
16	Approval and instuction to proceed to Stage 4	8 wks	Mon 03/07/23	Fri 25/08/23	15	Approval and instuction to proceed to Stage 4																							
17	STAGE 4: DOCUMENTATION AND PROCUREMENT	100 days	Fri 25/08/23	Wed 31/01/24	3	STAGE 4: DOCUMENTATION AND PROCUREMENT																							
18	Documentation	6 wks	Fri 25/08/23	Thu 05/10/23		Documentation																							
19	Tender Period	4 wks	Fri 06/10/23	Thu 02/11/23	18	Tender Period																							
20	Tender Report	2 wks	Fri 03/11/23	Thu 16/11/23	19.18	Tender Report																							
21	Award (Excl. Permit)	2 mons	Fri 17/11/23	Wed 31/01/24	20	Award (Excl. Permit)																							
22	EXPROPRIATIOI	120 days	Mon 03/07/23	Fri 15/12/23		EXPROPRIATIOI																							
23	Expropriation	6 mons	Mon 03/07/23	Fri 15/12/23	15	Expropriation																							
24	SCENARIO 2: STAGE 5 START AFTER BAR (N/P)	180 days	Thu 02/03/23	Wed 08/11/23		SCENARIO 2: STAGE 5 START AFTER BAR (N/P)																							
25	STAGE 3: DESIGN DEVELOPMENT	80 days	Thu 02/03/23	Wed 21/06/23	10	STAGE 3: DESIGN DEVELOPMENT																							
26	Design (Materials first 10km then geometry)	2 mons	Thu 02/03/23	Wed 26/04/23	10	Design (Materials first 10km then geometry)																							
27	Approval and instuction to proceed to Stage 4	8 wks	Thu 27/04/23	Wed 21/06/23	26	Approval and instuction to proceed to Stage 4																							
28	STAGE 4: DOCUMENTATION AND PROCUREMENT	100 days	Thu 22/06/23	Wed 08/11/23	25	STAGE 4: DOCUMENTATION AND PROCUREMENT																							
29	Documentation	6 wks	Thu 22/06/23	Wed 02/08/23		Documentation																							
30	Tender Period	4 wks	Thu 03/08/23	Wed 30/08/23	29	Tender Period																							
31	Tender Report	2 wks	Thu 31/08/23	Wed 13/09/23	29.30	Tender Report																							
32	Award (Excl. Permit)	2 mons	Thu 14/09/23	Wed 08/11/23	31	Award (Excl. Permit)																							
33	EXPROPRIATIOI	120 days	Thu 27/04/23	Wed 11/10/23		EXPROPRIATIOI																							
34	Expropriation	6 mons	Thu 27/04/23	Wed 11/10/23	26	Expropriation																							