

MOZAMBIQUE ROAD FUND (FE)

DFID/AFCAP PROJECT REF: AFCAP/Moz/017

Development of an Index for Monitoring the Condition of Low-Traffic Unpaved Roads



Final Report

October 2009

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EXECUTIVE SUMMARY

Mozambique’s road network consists of slightly over 29 000 kilometres of which 24 318 kilometres are unpaved, constituting over 80% of the network.

The condition of the unpaved roads is currently monitored through bi-annual visual condition surveys and associated speed surveys that are largely subjective in nature.

The condition of the roads is reported in terms of average speeds achieved, these are categorised into the following bands:

<u>Condition</u>	<u>Average Travel Speed</u>
Very Good	> 80 kph
Good	60 – 80 kph
Fair	40 – 60 kph
Poor	20 – 40 kph
Very Poor	< 30 kph

A study undertaken in 2006 revealed that 52% of the unpaved network was in fair or better condition using the above-mentioned criteria.

The shortcomings of the method in current use are lack of objectivity, non-automation, absence of link to desirable or design speed and adoption of excessively long ‘homogeneous’ reporting sections.

This project was instituted with the objective of developing a practical, affordable, reliable and objective method of monitoring condition and level-of-service of unpaved road networks in Mozambique using speed data collected using simple GPS technology.

Simple recreational GPS receivers were used to collect speed data under a testing regime that examined the following variables: sampling method (time or distance), sampling frequency, driving regime (fast, normal, slow), road class, reported road condition and GPS receiver type.

Indices were developed that report on the ‘speed deficiency’ characteristics at road segment, link and network levels.

‘Speed deficiency’ was measured against datums defined by Desirable Speed standards set by ANE. When speeds achieved were above Desirable Speed this was taken as indicative of good road conditions.

In summary the indices identify the length of roads and extent of network where speeds below Desirable Speed are experienced, compares the time it takes to traverse those sections to Desirable Speed standard and finally quantify the lowering of travel speed below Desirable Speed.

Road Link Sub-Speed Index (L-SSI) and Network Sub-Speed Index (N-SSI) derived from Segment Sub-Speed Ratings are recommended for adoption as primary indicators of condition of the unpaved road network.

These above-mentioned indices vary from 0 to 1.0 with a road in very good condition returning a value of 1.0.

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Segment Sub-Speed Ratings analyse all speeds falling below Desirable Speed over five kilometer pre-defined road segments, giving appropriate weighting to speed variations experienced over the same distance.

The scale indicating Level of Service offered by un-paved road links and networks in terms of L-SSI and N-SSI is recommended as follows:

Link Level and Network Level

Level of Service	L-SSI and N-SSI	Road Condition
A	0.8 – 1.0	Very Good
B	0.6 – 0.8	Good
C	0.4 – 0.6	Fair
D	0.2 – 0.4	Poor
E	0.0 – 0.2	Very Poor

The bands given above are indicative only and require development through structured research.

The trend of the level of service will require monitoring regularly at both link and network levels and development of links to capital and maintenance expenditures on the network.

On the whole the use of GPS receivers was found objective, appropriate, robust and economical and was recommended for implementation at provincial level.

Final Report**1 INTRODUCTION****1.1 Project Background**

The road network in Mozambique is slightly over 29 000 kilometres. Of this total mileage approximately 24 318 kilometres are unpaved, constituting over 80% of the network.

The condition of unpaved roads in Mozambique is currently monitored through bi-annual visual condition surveys conducted by provincial consultants employed by the National Road Administration (ANE).

These surveys are undertaken in accordance with a standard method developed by ANE which reports on a range of road condition criteria mainly relevant to programme level activities, for example, road width, the condition of drainage systems, type of surfacing and travel speed, among other criteria.

Travel speed is assessed in a largely subjective manner wherein personnel carrying out visual assessments estimate the average speed. Currently there is no instrumentation involved.

The condition of the unpaved road network is then summarised into five categories using the following average travel speed bands:

<u>Condition</u>	<u>Average Travel Speed</u>
Very Good	> 80 kph
Good	60 – 80 kph
Fair	40 – 60 kph
Poor	20 – 40 kph
Very Poor	< 30 kph

The above speed band categories are used across all classes of unpaved roads irrespective of design speeds defined for each class.

The most recent survey of the entire network was in 2006 that was instituted to assist in defining a new integrated road works programme known as PRISE 2007-2009. The study revealed that 52% of the unpaved network was in fair or better condition using the above-mentioned criteria.

The unpaved road network of 23 318 kilometres was sub-divided into 502 uniform sections giving an average length of a uniform section as 48 kilometres. The relatively long average uniform sections indicated use of very coarse and subjective speed data. *Table 1* below summarises the findings of the 2006 study.

Table 1: Unpaved Roads – Summary Statistics by Road Class

Road Class	Length (kms)	% Gravel Surface	% Fair or better	Days Intransitable	Avg AADT	Avg Width (m)
Primary	1,339	84%	59%	16	77	5.9
Secondary	4,020	65%	56%	56	58	5.6
Tertiary	12,231	60%	61%	62	39	4.8
Vicinal	6,728	33%	32%	134	21	4.0
Total	24,318	55%	52%	79	40	4.8

Source: Review of Road Sector Strategy and Phase 2 Planning, Unpaved Road Works Program, Draft, ANE, 2006

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1.2 The Need for a Network Level Condition Indicator

The Mozambique Road Fund (FE) is concerned with the overall network condition and requires an appropriate indicator of the level of service or performance of the same, preferably linked to the International Roughness Index (IRI). The trend of the indicator over periods of time will then be used to judge the effectiveness of maintenance interventions.

Currently the performance of ANE and the FE at agency board and management level is monitored effectively by the PRISE Performance Appraisal Framework (PAF) which can be viewed as an elaborate tool that measures political will, timeous decision making and efficiency of procurement processes, amongst others. However this tool does not correlate well with the condition of the network or the level of service offered, nor is it designed to achieve this.

On the other hand, at project engineering level there are well developed procedures, guidelines and even highly technical equipment for measuring the condition of the roads. As an illustration, the Falling Weight Deflectometer (FWD) is being used on surfaced roads to estimate the remaining life and when this is extended over the entire network on a regular testing regime it would give a clear picture of the performance of the network, albeit in highly technical in engineering terminology. A similar example is the Bump Integrator used to measure roughness on paved roads and also on a limited scale on unpaved roads. The shortcoming is that these very precise tools cannot be extended to cover the entire network as the cost far outweighs the benefits and require highly qualified expertise which is not readily available.

It can be seen that between the two extremes mentioned above there is a demand for a simple tool that can generate objective indicators of the condition or level of service a road network provides in relation to capital and maintenance expenditures as well as the general aging trend of the network. The general road user would also welcome regular information feedback on the trend of the indicators.

This project investigated the feasibility of improving and standardising the method of collecting and analysing travel speed data on the unpaved road network in Mozambique using simple GPS technology.

1.3 Objective of Project

The objective of the project was to develop a practical, affordable, reliable and objective method of monitoring condition and level-of-service of unpaved road networks in Mozambique.

1.4 Report Outline

This report is structured as follows:

Section 2 presents the design of the research survey whilst defining the proposed indices, outlining

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variables to be considered and giving summarised information on the technology used.

Section 3 details how the fieldwork was undertaken; it provides a step by step insight into all field activities highlighting the important aspects.

Section 4 summarises treatment of data after fieldwork including detailed analysis.

Section 5 is a presentation of results and other subtle findings.

Section 6 is an overall evaluation of the methodology adopted including a component of literature review of related published documents.

Section 7 outlines recommendation on procedures to be followed in collecting data at provincial level as well data collation and national level.

Section 8 presents recommendations for further investigations to improve the proposed methodology.

2 RESEARCH DESIGN

2.1 Rationale of Approach

Considered simplistically and in an ideal situation, a vehicle travelling along a road of uniform conditions along its entire length would simply accelerate from a stationary position, attain required velocity and maintain the same until the time when it is required to decelerate and again come to a stationary position.

The above situation is seldom encountered on any road, even a motorway, as other external factors such road characteristics, driver behaviour and car type come into play. The challenge has been to accurately define the contribution of each of these factors on level of comfort enjoyed by the road user, especially on unpaved roads.

Various ‘responsive’ methods of measuring road condition have been developed over the years including the Bump Integrator and other types of accelerometers. These methods are generally expensive and unsuited for use on rural unpaved roads.

This project has been based on the rationale that a driver will ‘respond’ to the road condition by slowing down and accelerating and an attempt was to be made to quantify this response into an objective measure that can be used as an indicator of level of service.

The GPS technology now available enables collection of extensive and reasonably accurate data of position and speed that can be analysed to yield such an indicator.

2.2 Desirable/Design Speed

In assessing the level of service provided by any infrastructure it is imperative to define a baseline to compare against. In this project ANE’s Design standards (ANE, 2004) were used to define Desirable or Design Speeds for the three classes of unpaved roads under consideration: secondary, tertiary and vicinal.

The Desirable Speeds are given as:

- Secondary – 60 km/hr
- Tertiary – 50 km/hr

As ANE standards do not specify the Desirable Speed for vicinal roads a speed of 40 km/hr was adopted for the project.

Speeds logged continuously using GPS receivers were to be qualitatively compared against the thresholds defined by the Desirable Speeds.

2.3 Road Link Segmentation

One disadvantage of the current method used by ANE to categorise the condition of roads using speed is that entire link lengths, some as long as 100 kilometres, are judged as single homogeneous sections without being segmented into identifiable and manageable segments.

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This projects proposed division of the road links into standard five kilometre segments.

Results for the segments were then merged after appropriate weighting of the parameters to give results for a link followed by aggregation of the links into a network.

2.4 Definition of Proposed Indices

2.4.1 Overview

As a vehicle traverses over a road its speed continuously oscillates above and below the Desirable Speed depending on physical road conditions as well as interaction with other traffic. This is particularly discernible on roads in poor condition.

Travel at speeds above Desirable Speed was viewed as reflecting good conditions and was to be discounted. Speeds below Desirable Speed were subjected to analysis to define the ‘speed deficiency’ of each road segment, link and ultimately of the network.

The ratings and indices defined below are based on the above premise that is based on the analogy to the ‘weakest link’ in a chain.

2.4.2 Road Segment Level

The following ratings were proposed for testing the method at road segment level, a segment being 5 kilometres in length:

Speed Efficiency Rating – compares actual overall Average Speed achieved over each segment to the Desirable Speed. The Desirable Speed may alternatively be referred to as Design Speed. A vehicle travelling at a uniform speed equivalent to the Desirable Speed over the duration of the entire journey will have a rating equal to 1.0.

Sub-Speed Time Rating – the cumulative total time travelled at speeds below Desirable Speed within the segment is expressed as a ratio of calculated time it would take to traverse the same distance travelling at the Desirable Speed. A road in poor condition returns a rating above 1.0 whilst that in good condition will have a rating approaching 1.0.

Sub-Speed Distance Rating - a ratio of the total distance travelled at speeds below Desirable Speed to the length of a road segment. A length of road in good condition will have a rating approaching zero.

Sub-Speed Rating – the calculated average of speeds below Desirable Speed for a segment, reduced by the standard deviation of speeds over the segment, and then taken as ratio of the defined Desirable Speed. The reduction with the standard deviation gives greater weighting to the speeds below Desirable Speed. All segments with average speeds above Desirable Speed are assigned a Sub-Speed Rating of 1.0.

Sub-Speed Rating varies from 0 to 1, where a rating closer to 1.0 indicates travel closer to Desirable Speed and thus a road in good condition.

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2.4.3 Road Link Level

Link Travel Time Index – ratio of actual travel time taken traversing the road link to calculated time it would take travelling at the Desirable Speed. A value above 1.0 indicates poor road condition leading to extended travel time.

Link Speed Efficiency Index – weighted average of segment Speed Efficiency Ratings, weighted by standard deviation of acceleration of each segment.

Standard deviation of acceleration gives a good indication of the ‘start and go’ nature of a journey. Previous studies (FHWA, 2004) have demonstrated how acceleration is so linked and the Highway Capacity Manual includes guidelines using the same to estimate acceleration noise and fuel consumption in an urban setting.

Link Sub-Speed Time Index – the average of segment Sub-Speed Time Ratings.

Link Sub-Speed Distance Index – the average of segment Sub-Speed Distance Ratings.

Link Sub-Speed Index (L-SSI) – The average of segment Sub-Speed Ratings.

2.4.4 Network Level

Network Travel Time Index – weighted average Link Travel Time Indices weighted by length of links and Desirable Speed.

Network Speed Efficiency Index – weighted average of link Overall Speed Efficiency Indices, weighted by length of links and Desirable Speed.

Network Sub-Speed Time Index – the weighted average of Link Sub-Speed Time Indices weighted by length of links and Desirable Speed.

Network Sub-Speed Distance Index – the average of Link Sub-Speed Distance Indices weighted by length of links and Desirable Speed.

Network Sub-Speed Index – the average of Link Sub-Speed Indices weighted by length of links and Desirable Speed.

Network Sub-Speed Index (N-SSI) – the average of Link Sub-Speed Indices, weighted by Sub-Speed Distance Index and Sub-Speed Time Index.

The N-SSI is the ultimate index that defines the ‘speed deficiency’ of the network and varies from 0 to 1.

A road network with an N-SSI index approaching 1.0 is judged to be in good condition and vehicles will generally achieve speeds close to Desirable Speed.

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2.5 Survey Variables

The variables considered for this project were as indicated in *Table 2* below. The table indicates which variables were assumed as held constant.

Table 2: Summary of Unpaved Roads Survey Variables

Variable	Active	Fixed
Road classification	✓	
Road surface terrain		✗
Road geometrics		✗
Road surface type (gravel or earth)		✗
Road condition	✓	
Traffic volume		✗
Driving regimes	✓	
Driver		✗
Vehicle type		✗
Tyre pressure		✗
GPS receiver type	✓	
Sampling method	✓	
Sampling Frequency	✓	

2.6 Selection of Survey Roads

There was no special consideration given to selecting the location of the roads for survey other than proximity to Maputo and coverage of the three classes: secondary, tertiary and vicinal.

The condition of the roads was also considered with the aim of selecting a spectrum of roads in each functional class in good, fair and poor condition. In the absence of latest condition survey information the condition reported in 2006 was used as a guide.

The selected survey roads were located in Maputo and Gaza Provinces and are indicated in detail on maps in *Annexure I*, with summary details given in a sub-section below.

The same annexure also includes typical photographs of road classes surveyed.

2.7 Survey Vehicle

A Toyota Hilux, 3.0 litre engine, 4x2 with automatic transmission was used for the project.

The vehicle is representative of utility trucks commonly found on rural roads and is extensively used on road projects in Mozambique by ANE and provincial consultants.

2.8 Driving Regimes

Three driving regimes were selected for testing: fast, normal and slow.

Fast driving involved cruising freely at maximum attainable speed, almost as an ambulance would travel.

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Normal driving entailed driving at a pace that was relatively free of significant risk.

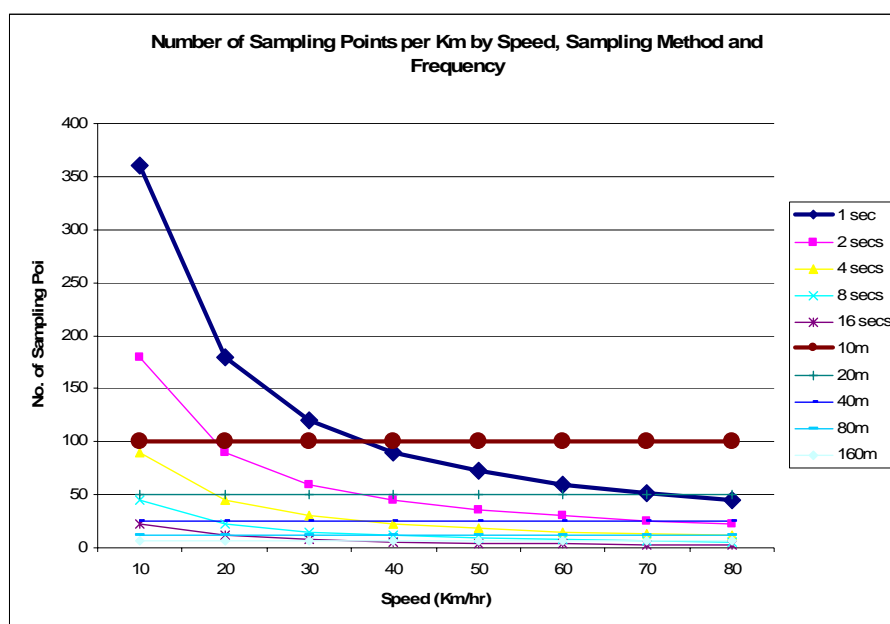
Slow driving involved absolutely risk free cruising avoiding all manners of discomfort.

2.9 Sampling Methods and Frequency

GPS receivers can be set to log speed data in three basic modes: time, distance and automatic. The amount of data collected depends of the frequencies selected.

Figure 1 below gives an illustration of the number of sampling points per kilometre at different time and distance intervals for a range of speeds.

Figure 1: Number of Sampling Points by Speed and Time/Distance Interval



It can be concluded from the above figure that sampling by time period provides more data at low speeds than shortening the distance.

At high speeds sampling by distance becomes superior to time sampling.

For the purposes of the project the standard sampling period was adopted as 5 seconds.

Sampling by varying distance lengths as well as time periods was also undertaken.

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2.10 Survey Matrix

Table 3 below summarises the final matrix of survey roads and test parameters. A total of 36 test series were to be undertaken.

Table 3: Survey Matrix Summary

Series No.	Road Details				Survey Length (km)	Observed Road Condition	Desirable Speed (Km/hr)	Driving Regime			GPS Receiver		Sampling Method		Sampling Frequency	
	Province	Route No	Class	From - To				Fast	Normal	Slow	Garmin 1	Garmin 2	Time	Dist		
1	MAPUTO	N200	Secondary	Boane - Bela Vista	60.7	Poor	60		x		x		x		5s	
2-1	GAZA	N221	Secondary	Macarante-Mabalane	69.6	Good	60	x			x		x		5s	
2-2	GAZA	N221	Secondary	Macarante-Mabalane	70.2	Good	60		x				x		5s	
3	GAZA	R453	Secondary	Mabalane-Combomune	46.7	Fair	60		x		x		x		5s	
4	MAPUTO	R408	Tertiary	Catuane - R407	61.9	Good	50		x		x		x		5s	
5-1	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50	x			x		x		5s	
5-2	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x		x		5s	
5-3	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.3	Fair	50			x	x		x		5s	
6A	MAPUTO	R406	Tertiary	N200 - Catuane	70.2	Poor	50		x		x		x		5s	
6B	MAPUTO	R406	Tertiary	N200 - Catuane	35.7	Poor	50		x		x		x		5s	
7	MAPUTO	R406	Tertiary	N200 - Catuane	34.7	Poor	50		x		x			x	2s	
8	MAPUTO	R406	Tertiary	N200 - Catuane	34.6	Poor	50		x		x			x		50m
9	MAPUTO	R406	Tertiary	N200 - Catuane	34.5	Poor	50		x		x			x		100m
10-1	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.6	Poor	40		x		x			x		10m
10-2	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x			x		20m
10-3	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x			x		40m
10-4	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.0	Poor	40		x		x			x		80m
10-5	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		1s	
10-6	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		4s	
10-7	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		8s	
10-8	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		16s	
10-9	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x			x	Auto		Auto	
11-1	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40	x					x		5s	
11-2A	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40		x				x		5s	
11-2B	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s	
11-2C	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s	
11-3	GAZA	R852	Vicinal	Changane - Nalazi	22.2	Good	40			x	x		x		5s	
12-1	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s	
12-2	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.4	Fair	40		x		x		x		5s	
12-3	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s	
12-4	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s	
13	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x	x	Auto		Auto	
14	GAZA	R442	Tertiary	Chibuto - Changane	51.2	Fair	50		x		x		x		5s	
15	GAZA	R441	Tertiary	Nalazi - Chokwe	96.4	Poor	50		x		x	x	Auto		Auto	
16-1	GAZA	R453	Vicinal	Combomune - Macandze	50.0	Poor	50		x		x		x		5s	
16-2	GAZA	R453	Vicinal	Combomune - Macandze	49.9	Poor	50		x		x		x		2s	
Total Kms Surveyed					1,213.9											

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The objective of the FE in undertaking this project was to set up a system that is cheap, simple, robust and given to high levels of repeatability.

A low cost approach was therefore adopted and simple recreational GPS receivers were used in the field trials.

The Garmin Oregon 300 and nuvi 250s were adopted and their specifications are summarised in *Table 4* below.

Table 4: GPS Receivers Specifications

GARMIN OREGON 300	nuvi 250
<ul style="list-style-type: none"> • Garmin integrated software • Micro – SD card storage • Computer interface – USB NMEA full speed mass storage • Display: 240 x 400 colour TFT display, touch screen, 76mm diagonally • 12 Channels GPS receiver • Acquisition times – Cold <33s, Warm<1s • Update rate: 1 Hz • Size: 11.4 cm x 5.8 cm x 3.6 cm • Weight: 0.193kg • Accuracy: 10m GPS, 3-5m DGPS 	<ul style="list-style-type: none"> • Garmin integrated software • Micro – SD card storage • Computer interface – USB 2.0 full speed mass storage • Display: 272 x 480 colour TFT display, touch screen, 107.5mm diagonally • GPS Receiver – high sensitivity with Hotfix • Acquisition times – Cold <38s, Warm<1s • Update rate: 1 Hz • Size: 12 cm x 7.4 cm x 1.95 cm • Weight: 0.168kg • Accuracy: 10m GPS, 3-5m DGPS

2.11.2 Ancillary Equipment

The following ancillary equipment was assembled for the exercise:

- Dictaphone and magnetic cassette tapes,
- Battery chargers,
- Camera,
- Clip boards, stationery, etc

2.12 Software**2.12.1 Data Transfer to PC**

The Garmin GPS receivers adopted had proprietary software in-built for transfer of *gpx* track files to a PC or Laptop.

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The software was also capable of transferring the track information in other formats such as data base and text.

2.12.2 Track Data Viewing

Garmin's *Mapsource* map viewing software, which is supplied with the purchase of receivers, was to be used to view the tracks on background maps of Southern Africa.

The maps were available at minimal cost (less than \$2.0) and were activated over the internet.

2.12.3 Data Conversion to Excel

For conversion of *gpx* files to *csv* format, freeware known as *G7toWin* was obtained from the internet.

The *csv* files would then be easily convertible to *Excel* files for manipulation using the spreadsheet functions.

2.12.4 Data Analysis

To maintain the low cost approach to the exercise data analysis was performed using *Microsoft Excel* Spreadsheets.

3 FIELDWORK METHODOLOGY

3.1 Commencement and Logsheet Completion

Safety was considered paramount in carrying out the field surveys and it was important to always park at a safe location at the beginning and end of survey sections.

At the start of each survey section a logsheet was completed capturing the following information:

- Series file number in a predetermined standardised format,
- Surveyor's identity,
- Date of survey,
- Road name and route number,
- Estimated starting time,
- Starting point location name,
- Ending point location name,
- Weather condition.

Annexure II contains typical completed logsheets from the study.

3.2 GPS Receivers Start-Up

The GPS start-up process involved:

1. Checking all the GPS receiver and other equipment: batteries, chargers, cables, memory,
2. Setting up the receivers in position with clear view of the sky, switched on given the necessary time to acquire satellites. The period was generally less than 30s,
3. Turning on the GPS units and waiting until the units found enough satellites,
4. Clearing any previously recorded and downloaded tracks, and
5. Selecting the logging method and frequency on the GPS unit (time or distance or auto).

3.3 Driving Regime

After the starting up of the GPS receivers the surveyor then:

1. Commenced driving and attained a steady speed as soon as was practical, the aim was to achieve this within the first 100m of the survey section,
2. Maintained steady speed and slowed down in response to the condition of the road or other interruptions such as other traffic, pedestrians or livestock,

3.4 Recording of Events and Waypoints

For safety reasons and to maintain continuity, the surveyor recorded events and waypoint information on a Dictaphone whilst on the drive, instead of writing down.

The sequence captured the following:

- Series identity number,
- Road name and route number,
- Reported condition of the road,
- Starting point location details,
- Weather conditions,

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- Whilst driving along noted all start and end times of significant disruptions, features and observations as guided by the way-point listing and codes,
- Location by distance from beginning of survey section using vehicle odometer,
- Details of the event or feature,
- Time when event ended in relevant cases,
- Ending time and location.

3.5 Ending Recording Session

At the end of a survey section, after parking at a safe place, the ending time for the series was recorded firstly on the Dictaphone.

The surveyor then filled in the logsheet with any information that was relevant to the series, capturing the following, amongst others:

- Time when the survey of the section was completed,
- Road condition overview,
- Road geometry,
- Road materials,
- Maintenance works on road etc.

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4.2 Waypoint/Events Information

Events encountered during the progression of the survey as recorded on the Dictaphone were played back and all information logged onto electronic forms.

Annexure III includes the completed waypoint/events logsheets.

It was notable that there were no significant non-condition related disruptions to the survey process probably due to low levels of traffic and sparse populations along the surveyed corridors. Where disruptions were experienced they were generally for a few seconds.

On the few occasions where the drive regime was interrupted the data pertaining to that interval was discarded and substituted with data obtained from interpolating between the prior and post points of steady travel. The time duration was not altered.

4.3 Data Consolidation

GPS surveys generate significant amounts of data especially when short sampling periods or distances are used.

Consolidation of such data into a manageable structure is necessary and would normally be best achieved using database software. In this case simple *Excel* spreadsheets were used.

A freeware known as *G7toWin* sourced on the internet was used to convert *Garmin gpx* data into comma separated values (*csv*). The software had the advantage that several files could be opened at once thus significantly shortening the processing time.

The resulting files were cleaned for unnecessary data and the file remained only with the following relevant fields:

- Point no.
- Coordinates
- Date and time
- Leg length
- Leg time
- Leg speed

The files were then converted to *Excel* files a format which is given to further manipulation. As the files are bulky and not amenable to presentation as part of this report they are recorded on compact disc and are available for distribution.

A typical example of the files mentioned above is included as *Annexure IV* to this report

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4.4 Data Analysis

4.4.1 Statistical Analysis

Using *Excel* spreadsheets the data for each road was treated as follows:

1. Calculation of cumulative distance and time,
2. Calculation of acceleration rates by leg,
3. Extracting of relevant statistics as follows: length surveyed, overall average speed, mean running speed (speeds > 5km/hr), highest speed attained, lowest speed attained, mean acceleration rate, mean deceleration rate, overall mean acceleration/deceleration, speed and acceleration standard deviation, number of deceleration events over the journey,
4. Extracting speed distribution data for each survey link in 5km/hr bands,
5. Segmentation of survey sections into 5km lengths,
6. Extraction of sub-speed information – distance and time, for each five kilometre section,
7. Calculation of the various ratings and indices outlined in Section 2,
8. Summarising of results for all survey lengths as given in *Annexure V*,
9. Plotting of :
 - Speed/time profiles,
 - Acceleration/Time profiles,
 - Speed/distance profiles,
 - Speed distribution histograms,
 - Indices by road class, condition, sampling method, sampling frequency and driving regime.

The above mentioned plots and data summaries for each road link are also included as *Annexure VI*.

4.4.2 Speed vs Time Plot as Principal Analysis Tool

As mentioned above, for each surveyed road profiles were plotted of speed and acceleration against time.

The speed time profile was adopted as the principal tool in the analysis as it carried 'real-time' information on variation of the speed as compared to speed distance profiles.

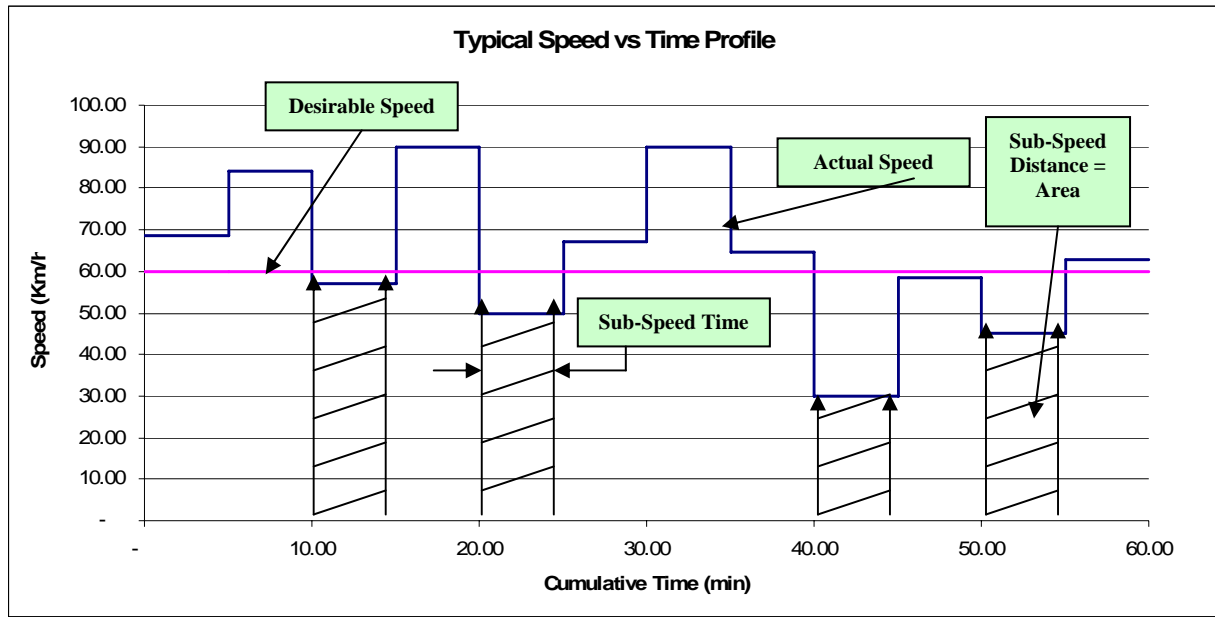
Figure 3 overleaf shows how the profile of speed against time was used determining sub-speed times, and subsequently sub-speed distances, relative to a pre-defined Desirable Speed. The plot is exaggerated to make for easy representation of what will essentially be occurring at much shorter time intervals.

On the whole, the spreadsheet was interrogated to yield cumulative times and distances, at segment level, only for those instances the leg speed was below the Desirable Speed.

The results were then manipulated to give the indices defined elsewhere in this report.

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Figure 3: Typical Speed vs Time Profile



5 PRESENTATION OF RESULTS

5.1 Overview

Annexure V contains the summary of all results and these are reviewed in the sub-sections below.

The review concentrates on assessing the following:

- Sensitivity of indices to sampling method and frequency,
- Effect of the three driving regimes on the indices,
- Repeatability of the method,
- Trend of results by road class and visually observed condition, and
- Comparison of results of two GPS receivers set in automatic mode for one of the survey series.

5.2 Sampling Method and Frequency

5.2.1 Distance Sampling

Testing the effect of varying sampling distance was undertaken on a poor vicinal road.

As shown on *Figure 4* the measured Mean Speed decreases with increasing sampling distance intervals from 10m to 40m whilst the sampling distance of 80m gives a result which breaks the trend. Taking the 80m result as an outlier it can be concluded that as the sampling distance decreases less data is collected and thus the receiver ‘misses out’ on important events and tends to average out over the longer distance.

In *Figure 5* the Sub-Speed Time Index also shows a downward trend with the 40m value standing out as an outlier.

Figure 6 shows the Sub-Speed Distance Index increasing uniformly with sampling distance showing the non-contribution of any high peaks in the speed profile.

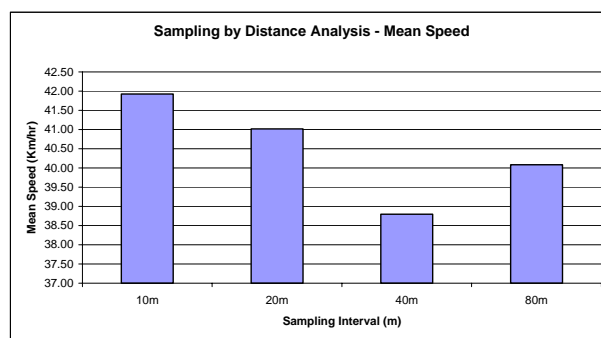


Figure 4: Mean Speed by Sampling Distance Interval

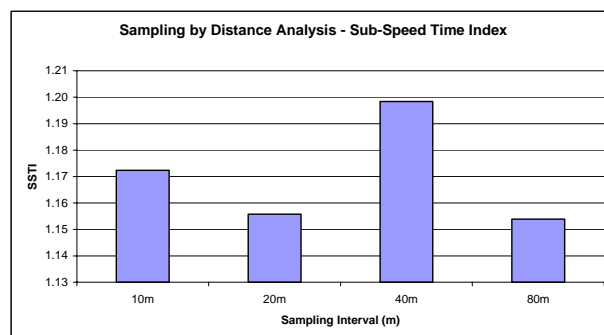


Figure 5: Sub-Speed Time Index by Sampling Distance Interval

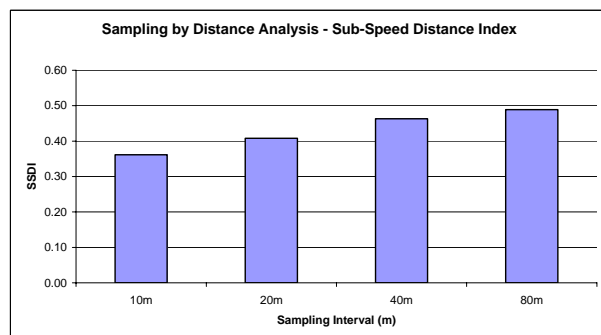


Figure 6: Sub-Speed Distance Index by Sampling Distance Interval

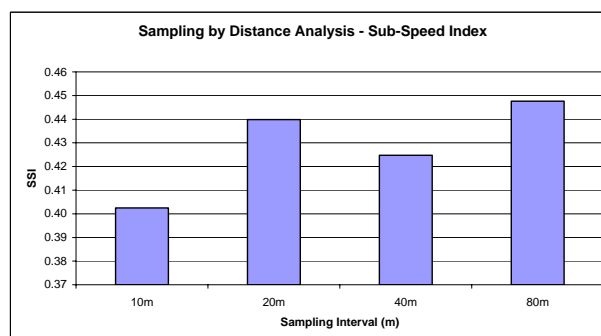


Figure 7: Sub-Speed Index by Sampling Distance Interval

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5.2.2 Time Sampling

Sampling by varying time period was also undertaken on the same vicinal road as varying distance.

It was observed that recorded mean speed decreases with increasing sampling time interval as was noted with increasing sampling distance. This effect is illustrated in *Figure 8*.

The rest of the indices as shown in *Figures 9-11* also show a trend that has a close correlation to the sampling interval.

As the time interval increases the data logged is less and thus the variations in speed are not captured, especially on roads in poor condition.

As the time interval increases the Sub-Speed Distance Index increases and again this implies filtering out of the instances where high speeds are attained and these would balance out the trend.

On a poor road such instances of high speeds are experienced less frequently.

For accurate results it is therefore necessary to keep the sampling period as short as is practical. Using a one second interval will generate a significant amount of data, however it may not be as practical such large amounts of information will call for higher end computing capacity in terms of processing speed and memory which will be expensive.

From the results of the study an interval of 5 seconds is seen as appropriate.

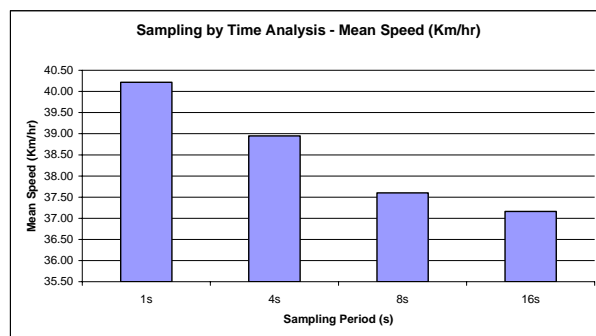


Figure 8: Mean Speed by Sampling Time Interval

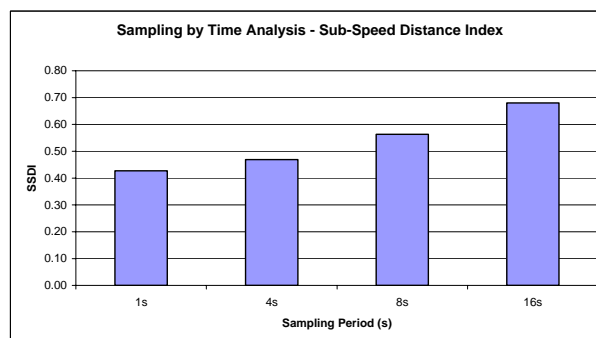


Figure 9: Sub-Speed Distance Index by Sampling Time Interval

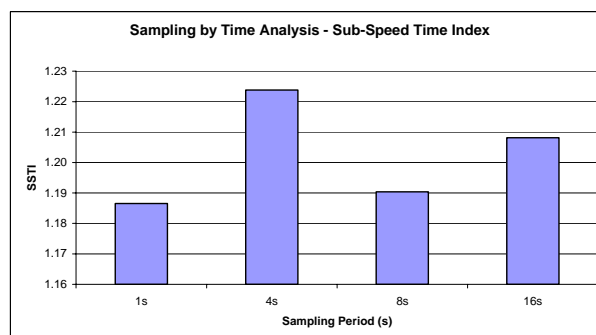


Figure 10: Sub-Speed Time Index by Sampling Time Interval

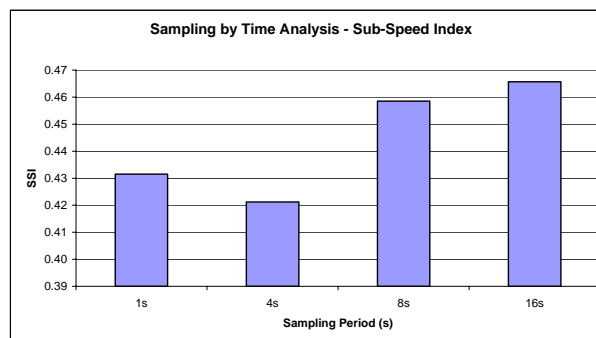


Figure 11: Sub-Speed Index by Sampling Time Interval

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5.3 Driving Regimes

The pre-defined driving regimes were tested on a tertiary and a vicinal road in fair and good condition respectively.

Relatively high speeds were attained on both the tertiary and vicinal roads under the fast driving regime reflecting well on the effectiveness of ongoing maintenance activities.

The results as given in *Figures 12-15* show that all indices are sensitive to the three driving regimes except the Sub-Speed Time Index.

This may imply that under any driving regime drivers will slow down to the same extent on encountering any points on the road where transitivity is severely limited. If this is the case this indicator has potential for use as an effective measure of condition and warrants further investigation.

On the other hand, as expected, *Figure 13* shows the Sub-Speed Distance Indices significantly defined for the slow driving regime.

For the method to return usable results survey drivers must drive in the ‘normal’ mode as this will be representative of speeds that most road users adopt when on the network.

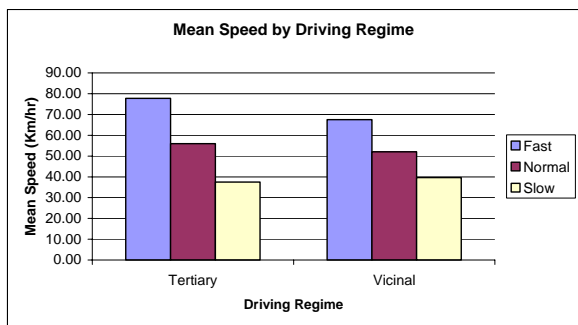


Figure 12: Mean Speed by Road Class and Driving Regime

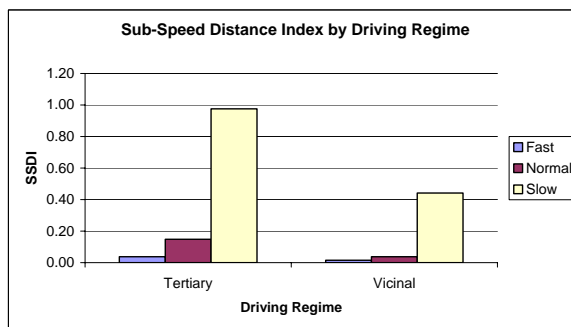


Figure 13: Sub-Speed Distance Index by Road Class and Driving Regime

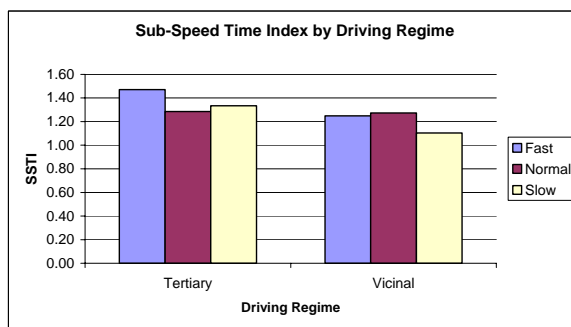


Figure 14: Sub-Speed Time Index by Road Class and Driving Regime

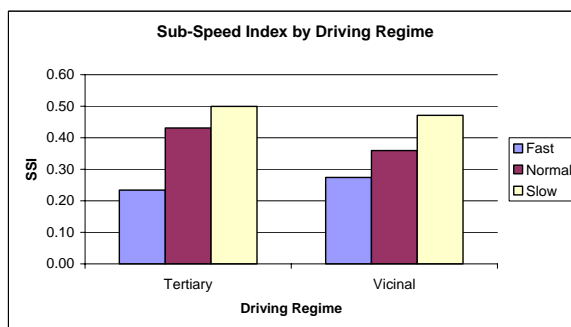


Figure 15: Sub-Speed Index by Road Class and Driving Regime

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5.4 Repeatability

Repeatability test runs were undertaken on two vicinal roads, one in reportedly good condition and the other in fair condition.

The results as shown *Figures 16-17* for Mean Speed and Sub-Speed Distance Index do not reflect a clear pattern of repeatability.

However Sub-Speed Time Index and Sub-Speed Index in *Figures 18-19* returned uniform results. Again it can be seen that Sub-Speed Time Index has the most uniform results.

On the whole, the order of magnitude of the variations was calculated as insignificant and this was confirmed by coefficients of variation of almost nil for all the indices. The method will therefore potentially yield repeatable results although further trial need to be undertaken to cater for different conditions.

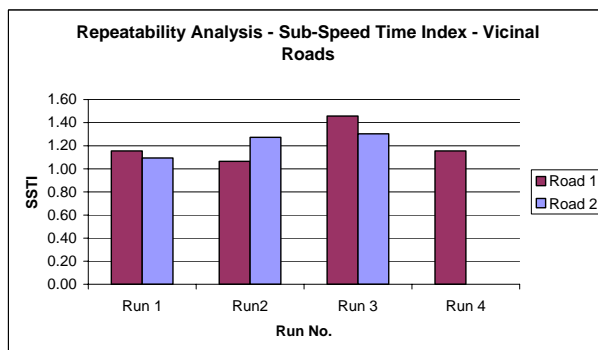


Figure 18: Sub-Speed Time Index Trend for Repeatability Runs

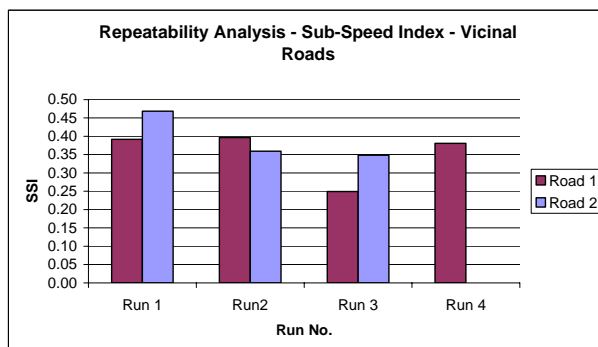


Figure 19: Sub-Speed Index Trend for Repeatability Runs

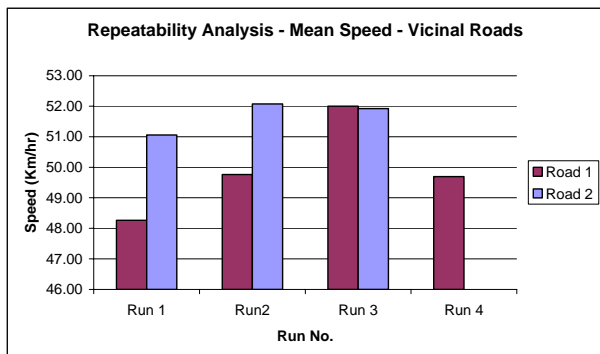


Figure 16: Mean Speed Trend for Repeatability Runs

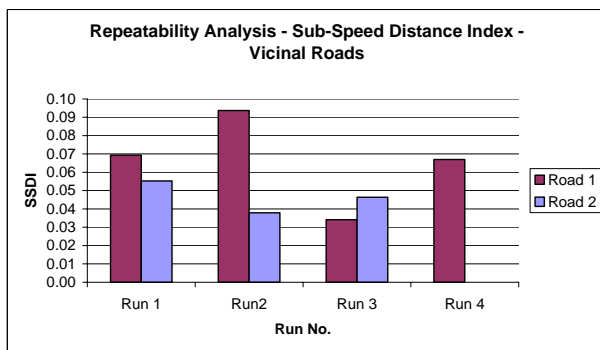


Figure 17: Sub-Speed Distance Index Trend for Repeatability Runs

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5.5 Road Classification and Condition

As shown in the survey matrix in a previous section three roads in good, fair and poor condition were selected in the three classes comprising secondary, tertiary and vicinal.

Analysis of the mean speeds in *Figure 20* for the three road classes and three condition states shows relatively high speeds were achieved for secondary and tertiary classes, even for the poor condition.

Again this reflects well on the effectiveness of maintenance regimes currently being implemented by ANE.

For the vicinal road in poor condition almost half distance was covered at speeds lower than desirable as reflected in *Figure 21*.

There is evidence from Figures 20-21 that the magnitude of the indices reflect road hierarchy as well as the different physical conditions of the subject roads.

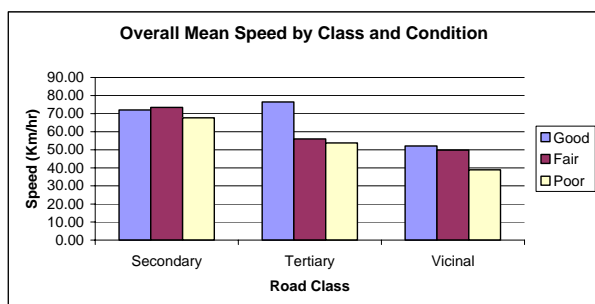


Figure 20: Mean Speed by Road Class and Condition

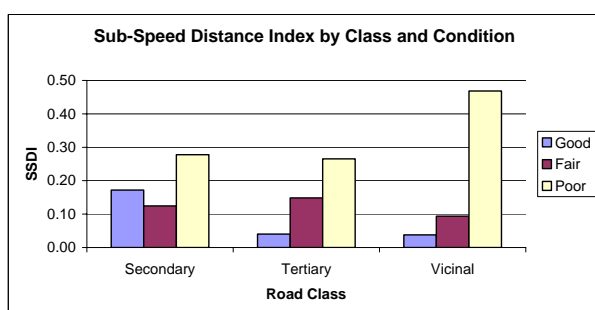


Figure 21: Sub-Speed Distance Index Road by Class and Condition

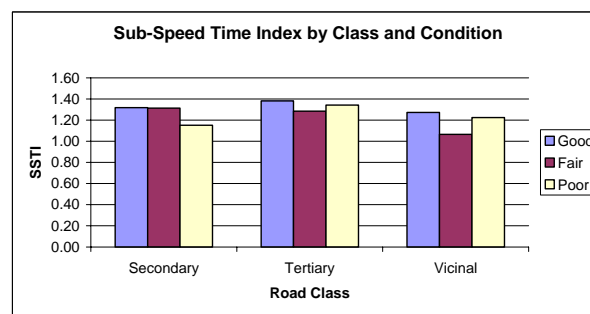


Figure 22: Sub-Speed Time Index by Road Class and Condition

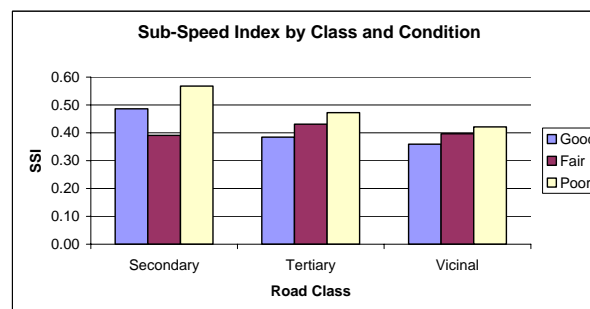


Figure 23: Sub-Speed Index by Road Class and Condition

5.6 GPS Receiver Type

The two GPS were compared set in Automatic mode on a tertiary road in fair condition and under a normal driving regime.

Table 5 below indicates that there is no significant difference between the results returned by the two receivers for all indices except for Sub Speed Time Index.

This was to be expected as GPS technology has improved all around and the fact that sampling of speed data is direct (Doppler principle) and has been proven to be inherently accurate to levels as much as +/- 0.1 km/hr.

Table 5: Comparison of GPS Receivers in Auto Mode

	GPS Receiver		Absolute Difference
	Oregon 300	nuvi 250	
Mean Speed	66.37	67.42	1.06
Speed Efficiency Index	1.25	1.22	0.03
Sub-Speed Time Index	1.74	1.42	0.32
Sub-Speed Distance Index	0.05	0.06	0.01
Sub-Speed Index	0.21	0.33	0.12
Decelerations/km	3	3	-

6 REVIEW OF METHODOLOGY

6.1 Traffic Levels

It was observed during the fieldwork that traffic on the subject roads was very low especially on vicinal roads. Thus there was therefore no effect of other traffic on the survey.

6.2 Survey Vehicle

The survey vehicle used was capable of traversing most if not all of the difficult sections of road encountered and thus the results do not reflect any significant delay due to 'intransitable' sections. ANE's 'Spot Improvements for Basic Access' manual provides guidelines in defining the standard vehicle and the authority responsible for managing any particular road has the responsibility for the exercise. The survey vehicle used in this survey may not qualify as a standard vehicle under the guidelines particularly for vicinal roads.

6.3 GPS Technology

Although relatively cheap to purchase, the GPS receivers used were found to be rugged and had adequate features to capture the required data. They were capable of receiving signal from at least 12 satellites simultaneously and at intervals as short as one second where required.

The rural setting of the exercise was also given to accurate data collection as there was no interference to the signal which is usually experienced when using such receivers in an urban setting.

The receivers could also process and display velocity data, a feature that was not common in hand-held receivers a few years ago. It has been shown in other studies that velocity data obtained in this way is inherently more accurate than that which can be obtained by post-processing position data (Beliss G., 2004). Velocity is obtained by calculating the Doppler-shift in the satellite signal carrier waves and accuracy has been found to be of the order of magnitude of 0.1km/hr (Clark, 1998).

One limitation that was associated with GPS receivers previously was that of memory capacity. Nowadays the instruments are equipped with substantial internal memory which can be further enhanced with affordable high capacity micro-SD memory cards.

6.4 Data Collection

The logging of data by GPS receiver is fully automated, once set there is no substantial interaction with driver or operator. This has obvious advantages as the quality of the data is not affected by the level of skill and experience of the surveyor.

The exercise can be undertaken by one person and at most two on busy roads if necessary. The manpower costs are thus minimized.

At the onset of the project it had been anticipated that there would be substantial events during the drives disturbing the data collection exercise. Experience in the field yielded minimal interruptions especially on tertiary and vicinal roads.

6.5 Data Consolidation

Software that is available on the market or as freeware over the internet does not yield standardized download files. The output format is not necessarily clean and in many instances the result is a format that cannot be exported to other packages. However, it is relatively easy to arrange for customization for a fee.

6.6 Data Analysis

As mentioned elsewhere only Microsoft Excel spread sheets were used to manipulate the data. It was found that use of such spreadsheets has limitations as the data quantity increases beyond 100Mb per file.

It will be more practical to create a database on a platform such as Microsoft Access.

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7 RECOMMENDATIONS FOR IMPLEMENTATION OF METHOD**7.1 Level of Service Definition**

It is proposed that the **Link Sub-Speed Index (L-SSI)** and **Network Sub-Speed Index (N-SSI)** be adopted as primary indicators of condition of the unpaved road network.

These indices can then be further developed to establish Level of Service criteria bands that will be structured as indicated below:

Link Level

Level of Service	Link Sub-Speed Index (L-SSI)	Condition
A	0.8 – 1.0	Very Good
B	0.6 – 0.8	Good
C	0.4 – 0.6	Fair
D	0.2 – 0.4	Poor
E	0.0 – 0.2	Very Poor

Network Level

Level of Service	Network Sub-Speed Index (N-SSI)	Condition
A	0.8 – 1.0	Very Good
B	0.6 – 0.8	Good
C	0.4 – 0.6	Fair
D	0.2 – 0.4	Poor
E	0.0 – 0.2	Very Poor

The bands given above are indicative only and will need to be developed through structured research.

The trend of the level of service will then be monitored regularly at both link and network levels.

7.2 Data Collection Teams

Utilisation should be made of the existing structures at provincial level responsible for the bi-annual collection of condition data. The method requires minimal personnel, only the driver.

7.3 GPS Equipment

The teams simply need to be equipped with a standard tool kit for the purpose. It is recommended that the Garmin Oregon 300 used in the study be adopted. A unit costs approximately \$600.00.

To guarantee data integrity it may be necessary to locate all the survey kits at FE and distribute the same close to the dates set for the surveys.

7.4 Driving Regime

The normal driving regime must be adopted. The drivers are not to be given any special instructions other than to drive in safe and cautious ‘normal’ manner.

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7.5 Sampling Method and Interval

GPS receivers shall be set to sample by time. This is inherently more accurate. An interval of 5 seconds is recommended.

7.6 Data Download

All provinces must be equipped with simple GPS track download and viewing software. The teams will be required to download the data after each field day whilst retaining the files on the receiver. Hence units to be procured for the purpose must have memory of at least 10 Mb.

On completion of the survey exercises in the provinces the unit must be forwarded to the FE with all logs intact.

7.7 Data Transfer and File Naming

In transferring of data from receiver units the file naming for each route shall be simply maintained as the official route number to which a date shall appended, for example *N200-13-09-2009*.

7.8 Data Preparation

Using a standardised *gpx* file transfer software logs received from the survey shall be interrogated to yield a file with the following columns containing data for each sampling point for each road surveyed:

1. Northing coordinate (in decimal format),
2. Easting coordinate (in decimal format),
3. Date (separate columns for Year, Month, Day),
4. Time (separate columns for Hr, Min, Seconds
5. Leg length (m),
6. Leg time (s), and
7. Speed (Km/hr).

7.9 Data Analysis and Results Reporting

Data prepared as indicated in the above section for each road link shall be imported directly to a spreadsheet prepared for each province through a simple cut and paste routine.

Once data for all roads has been imported the results sheet can be viewed summarising all the results for a particular province.

8 RECOMMENDATIONS FOR FURTHER STUDIES

8.1 Level of Service Scale Definition

The bands indicated in sub-section 7.1 require development through structured research and condition monitoring programme.

It would be beneficial for a representative network to be selected for monitoring over at least three years with data collection undertaken on a monthly basis.

The trend in the indices can then be monitored and related to capital and maintenance expenditures on that representative network.

8.2 Driver Behaviour

The survey reported in this document was undertaken by one driver and as such the results can be judged as non-representative to a certain extent.

8.3 Car Type

There is need to test the method using a spectrum of vehicles selected as representative of the classes currently using the road network.

8.4 Definition of Desirable Speed and Adjustment Factors

ANE's standards stipulate desirable speed for all classes of unpaved roads. An examination of the appropriateness of the levels is necessary. Adjustment factors are also necessary to cater for road geometrics, terrain and other factors for each road link.

The exercise could be taken down to segment level as well. If this is undertaken it will be possible to define a baseline for future trend analysis.

8.5 Calibration

There is need for correlation of the method to condition as determined by the visual assessment method as well as roughness measurements. Results can then be transferable to the IRI scale.

8.6 Higher Trafficked Roads

It will be possible to use the proposed method for road with higher traffic although the results will require traffic levels to be taken into account.

For such roads it is recommended that the SSATP SOURCE method be considered. Details of the method are available on the following website: <http://www.isted.com>.

8.7 Interactive Database

Simple spreadsheets were used to analyse the data in this exercise. Consideration should be given to setting up an elaborate user friendly database system.

8.8 GIS Integration

Use of a GIS system in travel time studies enhances the presentation of the results through pictorially projecting the data as well as relating the same to other information about the road network.

Speed deficiency charts can be plotted rapidly and these can guide rapid identification of problem areas.

A web-site can also be established that will show the level of service by link and can be made accessible for viewing by decision makers and the general public. Such a service is now relatively easy and cheap to establish in the advent of information tools such as Google-Earth.

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3. Bellis, Graeme, 2004. Detailed Speed and Travel Time Surveys using Low Cost GPS Equipment. *IPENZ Transportation Group, Technical Conference 2004.*
4. Federal Highways Authority, USA, *Travel Time Data Collection Handbook.*

**Annexure I: Maps of Surveyed Roads and Sample
Photographs**

33°00'E

Mangonzo

Mapulanguene

B-0

GAZA

Magude

Motaze Norte

Macaene

Motaze

South Africa

Panjane

Magude

Xinavane

Ilha Josina Machel

Moamba

Chinhuanine

Palmeira

Calanga

Ressano Garcia

Aivor

Maragra

25°30'0"S

Moamba

Vundiça

Maluana

25°30'0"S

B-02

Pessene

Marracuene

MAPS REPRODUCED WITH PERMISSION FROM MOC FE, COURTESY OF SEED, SSI AND ANE

Namaacha

Marracuene

Michafutene

Matola

Maputo

SERIES 10

Matola

Maputo

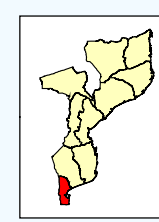
Namaacha

Boane

Maputo

SERIES 5

Machangulo/Ndelano



Vila de Goba

SERIES

Maputo

LEGEND

Towns

- Provincial Capital
- Major Towns
- Minor Towns
- Other Towns

Bridges

- Bridges

Districts

- Districts

National Boundary

- National Boundary

Provincial Regions

- Provincial Regions

Rivers

- Rivers

Lakes

- Lakes

Roads

- Paved roads
- Unpaved roads - Conditions Not Captured

Travel Speed Survey Road

- Travel Speed Survey Road

Unpaved Roads

Conditions

- Good
- Fair
- Poor

Transibilities

- Always Transible
- Intransible During Rainy Season
- Fully Intransible

Swaziland

SERIES 4

SERIES 6

SERIES 6B-9

27°0'0"S

33°00'E

PREPARED BY: **SEED** **Stewart Scott international**

CLIENT: **ANE** Administração Nacional de Estradas

PROJECTION: Decimal Degrees WGS 84

SCALE: 1:800,000

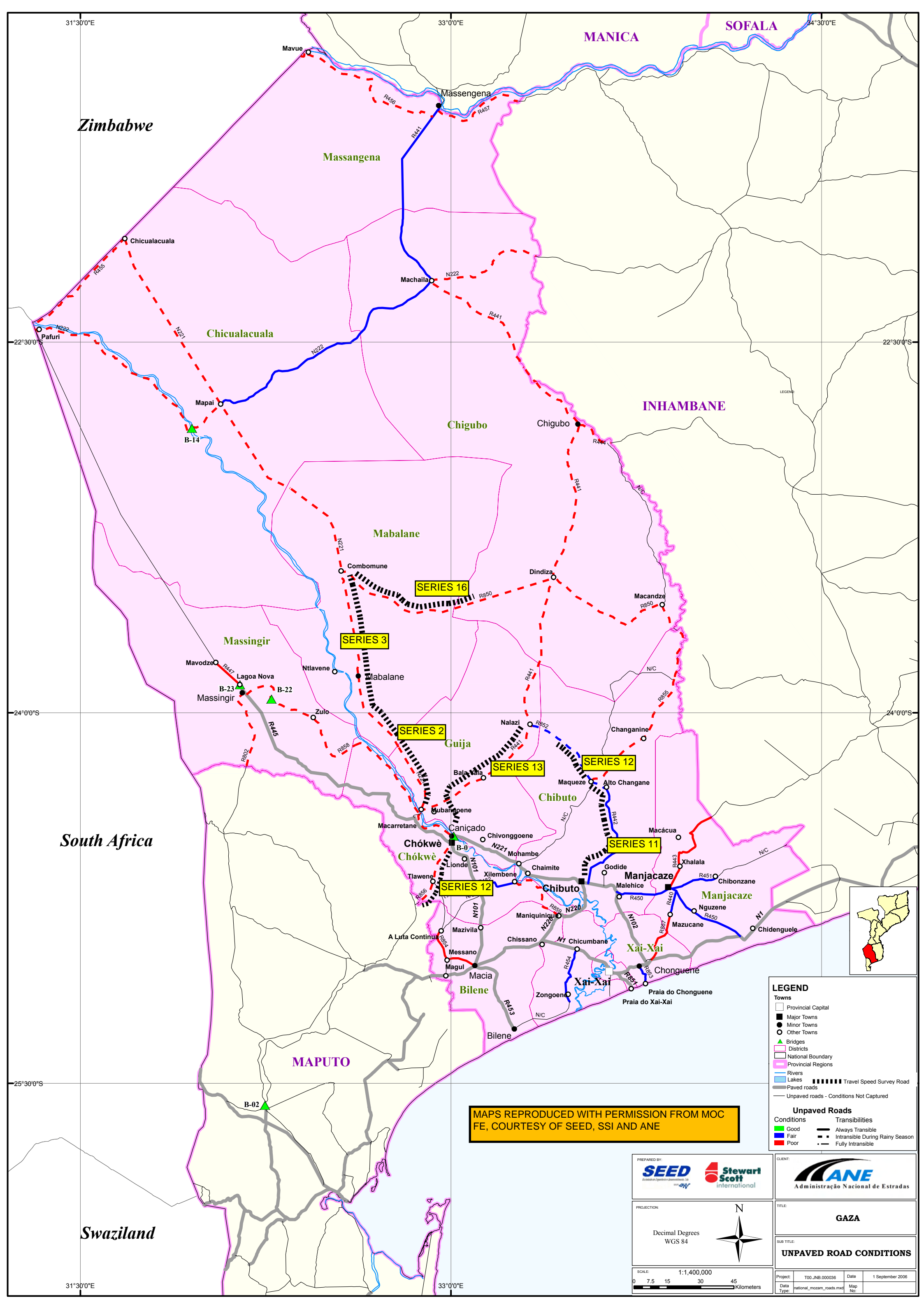
0 7.5 15 Kilometers

TITLE: **MAPUTO**

SUB-TITLE: **UNPAVED ROAD CONDITIONS**

Project: T00_INB_000036 Date: 1 September 2006

Data Type: national_mozam_roads.mxd Map No:



MAPS REPRODUCED WITH PERMISSION FROM MOC FE, COURTESY OF SEED, SSI AND ANE

LEGEND

Towns

- Provincial Capital
- Major Towns
- Minor Towns
- Other Towns

Bridges

Districts

National Boundary

Provincial Regions

Rivers

Lakes

Paved roads

Unpaved roads - Conditions Not Captured

Unpaved Roads

Conditions	Transibilities
Good	Always Transitable
Fair	Intransitable During Rainy Season
Poor	Fully Intransitable

PREPARED BY: **SEED** **Stewart Scott international**

CLIENT: **ANE**
Administração Nacional de Estradas

PROJECTION: Decimal Degrees WGS 84

SCALE: 1:1,400,000

0 7.5 15 30 45 Kilometers

TITLE: **GAZA**

SUB TITLE: **UNPAVED ROAD CONDITIONS**

Project:	T00.JNB.000036	Date:	1 September 2006
Data Type:	national_mozam_roads.mxd	Map No.:	

DEVELOPMENT OF CONDITION INDICES FOR UNPAVED ROADS IN MOCAMBIQUE

SAMPLE PHOTOGRAPHS OF SURVEY ROADS

CLASS: TYPICAL SECONDARY ROADS



Route No N221: Macarante – Mabalane – Gaza Province
Condition: Good



Route No. N221 Boane - Bela Vista - Maputo Province
Condition: Poor



Route No: N221 Boane - Bela Vista – Maputo Province
Condition: Good



Route No. N221 Boane - Bela Vista - Maputo Province
Condition: Poor

**DEVELOPMENT OF CONDITION INDICES FOR UNPAVED ROADS IN MOCAMBIQUE
SAMPLE PHOTOGRAPHS OF SURVEY ROADS**

CLASS: TYPICAL TERTIARY ROADS



Route No R403: Catembe - Bela Vista – Maputo Province
Condition: Fair



Route No: N200-Catuane – Maputo Province
Condition: Poor



Route No R406: N200- Catuane - Maputo Province
Condition: Poor



Route No R406: N200- Catuane – Maputo Province
Condition: Poor

**DEVELOPMENT OF CONDITION INDICES FOR UNPAVED ROADS IN MOCAMBIQUE
SAMPLE PHOTOGRAPHS OF SURVEY ROADS**

CLASS: TYPICAL VICINAL ROAD



Route No R856: Chokwe – Fr Maputo – Gaza Province
Condition: Poor



Route No R453: Combomune – Macandze – Gaza Province
Condition: Poor



Route No R453: Combomune – Macandze – Gaza Province
Condition: Poor

Annexure II: Typical Completed Survey Logsheets

GPS LOGSHEET

Surveyor's Name: *C.T. Bopoto*

Date: *06/08/09*

Road Name: *Boane - Bela Vista*

Route No: *N200*

Estimated Start Time: *0830am*

Starting Point: *Boane* **Ending Point:** *Bela Vista Junction*

Weather Conditions: *Cloudy, dry*

Observations/Events: *SERIES 1*

- 1. Road in poor condition after Tembe Bridge*
- 2. Road is not graveled*
- 3. Level now below surrounding natural ground*
- 4. Wide formation*
- 5. Main defect- water ponding on road, numerous puddles, potholes. Poor drainage*
- 6. Grading overdue*

Approximate Ending Time: *0923am*

Office Use Only

Transferred to PC

Post Processed

Associated Filenames: _____

Processed by: _____

GPS LOGSHEET

Surveyor's Name: *C.T. Bopoto*

Date: *11/08/09*

Road Name: *Mabalane-Macarretane*

Route No: *N221*

Estimated Start Time: *1622pm*

Starting Point: *Mabalane* **Ending Point:**

Weather Conditions: *Clear, hot*

Observations/Events: *SERIES 2-1 (FAST DRIVE)*

- 1. Channelisation of traffic means higher speeds affirmable on road in poor/fair conditions.*
- 2. Consider- drive as another series*
- 3. Culverts constructed higher than road, slow down necessary*

Approximate Ending Time: *1711pm*

Office Use Only

Transferred to PC

Post Processed

Associated Filenames: _____

Processed by: _____

GPS LOGSHEET

Surveyor's Name: *C.T. Bopoto*

Date: *11/08/09*

Road Name: *Macarretane-Mabalape*

Route No: *N221 (Secondary) (Fair)*

Estimated Start Time: *1020am*

Starting Point: *Macarretane* **Ending Point:** *Combomune*

Weather Conditions: *Cool, sunny, dry*

Observations/Events: *SERIES 2-2 NORMAL DRIVING 85s*

- 1. Road very wide up to 7-10m.*
- 2. Relatively good condition, achieved high speeds*
- 3. Traffic channeling to drains ~ 15 km before Mabalane*
- 4. Spot regravelling in progress*
- 5. Culverts (some) recently constructed*

Approximate Ending Time: *1118am*

Office Use Only

Transferred to PC

Post Processed

Associated Filenames: _____

Processed by: _____

Annexure III: Waypoints/Events Logsheets

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
04-Aug	13:00	5_1	KATEMEBE-BELAVISTA				T	GOOD CONDITION
	13:35							BATTERY CHANGE
	13:36							GIVING WAY TO TRFAFFIC
	13:40						WKS	
	13:45						WKS	
	13:50							PHOTOGRAPHS
	13:51		MATOLA					
	13:53						WKS	
	14:07							BAD ROAD
	14:30							
	14:40	5_2	BELAVISTA-KATEMBE					
	14:42							
	14:42							
	15:14:00		END-KATEMBE					
05-Aug	13:17	5_3	KATEMBE-BELAVISTA					
	13:18						VLT	
	13:26						T	
	13:32						P;LS	POOR ROAD
	13:35						WKS;DTR	
	13:36			SFD				GOOD ROAD
	13:38						WKS;DTR	

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
	13:42			SFD			T	
	13:43						CV	
	13:49		END-BELAVISTA					
05-Aug	14:05	6	CATUANE					
	14:07			SFD				NO MAINTENACE
	14:08							PHOTOGRAPHS
	14:11						RX	
	14:15						T	POOR CONDITION
	14:16		START-VILLAGE				VLT	
	14:17		END-VILLAGE				VLT	
	14:23							PHOTOGRAPHS
	14:28						DTR	
	14:29			GRV				PHOTGRAPHS
	14:32						LS	
	14:36						CV	
	14:45						G	POOR ROAD
	14:47						CV;RX	
	14:50						DTR	
	14:55			ETH			WKS	
	14:58						CV;G	
	15:01						RX	
	15:04			TRK				

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
	15:05							
	15:09						VLT	
	15:10						VLT	
	15:11			ETH				
	15:13			TRK				
	15:16						VLT	
	15:20						RX	
	15:25		END-CATAUNE					
	15:48		CATUANE-BOANE					
	15:53						LS	
	15:55						LS	
	15:58						LS	
06-Aug	08:36	1	BOANE-BELAVISTA--START		SEC			
	08:41						P	
	08:44		JOSIAH TONGOGARA				VLT	
	08:50						T:RX	
	08:59		DINDANE					PHOTOGRAPHS
	09:23		BELAVISTA-BOANE--END				JN	
	09:42	7	CATUANE--START					

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
11-Aug	10:20	2_2	MAKAKANE					
	10:21						RY	
	10:24						RY	
	10:34						RY	ROAD- GOOD CONDITION
	10:36		PALANE				VLT	
	10:58						LS	
	11:02						T	DRIVING INTO THE DRAIN ON LHS
	11:06						CV	
	11:13			GRV		VERY WIDE	WKS	TRAFFIC GOING INTO DRAIN
	11:17		MABALANE--START				LS	
	11:18		END--MABALANE					
	11:33	5 OR 6	MABALANE- COMBOMUNE		SEC		WKS	GOOD CONDITION
	11:43						WKS	
	11:45						CV	MOUNTAIN CULVERT
	11:52						CV	
	11:57						VLT;CV	
	11:58						DTR;CV	END OF CONSTRUCTION
	12:03							
	12:08		COMBOMUNE				WKS	
	12:11		START--COMBOMUNE					
	12:12		END--COMBOMUNE					
	12:14		COMBOMUNE- DINDIZA		VIC			

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
	16:35						CV	
	16:36						CV	
	16:37						LS	
	16:44						CV	
	16:48						CV	
	16:57						T	
	16:58		PELANE					
	17:05		START--CHINAKA				LS;RY	
	17:11		END--MAKARAKANE				RY;LS;P	
12-Aug	09:30	11	COMBANE-MANIKINIKI					
	09:37						WKS	WBHO
	10:09		CHIBUTO					
	10:12		START--CHIBUTU		TRY			
	10:20							BAD CONDITIOND
	10:33							BAD- GULLY
	11:07		END--CHANGUANE					
	11:15				VIC			
	11:24			TRK			VLT	
	11:30				VIC			
	11:40				VIC			U-TURN
	11:41		ORIGINAL ROAD	TRK	VIC			

**GPS SURVEY
WAYPOINTS/EVENTS LOG**

Start - **START** End - **END**

Livestock - **LS** Pedestrians - **P** Traffic - **T** Culvert - **CV** Village/Town - **VLT** Junction - **JN** Railway - **RY**

Curves/Bends - **CB** Works - **WKS** Detour - **DTR** River Crossing - **RX**

Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**

Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal - **VIC**

DATE	TIME	SERIES NO	SERIES NAME	ROAD TYPE	ROAD CLASS	ROAD WIDTH(m)	EVENT CODE	COMMENTS
	12:03		END					
	12:10	11	CHANGWANE					
	12:28		START				VLT	50 KM/H
	12:29		END					
	12:34		END					
	12:36	11	START					
	13:00		END					
	13:01		START					
	13:11						P	
	13:19						VLT	
	13:35		END					
	13:31				VIC			FAST DRIVE
	13:34		START				VLT	
	13:36				VIC			
	13:46		END					
	13:55		START--MALAZI					
	14:18						VLT	
	14:21		MALAZI					
	14:25		LEAVE MALAZI					
	14:46						DTR	POOR CONDITIONS
	14:58						T	
	15:04						RX	

Annexure IV: Typical GPS Data Log

**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE: **MAPUTO** DISTRICT: **BOANE**
 ROAD NAME: **Boane - Bela Vista** ROAD NO.: **N200** ROAD CLASS: **Secondary**
 DESIRABLE SPEED (Km/hr): **60.00** REPORTED CONDIT: **Poor**

Point No.	Lat	Long	Month	Day	Year	Hour	Min	Sec	Leg Distance (m)	Cum. Distance (m)	Leg Time (s)	Cum. Elapsed Time (s)	Leg Speed (km/hr)	Leg Acceleration (m/s/s)
1	-26.0618	32.3186	8	6	2009	6	29	58	42.41	42	5	5	30.53	0.00
2	-26.0624	32.3184	8	6	2009	6	30	3	68.59	111	5	10	49.39	5.24
3	-26.0630	32.3184	8	6	2009	6	30	8	71.38	182	5	15	51.39	0.56
4	-26.0637	32.3186	8	6	2009	6	30	13	73.16	256	5	20	52.68	0.36
5	-26.0643	32.3188	8	6	2009	6	30	18	73.98	330	5	25	53.27	0.16
6	-26.0650	32.3189	8	6	2009	6	30	23	76.69	406	5	30	55.22	0.54
7	-26.0657	32.3191	8	6	2009	6	30	28	78.33	485	5	35	56.40	0.33
8	-26.0664	32.3192	8	6	2009	6	30	33	81.12	566	5	40	58.41	0.56
9	-26.0672	32.3192	8	6	2009	6	30	38	84.17	650	5	45	60.61	0.61
10	-26.0680	32.3192	8	6	2009	6	30	43	87.54	737	5	50	63.03	0.67
11	-26.0687	32.3191	8	6	2009	6	30	48	88.3	826	5	55	63.58	0.15
12	-26.0695	32.3191	8	6	2009	6	30	53	88.54	914	5	60	63.75	0.05
13	-26.0703	32.3190	8	6	2009	6	30	58	85.71	1,000	5	65	61.71	-0.57
14	-26.0711	32.3189	8	6	2009	6	31	3	86.22	1,086	5	70	62.08	0.10
15	-26.0719	32.3189	8	6	2009	6	31	8	86.04	1,172	5	75	61.95	-0.04
16	-26.0726	32.3189	8	6	2009	6	31	13	87.58	1,260	5	80	63.05	0.31
17	-26.0734	32.3191	8	6	2009	6	31	18	86.41	1,346	5	85	62.22	-0.23
18	-26.0741	32.3195	8	6	2009	6	31	23	89.91	1,436	5	90	64.74	0.70
19	-26.0748	32.3200	8	6	2009	6	31	28	92.63	1,529	5	95	66.69	0.54
20	-26.0755	32.3206	8	6	2009	6	31	33	97.58	1,626	5	100	70.25	0.99
21	-26.0762	32.3212	8	6	2009	6	31	38	98.86	1,725	5	105	71.18	0.26
22	-26.0769	32.3218	8	6	2009	6	31	43	96.93	1,822	5	110	69.79	-0.39
23	-26.0776	32.3224	8	6	2009	6	31	48	94.62	1,917	5	115	68.12	-0.46
24	-26.0783	32.3230	8	6	2009	6	31	53	95.13	2,012	5	120	68.49	0.10
25	-26.0789	32.3236	8	6	2009	6	31	58	96.38	2,108	5	125	69.39	0.25
26	-26.0796	32.3242	8	6	2009	6	32	3	96.03	2,204	5	130	69.14	-0.07
27	-26.0803	32.3248	8	6	2009	6	32	8	96.48	2,301	5	135	69.47	0.09
28	-26.0810	32.3254	8	6	2009	6	32	13	98.21	2,399	5	140	70.71	0.34
29	-26.0817	32.3259	8	6	2009	6	32	18	99.51	2,498	5	145	71.65	0.26
30	-26.0825	32.3264	8	6	2009	6	32	23	100.51	2,599	5	150	72.37	0.20
31	-26.0834	32.3269	8	6	2009	6	32	28	103.05	2,702	5	155	74.20	0.51
32	-26.0843	32.3272	8	6	2009	6	32	33	106.58	2,809	5	160	76.74	0.71
33	-26.0852	32.3275	8	6	2009	6	32	38	107.43	2,916	5	165	77.35	0.17
34	-26.0861	32.3278	8	6	2009	6	32	43	108.6	3,025	5	170	78.19	0.23
35	-26.0870	32.3281	8	6	2009	6	32	48	105.4	3,130	5	175	75.89	-0.64
36	-26.0879	32.3285	8	6	2009	6	32	53	105.95	3,236	5	180	76.28	0.11
37	-26.0888	32.3289	8	6	2009	6	32	58	106.34	3,342	5	185	76.56	0.08
38	-26.0897	32.3293	8	6	2009	6	33	3	107.68	3,450	5	190	77.53	0.27
39	-26.0906	32.3297	8	6	2009	6	33	8	104.44	3,554	5	195	75.20	-0.65
40	-26.0914	32.3302	8	6	2009	6	33	13	103.04	3,657	5	200	74.19	-0.28
41	-26.0923	32.3306	8	6	2009	6	33	18	104.58	3,762	5	205	75.30	0.31
42	-26.0931	32.3310	8	6	2009	6	33	23	107.31	3,869	5	210	77.26	0.54
43	-26.0940	32.3315	8	6	2009	6	33	28	107.98	3,977	5	215	77.75	0.14
44	-26.0949	32.3320	8	6	2009	6	33	33	107.96	4,085	5	220	77.73	-0.01
45	-26.0958	32.3324	8	6	2009	6	33	38	108.28	4,194	5	225	77.96	0.06
46	-26.0967	32.3326	8	6	2009	6	33	43	106.18	4,300	5	230	76.45	-0.42
47	-26.0977	32.3328	8	6	2009	6	33	48	104.52	4,404	5	235	75.25	-0.33
48	-26.0986	32.3329	8	6	2009	6	33	53	104.01	4,508	5	240	74.89	-0.10
49	-26.0995	32.3331	8	6	2009	6	33	58	104.71	4,613	5	245	75.39	0.14
50	-26.1005	32.3332	8	6	2009	6	34	3	107.75	4,721	5	250	77.58	0.61
51	-26.1015	32.3334	8	6	2009	6	34	8	110.77	4,832	5	255	79.76	0.61
52	-26.1025	32.3336	8	6	2009	6	34	13	114.04	4,946	5	260	82.11	0.65
53	-26.1035	32.3337	8	6	2009	6	34	18	113.35	5,059	5	265	81.61	-0.14
54	-26.1045	32.3339	8	6	2009	6	34	23	113.83	5,173	5	270	81.96	0.10
55	-26.1056	32.3341	8	6	2009	6	34	28	119.75	5,292	5	275	86.22	1.18
56	-26.1066	32.3343	8	6	2009	6	34	33	119.11	5,412	5	280	85.76	-0.13
57	-26.1077	32.3344	8	6	2009	6	34	38	116.05	5,528	5	285	83.56	-0.61
58	-26.1087	32.3346	8	6	2009	6	34	43	116.61	5,644	5	290	83.96	0.11
59	-26.1097	32.3348	8	6	2009	6	34	48	118.04	5,762	5	295	84.99	0.29
60	-26.1108	32.3349	8	6	2009	6	34	53	120.5	5,883	5	300	86.76	0.49
61	-26.1119	32.3351	8	6	2009	6	34	58	121.76	6,005	5	305	87.67	0.25
62	-26.1130	32.3353	8	6	2009	6	35	3	118.99	6,124	5	310	85.67	-0.56
63	-26.1140	32.3355	8	6	2009	6	35	8	118.19	6,242	5	315	85.10	-0.16
64	-26.1151	32.3357	8	6	2009	6	35	13	119.58	6,361	5	320	86.10	0.28
65	-26.1161	32.3359	8	6	2009	6	35	18	115.88	6,477	5	325	83.43	-0.74
66	-26.1171	32.3362	8	6	2009	6	35	23	112.77	6,590	5	330	81.20	-0.62
67	-26.1180	32.3366	8	6	2009	6	35	28	111.78	6,702	5	335	80.48	-0.20
68	-26.1190	32.3369	8	6	2009	6	35	33	109.11	6,811	5	340	78.56	-0.53
69	-26.1199	32.3372	8	6	2009	6	35	38	106.03	6,917	5	345	76.34	-0.62
70	-26.1208	32.3375	8	6	2009	6	35	43	108.85	7,026	5	350	78.37	0.56
71	-26.1218	32.3378	8	6	2009	6	35	48	111.15	7,137	5	355	80.03	0.46
72	-26.1228	32.3381	8	6	2009	6	35	53	113.12	7,250	5	360	81.45	0.39
73	-26.1237	32.3384	8	6	2009	6	35	58	112.12	7,362	5	365	80.73	-0.20
74	-26.1247	32.3387	8	6	2009	6	36	3	115.57	7,478	5	370	83.21	0.69
75	-26.1257	32.3391	8	6	2009	6	36	8	116.41	7,594	5	375	83.82	0.17
76	-26.1267	32.3394	8	6	2009	6	36	13	115.35	7,709	5	380	83.05	-0.21
77	-26.1277	32.3397	8	6	2009	6	36	18	116.17	7,826	5	385	83.64	0.16
78	-26.1288	32.3400	8	6	2009	6	36	23	119.17	7,945	5	390	85.80	0.60
79	-26.1298	32.3403	8	6	2009	6	36	28	121.85	8,067	5	395	87.73	0.54
80	-26.1309	32.3406	8	6	2009	6	36	33	122.18	8,189	5	400	87.97	0.07
81	-26.1320	32.3408	8	6	2009	6	36	38	121.7	8,311	5	405	87.62	-0.10

Point No.	Lat	Long	Month	Day	Year	Hour	Min	Sec	Leg Distance (m)	Cum. Distance (m)	Leg Time (s)	Cum. Elapsed Time (s)	Leg Speed (km/hr)	Leg Acceleration (m/s/s)
82	-26.1330	32.3408	8	6	2009	6	36	43	118.1	8,429	5	410	85.03	-0.72
83	-26.1341	32.3406	8	6	2009	6	36	48	119.19	8,548	5	415	85.82	0.22
84	-26.1352	32.3404	8	6	2009	6	36	53	119.18	8,667	5	420	85.81	-0.00
85	-26.1362	32.3403	8	6	2009	6	36	58	116.81	8,784	5	425	84.10	-0.48
86	-26.1373	32.3401	8	6	2009	6	37	3	120.53	8,904	5	430	86.78	0.74
87	-26.1384	32.3399	8	6	2009	6	37	8	122.91	9,027	5	435	88.50	0.48
88	-26.1394	32.3397	8	6	2009	6	37	13	122.32	9,150	5	440	88.07	-0.12
89	-26.1405	32.3395	8	6	2009	6	37	18	118.68	9,268	5	445	85.45	-0.73
90	-26.1415	32.3393	8	6	2009	6	37	23	118.43	9,387	5	450	85.27	-0.05
91	-26.1425	32.3391	8	6	2009	6	37	28	112.42	9,499	5	455	80.94	-1.20
92	-26.1436	32.3390	8	6	2009	6	37	33	115.4	9,614	5	460	83.09	0.60
93	-26.1446	32.3388	8	6	2009	6	37	38	115.47	9,730	5	465	83.14	0.01
94	-26.1457	32.3386	8	6	2009	6	37	43	119.38	9,849	5	470	85.96	0.78
95	-26.1467	32.3384	8	6	2009	6	37	48	121.63	9,971	5	475	87.58	0.45
96	-26.1478	32.3382	8	6	2009	6	37	53	118.06	10,089	5	480	85.01	-0.71
97	-26.1488	32.3381	8	6	2009	6	37	58	116.35	10,205	5	485	83.77	-0.34
98	-26.1499	32.3379	8	6	2009	6	38	3	118.11	10,323	5	490	85.04	0.35
99	-26.1509	32.3377	8	6	2009	6	38	8	120.07	10,444	5	495	86.45	0.39
100	-26.1520	32.3375	8	6	2009	6	38	13	122.07	10,566	5	500	87.89	0.40
101	-26.1531	32.3374	8	6	2009	6	38	18	121.3	10,687	5	505	87.34	-0.15
102	-26.1542	32.3372	8	6	2009	6	38	23	120.05	10,807	5	510	86.43	-0.25
103	-26.1553	32.3370	8	6	2009	6	38	28	122.25	10,929	5	515	88.02	0.44
104	-26.1563	32.3368	8	6	2009	6	38	33	120.04	11,049	5	520	86.43	-0.44
105	-26.1573	32.3366	8	6	2009	6	38	38	114.35	11,164	5	525	82.33	-1.14
106	-26.1583	32.3365	8	6	2009	6	38	43	112.81	11,276	5	530	81.22	-0.31
107	-26.1594	32.3363	8	6	2009	6	38	48	116.58	11,393	5	535	83.93	0.75
108	-26.1605	32.3361	8	6	2009	6	38	53	121.7	11,515	5	540	87.62	1.03
109	-26.1616	32.3359	8	6	2009	6	38	58	123.91	11,639	5	545	89.21	0.44
110	-26.1627	32.3357	8	6	2009	6	39	3	125.09	11,764	5	550	90.07	0.24
111	-26.1638	32.3355	8	6	2009	6	39	8	123.66	11,887	5	555	89.03	-0.29
112	-26.1649	32.3354	8	6	2009	6	39	13	121.84	12,009	5	560	87.72	-0.36
113	-26.1659	32.3352	8	6	2009	6	39	18	112.78	12,122	5	565	81.20	-1.81
114	-26.1668	32.3350	8	6	2009	6	39	23	109.88	12,232	5	570	79.11	-0.58
115	-26.1678	32.3349	8	6	2009	6	39	28	110.8	12,343	5	575	79.78	0.19
116	-26.1688	32.3347	8	6	2009	6	39	33	109.14	12,452	5	580	78.58	-0.33
117	-26.1698	32.3345	8	6	2009	6	39	38	114.06	12,566	5	585	82.12	0.98
118	-26.1708	32.3343	8	6	2009	6	39	43	115.59	12,681	5	590	83.22	0.31
119	-26.1719	32.3341	8	6	2009	6	39	48	115.13	12,797	5	595	82.89	-0.09
120	-26.1729	32.3340	8	6	2009	6	39	53	116.68	12,913	5	600	84.01	0.31
121	-26.1739	32.3338	8	6	2009	6	39	58	117.06	13,030	5	605	84.28	0.07
122	-26.1750	32.3336	8	6	2009	6	40	3	114.98	13,145	5	610	82.79	-0.41
123	-26.1760	32.3335	8	6	2009	6	40	8	114.49	13,260	5	615	82.43	-0.10
124	-26.1770	32.3333	8	6	2009	6	40	13	112.39	13,372	5	620	80.92	-0.42
125	-26.1779	32.3332	8	6	2009	6	40	18	108.15	13,480	5	625	77.87	-0.85
126	-26.1789	32.3330	8	6	2009	6	40	23	102.48	13,583	5	630	73.79	-1.13
127	-26.1797	32.3329	8	6	2009	6	40	28	92.69	13,676	5	635	66.74	-1.96
128	-26.1805	32.3327	8	6	2009	6	40	33	96.29	13,772	5	640	69.33	0.72
129	-26.1815	32.3326	8	6	2009	6	40	38	103.18	13,875	5	645	74.29	1.38
130	-26.1824	32.3324	8	6	2009	6	40	43	101.36	13,976	5	650	72.98	-0.36
131	-26.1833	32.3323	8	6	2009	6	40	48	108.66	14,085	5	655	78.24	1.46
132	-26.1843	32.3321	8	6	2009	6	40	53	108.78	14,194	5	660	78.32	0.02
133	-26.1853	32.3319	8	6	2009	6	40	58	109.09	14,303	5	665	78.54	0.06
134	-26.1862	32.3318	8	6	2009	6	41	3	109.06	14,412	5	670	78.52	-0.01
135	-26.1872	32.3316	8	6	2009	6	41	8	110	14,522	5	675	79.20	0.19
136	-26.1882	32.3314	8	6	2009	6	41	13	110.71	14,633	5	680	79.71	0.14
137	-26.1892	32.3313	8	6	2009	6	41	18	111.88	14,745	5	685	80.55	0.23
138	-26.1902	32.3311	8	6	2009	6	41	23	112.94	14,857	5	690	81.31	0.21
139	-26.1912	32.3309	8	6	2009	6	41	28	113.16	14,971	5	695	81.47	0.04
140	-26.1921	32.3308	8	6	2009	6	41	33	99.18	15,070	5	700	71.41	-2.79
141	-26.1930	32.3306	8	6	2009	6	41	38	102.74	15,173	5	705	73.97	0.71
142	-26.1940	32.3304	8	6	2009	6	41	43	111.51	15,284	5	710	80.29	1.76
143	-26.1950	32.3303	8	6	2009	6	41	48	109.1	15,393	5	715	78.55	-0.48
144	-26.1959	32.3302	8	6	2009	6	41	53	106.79	15,500	5	720	76.89	-0.46
145	-26.1969	32.3302	8	6	2009	6	41	58	108.86	15,609	5	725	78.38	0.41
146	-26.1979	32.3302	8	6	2009	6	42	3	111.98	15,721	5	730	80.62	0.62
147	-26.1989	32.3303	8	6	2009	6	42	8	113.78	15,835	5	735	81.92	0.36
148	-26.2000	32.3303	8	6	2009	6	42	13	115.44	15,950	5	740	83.11	0.33
149	-26.2010	32.3303	8	6	2009	6	42	18	117.2	16,067	5	745	84.38	0.35
150	-26.2021	32.3303	8	6	2009	6	42	23	121.21	16,188	5	750	87.27	0.80
151	-26.2032	32.3303	8	6	2009	6	42	28	126.99	16,315	5	755	91.44	1.16
152	-26.2044	32.3303	8	6	2009	6	42	33	126.89	16,442	5	760	91.36	-0.02
153	-26.2055	32.3304	8	6	2009	6	42	38	123	16,565	5	765	88.56	-0.78
154	-26.2066	32.3304	8	6	2009	6	42	43	123.45	16,689	5	770	88.88	0.09
155	-26.2077	32.3304	8	6	2009	6	42	48	123.66	16,812	5	775	89.04	0.04
156	-26.2089	32.3304	8	6	2009	6	42	53	126.32	16,939	5	780	90.95	0.53
157	-26.2099	32.3304	8	6	2009	6	42	58	122	17,061	5	785	87.84	-0.86
158	-26.2110	32.3304	8	6	2009	6	43	3	115.55	17,176	5	790	83.20	-1.29
159	-26.2120	32.3305	8	6	2009	6	43	8	111.88	17,288	5	795	80.55	-0.74
160	-26.2130	32.3305	8	6	2009	6	43	13	112.21	17,400	5	800	80.79	0.07
161	-26.2140	32.3305	8	6	2009	6	43	18	111.76	17,512	5	805	80.47	-0.09
162	-26.2150	32.3305	8	6	2009	6	43	23	115.44	17,628	5	810	83.11	0.73
163	-26.2161	32.3305	8	6	2009	6	43	28	118.09	17,746	5	815	85.03	0.53
164	-26.2172	32.3305	8	6	2009	6	43	33	116.87	17,863	5	820	84.15	-0.24
165	-26.2182	32.3305	8	6	2009	6	43	38	119.32	17,982	5	825	85.91	0.49
166	-26.2193	32.3306	8	6	2009	6	43	43	119.21	18,101	5	830	85.83	-0.02
167	-26.2203	32.3306	8	6	2009	6	43	48	115.54	18,217	5	835	83.19	-0.73
168	-26.2214	32.3306	8	6	2009	6	43	53	114.86	18,331	5	840	82.70	-0.14
169	-26.2224	32.3306	8	6	2009	6	43	58	118.21	18,450	5	845	85.11	0.67
170	-26.2235	32.3306	8	6	2009	6	44	3	120.24	18,570	5	850	86.58	0.41
171	-26.2246	32.3306	8	6	2009	6	44	8	118.66	18,689	5	855	85.43	-0.32
172	-26.2256	32.3306	8	6	2009	6	44	13	118.09	18,807	5	860	85.03	-0.11
173	-26.2266	32.3307	8	6	2009	6	44	18	103.99	18,911	5	865	74.87	-2.82
174	-26.2275	32.330												

Point No.	Lat	Long	Month	Day	Year	Hour	Min	Sec	Leg Distance (m)	Cum. Distance (m)	Leg Time (s)	Cum. Elapsed Time (s)	Leg Speed (km/hr)	Leg Acceleration (m/s/s)
179	-26.2322	32.3308	8	6	2009	6	44	48	110.77	19,530	5	895	79.75	0.71
180	-26.2331	32.3308	8	6	2009	6	44	53	110.11	19,640	5	900	79.28	-0.13
181	-26.2341	32.3308	8	6	2009	6	44	58	111.21	19,752	5	905	80.07	0.22
182	-26.2352	32.3309	8	6	2009	6	45	3	113.01	19,865	5	910	81.37	0.36
183	-26.2362	32.3309	8	6	2009	6	45	8	113.11	19,978	5	915	81.44	0.02
184	-26.2372	32.3309	8	6	2009	6	45	13	113.09	20,091	5	920	81.43	-0.00
185	-26.2383	32.3309	8	6	2009	6	45	18	117.76	20,209	5	925	84.79	0.93
186	-26.2393	32.3309	8	6	2009	6	45	23	115.54	20,324	5	930	83.19	-0.44
187	-26.2403	32.3309	8	6	2009	6	45	28	114.54	20,439	5	935	82.47	-0.20
188	-26.2414	32.3309	8	6	2009	6	45	33	118.65	20,557	5	940	85.43	0.82
189	-26.2425	32.3310	8	6	2009	6	45	38	121.21	20,678	5	945	87.27	0.51
190	-26.2436	32.3310	8	6	2009	6	45	43	119.65	20,798	5	950	86.15	-0.31
191	-26.2446	32.3310	8	6	2009	6	45	48	117.64	20,916	5	955	84.70	-0.40
192	-26.2457	32.3310	8	6	2009	6	45	53	117.31	21,033	5	960	84.46	-0.07
193	-26.2467	32.3310	8	6	2009	6	45	58	117.2	21,150	5	965	84.38	-0.02
194	-26.2477	32.3310	8	6	2009	6	46	3	109.3	21,260	5	970	78.70	-1.58
195	-26.2487	32.3310	8	6	2009	6	46	8	109.87	21,369	5	975	79.11	0.11
196	-26.2497	32.3310	8	6	2009	6	46	13	108.53	21,478	5	980	78.14	-0.27
197	-26.2506	32.3310	8	6	2009	6	46	18	106.42	21,584	5	985	76.62	-0.42
198	-26.2515	32.3310	8	6	2009	6	46	23	101.65	21,686	5	990	73.19	-0.95
199	-26.2525	32.3310	8	6	2009	6	46	28	101.42	21,787	5	995	73.02	-0.05
200	-26.2534	32.3310	8	6	2009	6	46	33	104.86	21,892	5	1,000	75.50	0.69
201	-26.2543	32.3310	8	6	2009	6	46	38	105.42	21,998	5	1,005	75.90	0.11
202	-26.2553	32.3310	8	6	2009	6	46	43	104.64	22,102	5	1,010	75.34	-0.16
203	-26.2563	32.3310	8	6	2009	6	46	48	109.53	22,212	5	1,015	78.86	0.98
204	-26.2573	32.3310	8	6	2009	6	46	53	113.09	22,325	5	1,020	81.42	0.71
205	-26.2583	32.3310	8	6	2009	6	46	58	113.98	22,439	5	1,025	82.06	0.18
206	-26.2593	32.3310	8	6	2009	6	47	3	108.64	22,548	5	1,030	78.22	-1.07
207	-26.2602	32.3310	8	6	2009	6	47	8	104.75	22,652	5	1,035	75.42	-0.78
208	-26.2612	32.3310	8	6	2009	6	47	13	105.08	22,757	5	1,040	75.66	0.07
209	-26.2621	32.3310	8	6	2009	6	47	18	105.3	22,863	5	1,045	75.82	0.04
210	-26.2631	32.3310	8	6	2009	6	47	23	106.19	22,969	5	1,050	76.46	0.18
211	-26.2641	32.3310	8	6	2009	6	47	28	108.75	23,078	5	1,055	78.30	0.51
212	-26.2650	32.3310	8	6	2009	6	47	33	105.31	23,183	5	1,060	75.82	-0.69
213	-26.2659	32.3310	8	6	2009	6	47	38	105.32	23,288	5	1,065	75.83	0.00
214	-26.2669	32.3310	8	6	2009	6	47	43	104.86	23,393	5	1,070	75.50	-0.09
215	-26.2678	32.3310	8	6	2009	6	47	48	102.86	23,496	5	1,075	74.06	-0.40
216	-26.2687	32.3310	8	6	2009	6	47	53	100.3	23,596	5	1,080	72.21	-0.51
217	-26.2696	32.3310	8	6	2009	6	47	58	99.41	23,696	5	1,085	71.57	-0.18
218	-26.2705	32.3311	8	6	2009	6	48	3	103.06	23,799	5	1,090	74.21	0.73
219	-26.2714	32.3313	8	6	2009	6	48	8	96.92	23,896	5	1,095	69.78	-1.23
220	-26.2722	32.3317	8	6	2009	6	48	13	92.98	23,989	5	1,100	66.94	-0.79
221	-26.2728	32.3322	8	6	2009	6	48	18	92.37	24,081	5	1,105	66.51	-0.12
222	-26.2734	32.3329	8	6	2009	6	48	23	97	24,178	5	1,110	69.84	0.92
223	-26.2739	32.3336	8	6	2009	6	48	28	92.19	24,270	5	1,115	66.37	-0.96
224	-26.2745	32.3344	8	6	2009	6	48	33	99.4	24,370	5	1,120	71.57	1.44
225	-26.2750	32.3353	8	6	2009	6	48	38	107.11	24,477	5	1,125	77.12	1.54
226	-26.2756	32.3362	8	6	2009	6	48	43	108.47	24,585	5	1,130	78.10	0.27
227	-26.2762	32.3371	8	6	2009	6	48	48	109.04	24,694	5	1,135	78.51	0.11
228	-26.2768	32.3380	8	6	2009	6	48	53	112.36	24,807	5	1,140	80.90	0.66
229	-26.2774	32.3389	8	6	2009	6	48	58	114.27	24,921	5	1,145	82.28	0.38
230	-26.2780	32.3398	8	6	2009	6	49	3	115.56	25,036	5	1,150	83.20	0.26
231	-26.2786	32.3408	8	6	2009	6	49	8	114.88	25,151	5	1,155	82.71	-0.14
232	-26.2793	32.3416	8	6	2009	6	49	13	109.94	25,261	5	1,160	79.16	-0.99
233	-26.2800	32.3423	8	6	2009	6	49	18	107.84	25,369	5	1,165	77.65	-0.42
234	-26.2808	32.3429	8	6	2009	6	49	23	106.98	25,476	5	1,170	77.02	-0.18
235	-26.2816	32.3434	8	6	2009	6	49	28	106.58	25,583	5	1,175	76.74	-0.08
236	-26.2825	32.3439	8	6	2009	6	49	33	107.12	25,690	5	1,180	77.13	0.11
237	-26.2834	32.3444	8	6	2009	6	49	38	113.09	25,803	5	1,185	81.42	1.19
238	-26.2844	32.3448	8	6	2009	6	49	43	113.27	25,916	5	1,190	81.55	0.04
239	-26.2852	32.3453	8	6	2009	6	49	48	104.53	26,021	5	1,195	75.26	-1.75
240	-26.2860	32.3457	8	6	2009	6	49	53	99.5	26,120	5	1,200	71.64	-1.01
241	-26.2868	32.3461	8	6	2009	6	49	58	95.03	26,215	5	1,205	68.42	-0.89
242	-26.2875	32.3464	8	6	2009	6	50	3	78.08	26,293	5	1,210	56.22	-3.39
243	-26.2882	32.3468	8	6	2009	6	50	8	96.12	26,389	5	1,215	69.20	3.61
244	-26.2891	32.3472	8	6	2009	6	50	13	105.73	26,495	5	1,220	76.13	1.93
245	-26.2900	32.3477	8	6	2009	6	50	18	105.43	26,601	5	1,225	75.91	-0.06
246	-26.2908	32.3481	8	6	2009	6	50	23	103.42	26,704	5	1,230	74.46	-0.40
247	-26.2917	32.3485	8	6	2009	6	50	28	107.07	26,811	5	1,235	77.09	0.73
248	-26.2926	32.3490	8	6	2009	6	50	33	108.78	26,920	5	1,240	78.32	0.34
249	-26.2934	32.3494	8	6	2009	6	50	38	106.52	27,026	5	1,245	76.69	-0.45
250	-26.2943	32.3499	8	6	2009	6	50	43	105.53	27,132	5	1,250	75.98	-0.20
251	-26.2951	32.3503	8	6	2009	6	50	48	101.75	27,234	5	1,255	73.26	-0.76
252	-26.2959	32.3506	8	6	2009	6	50	53	90.98	27,325	5	1,260	65.50	-2.16
253	-26.2967	32.3508	8	6	2009	6	50	58	85.7	27,410	5	1,265	61.70	-1.06
254	-26.2974	32.3509	8	6	2009	6	51	3	84.18	27,495	5	1,270	60.61	-0.30
255	-26.2981	32.3510	8	6	2009	6	51	8	74.27	27,569	5	1,275	53.47	-1.98
256	-26.2988	32.3512	8	6	2009	6	51	13	77.94	27,647	5	1,280	56.11	0.73
257	-26.2997	32.3513	8	6	2009	6	51	18	100.57	27,747	5	1,285	72.41	4.53
258	-26.3007	32.3515	8	6	2009	6	51	23	113.12	27,860	5	1,290	81.44	2.51
259	-26.3016	32.3516	8	6	2009	6	51	28	107.98	27,968	5	1,295	77.75	-1.03
260	-26.3022	32.3518	8	6	2009	6	51	33	67.85	28,036	5	1,300	48.85	-8.03
261	-26.3028	32.3518	8	6	2009	6	51	38	61.85	28,098	5	1,305	44.53	-1.20
262	-26.3035	32.3519	8	6	2009	6	51	43	76.89	28,175	5	1,310	55.36	3.01

Annexure V: Summary of Survey Results

MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES

SUMMARY OF RESULTS

Series No.	Road Details				Survey Length (km)	Observed Road Condition	Desirable Speed (Km/hr)	Driving Regime			GPS Receiver		Sampling Method		Sampling Frequency	Road Link Statistics							Road Link Indices								
	Province	Route No	Class	From - To				Fast	Normal	Slow	Garmin 1	Garmin 2	Time	Dist		Cum Travel Time (Hr)	MEAN Running Speed (Km/hr)	Overall MEAN Speed (Km/hr)	Speed STDEV	Speed Coeff VAR	Accn MEAN	Decln MEAN	Decln Events/ Km	Accn & Decln STDEV	Total Travel Time Index	Average Speed Efficiency Index	Sub-Speed Time Index	Sub-Speed Distance Index	LINK SUB-SPEED INDEX (L-SSI)		
1	MAPUTO	N200	Secondary	Boane - Bela Vista	60.7	Poor	60		x		x		x		5s		0.90	67.71	67.71	12.28	0.18	0.75	-0.87	5	1.27	0.89	1.11	1.15	0.28	0.71	
2-1	GAZA	N221	Secondary	Macarante-Mabalane	69.6	Good	60	x			x		x		5s		0.81	86.40	86.40	15.01	0.17	0.52	-0.61	10	0.85	0.69	1.40	1.19	0.08	0.79	
2-2	GAZA	N221	Secondary	Macarante-Mabalane	70.2	Good	60		x				x		5s		0.98	72.04	72.04	13.19	0.18	0.68	-0.77	5	1.20	0.83	1.21	1.32	0.17	0.78	
3	GAZA	R453	Secondary	Mabalane-Combomune	46.7	Fair	60		x		x		x		5s		0.64	73.48	73.48	16.34	0.22	0.95	-1.12	5	1.72	0.82	1.17	1.31	0.12	0.59	
4	MAPUTO	R408	Tertiary	Catuane - R407	61.9	Good	50		x		x		x		5s		0.81	76.58	76.46	17.77	0.23	1.21	-1.38	5	1.99	0.65	1.49	1.38	0.04	0.59	
5-1	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50	x			x		x		5s		0.54	78.16	77.78	18.17	0.23	1.51	-1.64	5	2.29	0.64	1.56	1.47	0.04	0.43	
5-2	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x		x		5s		0.75	56.28	55.98	11.19	0.20	0.83	-0.98	6	1.40	0.89	1.10	1.29	0.15	0.50	
5-3	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.3	Fair	50			x	x		x		5s		1.10	38.56	37.53	9.09	0.24	0.55	-0.59	10	0.85	1.33	0.75	1.33	0.98	0.50	
6A	MAPUTO	R406	Tertiary	N200 - Catuane	70.2	Poor	50		x		x		x		5s		1.31	53.73	53.73	15.99	0.30	1.15	-1.36	7	1.84	0.93	1.09	1.34	0.27	0.51	
6B	MAPUTO	R406	Tertiary	N200 - Catuane	35.7	Poor	50		x		x		x		5s		0.58	61.11	61.11	14.50	0.24	1.11	-1.39	6	1.88	0.82	1.20	1.28	0.15	0.45	
7	MAPUTO	R406	Tertiary	N200 - Catuane	34.7	Poor	50		x		x		x	x	2s		0.59	58.71	58.71	11.33	0.19	0.47	-0.52	15	0.81	0.85	1.15	1.28	0.15	0.56	
8	MAPUTO	R406	Tertiary	N200 - Catuane	34.6	Poor	50		x		x		x		50m		0.58	61.58	59.31	12.04	0.20	0.72	-0.82	8	1.33	0.84	1.20	1.22	0.15	0.48	
9	MAPUTO	R406	Tertiary	N200 - Catuane	34.5	Poor	50		x		x		x		100m		0.56	64.57	62.11	12.39	0.19	1.16	-1.14	5	1.90	0.81	1.24	1.16	0.12	0.51	
10-1	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.6	Poor	40		x		x		x		10m		0.25	44.53	41.92	10.49	0.24	0.39	-0.47	32	0.62	0.95	1.14	1.17	0.36	0.40	
10-2	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		20m		0.25	42.21	41.02	7.84	0.19	0.62	-0.69	19	0.95	0.98	1.06	1.16	0.41	0.44	
10-3	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		40m		0.26	40.62	38.80	8.56	0.21	0.95	-0.97	11	1.34	1.03	1.03	1.20	0.46	0.42	
10-4	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.0	Poor	40		x		x		x		80m		0.25	41.42	40.08	7.98	0.19	1.12	-1.07	6	1.56	1.00	1.06	1.15	0.49	0.45	
10-5	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		1s		0.25	40.22	40.22	8.73	0.22	0.29	-0.35	41	0.46	0.99	1.04	1.19	0.43	0.43	
10-6	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		4s		0.26	38.95	38.95	8.63	0.22	0.89	-1.14	11	1.37	1.03	1.00	1.22	0.47	0.42	
10-7	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		8s		0.27	37.60	37.60	7.00	0.19	1.10	-1.13	6	1.49	1.06	0.95	1.19	0.56	0.46	
10-8	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		16s		0.27	37.16	37.16	7.96	0.21	1.41	-1.38	3	1.75	1.08	0.93	1.21	0.68	0.57	
10-9	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x			x	Auto	Auto			0.25	38.38	40.20	7.88	0.21	1.27	-1.21	6	1.68	1.00	1.01	1.18	0.43	0.46	
11-1	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40	x					x		5s		0.30	67.49	67.49	11.30	0.17	1.89	-2.15	5	2.58	0.59	1.65	1.25	0.02	0.56	
11-2A	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40		x				x		5s		0.40	51.06	51.06	6.41	0.13	0.77	-0.85	7	1.15	0.78	1.26	1.09	0.06	0.57	
11-2B	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s		0.39	52.08	52.08	7.02	0.13	0.83	-1.21	6	1.33	0.77	1.28	1.27	0.04	0.49	
11-2C	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s		0.39	54.44	51.92	7.49	0.14	0.99	-1.16	7	1.42	0.77	1.31	1.30	0.05	0.61	
11-3	GAZA	R852	Vicinal	Changane - Nalazi	19.9	Good	40			x	x		x		5s		0.50	39.65	39.65	5.46	0.14	0.57	-0.67	9	0.94	1.01	0.99	1.10	0.44	0.47	
12-1	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.44	48.26	48.26	7.07	0.15	0.82	-0.82	8	1.16	0.83	1.21	1.15	0.07	0.39	
12-2	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.4	Fair	40		x		x		x		5s		0.43	50.92	49.76	6.77	0.13	0.78	-0.82	7	1.02	0.80	1.28	1.07	0.09	0.64	
12-3	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.41	52.00	52.00	11.09	0.21	0.91	-1.00	7	1.30	0.77	1.26	1.46	0.03	0.25	
12-4	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.43	49.69	49.69	8.23	0.17	0.92	-0.97	8	1.34	0.80	1.24	1.16	0.07	0.38	
13	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x	x	Auto	Auto			0.63	61.97	66.37	18.15	0.29	1.45	-1.60	3	2.32	0.75	1.25	1.74	0.05	0.51	
14	GAZA	R442	Tertiary	Chibuto - Changane	51.2	Fair	50		x		x		x		5s		0.92	55.72	55.55	12.93	0.23	0.99	-1.12	7	1.65	0.90	1.11	1.29	0.18	0.46	
15	GAZA	R441	Tertiary	Nalazi - Chokwe	96.4	Poor	50		x		x	x	Auto	Auto			1.97	48.07	48.89	15.08	0.31	1.38	-1.65	6	2.19	1.72	0.99	1.72	0.33	0.55	
16-1	GAZA	R453	Vicinal	Combomune - Macandze	50.0	Poor	50		x		x		x		5s		1.12	44.79	44.79	6.93	0.15	0.72	-0.80	8	1.13	0.89	1.09	1.13	0.16	0.61	
16-2	GAZA	R453	Vicinal	Combomune - Macandze	49.9	Poor	50		x		x		x		2s		0.98	50.91	50.91	9.09	0.18	0.58	-0.65	17	0.88	0.79	1.30	1.22	0.04	0.57	
Total Kms Surveyed					1,211.5																										

Network Level Indices
Weighted by Length of Road Surveyed and Desirable Speed

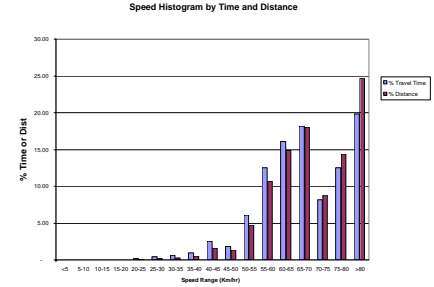
Network Indices				
Total Travel Time Index	Average Speed Efficiency Index	Sub-Speed Time Index	Sub-Speed Distance Index	NETWORK SUB-SPEED INDEX (N SSI)
0.91	1.19	1.31	0.20	0.56

Annexure VI: Summaries of Analysed GPS Data for Surveyed Roads

**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BOANE	ROAD NAME:	Boane - Bela Vista	ROAD NO.:	N200
SURVEY SERIES NO.:	1	ROAD CLASS:	Secondary	DESIRABLE SPEED (Km/hr):	60.00	REPORTED CONDITION:	Poor
SURVEY SECTION - FROM (Km):	0	SERIES DESCRIPTION:	Normal drive, 5 seconds sampling period				
TOTAL TRAVEL TIME (Hrs):	0.90	TO (Km):	61	SURVEY LENGTH (Km):	61		
AVG ACCLN RATE (m/s/s):	0.75	OVERALL AVG. SPEED (Km/hr):	67.7	AVG. RUNNING SPEED (Km/hr):	67.71	LOWEST SPEED (Km/hr):	22.82
NO. OF STOPPAGES:	-	OVERALL SPEED STD DEV.:	12.3	HIGHEST SPEED (Km/hr):	91.44	NO OF DECLN EVENTS:	299
ie Speed<5Km/hr)		AVG DECLN RATE (m/s/s):	-0.87	HARSHEST DECLN RATE (m/s/s):	-8.41	DECLN EVENTS/Km:	5
		ACCLN STD DEV:	1.27				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	0.16	0.47	0.62	0.93	2.48	1.86	6.05	12.56	16.12	18.14	8.22	12.56	19.84
% Survey Distance	-	-	-	-	0.05	0.19	0.29	0.53	1.57	1.31	4.68	10.70	14.86	18.01	8.76	14.36	24.68

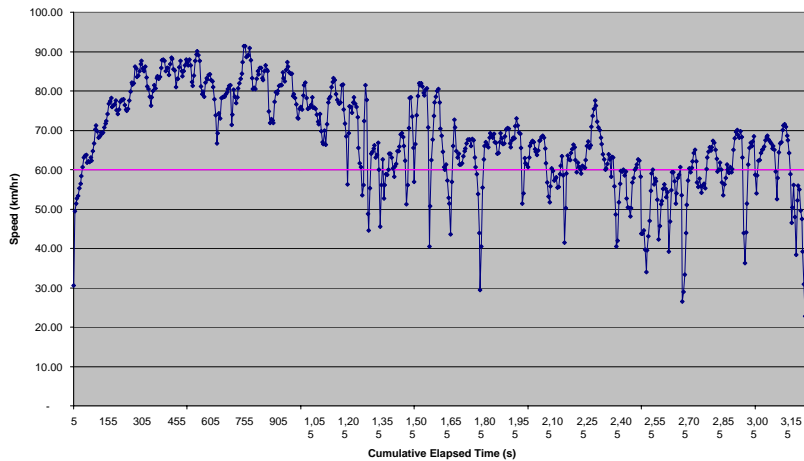
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
Average Speed (Km/hr)	68.48	84.15	81.81	81.93	77.37	66.98	67.80	64.62	61.36	58.30	56.00	62.94
Speed Standard Deviation	18.9	21.0	20.7	20.7	20.0	18.8	18.9	18.3	17.8	17.3	17.1	18.0
Acceleration Standard Deviation	0.24	0.13	0.18	0.23	0.18	0.56	0.56	0.33	0.34	0.35	0.47	0.39
AVG SPEED EFFICIENCY RATING	1.14	1.40	1.36	1.37	1.29	1.12	1.13	1.08	1.02	0.97	0.93	1.05
Travel Time at Speed<Desirable	0.01	-	-	-	-	0.02	0.02	0.01	0.03	0.05	0.06	0.02
SUB-SPEED TIME RATING	1.18	1.00	1.00	1.00	1.00	1.10	1.14	1.28	1.08	1.16	1.14	1.14
Distance Travel at Speed<Desirable	0.57	-	-	-	-	1.14	0.80	0.39	1.55	2.36	3.22	1.10
SUB-SPEED DISTANCE RATING	0.11	-	-	-	-	0.23	0.16	0.08	0.31	0.47	0.64	0.22
LOWER LIMIT SUB-SPEED - (Km/hr)	32.05	60.00	60.00	60.00	60.00	35.92	33.63	28.67	37.87	34.18	35.56	34.71
SUB-SPEED RATING	0.53	1.00	1.00	1.00	1.00	0.60	0.56	0.48	0.63	0.57	0.59	0.58

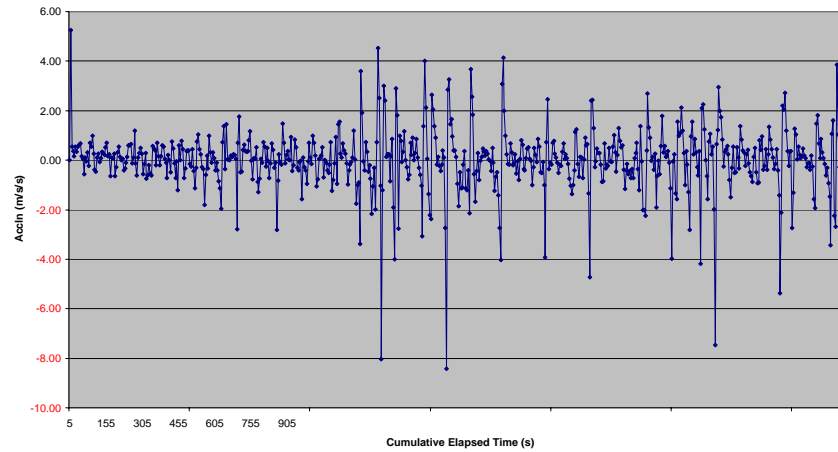
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.89
AVG SPEED EFFICIENCY INDEX	1.11
SUB-SPEED TIME INDEX	1.15
SUB-SPEED DISTANCE INDEX	0.28
LINK SUB-SPEED INDEX (L-SSI)	0.71

Speed/Time Profile



Acceleration/Time Profile

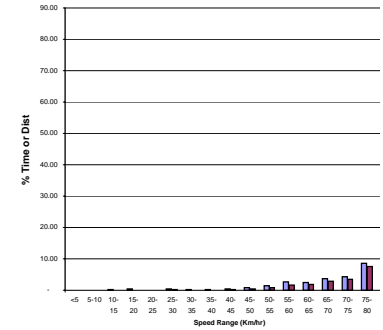


**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	MACARANTE	ROAD NAME:	Macarante-Mabalane	ROAD NO.:	N221
		ROAD CLASS:	Secondary	DESIRABLE SPEED (Km/hr):	60.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	2-1	SERIES DESCRIPTION:	Fast drive, 5 seconds sampling period				
SURVEY SECTION - FROM (Km):	-	TO (Km):	70	SURVEY LENGTH (Km):	70		
TOTAL TRAVEL TIME (Hrs):	0.81	OVERALL AVG. SPEED (Km/hr):	86.4	AVG. RUNNING SPEED (Km/hr):	86.40	LOWEST SPEED (Km/hr):	9.44
		OVERALL SPEED STD DEV.:	15.0	HIGHEST SPEED (Km/hr):	114.15		
AVG ACCLN RATE (m/s/s):	0.52	AVG DECLN RATE (m/s/s):	-0.61	HARSHEST DECLN RATE (m/s/s):	-4.59	NO OF DECLN EVENTS:	661.00
		ACCLN STD DEV.:	0.85			DECLN EVENTS/Km:	10.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

Speed Histogram by Time and Distance



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	0.14	0.35	0.07	0.35	0.14	0.14	0.35	0.83	1.38	2.55	2.48	3.59	4.21	8.49	74.95
% Survey Distance	-	-	0.02	0.07	0.02	0.11	0.05	0.06	0.17	0.46	0.83	1.70	1.80	2.81	3.53	7.64	80.72

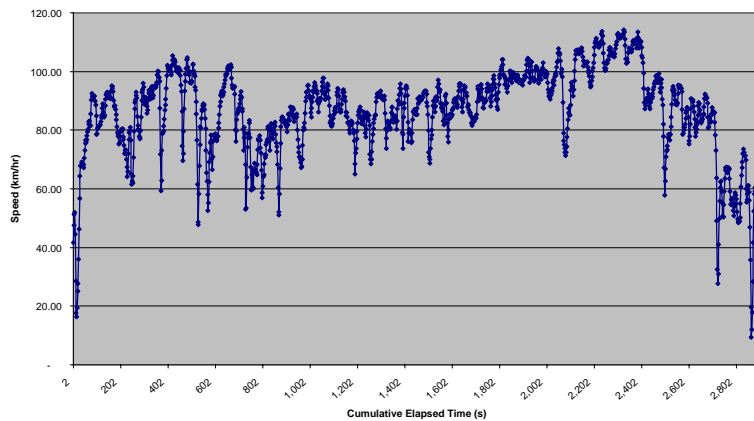
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70
Average Speed (Km/hr)	76.45	89.26	85.66	78.06	86.64	84.25	86.04	88.02	95.43	96.59	102.34	106.13	86.97	63.61
Speed Standard Deviation	21.4	22.9	22.5	21.4	22.5	22.1	22.4	22.6	23.5	23.8	24.5	25.0	22.6	18.9
Acceleration Standard Deviation	0.25	0.27	0.31	0.33	0.15	0.18	0.20	0.16	0.11	0.15	0.11	0.11	0.21	0.39
AVG SPEED EFFICIENCY RATING	1.27	1.49	1.43	1.30	1.44	1.40	1.43	1.47	1.59	1.61	1.71	1.77	1.45	1.06
Travel Time at Speed<Desirable	0.01	0.00	0.00	0.01	-	-	-	-	-	-	-	-	0.00	0.03
SUB-SPEED TIME RATING	1.64	1.01	1.12	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.23
Distance Travel at Speed<Desirable	0.28	0.03	0.18	0.28	-	-	-	-	-	-	-	-	0.03	1.63
SUB-SPEED DISTANCE RATING	0.06	0.01	0.04	0.06	-	-	-	-	-	-	-	-	0.01	0.33
LOWER LIMIT SUB-SPEED - (Km/hr)	15.08	36.44	30.91	34.44	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	35.28	29.95
SUB-SPEED RATING	0.25	0.61	0.52	0.57	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.50

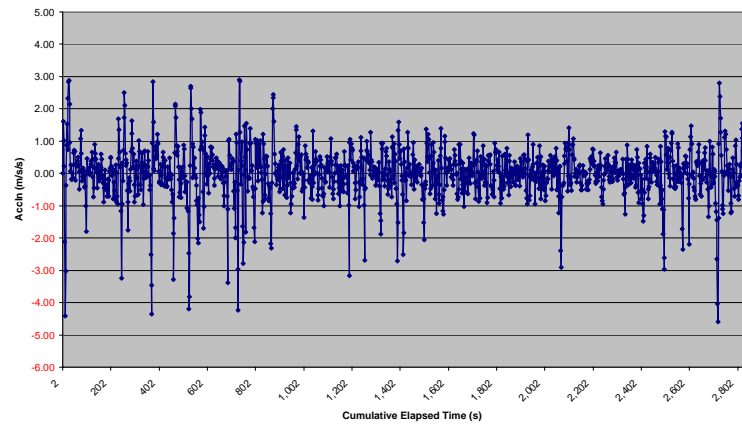
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.69
AVG SPEED EFFICIENCY INDEX	1.40
SUB-SPEED TIME INDEX	1.19
SUB-SPEED DISTANCE INDEX	0.08
LINK SUB-SPEED INDEX (L-SSI)	0.79

Speed/Time Profile



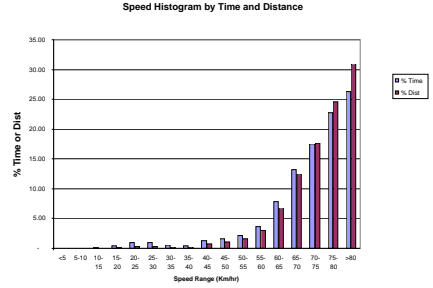
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	MACARANTE	ROAD NAME:	Macarante-Mabalane	ROAD NO.:	N221
		ROAD CLASS:	Secondary	DESIRABLE SPEED (Km/hr):	60.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	2-2	SURVEY SECTION - FROM (Km):	-	SURVEY DESCRIPTION:	Normal drive, 5 seconds sampling period		
		TO (Km):	70	SURVEY LENGTH (Km):	70		
TOTAL TRAVEL TIME (Hrs):	0.98	OVERALL AVG. SPEED (Km/hr):	72.0	AVG. RUNNING SPEED (Km/hr):	72.04	LOWEST SPEED (Km/hr):	14.70
		OVERALL SPEED STD DEV.:	13.2	HIGHEST SPEED (Km/hr):	95.94		
AVG ACCLN RATE (m/s/s):	0.68	AVG DECLN RATE (m/s/s):	-0.77	HARSHEST DECLN RATE (m/s/s):	-7.76	NO OF DECLN EVENTS:	329.00
		ACCLN STD DEV.:	1.20			DECLN EVENTS/Km:	5.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	0.14	0.43	1.00	1.00	0.57	0.43	1.28	1.57	2.14	3.70	7.83	13.25	17.52	22.79	26.35
% Survey Distance	-	-	0.03	0.11	0.30	0.37	0.26	0.23	0.77	1.04	1.59	3.00	6.81	12.41	17.62	24.54	30.93

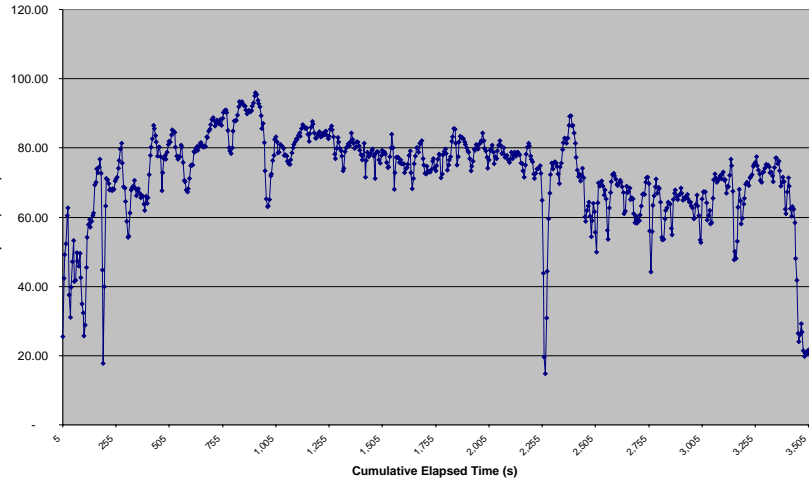
SEGMENT SPEED DATA

Segment Chainages: From/To	70-65	65-60	60-55	55-50	50-45	45-40	40-35	35-30	30-25	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	57.03	74.66	81.57	85.74	81.83	80.95	76.47	77.99	78.68	71.17	69.13	63.59	64.64	66.66
Speed Standard Deviation	16.9	19.0	19.9	20.5	19.9	19.7	19.1	19.5	19.3	18.9	18.3	17.4	17.6	18.1
Acceleration Standard Deviation	0.74	0.23	0.12	0.20	0.11	0.17	0.24	0.18	0.13	0.47	0.31	0.34	0.36	0.28
AVG SPEED EFFICIENCY RATING	0.95	1.24	1.36	1.43	1.36	1.35	1.27	1.30	1.31	1.19	1.15	1.06	1.08	1.11
Travel Time at Speed<Desirable	0.04	-	-	-	-	-	-	-	-	0.01	0.01	0.02	0.02	0.01
SUB-SPEED TIME RATING	1.35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.69	1.08	1.08	1.09	1.65
Distance Travel at Speed<Desirable	1.97	-	-	-	-	-	-	-	-	0.30	0.54	1.00	1.00	0.35
SUB-SPEED DISTANCE RATING	0.39	-	-	-	-	-	-	-	-	0.06	0.11	0.20	0.20	0.07
LOWER LIMIT SUB-SPEED - (Km/hr)	27.45	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	16.59	37.09	38.18	37.58	18.14
SUB-SPEED RATING	0.46	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.28	0.62	0.64	0.63	0.30

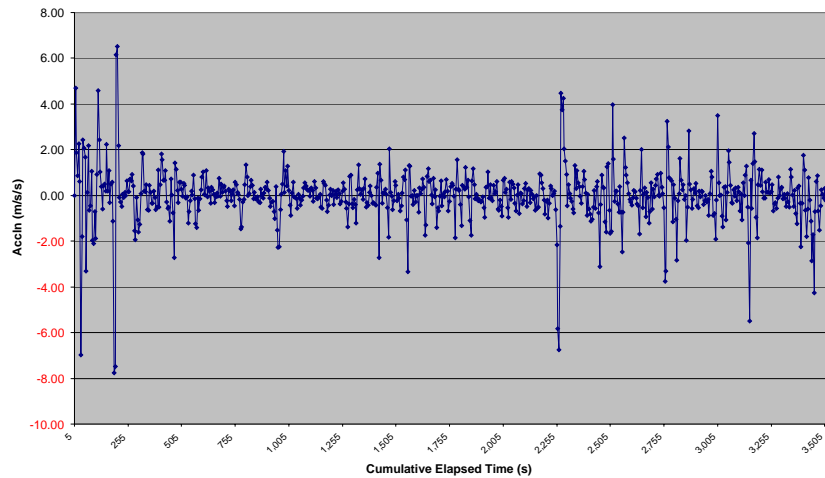
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.83
AVG SPEED EFFICIENCY INDEX	1.21
SUB-SPEED TIME INDEX	1.32
SUB-SPEED DISTANCE INDEX	0.17
LINK SUB-SPEED INDEX (L-SSI)	0.78

Speed/Time Profile



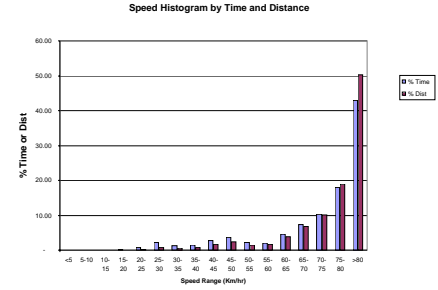
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	MABALANE	ROAD NAME:	Mabalane-Combomune	ROAD NO.:	R453
		ROAD CLASS:	Secondary	DESIRABLE SPEED (Km/hr):	60.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	3	SURVEY SECTION - FROM (Km):	-	SURVEY DESCRIPTION:	Normal drive, 5 seconds sampling period		
		TO (Km):	47	SURVEY LENGTH (Km):	47		
TOTAL TRAVEL TIME (Hrs):	0.64	OVERALL AVG. SPEED (Km/hr):	73.5	AVG. RUNNING SPEED (Km/hr):	73.48	LOWEST SPEED (Km/hr):	19.85
		OVERALL SPEED STD DEV.:	16.3	HIGHEST SPEED (Km/hr):	96.87		
AVG ACCLN RATE (m/s/s):	0.95	AVG DECLN RATE (m/s/s):	1.12	HARSHEST DECLN RATE (m/s/s):	-7.88	NO OF DECLN EVENTS:	210.00
		ACCLN STD DEV.:	1.72			DECLN EVENTS/Km:	5.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

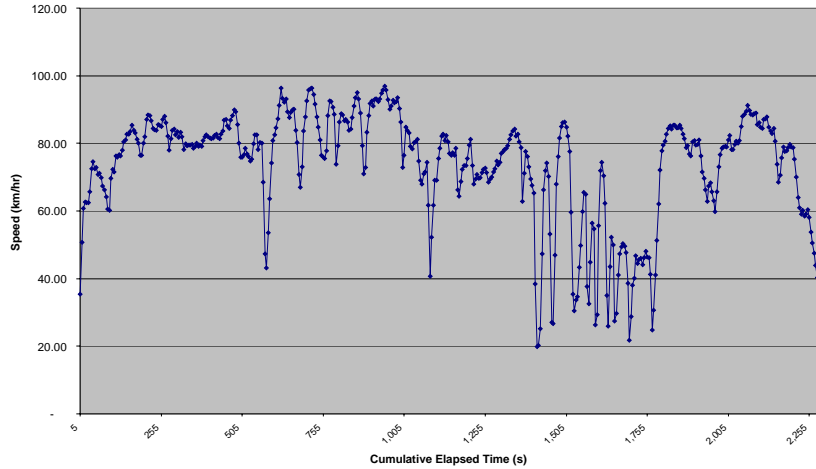


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.22	0.66	2.18	1.31	1.53	2.84	3.71	2.18	1.97	4.59	7.42	10.26	17.90	43.01
% Survey Distance	-	-	-	0.06	0.20	0.81	0.58	0.77	1.64	2.40	1.55	1.56	3.89	6.87	10.13	18.97	50.32

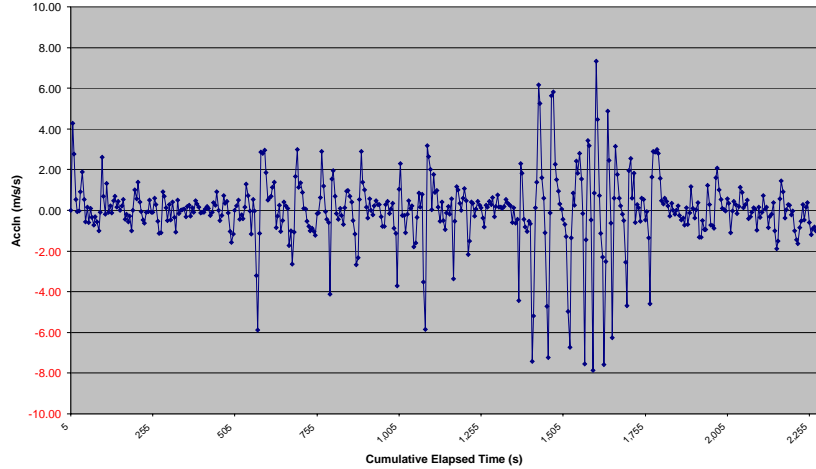
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50
Average Speed (Km/hr)	74.18	82.19	79.94	85.98	81.58	75.40	55.12	63.82	81.43
Speed Standard Deviation	23.0	24.3	24.1	24.9	24.4	23.2	20.6	22.0	24.1
Acceleration Standard Deviation	0.33	0.14	0.48	0.43	0.48	0.25	1.32	0.51	0.24
AVG SPEED EFFICIENCY RATING	1.24	1.37	1.33	1.43	1.36	1.26	0.92	1.06	1.36
Travel Time at Speed-Desirable	0.00	-	0.00	-	0.00	-	0.05	0.03	0.00
SUB-SPEED TIME RATING	1.39	1.00	1.25	1.00	1.29	1.00	1.50	1.45	1.00
Distance Travel at Speed-Desirable	0.12	-	0.20	-	0.13	-	2.00	1.20	0.08
SUB-SPEED DISTANCE RATING	0.02	-	0.04	-	0.03	-	0.40	0.24	0.02
LOWER LIMIT SUB-SPEED - (Km/hr)	20.07	60.00	23.92	60.00	22.10	60.00	19.42	19.34	35.78
SUB-SPEED RATING	0.33	1.00	0.40	1.00	0.37	1.00	0.32	0.32	0.60

TOTAL TRAVEL TIME INDEX	0.82
AVG SPEED EFFICIENCY INDEX	1.17
SUB-SPEED TIME INDEX	1.31
SUB-SPEED DISTANCE INDEX	0.12
LINK SUB-SPEED INDEX (L-SSI)	0.59

Speed/Time Profile



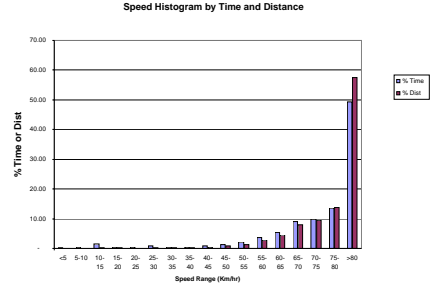
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BOANE	ROAD NAME:	Catwane - R407	ROAD NO.:	R408
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	4	SERIES DESCRIPTION:	Normal Drive, 5 seconds sampling period				
SURVEY SECTION - FROM (Km):	-	TO (Km):	62	SURVEY LENGTH (Km):	62		
TOTAL TRAVEL TIME (Hrs):	0.81	OVERALL AVG. SPEED (Km/hr):	76.5	AVG. RUNNING SPEED (Km/hr):	76.58	LOWEST SPEED (Km/hr):	4.80
		OVERALL SPEED STD DEV.:	17.8	HIGHEST SPEED (Km/hr):	102.16		
AVG ACCLN RATE (m/s/s):	1.21	AVG DECLN RATE (m/s/s):	-1.38	HARSHEST DECLN RATE (m/s/s):	-10.98	NO OF DECLN EVENTS:	272.00
		ACCLN STD DEV.:	1.99			DECLN EVENTS/Km:	5.00
NO. OF STOPPAGES:	1	TOTAL STOPPAGE TIME (Hrs):	0.00	AVG STOPPAGE TIME (Sec):	5.00		
ie Speed<5Km/hr							

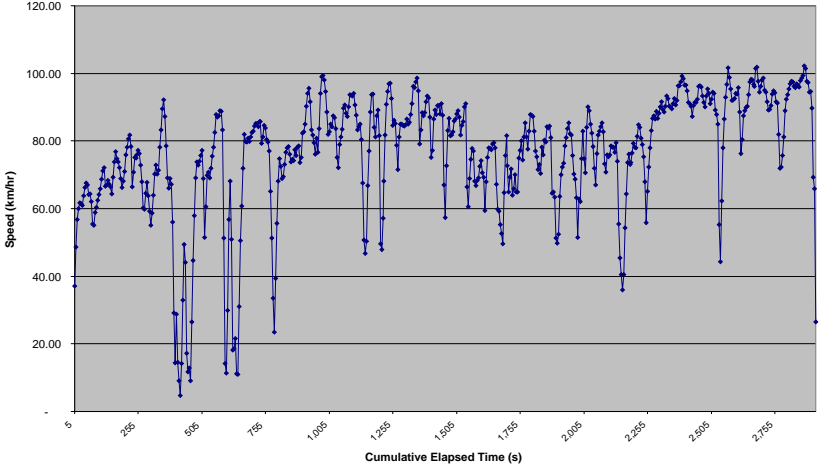


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	0.17	0.34	1.54	0.51	0.34	0.86	0.51	0.51	0.86	1.37	2.06	3.60	5.49	9.09	9.95	13.55	49.23
% Survey Distance	0.01	0.04	0.26	0.12	0.10	0.32	0.22	0.25	0.48	0.87	1.39	2.69	4.52	8.05	9.45	13.72	57.51

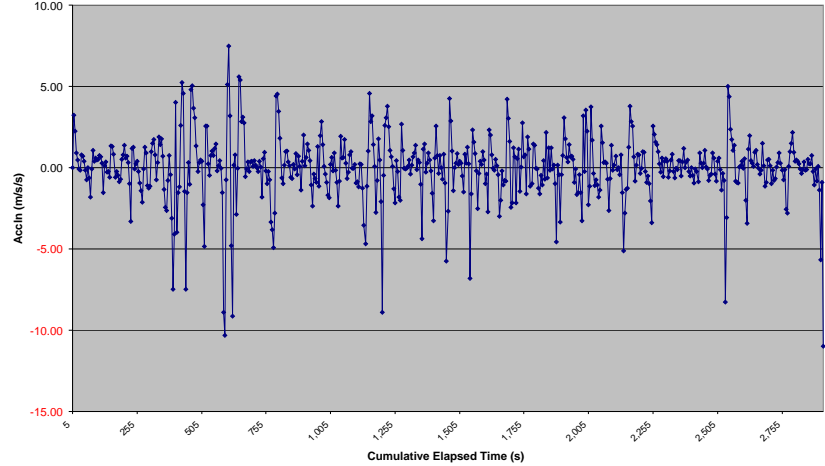
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50	50-55	55-60	60-65
Average Speed (Km/hr)	67.46	58.47	63.90	83.98	80.99	86.02	72.05	74.44	74.18	88.09	88.70	92.64
Speed Standard Deviation	19.6	19.5	20.4	21.8	22.0	22.4	20.4	20.7	20.9	22.7	22.6	23.2
Acceleration Standard Deviation	0.30	0.83	1.02	0.32	0.64	0.46	0.53	0.43	0.50	0.27	0.53	0.24
AVG SPEED EFFICIENCY RATING	1.35	1.17	1.28	1.68	1.62	1.72	1.44	1.49	1.48	1.76	1.77	1.85
Travel Time at Speed-Desirable	0.00	0.02	0.02	-	0.00	-	0.00	0.01	-	0.00	-	0.00
SUB-SPEED TIME RATING	1.17	2.20	2.28	1.00	1.04	1.00	1.01	1.00	1.23	1.00	1.13	1.00
Distance Travel at Speed-Desirable	0.12	0.50	0.37	-	0.20	-	0.07	0.07	0.23	-	0.06	-
SUB-SPEED DISTANCE RATING	0.02	0.10	0.07	-	0.04	-	0.01	0.01	0.05	-	0.01	-
LOWER LIMIT SUB-SPEED - (Km/hr)	23.30	3.18	1.52	50.00	26.05	50.00	29.23	29.14	19.73	50.00	21.68	50.00
SUB-SPEED RATING	0.47	0.06	0.03	1.00	0.52	1.00	0.58	0.58	0.39	1.00	0.43	1.00

TOTAL TRAVEL TIME INDEX	0.65
AVG SPEED EFFICIENCY INDEX	1.49
SUB-SPEED TIME INDEX	1.38
SUB-SPEED DISTANCE INDEX	0.04
LINK SUB-SPEED INDEX (L-SSI)	0.59

Speed/Time Profile



Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

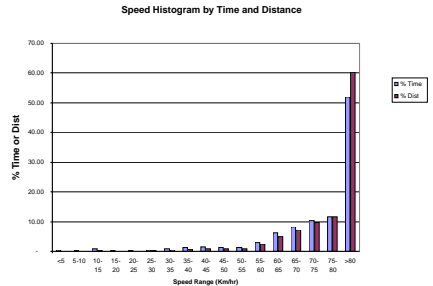
GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	CATEMBE	ROAD NAME:	Catembe - Bela Vista	ROAD NO.:	R403
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	5-1	SERIES DESCRIPTION:	Fast drive regime, 5 second sampling period				
SURVEY SECTION - FROM (Km):	0.04	TO (Km):	42	SURVEY LENGTH (Km):	42		
TOTAL TRAVEL TIME (Hrs):	0.54	OVERALL AVG. SPEED (Km/hr):	77.8	AVG. RUNNING SPEED (Km/hr):	78.16	LOWEST SPEED (Km/hr):	2.25
		OVERALL SPEED STD DEV.:	18.2	HIGHEST SPEED (Km/hr):	105.78		
AVG ACCLN RATE (m/s/s):	1.51	AVG DECLN RATE (m/s/s):	-1.64	HARSHEST DECLN RATE (m/s/s):	-11.58	NO OF DECLN EVENTS:	185.00
		ACCLN STD DEV.:	2.29	DECLN EVENTS/Km:	5.00		
NO. OF STOPPAGES:	2	TOTAL STOPPAGE TIME (Hrs):	0.00	AVG STOPPAGE TIME (Sec):	5.00		
ie Speed<5Km/hr							

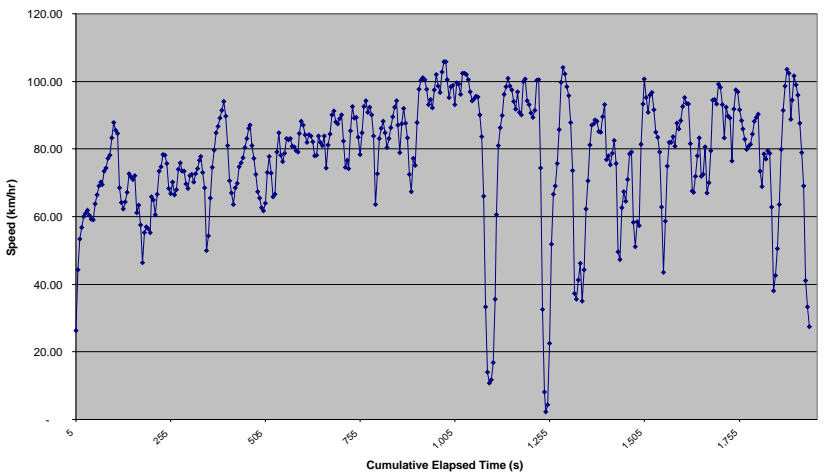
Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	0.52	0.26	0.77	0.26	0.26	0.52	0.77	1.29	1.55	1.29	1.29	3.09	6.19	8.25	10.31	11.60	51.80
% Survey Distance	0.02	0.03	0.12	0.06	0.07	0.18	0.33	0.60	0.85	0.79	0.86	2.28	4.98	7.16	9.64	11.61	60.40

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45
Average Speed (Km/hr)	66.12	74.21	81.40	86.85	84.60	73.82	77.73	81.24
Speed Standard Deviation	23.3	24.7	25.9	27.2	28.1	26.3	25.9	26.2
Acceleration Standard Deviation	0.56	0.51	0.43	0.59	0.86	1.23	0.95	0.75
AVG SPEED EFFICIENCY RATING	1.32	1.48	1.63	1.74	1.69	1.48	1.55	1.62
Travel Time at Speed-Desirable	0.00	0.00	-	-	0.01	0.02	0.00	0.00
SUB-SPEED TIME RATING	1.28	1.00	1.00	1.00	2.46	1.78	1.07	1.24
Distance Travel at Speed-Desirable	0.16	0.07	-	-	0.17	0.43	0.19	0.11
SUB-SPEED DISTANCE RATING	0.03	0.01	-	-	0.03	0.09	0.04	0.02
LOWER LIMIT SUB-SPEED - (Km/hr)	15.79	25.20	50.00	50.00	7.77	1.86	20.89	14.24
SUB-SPEED RATING	0.32	0.50	1.00	1.00	0.16	0.04	0.42	0.28

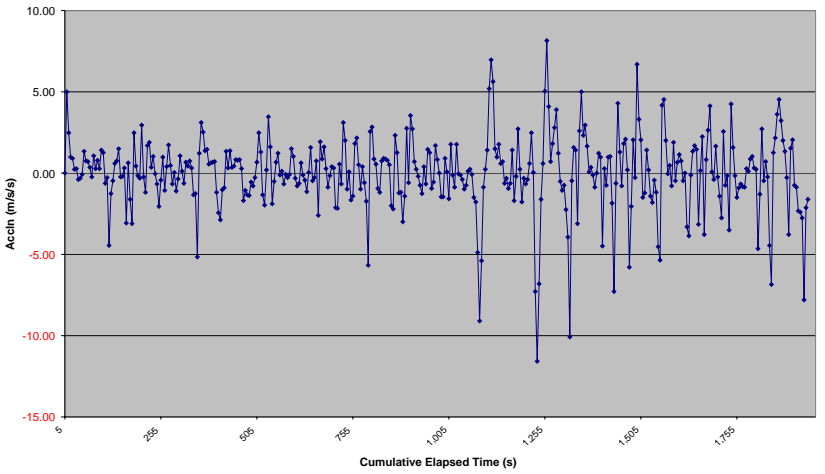
TOTAL TRAVEL TIME INDEX	0.64
AVG SPEED EFFICIENCY INDEX	1.56
SUB-SPEED TIME INDEX	1.47
SUB-SPEED DISTANCE INDEX	0.04
LINK SUB-SPEED INDEX (L-SSI)	0.43



Speed/Time Profile



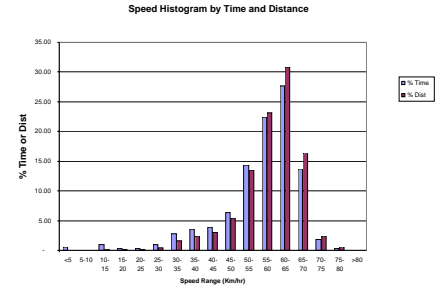
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	CATEMBE	ROAD NAME:	Catembe - Bela Vista	ROAD NO.:	R403
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	5-2	SERIES DESCRIPTION:	Normal drive regime, 5 second sampling period				
SURVEY SECTION - FROM (Km):	-	TO (Km):	42	SURVEY LENGTH (Km):	42		
TOTAL TRAVEL TIME (Hrs):	0.75	OVERALL AVG. SPEED (Km/hr):	56.0	AVG. RUNNING SPEED (Km/hr):	56.28	LOWEST SPEED (Km/hr):	2.00
		OVERALL SPEED STD DEV.:	11.2	HIGHEST SPEED (Km/hr):	75.58		
AVG ACCLN RATE (m/s/s):	0.83	AVG DECLN RATE (m/s/s):	-0.98	HARSHEST DECLN RATE (m/s/s):	-8.25	NO OF DECLN EVENTS:	247.00
		ACCLN STD DEV.:	1.40			DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	3	TOTAL STOPPAGE TIME (Hrs):	0.00	AVG STOPPAGE TIME (Sec):	5.00		
ie Speed<5Km/hr)							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	0.56	-	0.93	0.37	0.37	0.93	2.78	3.53	3.90	6.31	14.29	22.45	27.64	13.73	1.86	0.37	-
% Survey Distance	0.02	-	0.23	0.13	0.15	0.46	1.61	2.37	2.96	5.40	13.46	23.13	30.80	16.40	2.37	0.50	-

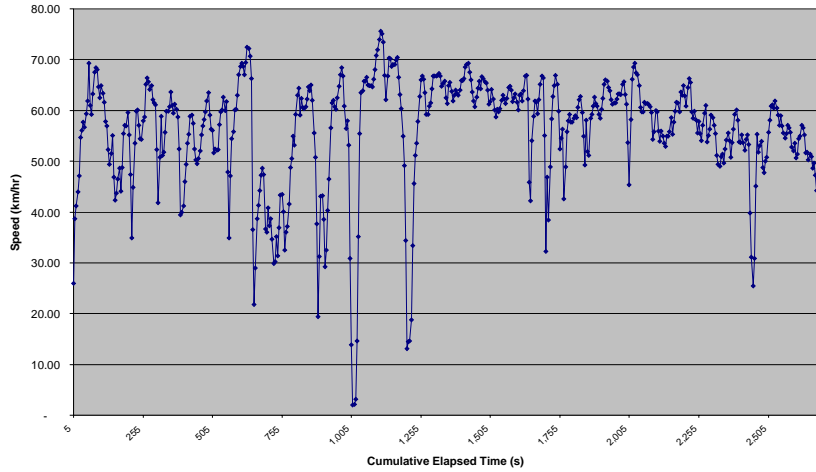
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45
Average Speed (Km/hr)	55.28	57.23	45.34	60.52	63.61	57.98	60.52	54.01
Speed Standard Deviation	18.3	18.6	17.2	19.5	19.6	18.7	19.0	18.0
Acceleration Standard Deviation	0.48	0.40	0.85	0.46	0.14	0.58	0.29	0.38
AVG SPEED EFFICIENCY RATING	1.11	1.14	0.91	1.21	1.27	1.16	1.21	1.08
Travel Time at Speed<Desirable	0.02	0.01	0.06	0.01	-	0.01	0.00	0.01
SUB-SPEED TIME RATING	1.15	1.14	1.47	1.79	1.00	1.14	1.10	1.20
Distance Travel at Speed<Desirable	1.02	0.55	2.12	0.31	-	0.55	0.06	0.58
SUB-SPEED DISTANCE RATING	0.20	0.11	0.42	0.06	-	0.11	0.01	0.12
LOWER LIMIT SUB-SPEED - (Km/hr)	25.03	25.32	16.80	8.42	50.00	25.23	26.35	23.69
SUB-SPEED RATING	0.50	0.51	0.34	0.17	1.00	0.50	0.53	0.47

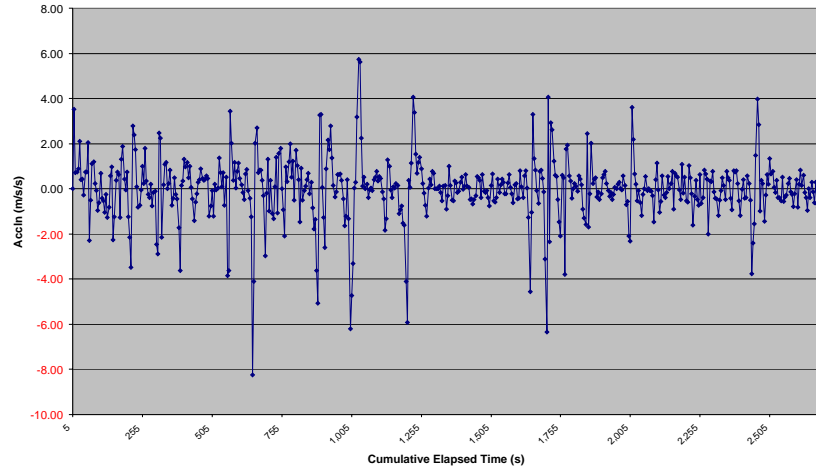
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.89
AVG SPEED EFFICIENCY INDEX	1.10
SUB-SPEED TIME INDEX	1.29
SUB-SPEED DISTANCE INDEX	0.15
LINK SUB-SPEED INDEX (L-SSI)	0.50

Speed/Time Profile



Acceleration/Time Profile

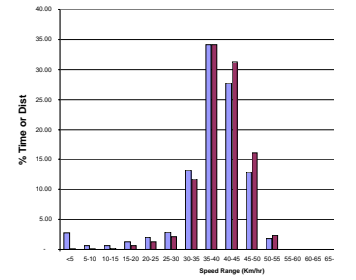


**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	CATEMBE	ROAD NAME:	Catembe - Bela Vista	ROAD NO.:	R403
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	5-3	SERIES DESCRIPTION:	Slow drive regime, 5 second sampling period				
SURVEY SECTION - FROM (Km):	-	TO (Km):	41	SURVEY LENGTH (Km):	41		
TOTAL TRAVEL TIME (Hrs):	1.10	OVERALL AVG. SPEED (Km/hr):	37.5	AVG. RUNNING SPEED (Km/hr):	38.56	LOWEST SPEED (Km/hr):	-
		OVERALL SPEED STD DEV.:	9.1	HIGHEST SPEED (Km/hr):	52.60		
AVG ACCLN RATE (m/s/s):	0.55	AVG DECLN RATE (m/s/s):	-0.59	HARSHEST DECLN RATE (m/s/s):	-5.39	NO OF DECLN EVENTS:	377.00
		ACCLN STD DEV.:	0.85			DECLN EVENTS/Km:	10.00
NO. OF STOPPAGES:	22	TOTAL STOPPAGE TIME (Hrs):	0.03	AVG STOPPAGE TIME (Sec):	5.00		
ie Speed<5Km/hr							

Speed Histogram by Time and Distance



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	2.78	0.63	0.63	1.26	2.02	2.90	13.26	34.09	27.78	12.88	1.77	-	-	-	-	-	-
% Survey Distance	0.11	0.14	0.21	0.59	1.25	2.16	11.70	34.08	31.25	16.13	2.39	-	-	-	-	-	-

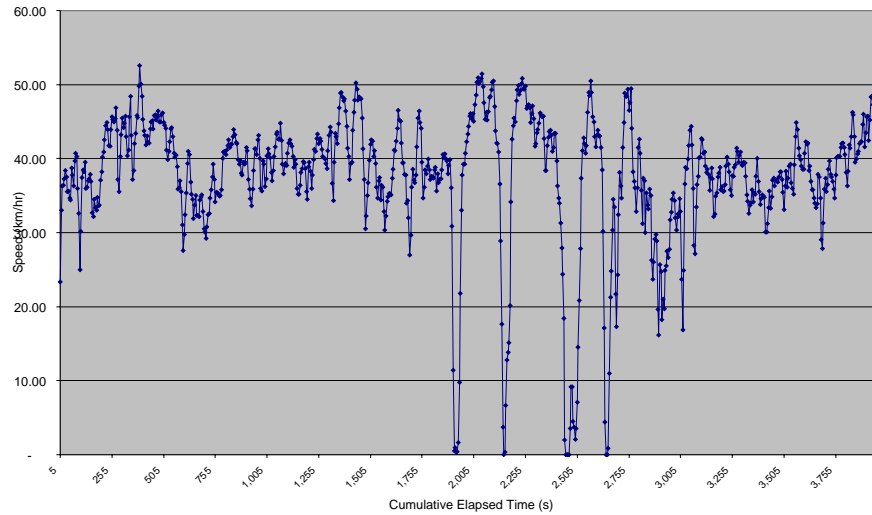
SEGMENT SPEED DATA

Segment Chainages: From/To	40-35	35-30	30-25	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	39.95	38.60	40.03	39.62	38.08	34.63	34.33	37.62
Speed Standard Deviation	12.7	12.6	12.8	12.8	13.3	12.6	11.9	12.3
Acceleration Standard Deviation	0.26	0.16	0.18	0.22	0.42	0.46	0.32	0.19
AVG SPEED EFFICIENCY RATING	0.80	0.77	0.80	0.79	0.76	0.69	0.69	0.75
Travel Time at Speed-Desirable	0.12	0.13	0.13	0.13	0.12	0.14	0.15	0.13
SUB-SPEED TIME RATING	1.26	1.30	1.25	1.27	1.37	1.45	1.46	1.33
Distance Travel at Speed-Desirable	4.80	5.04	5.00	4.94	4.27	4.93	5.01	5.02
SUB-SPEED DISTANCE RATING	0.96	1.01	1.00	0.99	0.85	0.99	1.00	1.00
LOWER LIMIT SUB-SPEED - (Km/hr)	26.94	26.00	27.28	26.75	23.29	21.83	22.46	25.28
SUB-SPEED RATING	0.54	0.52	0.55	0.53	0.47	0.44	0.45	0.51

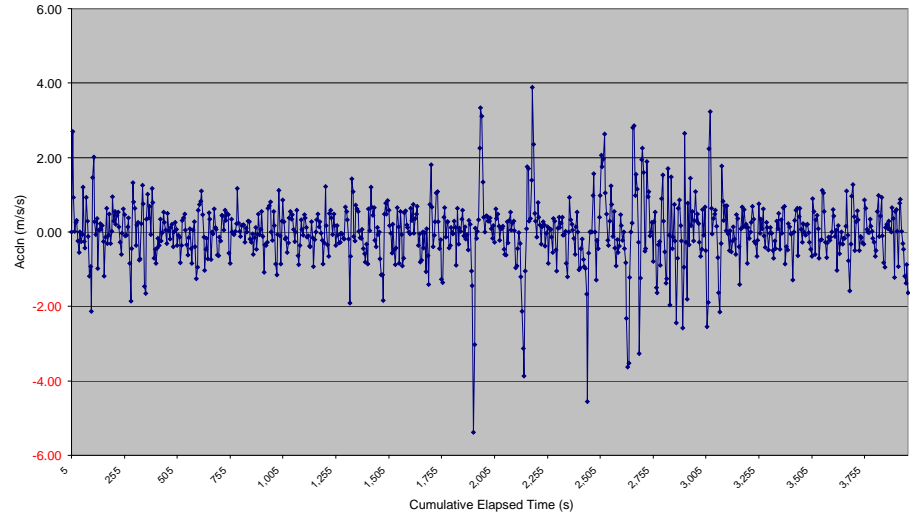
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.33
AVG SPEED EFFICIENCY INDEX	0.75
SUB-SPEED TIME INDEX	1.33
SUB-SPEED DISTANCE INDEX	0.98
LINK SUB-SPEED INDEX (L-SSI)	0.50

Speed/Time Profile



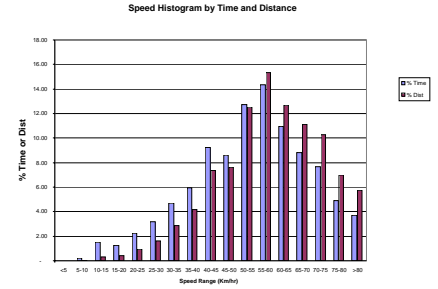
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BELA VISTA	ROAD NAME:	N200 - Catuane	ROAD NO.:	R406
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	6A	SERIES DESCRIPTION: Normal drive, 5 second sampling period					
SURVEY SECTION - FROM (Km):	0.03	TO (Km):	70	SURVEY LENGTH (Km):	70		
TOTAL TRAVEL TIME (Hrs):	1.31	OVERALL AVG. SPEED (Km/hr):	53.7	AVG. RUNNING SPEED (Km/hr):	53.73	LOWEST SPEED (Km/hr):	6.93
		OVERALL SPEED STD DEV.:	16.0	HIGHEST SPEED (Km/hr):	90.08		
AVG ACCLN RATE (m/s/s):	1.15	AVG DECLN RATE (m/s/s):	-1.36	HARSHEST DECLN RATE (m/s/s):	-11.58	NO OF DECLN EVENTS:	431.00
		ACCLN STD DEV.:	1.84			DECLN EVENTS/Km:	7.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.21	1.49	1.28	2.23	3.19	4.68	5.95	9.25	8.61	12.75	14.35	10.95	8.82	7.65	4.89	3.72
% Survey Distance	-	0.04	0.33	0.41	0.93	1.63	2.86	4.17	7.34	7.64	12.50	15.32	12.70	11.11	10.29	7.01	5.74

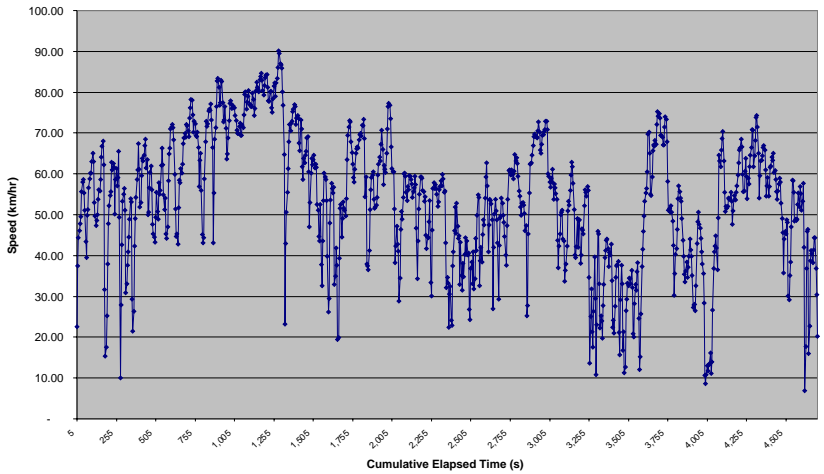
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50	50-55	55-60	60-65	65-70
Average Speed (Km/hr)	48.97	57.05	69.77	75.70	75.29	53.99	58.93	49.83	46.58	56.23	36.26	52.37	49.86
Speed Standard Deviation	13.6	14.4	16.1	16.5	16.8	14.3	14.8	13.5	13.1	14.5	11.9	14.2	14.1
Acceleration Standard Deviation	0.72	0.40	0.39	0.16	0.47	0.56	0.39	0.47	0.56	0.38	0.71	0.33	0.38
AVG SPEED EFFICIENCY RATING	0.98	1.14	1.40	1.51	1.51	1.08	1.18	1.00	0.93	1.12	0.73	1.05	1.00
Travel Time at Speed-Desirable	0.04	0.02	0.01	-	0.00	0.03	0.02	0.04	0.07	0.02	0.12	0.04	0.03
SUB-SPEED TIME RATING	1.35	1.09	1.14	1.00	1.51	1.31	1.28	1.30	1.23	1.24	1.55	1.29	1.82
Distance Travel at Speed-Desirable	1.59	0.96	0.24	-	0.09	1.06	0.60	1.39	2.82	0.90	3.72	1.68	0.88
SUB-SPEED DISTANCE RATING	0.32	0.19	0.05	-	0.02	0.21	0.12	0.28	0.56	0.18	0.74	0.34	0.18
LOWER LIMIT SUB-SPEED - (Km/hr)	23.31	31.56	27.78	50.00	16.25	23.80	24.14	24.87	27.57	25.99	20.28	24.71	13.39
SUB-SPEED RATING	0.47	0.63	0.56	1.00	0.33	0.48	0.48	0.50	0.55	0.52	0.41	0.49	0.27

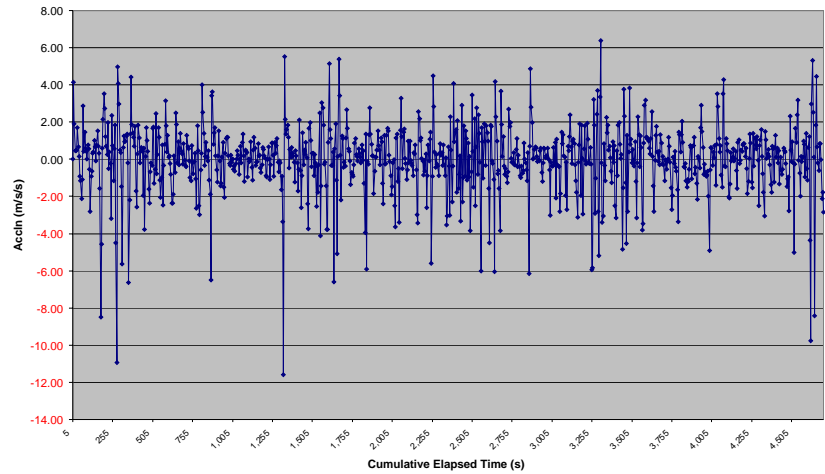
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.93
AVG SPEED EFFICIENCY INDEX	1.09
SUB-SPEED TIME INDEX	1.34
SUB-SPEED DISTANCE INDEX	0.27
LINK SUB-SPEED INDEX (L-SSI)	0.51

Speed/Time Profile



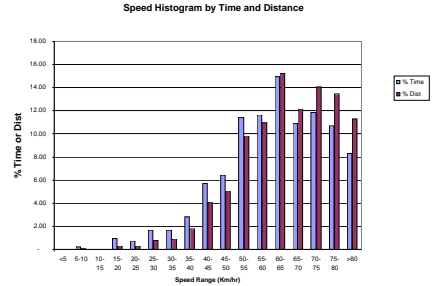
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BELA VISTA	ROAD NAME:	N200 - Catuane	ROAD NO.:	R406
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	6B	SURVEY SECTION - FROM (Km):	0.03	SURVEY DESCRIPTION:	Normal drive, 5 second sampling period		
		TO (Km):	36	SURVEY LENGTH (Km):	36		
TOTAL TRAVEL TIME (Hrs):	0.58	OVERALL AVG. SPEED (Km/hr):	61.1	AVG. RUNNING SPEED (Km/hr):	61.11	LOWEST SPEED (Km/hr):	9.99
		OVERALL SPEED STD DEV.:	14.5	HIGHEST SPEED (Km/hr):	90.08		
AVG ACCLN RATE (m/s/s):	1.11	AVG DECLN RATE (m/s/s):	-1.39	HARSHEST DECLN RATE (m/s/s):	-11.58	NO OF DECLN EVENTS:	183.00
		ACCLN STD DEV.:	1.88			DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

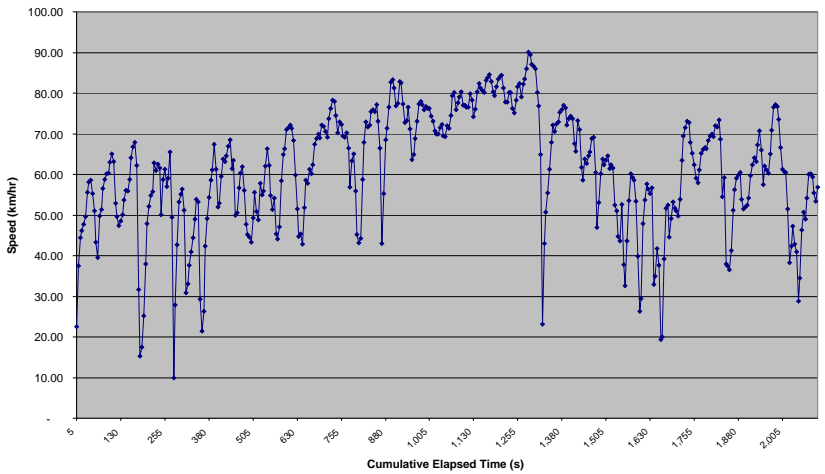


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.24	-	0.95	0.71	1.66	1.66	2.85	5.70	6.41	11.40	11.64	14.96	10.93	11.88	10.69	8.31
% Survey Distance	-	0.04	-	0.28	0.26	0.75	0.90	1.78	4.03	5.03	9.79	10.94	15.26	12.13	14.05	13.48	11.28

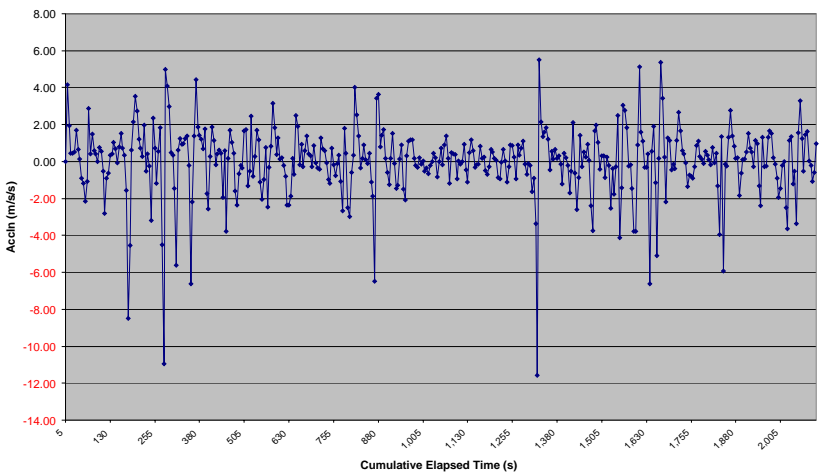
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Average Speed (Km/hr)	48.97	57.05	69.77	75.70	75.29	53.99	58.93
Speed Standard Deviation	19.4	20.6	23.2	23.9	24.3	20.4	21.2
Acceleration Standard Deviation	1.08	0.60	0.59	0.24	0.71	0.84	0.58
AVG SPEED EFFICIENCY RATING	0.98	1.14	1.40	1.51	1.51	1.08	1.18
Travel Time at Speed-Desirable	0.04	0.02	0.01	-	0.00	0.03	0.02
SUB-SPEED TIME RATING	1.35	1.09	1.14	1.00	1.51	1.31	1.28
Distance Travel at Speed-Desirable	1.59	0.96	0.24	-	0.09	1.06	0.60
SUB-SPEED DISTANCE RATING	0.32	0.19	0.05	-	0.02	0.21	0.12
LOWER LIMIT SUB-SPEED - (Km/hr)	17.56	25.36	20.66	50.00	8.75	17.68	17.73
SUB-SPEED RATING	0.35	0.51	0.41	1.00	0.17	0.35	0.35

TOTAL TRAVEL TIME INDEX	0.82
AVG SPEED EFFICIENCY INDEX	1.20
SUB-SPEED TIME INDEX	1.28
SUB-SPEED DISTANCE INDEX	0.15
LINK SUB-SPEED INDEX (L-SSI)	0.45

Speed/Time Profile



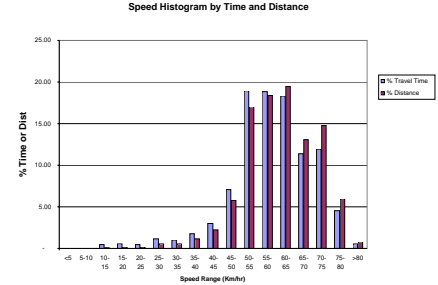
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BELA VISTA	ROAD NAME:	N200 - Catuane	ROAD NO.:	R406
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	7	SERIES DESCRIPTION:					
SURVEY SECTION - FROM (Km):	0.01	TO (Km):	35	SURVEY LENGTH (Km):	35		
TOTAL TRAVEL TIME (Hrs):	0.59	OVERALL AVG. SPEED (Km/hr):	58.7	AVG. RUNNING SPEED (Km/hr):	58.71	LOWEST SPEED (Km/hr):	5.80
		OVERALL SPEED STD DEV.:	11.3	HIGHEST SPEED (Km/hr):	81.14		
AVG ACCLN RATE (m/s/s):	0.47	AVG DECLN RATE (m/s/s):	-0.52	HARSHEST DECLN RATE (m/s/s):	-7.69	NO OF DECLN EVENTS:	496.00
		ACCLN STD DEV.:	0.81			DECLN EVENTS/Km:	15.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		

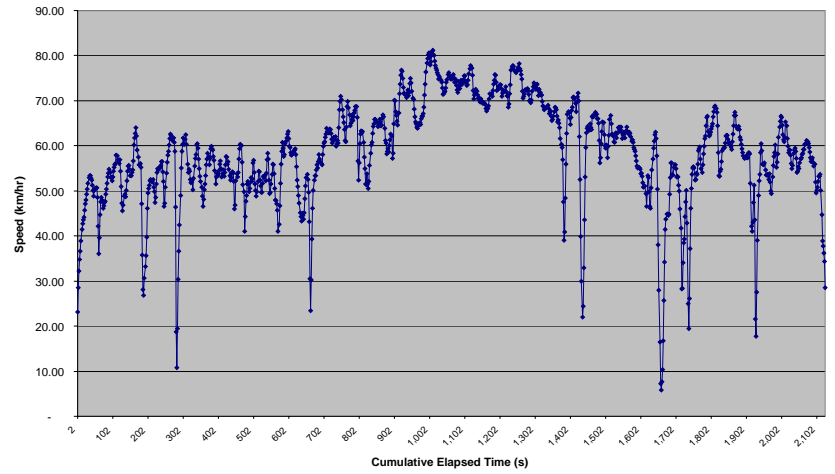


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	0.47	0.56	0.47	1.13	1.03	1.79	3.01	7.06	18.91	18.81	18.34	11.38	11.95	4.52	0.56
% Survey Distance	-	-	0.07	0.17	0.18	0.53	0.57	1.16	2.21	5.76	16.99	18.40	19.48	13.06	14.74	5.90	0.77

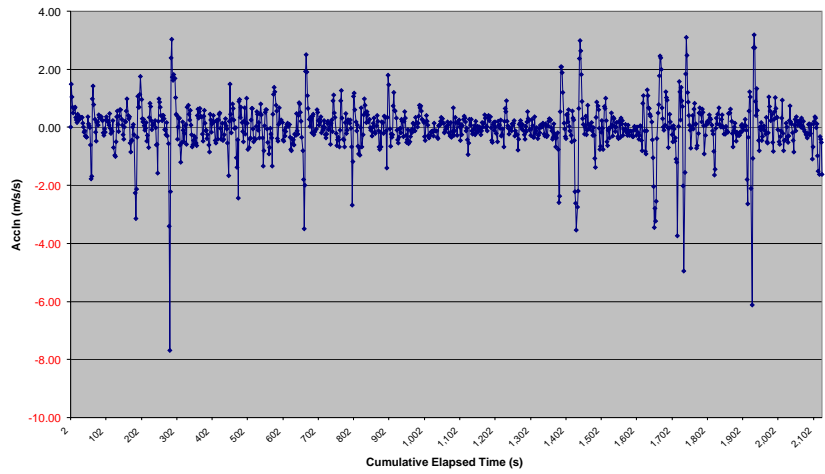
Segment Chainages: From/To	35-30	30-25	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	50.83	52.89	64.37	73.41	66.35	53.76	55.91
Speed Standard Deviation	19.3	19.5	21.8	23.5	22.5	20.2	19.8
Acceleration Standard Deviation	0.40	0.29	0.20	0.10	0.31	0.40	0.33
AVG SPEED EFFICIENCY RATING	1.02	1.06	1.29	1.47	1.33	1.08	1.12
Travel Time at Speed-Desirable	0.03	0.02	-	-	0.01	0.02	0.01
SUB-SPEED TIME RATING	1.21	1.11	1.00	1.00	1.36	1.41	1.38
Distance Travel at Speed-Desirable	1.31	1.03	-	-	0.20	0.77	0.38
SUB-SPEED DISTANCE RATING	0.26	0.21	-	-	0.04	0.15	0.08
LOWER LIMIT SUB-SPEED - (Km/hr)	21.93	25.64	50.00	50.00	14.42	15.35	18.66
SUB-SPEED RATING	0.44	0.51	1.00	1.00	0.29	0.31	0.37

TOTAL TRAVEL TIME INDEX	0.85
AVG SPEED EFFICIENCY INDEX	1.15
SUB-SPEED TIME INDEX	1.28
SUB-SPEED DISTANCE INDEX	0.15
LINK SUB-SPEED INDEX (L-SSI)	0.56

Speed/Time Profile



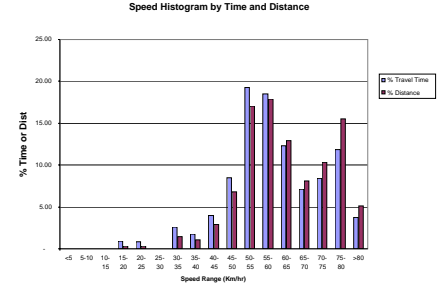
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BELA VISTA	ROAD NAME:	N200 - Catuane	ROAD NO.:	R406
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	8	SERIES DESCRIPTION:	Normal drive regime, 50m sampling interval				
SURVEY SECTION - FROM (Km):	0	TO (Km):	35	SURVEY LENGTH (Km):	35		
TOTAL TRAVEL TIME (Hrs):	0.58	OVERALL AVG. SPEED (Km/hr):	59.3	AVG. RUNNING SPEED (Km/hr):	61.58	LOWEST SPEED (Km/hr):	19.54
		OVERALL SPEED STD DEV.:	12.0	HIGHEST SPEED (Km/hr):	85.25		
AVG ACCLN RATE (m/s/s):	0.72	AVG DECLN RATE (m/s/s):	-0.82	HARSHEST DECLN RATE (m/s/s):	-9.99	NO OF DECLN EVENTS:	271.00
		ACCLN STD DEV.:	1.33			DECLN EVENTS/Km:	8.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

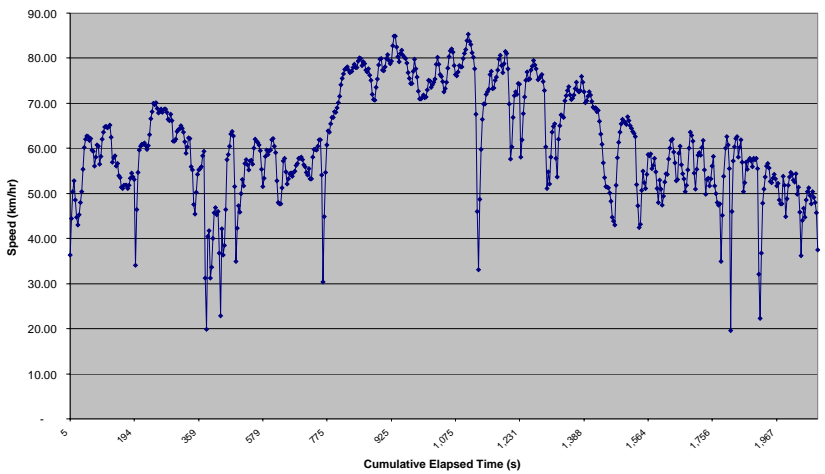


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.90	0.86	-	2.57	1.76	4.00	8.52	19.24	18.52	12.33	7.14	8.43	11.86	3.71
% Survey Distance	-	-	-	0.30	0.33	-	1.42	1.10	2.91	6.82	17.08	17.92	12.90	8.11	10.30	15.49	5.13

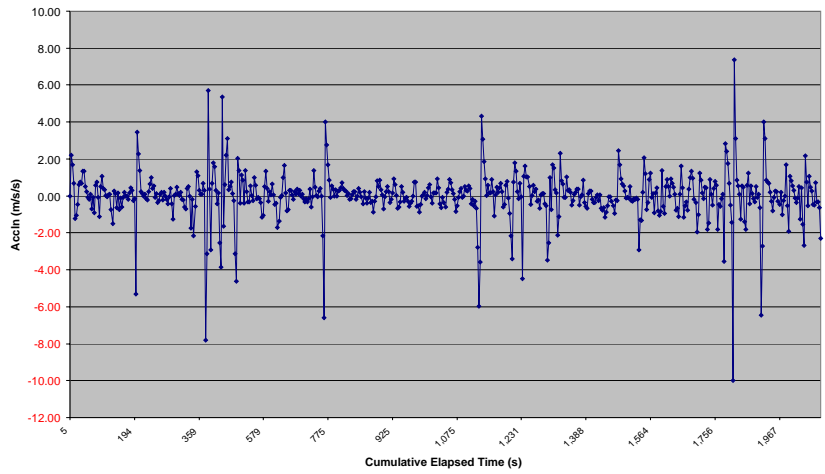
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Average Speed (Km/hr)	58.95	52.28	69.04	75.13	69.99	55.85	50.99
Speed Standard Deviation	21.3	18.9	24.1	25.9	24.8	20.0	17.8
Acceleration Standard Deviation	0.37	0.67	0.39	0.42	0.41	0.35	0.74
AVG SPEED EFFICIENCY RATING	1.18	1.05	1.38	1.50	1.40	1.12	1.02
Travel Time at Speed-Desirable	0.01	0.04	0.00	0.00	-	0.01	0.04
SUB-SPEED TIME RATING	1.17	1.29	1.35	1.21	1.00	1.09	1.21
Distance Travel at Speed-Desirable	0.51	1.47	0.11	0.16	-	0.61	1.65
SUB-SPEED DISTANCE RATING	0.10	0.29	0.02	0.03	-	0.12	0.33
LOWER LIMIT SUB-SPEED - (Km/hr)	21.56	19.96	12.80	15.36	50.00	25.94	23.65
SUB-SPEED RATING	0.43	0.40	0.26	0.31	1.00	0.52	0.47

TOTAL TRAVEL TIME INDEX	0.84
AVG SPEED EFFICIENCY INDEX	1.20
SUB-SPEED TIME INDEX	1.22
SUB-SPEED DISTANCE INDEX	0.15
LINK SUB-SPEED INDEX (L-SSI)	0.48

Speed/Time Profile



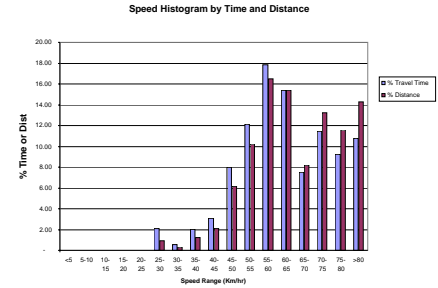
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	BELA VISTA	ROAD NAME:	N200 - Catuane	ROAD NO.:	R406
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	9	SERIES DESCRIPTION:					
SURVEY SECTION - FROM (Km):	0.10	TO (Km):	34	SURVEY LENGTH (Km):	34		
TOTAL TRAVEL TIME (Hrs):	0.56	OVERALL AVG. SPEED (Km/hr):	62.1	AVG. RUNNING SPEED (Km/hr):	64.57	LOWEST SPEED (Km/hr):	26.02
		OVERALL SPEED STD DEV.:	12.4	HIGHEST SPEED (Km/hr):	87.66		
AVG ACCLN RATE (m/s/s):	1.16	AVG DECLN RATE (m/s/s):	-1.14	HARSHEST DECLN RATE (m/s/s):	-10.27	NO OF DECLN EVENTS:	158.00
		ACCLN STD DEV.:	1.90	DECLN EVENTS/Km:	5.00		
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

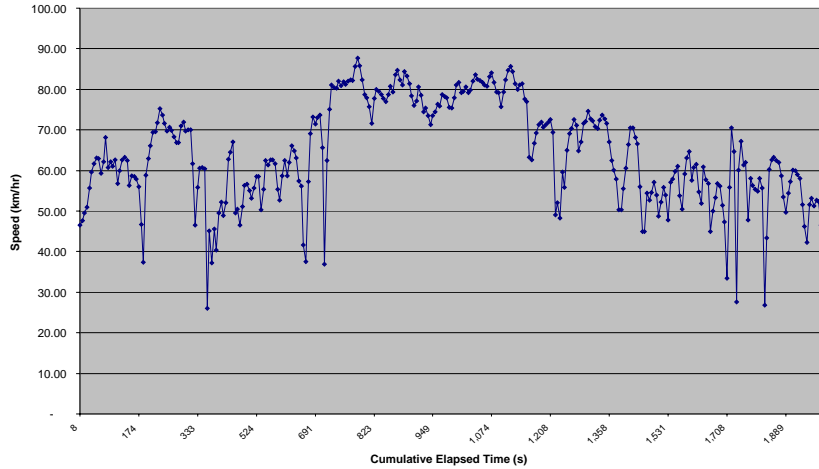


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	-	2.10	0.55	2.00	3.05	8.00	12.11	17.86	15.36	7.50	11.46	9.25	10.76
% Survey Distance	-	-	-	-	-	0.91	0.30	1.20	2.12	6.14	10.19	16.47	15.36	8.19	13.26	11.59	14.28

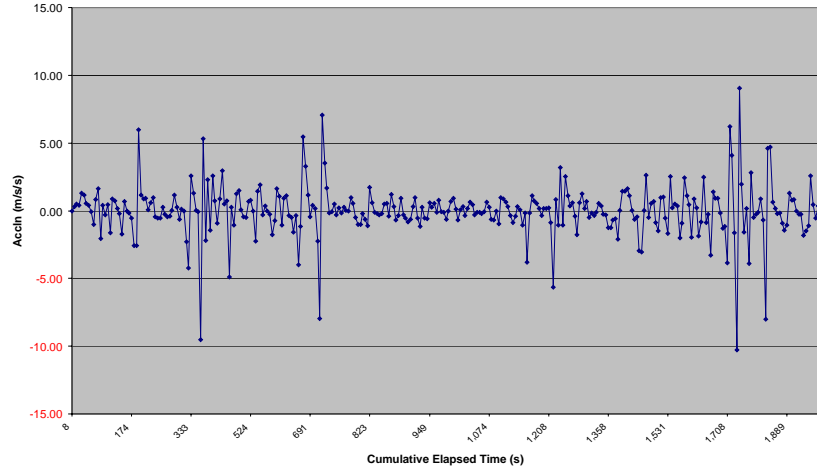
Segment Chainages: From/To	35-30	30-25	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	61.88	55.88	73.88	79.08	70.28	56.60	54.11
Speed Standard Deviation	21.9	20.0	26.5	27.7	24.8	20.1	18.9
Acceleration Standard Deviation	0.49	0.86	0.81	0.21	0.51	0.56	1.16
AVG SPEED EFFICIENCY RATING	1.24	1.12	1.48	1.58	1.41	1.13	1.08
Travel Time at Speed-Desirable	0.01	0.03	0.01	-	0.00	0.01	0.03
SUB-SPEED TIME RATING	1.11	1.19	1.29	1.00	1.03	1.08	1.28
Distance Travel at Speed-Desirable	0.54	1.05	0.30	-	0.22	0.51	1.06
SUB-SPEED DISTANCE RATING	0.11	0.21	0.06	-	0.04	0.10	0.21
LOWER LIMIT SUB-SPEED - (Km/hr)	23.13	22.14	12.20	50.00	23.87	26.14	20.31
SUB-SPEED RATING	0.46	0.44	0.24	1.00	0.48	0.52	0.41

TOTAL TRAVEL TIME INDEX	0.81
AVG SPEED EFFICIENCY INDEX	1.24
SUB-SPEED TIME INDEX	1.16
SUB-SPEED DISTANCE INDEX	0.12
LINK SUB-SPEED INDEX (L-SSI)	0.51

Speed/Time Profile



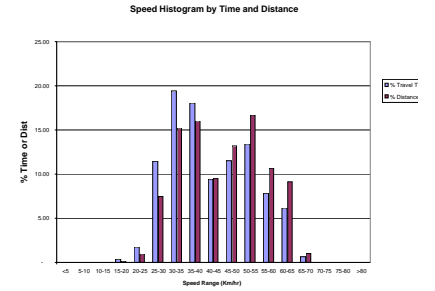
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	10-1	SERIES DESCRIPTION:	Normal drive regime, 10m sampling interval				
SURVEY SECTION - FROM (Km):	0.01	TO (Km):	11	SURVEY LENGTH (Km):	11		
TOTAL TRAVEL TIME (Hrs):	0.25	OVERALL AVG. SPEED (Km/hr):	41.9	AVG. RUNNING SPEED (Km/hr):	44.53	LOWEST SPEED (Km/hr):	16.69
		OVERALL SPEED STD DEV.:	10.5	HIGHEST SPEED (Km/hr):	66.23		
AVG ACCLN RATE (m/s/s):	0.39	AVG DECLN RATE (m/s/s):	-0.47	HARSHEST DECLN RATE (m/s/s):	-3.86	NO OF DECLN EVENTS:	331.00
		ACCLN STD DEV.:	0.62			DECLN EVENTS/Km:	32.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

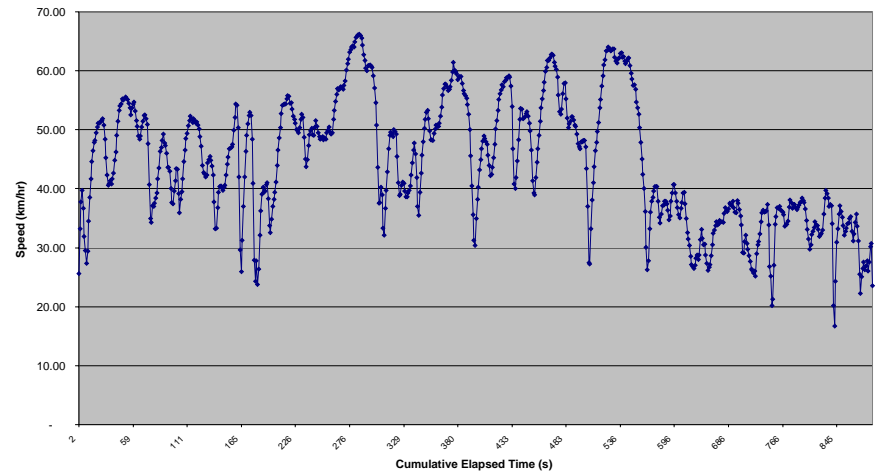


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.33	1.76	11.43	19.45	18.02	9.45	11.54	13.41	7.80	6.15	0.66	-	-	-
% Survey Distance	-	-	0.13	0.94	7.46	15.25	16.00	9.52	13.20	16.67	10.66	6.15	1.04	-	-	-	-

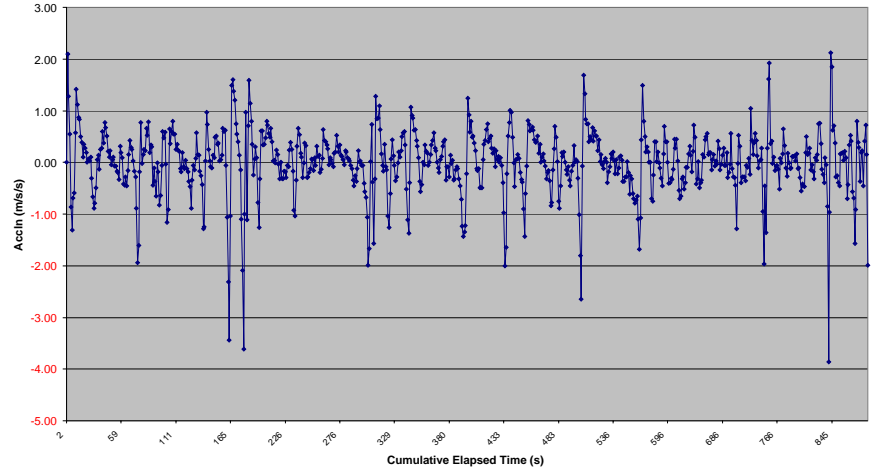
Segment Chainages: From/To	0-2	2-4	4-6	6-8	8-10
Average Speed (Km/hr)	45.20	49.52	49.12	49.07	33.04
Speed Standard Deviation	18.5	19.7	19.8	19.5	12.9
Acceleration Standard Deviation	0.30	0.30	0.26	0.24	0.24
AVG SPEED EFFICIENCY RATING	1.13	1.24	1.23	1.23	0.83
Travel Time at Speed-Desirable	0.01	0.01	0.01	0.02	0.06
SUB-SPEED TIME RATING	1.15	1.22	1.10	1.16	1.24
Distance Travel at Speed-Desirable	0.44	0.38	0.21	0.57	2.01
SUB-SPEED DISTANCE RATING	0.22	0.19	0.11	0.28	1.00
LOWER LIMIT SUB-SPEED - (Km/hr)	16.21	13.16	16.73	15.07	19.33
SUB-SPEED RATING	0.41	0.33	0.42	0.38	0.48

TOTAL TRAVEL TIME INDEX	0.95
AVG SPEED EFFICIENCY INDEX	1.14
SUB-SPEED TIME INDEX	1.17
SUB-SPEED DISTANCE INDEX	0.36
LINK SUB-SPEED INDEX (L-SSI)	0.40

Speed/Time Profile



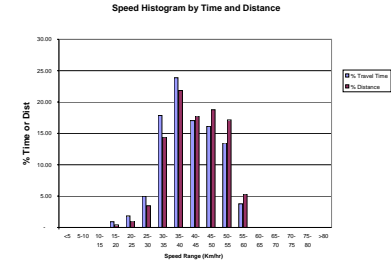
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
SURVEY SERIES NO.:	10-2	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SECTION - FROM (Km):	0.03	SERIES DESCRIPTION:	Normal drive regime, 20m sampling interval				
TOTAL TRAVEL TIME (Hrs):	0.25	TO (Km):	10	SURVEY LENGTH (Km):	10		
AVG ACCLN RATE (m/s/s):	0.62	OVERALL AVG. SPEED (Km/hr):	41.0	AVG. RUNNING SPEED (Km/hr):	42.21	LOWEST SPEED (Km/hr):	19.12
NO. OF STOPPAGES:	-	OVERALL SPEED STD DEV.:	7.8	HIGHEST SPEED (Km/hr):	58.49	NO OF DECLN EVENTS:	106.00
ie Speed<5Km/hr		AVG DECLN RATE (m/s/s):	-0.63	HARSHEST DECLN RATE (m/s/s):	-5.61	DECLN EVENTS/Km:	19.00
		ACCLN STD DEV.:	0.95				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.90	1.80	5.05	17.85	23.91	17.06	16.16	13.47	3.82	-	-	-	-	-
% Survey Distance	-	-	-	0.42	1.02	3.49	14.34	21.84	17.74	18.74	17.15	5.26	-	-	-	-	-

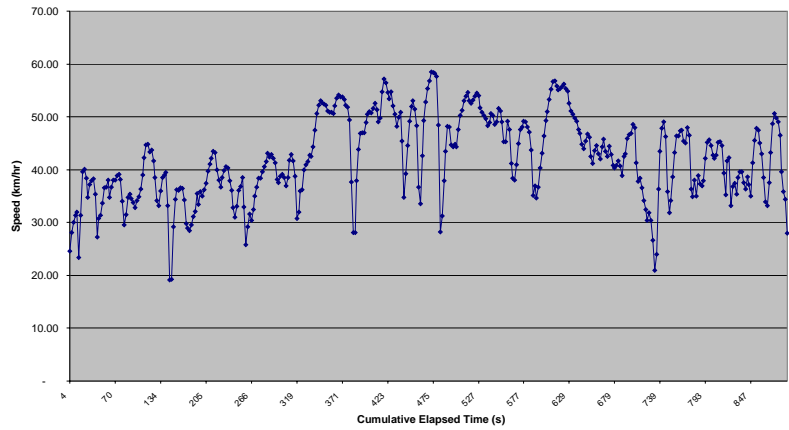
SEGMENT SPEED DATA

Segment Chainages: From/To	10-8	8-6	6-4	4-2	2-0
Average Speed (Km/hr)	34.96	41.21	49.27	46.45	40.18
Speed Standard Deviation	14.2	16.9	19.2	18.5	16.5
Acceleration Standard Deviation	0.43	0.37	0.50	0.27	0.48
AVG SPEED EFFICIENCY RATING	0.87	1.03	1.23	1.16	1.00
Travel Time at Speed<Desirable	0.05	0.03	0.01	0.00	0.03
SUB-SPEED TIME RATING	1.20	1.14	1.18	1.09	1.16
Distance Travel at Speed<Desirable	1.78	0.97	0.17	0.16	0.99
SUB-SPEED DISTANCE RATING	0.89	0.49	0.08	0.08	0.50
LOWER LIMIT SUB-SPEED - (Km/h)	19.08	18.07	14.75	18.23	17.83
SUB-SPEED RATING	0.48	0.45	0.37	0.46	0.45

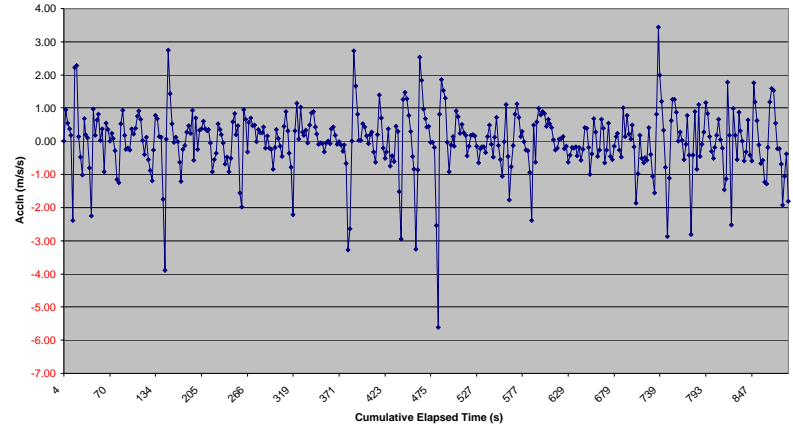
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.98
AVG SPEED EFFICIENCY INDEX	1.06
SUB-SPEED TIME INDEX	1.16
SUB-SPEED DISTANCE INDEX	0.41
LINK SUB-SPEED INDEX (L-SSI)	0.44

Speed/Time Profile



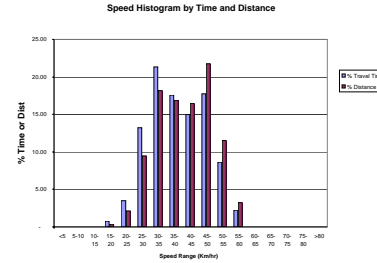
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
SURVEY SERIES NO.:	10-3	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SECTION - FROM (Km):	0.05	SERIES DESCRIPTION:	Normal drive regime, 40m sampling interval				
TOTAL TRAVEL TIME (Hrs):	0.26	TO (Km):	10	SURVEY LENGTH (Km):	10		
AVG ACCLN RATE (m/s/s):	0.95	OVERALL AVG. SPEED (Km/hr):	38.8	AVG. RUNNING SPEED (Km/hr):	40.62	LOWEST SPEED (Km/hr):	19.34
NO. OF STOPPAGES: ie Speed<5Km/hr	-	OVERALL SPEED STD DEV.:	8.6	HIGHEST SPEED (Km/hr):	58.15	NO OF DECLN EVENTS:	110.00
		AVG DECLN RATE (m/s/s):	-0.97	HARSHEST DECLN RATE (m/s/s):	-4.53	DECLN EVENTS/Km:	11.00
		ACCLN STD DEV.:	1.34				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.75	3.51	13.21	21.30	17.57	15.02	17.78	8.63	2.24	-	-	-	-	-
% Survey Distance	-	-	-	0.37	2.13	9.47	18.19	16.86	16.43	21.78	11.51	3.26	-	-	-	-	-

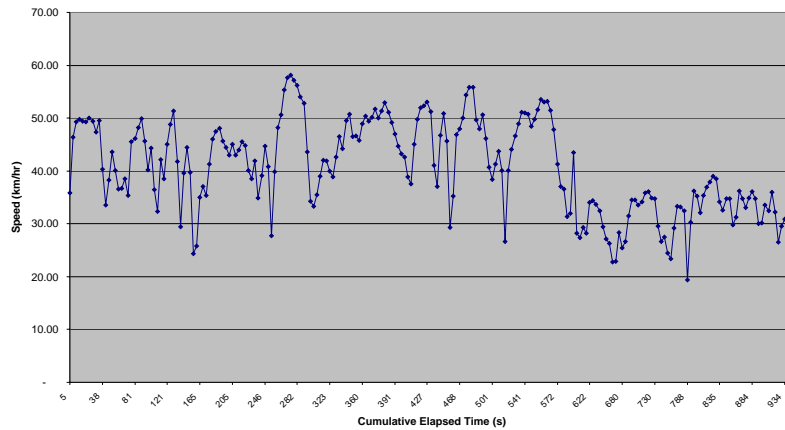
SEGMENT SPEED DATA

Segment Chainages: From/To	0-2	2-4	4-6	6-8	8-10
Average Speed (Km/hr)	41.53	44.42	47.36	38.02	32.68
Speed Standard Deviation	16.9	17.7	19.1	15.9	13.2
Acceleration Standard Deviation	0.73	0.56	0.59	0.61	0.47
AVG SPEED EFFICIENCY RATING	1.04	1.11	1.18	0.95	0.82
Travel Time at Speed<Desirable	0.02	0.01	0.01	0.04	0.06
SUB-SPEED TIME RATING	1.16	1.11	1.13	1.34	1.24
Distance Travel at Speed<Desirable	0.80	0.50	0.23	1.11	2.00
SUB-SPEED DISTANCE RATING	0.40	0.25	0.11	0.55	1.00
LOWER LIMIT SUB-SPEED - (Km/h)	17.51	18.25	16.28	13.87	19.04
SUB-SPEED RATING	0.44	0.46	0.41	0.35	0.48

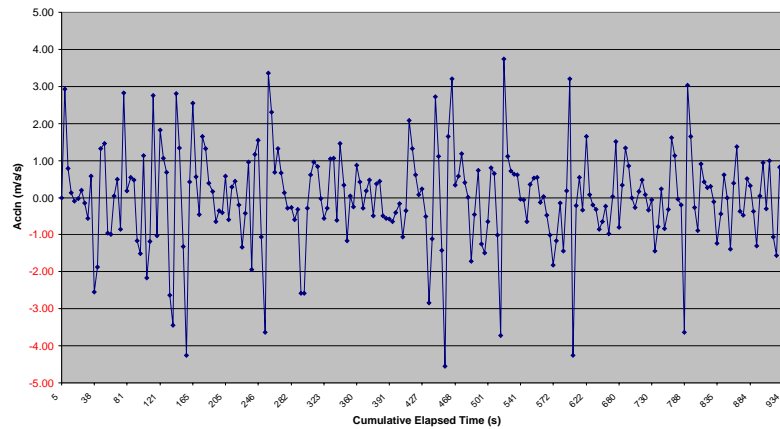
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.03
AVG SPEED EFFICIENCY INDEX	1.03
SUB-SPEED TIME INDEX	1.20
SUB-SPEED DISTANCE INDEX	0.46
LINK SUB-SPEED INDEX (L-SSI)	0.42

Speed/Time Profile



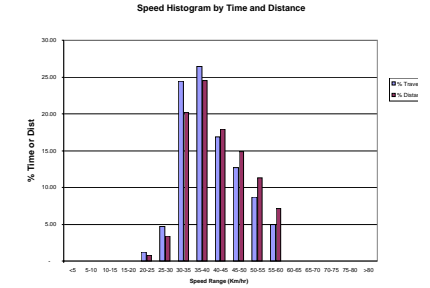
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	10-4	SERIES DESCRIPTION: Normal drive regime, 80m sampling interval					
SURVEY SECTION - FROM (Km):	0.08	TO (Km):	10	SURVEY LENGTH (Km):	10		
TOTAL TRAVEL TIME (Hrs):	0.25	OVERALL AVG. SPEED (Km/hr):	40.1	AVG. RUNNING SPEED (Km/hr):	41.42	LOWEST SPEED (Km/hr):	24.66
		OVERALL SPEED STD DEV.:	8.0	HIGHEST SPEED (Km/hr):	58.75		
AVG ACCLN RATE (m/s/s):	1.12	AVG DECLN RATE (m/s/s):	-1.07	HARSHEST DECLN RATE (m/s/s):	-6.47	NO OF DECLN EVENTS:	57.00
		ACCLN STD DEV.:	1.56			DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	1.22	4.67	24.44	26.44	16.89	12.67	8.67	5.00	-	-	-	-	-
% Survey Distance	-	-	-	-	0.75	3.37	20.16	24.51	17.89	14.90	11.33	7.10	-	-	-	-	-

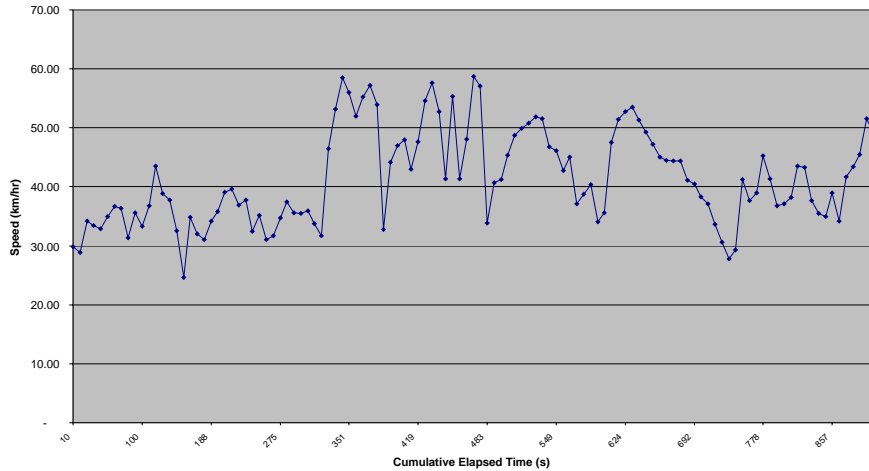
SEGMENT SPEED DATA

Segment Chainages: From/To	10-8	8-6	6-4	4-2	2-0
Average Speed (Km/hr)	34.28	41.61	48.40	43.84	38.61
Speed Standard Deviation	13.8	17.4	19.5	17.7	15.6
Acceleration Standard Deviation	0.51	0.82	0.99	0.46	0.56
AVG SPEED EFFICIENCY RATING	0.86	1.04	1.21	1.10	0.97
Travel Time at Speed-Desirable	0.05	0.04	0.00	0.01	0.03
SUB-SPEED TIME RATING	1.19	1.15	1.18	1.09	1.15
Distance Travel at Speed-Desirable	1.84	1.27	0.08	0.51	1.19
SUB-SPEED DISTANCE RATING	0.92	0.64	0.04	0.26	0.59
LOWER LIMIT SUB-SPEED - (Km/hr)	19.77	17.24	14.30	19.09	19.12
SUB-SPEED RATING	0.49	0.43	0.36	0.48	0.48

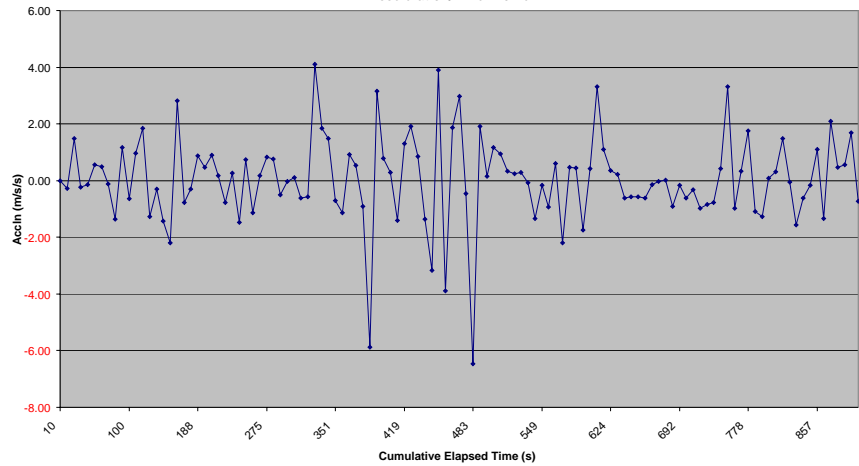
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.00
AVG SPEED EFFICIENCY INDEX	1.06
SUB-SPEED TIME INDEX	1.15
SUB-SPEED DISTANCE INDEX	0.49
LINK SUB-SPEED INDEX (L-SSI)	0.45

Speed/Time Profile



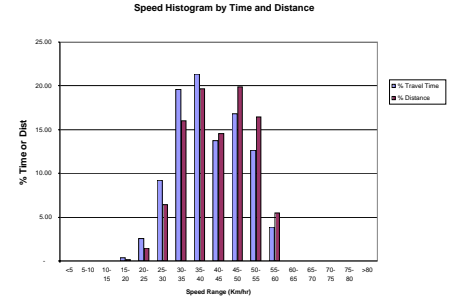
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	10-5	SERIES DESCRIPTION:	Normal drive regime, 1 second sampling interval				
SURVEY SECTION - FROM (Km):	0.01	TO (Km):	10	SURVEY LENGTH (Km):	10		
TOTAL TRAVEL TIME (Hrs):	0.25	OVERALL AVG. SPEED (Km/hr):	40.2	AVG. RUNNING SPEED (Km/hr):	40.22	LOWEST SPEED (Km/hr):	18.45
		OVERALL SPEED STD DEV.:	8.7	HIGHEST SPEED (Km/hr):	59.87		
AVG ACCLN RATE (m/s/s):	0.29	AVG DECLN RATE (m/s/s):	-0.35	HARSHEST DECLN RATE (m/s/s):	-2.53	NO OF DECLN EVENTS:	412.00
		ACCLN STD DEV.:	0.46			DECLN EVENTS/Km:	41.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr)							



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	0.33	2.53	9.23	19.56	21.32	13.74	16.81	12.64	3.85	-	-	-	-	-
% Survey Distance	-	-	0.15	1.46	6.42	16.02	19.65	14.54	19.85	16.46	5.45	-	-	-	-	-	-

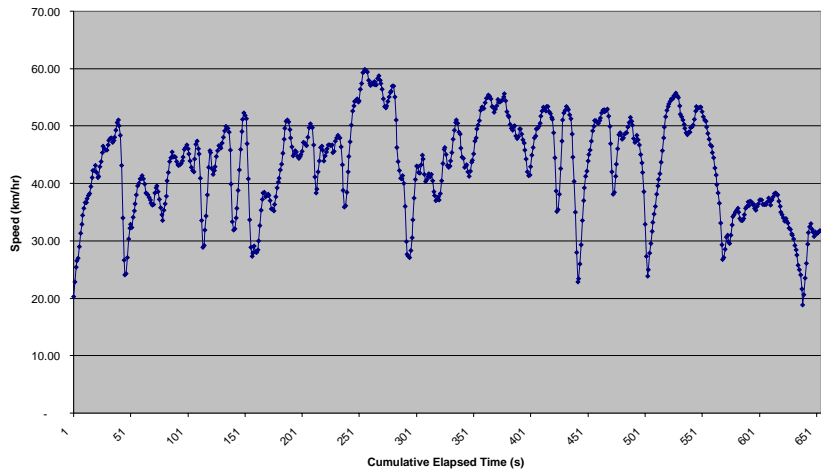
SEGMENT SPEED DATA

Segment Chainages: From/To	0-2	2-4	4-6	6-8	8-10
Average Speed (Km/hr)	39.75	46.53	47.71	38.73	33.55
Speed Standard Deviation	16.2	17.7	17.9	16.1	14.4
Acceleration Standard Deviation	0.26	0.20	0.21	0.17	0.16
AVG SPEED EFFICIENCY RATING	0.99	1.16	1.19	0.97	0.84
Travel Time at Speed-Desirable	0.02	0.01	0.00	0.03	0.06
SUB-SPEED TIME RATING	1.17	1.15	1.20	1.21	1.20
Distance Travel at Speed-Desirable	0.83	0.21	0.14	1.12	1.97
SUB-SPEED DISTANCE RATING	0.42	0.11	0.07	0.56	0.99
LOWER LIMIT SUB-SPEED - (Km/hr)	17.89	17.20	15.30	16.83	19.07
SUB-SPEED RATING	0.45	0.43	0.38	0.42	0.48

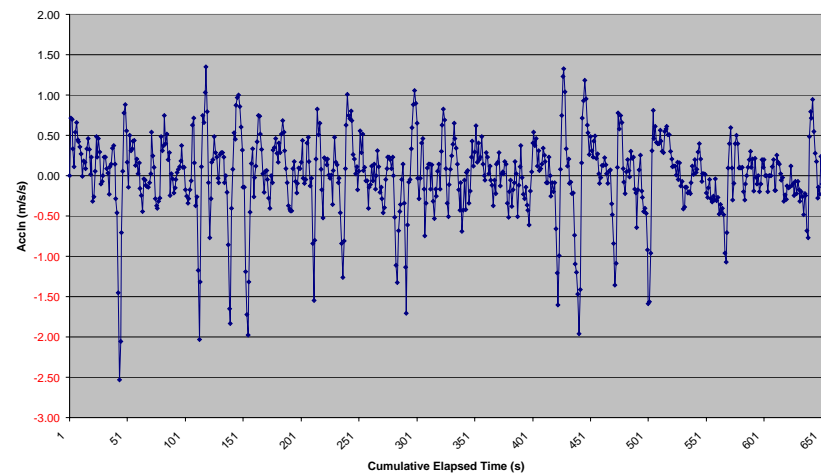
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.99
AVG SPEED EFFICIENCY INDEX	1.04
SUB-SPEED TIME INDEX	1.19
SUB-SPEED DISTANCE INDEX	0.43
LINK SUB-SPEED INDEX (L-SSI)	0.43

Speed/Time Profile



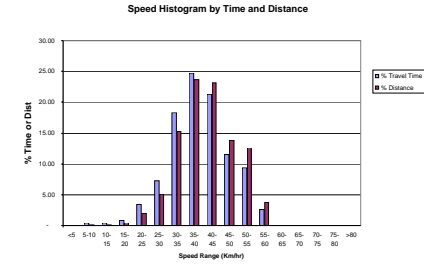
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453	
SURVEY SERIES NO.:	10-6	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor	
SURVEY SECTION - FROM (Km):	0.03	SERIES DESCRIPTION:	Normal drive regime, 4 second sampling interval					
		TO (Km):	10	SURVEY LENGTH (Km):	10			
TOTAL TRAVEL TIME (Hrs):	0.26	OVERALL AVG. SPEED (Km/hr):	38.9	AVG. RUNNING SPEED (Km/hr):	38.95	LOWEST SPEED (Km/hr):	9.37	
AVG ACCLN RATE (m/s/s):	0.89	OVERALL SPEED STD DEV.:	8.6	HIGHEST SPEED (Km/hr):	59.18	NO OF DECLN EVENTS:	103.00	
NO. OF STOPPAGES:	-	AVG DECLN RATE (m/s/s):	-1.14	HARSHEST DECLN RATE (m/s/s):	-5.15	DECLN EVENTS/Km:	11.00	
ie Speed<5Km/hr)		ACCLN STD DEV.:	1.97					
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-			



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.43	0.43	0.85	3.40	7.23	18.30	24.68	21.28	11.49	9.36	2.55	-	-	-	-	-
% Survey Distance	-	0.10	0.12	0.37	2.01	5.13	15.31	23.63	23.18	13.85	12.57	3.74	-	-	-	-	-

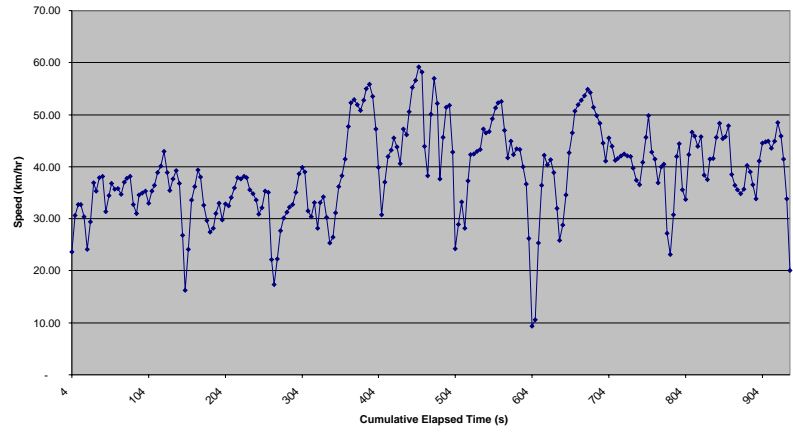
SEGMENT SPEED DATA

Segment Chainages: From/To	10-8	8-6	6-4	4-2	2-0
Average Speed (Km/hr)	33.63	36.80	45.29	40.48	40.58
Speed Standard Deviation	14.3	15.5	17.4	16.4	16.0
Acceleration Standard Deviation	0.52	0.51	0.72	0.62	0.58
AVG SPEED EFFICIENCY RATING	0.84	0.92	1.13	1.01	1.01
Travel Time at Speed<Desirable	0.06	0.04	0.01	0.02	0.02
SUB-SPEED TIME RATING	1.20	1.22	1.21	1.34	1.15
Distance Travel at Speed<Desirable	1.89	1.38	0.29	0.46	0.66
SUB-SPEED DISTANCE RATING	0.94	0.69	0.15	0.23	0.33
LOWER LIMIT SUB-SPEED - (Km/h)	19.05	17.13	15.72	13.49	18.86
SUB-SPEED RATING	0.48	0.43	0.39	0.34	0.47

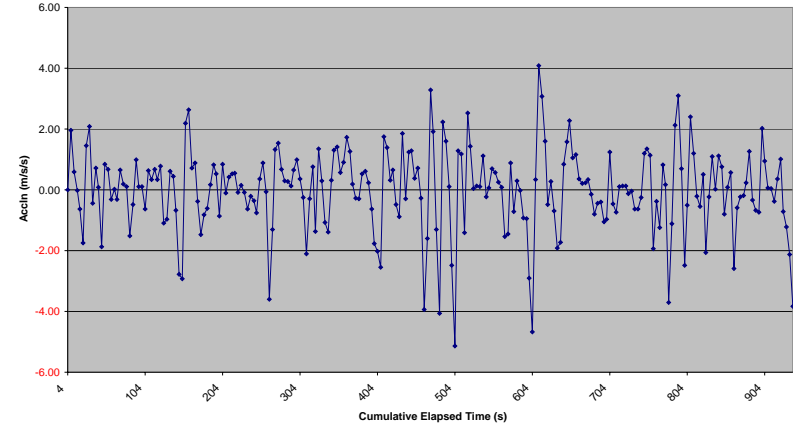
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.03
AVG SPEED EFFICIENCY INDEX	1.00
SUB-SPEED TIME INDEX	1.22
SUB-SPEED DISTANCE INDEX	0.47
LINK SUB-SPEED INDEX (L-SSI)	0.42

Speed/Time Profile



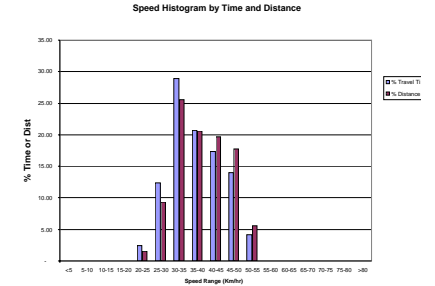
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	10-7	SERIES DESCRIPTION:	Normal drive regime, 8 second sampling interval				
SURVEY SECTION - FROM (Km):	0.06	TO (Km):	10	SURVEY LENGTH (Km):	10		
TOTAL TRAVEL TIME (Hrs):	0.27	OVERALL AVG. SPEED (Km/hr):	37.6	AVG. RUNNING SPEED (Km/hr):	37.60	LOWEST SPEED (Km/hr):	22.45
		OVERALL SPEED STD DEV.:	7.0	HIGHEST SPEED (Km/hr):	51.47		
AVG ACCLN RATE (m/s/s):	1.10	AVG DECLN RATE (m/s/s):	-1.13	HARSHEST DECLN RATE (m/s/s):	-3.76	NO OF DECLN EVENTS:	59.00
		ACCLN STD DEV.:	1.49			DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	2.48	12.40	28.93	20.66	17.36	14.05	4.13	-	-	-	-	-	-
% Survey Distance	-	-	-	-	1.52	9.35	25.56	20.56	19.69	17.75	5.57	-	-	-	-	-	-

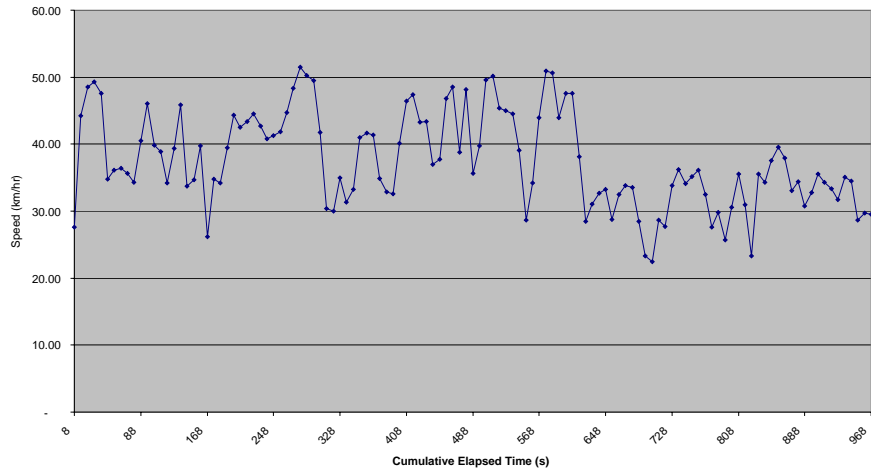
SEGMENT SPEED DATA

Segment Chainages: From/To	0-2	2-4	4-6	6-8	8-10
Average Speed (Km/hr)	38.37	41.33	42.13	35.50	33.09
Speed Standard Deviation	15.4	16.2	16.2	14.9	14.1
Acceleration Standard Deviation	0.84	0.50	0.70	0.68	0.55
AVG SPEED EFFICIENCY RATING	0.96	1.03	1.05	0.89	0.83
Travel Time at Speed-Desirable	0.04	0.01	0.02	0.04	0.06
SUB-SPEED TIME RATING	1.14	1.20	1.11	1.29	1.21
Distance Travel at Speed-Desirable	1.25	0.44	0.64	1.24	2.06
SUB-SPEED DISTANCE RATING	0.62	0.22	0.32	0.62	1.03
LOWER LIMIT SUB-SPEED - (Km/hr)	19.67	17.00	19.95	16.11	18.97
SUB-SPEED RATING	0.49	0.42	0.50	0.40	0.47

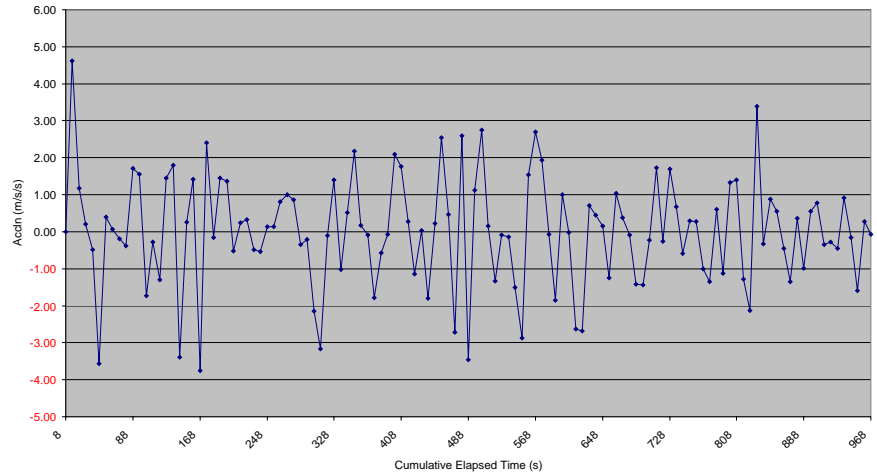
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.06
AVG SPEED EFFICIENCY INDEX	0.95
SUB-SPEED TIME INDEX	1.19
SUB-SPEED DISTANCE INDEX	0.56
LINK SUB-SPEED INDEX (L-SSI)	0.46

Speed/Time Profile



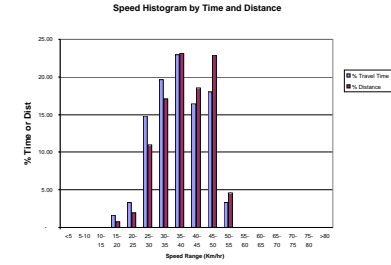
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	10-8	SERIES DESCRIPTION:	Normal drive regime, 16 second sampling interval				
SURVEY SECTION - FROM (Km):	0.13	TO (Km):	10	SURVEY LENGTH (Km):	10		
TOTAL TRAVEL TIME (Hrs):	0.27	OVERALL AVG. SPEED (Km/hr):	37.2	AVG. RUNNING SPEED (Km/hr):	37.16	LOWEST SPEED (Km/hr):	18.24
AVG ACCLN RATE (m/s/s):	1.41	OVERALL SPEED STD DEV.:	8.0	HIGHEST SPEED (Km/hr):	52.79	NO OF DECLN EVENTS:	29.00
NO. OF STOPPAGES:	-	AVG DECLN RATE (m/s/s):	+1.38	HARSHEST DECLN RATE (m/s/s):	-4.86	DECLN EVENTS/Km:	3.00
ie Speed<5Km/hr		ACCLN STD DEV.:	1.75	AVG STOPPAGE TIME (Sec):	-		
		TOTAL STOPPAGE TIME (Hrs):	-				



OVERALL SPEED HISTOGRAM DATA

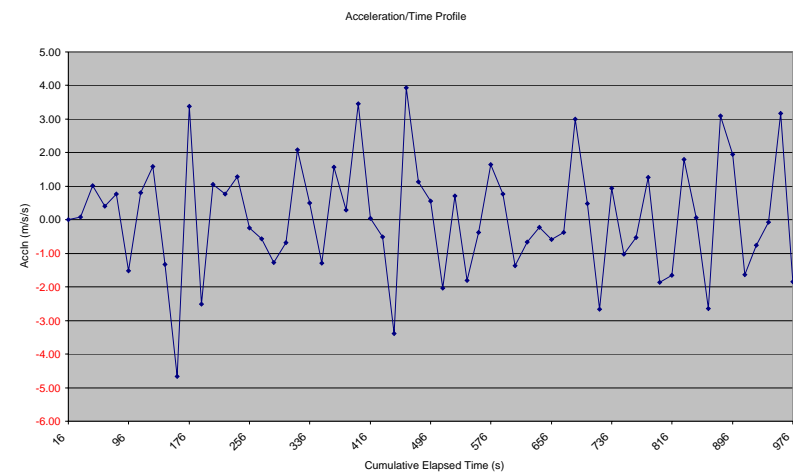
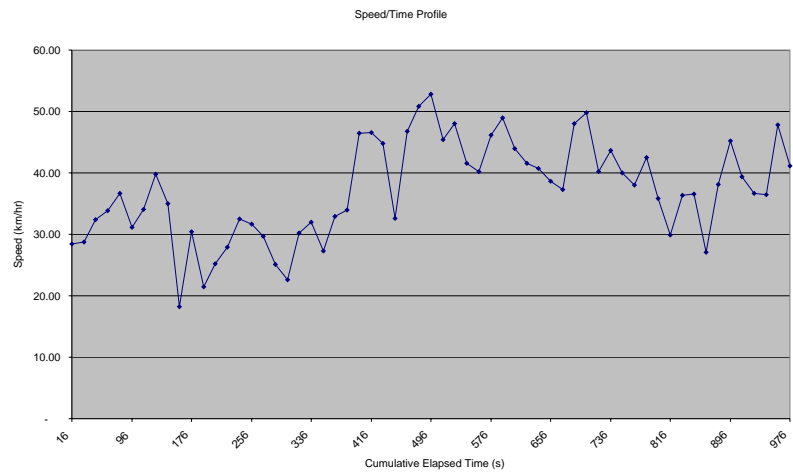
Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	1.64	3.28	14.75	19.67	22.95	16.39	18.03	3.28	-	-	-	-	-	-
% Survey Distance	-	-	-	0.80	1.94	10.99	17.10	23.14	18.54	22.90	4.57	-	-	-	-	-	-

SEGMENT SPEED DATA

Segment Chainages: From/To	10-8	8-6	6-4	4-2	2-0
Average Speed (Km/hr)	30.24	33.45	46.72	41.99	37.65
Speed Standard Deviation	13.1	14.6	16.8	16.4	15.3
Acceleration Standard Deviation	0.91	0.78	0.68	0.59	0.86
AVG SPEED EFFICIENCY RATING	0.76	0.84	1.17	1.05	0.94
Travel Time at Speed<Desirable	0.06	0.05	-	0.02	0.04
SUB-SPEED TIME RATING	1.32	1.33	1.00	1.04	1.14
Distance Travel at Speed<Desirable	1.88	1.47	-	0.68	1.41
SUB-SPEED DISTANCE RATING	0.94	0.73	-	0.34	0.70
LOWER LIMIT SUB-SPEED - (Km/h)	17.13	15.44	40.00	22.11	19.84
SUB-SPEED RATING	0.43	0.39	1.00	0.55	0.50

ROAD LINK CONDITION INDICES

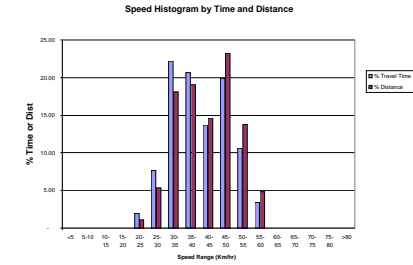
TOTAL TRAVEL TIME INDEX	1.08
AVG SPEED EFFICIENCY INDEX	0.93
SUB-SPEED TIME INDEX	1.21
SUB-SPEED DISTANCE INDEX	0.68
LINK SUB-SPEED INDEX (L-SSI)	0.57



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

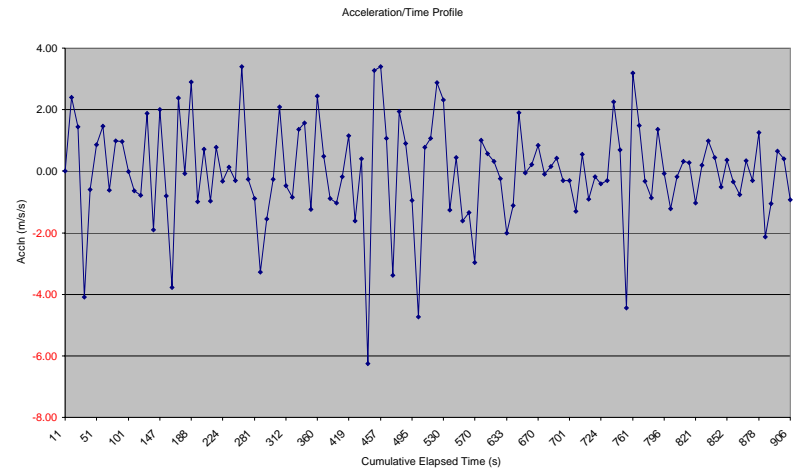
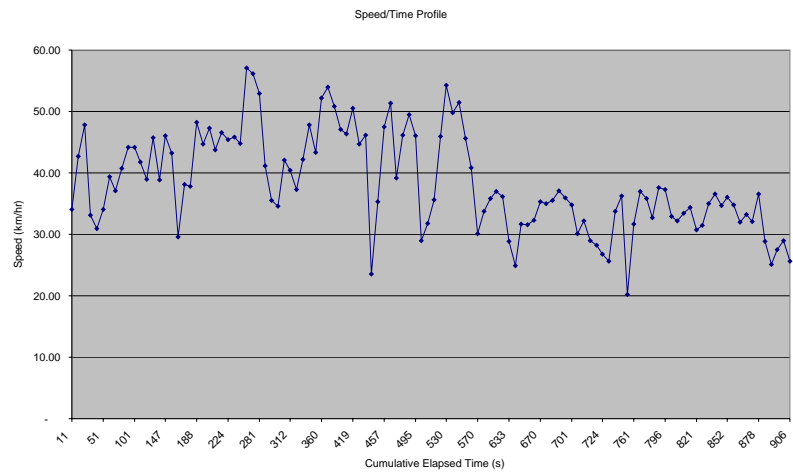
PROVINCE:	MAPUTO	DISTRICT:	MATOLA	ROAD NAME:	Rio Matola - Boane	ROAD NO.:	R453
SURVEY SERIES NO.:	10-9	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SECTION - FROM (Km):	0.10	SERIES DESCRIPTION:	Normal drive regime, AUTO sampling method				
TOTAL TRAVEL TIME (Hrs):	0.25	TO (Km):	10	SURVEY LENGTH (Km):	10		
AVG ACCLN RATE (m/s/s):	1.27	OVERALL AVG. SPEED (Km/hr):	40.2	AVG. RUNNING SPEED (Km/hr):	38.38	LOWEST SPEED (Km/hr):	20.21
NO. OF STOPPAGES: ie Speed<5Km/hr)	-	OVERALL SPEED STD DEV.:	7.9	HIGHEST SPEED (Km/hr):	57.05	NO OF DECLN EVENTS:	60.00
		AVG DECLN RATE (m/s/s):	+1.21	HARSHEST DECLN RATE (m/s/s):	-6.26	DECLN EVENTS/Km:	6.00
		ACCLN STD DEV.:	1.68				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	1.99	7.62	22.19	20.64	13.69	19.87	10.60	3.42	-	-	-	-	-
% Survey Distance	-	-	-	-	1.13	5.31	18.14	19.02	14.61	23.22	13.75	4.82	-	-	-	-	-

Segment Chainages: From/To	0-2	2-4	4-6	6-8	8-10
Average Speed (Km/hr)	39.42	44.78	45.37	38.05	32.77
Speed Standard Deviation	15.1	16.5	15.9	15.4	15.5
Acceleration Standard Deviation	0.74	0.62	0.90	0.76	0.70
AVG SPEED EFFICIENCY RATING	0.99	1.12	1.13	0.95	0.82
Travel Time at Speed<Desirable	0.03	0.01	0.00	0.03	0.06
SUB-SPEED TIME RATING	1.11	1.13	1.21	1.22	1.21
Distance Travel at Speed<Desirable	0.91	0.18	0.09	1.09	2.00
SUB-SPEED DISTANCE RATING	0.46	0.09	0.05	0.55	1.00
LOWER LIMIT SUB-SPEED - (Km/h)	20.92	18.89	17.01	17.34	17.61
SUB-SPEED RATING	0.52	0.47	0.43	0.43	0.44

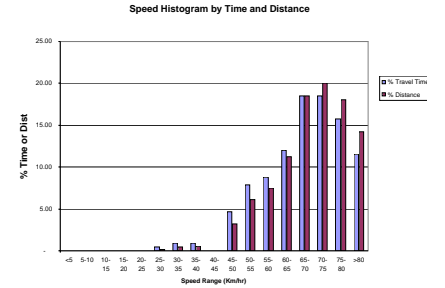
TOTAL TRAVEL TIME INDEX	1.00
AVG SPEED EFFICIENCY INDEX	1.01
SUB-SPEED TIME INDEX	1.18
SUB-SPEED DISTANCE INDEX	0.43
LINK SUB-SPEED INDEX (L-SSI)	0.46



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Changane - Nalazi	ROAD NO.:	R852
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	11-1	SERIES DESCRIPTION:	Fast drive, 5 seconds sampling period				
SURVEY SECTION - FROM (Km):	0.04	TO (Km):	20	SURVEY LENGTH (Km):	20		
TOTAL TRAVEL TIME (Hrs):	0.30	OVERALL AVG. SPEED (Km/hr):	67.5	AVG. RUNNING SPEED (Km/hr):	67.49	LOWEST SPEED (Km/hr):	26.08
		OVERALL SPEED STD DEV.:	11.3	HIGHEST SPEED (Km/hr):	90.19		
AVG ACCLN RATE (m/s/s):	1.89	AVG DECLN RATE (m/s/s):	-2.15	HARSHEST DECLN RATE (m/s/s):	-7.28	NO OF DECLN EVENTS:	101.00
		ACCLN STD DEV.:	2.58			DECLN EVENTS/Km:	5.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	-	0.46	0.93	0.93	-	4.63	7.87	8.80	12.04	18.52	18.52	15.74	11.57
% Survey Distance	-	-	-	-	-	0.18	0.43	0.53	-	3.22	6.12	7.48	11.24	18.52	20.04	18.01	14.23

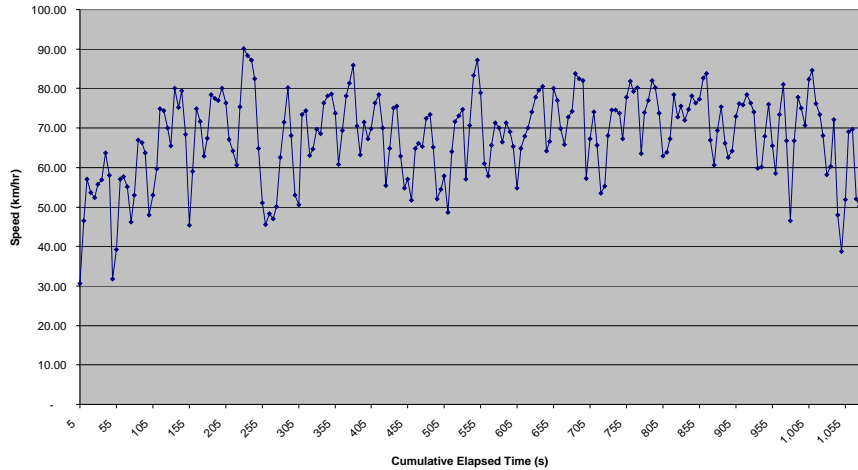
SEGMENT SPEED DATA

Segment Chainages: From/To	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	62.92	67.83	71.63	69.49	49.49
Speed Standard Deviation	28.7	29.4	30.7	30.2	7.0
Acceleration Standard Deviation	1.39	1.24	1.10	1.28	0.57
AVG SPEED EFFICIENCY RATING	1.57	1.70	1.79	1.74	1.24
Travel Time at Speed-Desirable	0.00	-	-	0.00	0.00
SUB-SPEED TIME RATING	1.18	1.00	1.00	1.03	1.53
Distance Travel at Speed-Desirable	0.14	-	-	0.05	0.04
SUB-SPEED DISTANCE RATING	0.03	-	-	0.01	0.01
LOWER LIMIT SUB-SPEED - (Km/hr)	5.23	40.00	40.00	8.57	19.07
SUB-SPEED RATING	0.13	1.00	1.00	0.21	0.48

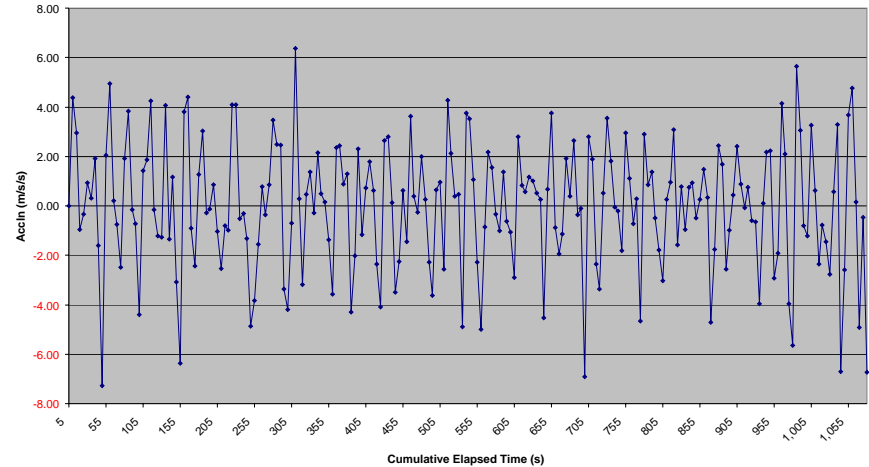
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.59
AVG SPEED EFFICIENCY INDEX	1.65
SUB-SPEED TIME INDEX	1.25
SUB-SPEED DISTANCE INDEX	0.02
LINK SUB-SPEED INDEX (L-SSI)	0.56

Speed/Time Profile



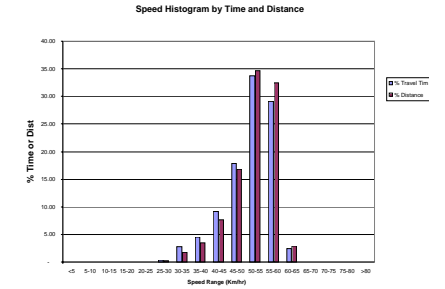
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Changane - Nalazi	ROAD NO.:	R852
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	11-2A	SERIES DESCRIPTION:	Normal drive regime, 5 seconds sampling period, repeatability survey				
SURVEY SECTION - FROM (Km):	0.05	TO (Km):	20	SURVEY LENGTH (Km):	20		
TOTAL TRAVEL TIME (Hrs):	0.40	OVERALL AVG. SPEED (Km/hr):	51.1	AVG. RUNNING SPEED (Km/hr):	51.06	LOWEST SPEED (Km/hr):	27.87
		OVERALL SPEED STD DEV.:	6.4	HIGHEST SPEED (Km/hr):	62.32		
AVG ACCLN RATE (m/s/s):	0.77	AVG DECLN RATE (m/s/s):	-0.85	HARSHEST DECLN RATE (m/s/s):	-4.70	NO OF DECLN EVENTS:	135.00
		ACCLN STD DEV.:	1.15			DECLN EVENTS/km:	7.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	-	0.35	2.81	4.56	9.12	17.89	33.68	29.12	2.46	-	-	-	-
% Survey Distance	-	-	-	-	-	0.19	1.79	3.49	7.65	16.81	34.72	32.43	2.92	-	-	-	-

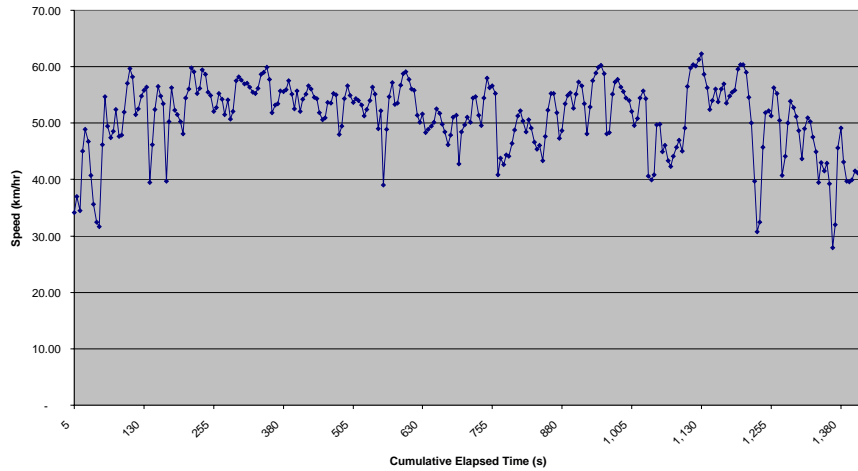
SEGMENT SPEED DATA

Segment Chainages: From/To	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	51.46	53.17	51.67	48.85	38.54
Speed Standard Deviation	22.4	22.8	22.4	21.8	4.6
Acceleration Standard Deviation	0.66	0.43	0.53	0.63	0.13
AVG SPEED EFFICIENCY RATING	1.29	1.33	1.29	1.22	0.96
Travel Time at Speed-Desirable	0.01	0.00	-	0.02	0.00
SUB-SPEED TIME RATING	1.12	1.03	1.00	1.10	1.13
Distance Travel at Speed-Desirable	0.40	0.05	-	0.56	0.10
SUB-SPEED DISTANCE RATING	0.08	0.01	-	0.11	0.02
LOWER LIMIT SUB-SPEED - (Km/hr)	13.22	16.24	40.00	14.62	30.84
SUB-SPEED RATING	0.33	0.41	1.00	0.37	0.77

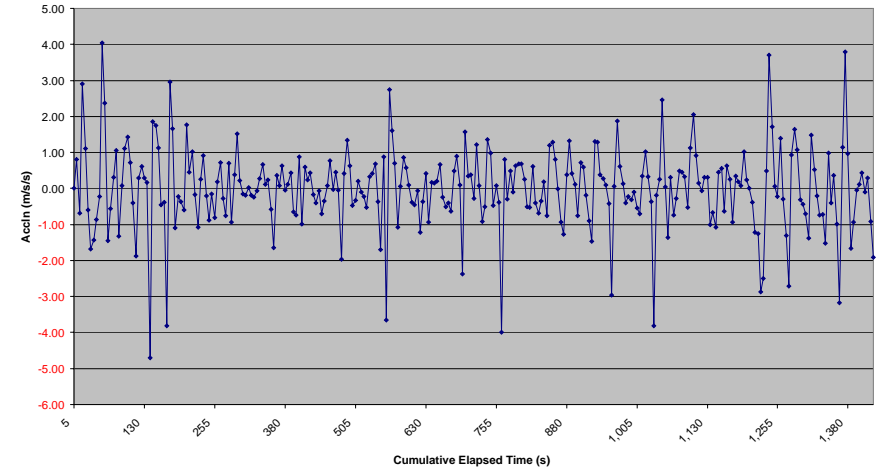
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.78
AVG SPEED EFFICIENCY INDEX	1.26
SUB-SPEED TIME INDEX	1.09
SUB-SPEED DISTANCE INDEX	0.06
LINK SUB-SPEED INDEX (L-SSI)	0.57

Speed/Time Profile



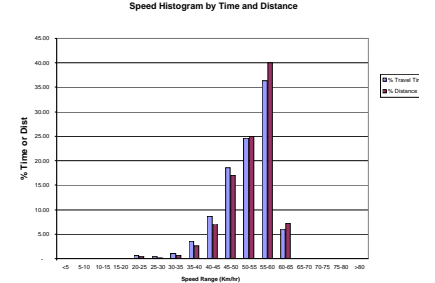
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Changane - Nalazi	ROAD NO.:	R852
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	11-2B	SERIES DESCRIPTION:	Normal drive regime, 5 seconds sampling period, repeatability survey				
SURVEY SECTION - FROM (Km):	0.04	TO (Km):	20	SURVEY LENGTH (Km):	20		
TOTAL TRAVEL TIME (Hrs):	0.39	OVERALL AVG. SPEED (Km/hr):	52.1	AVG. RUNNING SPEED (Km/hr):	52.08	LOWEST SPEED (Km/hr):	22.97
		OVERALL SPEED STD DEV.:	7.0	HIGHEST SPEED (Km/hr):	64.66		
AVG ACCLN RATE (m/s/s):	0.83	AVG DECLN RATE (m/s/s):	-1.21	HARSHEST DECLN RATE (m/s/s):	-5.16	NO OF DECLN EVENTS:	115.00
		ACCLN STD DEV.:	1.33			DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	0.71	0.36	1.07	3.57	8.57	18.57	24.64	36.43	6.07	-	-	-	-
% Survey Distance	-	-	-	-	0.33	0.17	0.67	2.57	7.04	16.95	24.99	40.08	7.20	-	-	-	-

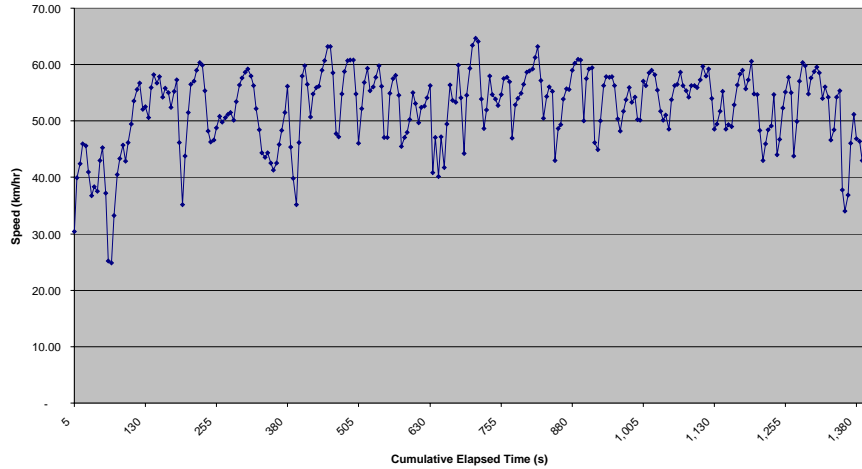
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25
Average Speed (Km/hr)	48.47	53.20	55.06	52.86	40.14
Speed Standard Deviation	21.8	22.9	23.5	22.9	5.5
Acceleration Standard Deviation	0.60	0.77	0.59	0.62	0.32
AVG SPEED EFFICIENCY RATING	1.21	1.33	1.38	1.32	1.00
Travel Time at Speed-Desirable	0.01	0.00	-	0.00	0.00
SUB-SPEED TIME RATING	1.18	1.07	1.00	1.10	1.74
Distance Travel at Speed-Desirable	0.47	0.10	-	0.15	0.03
SUB-SPEED DISTANCE RATING	0.09	0.02	-	0.03	0.01
LOWER LIMIT SUB-SPEED - (Km/hr)	12.05	14.55	40.00	13.37	17.51
SUB-SPEED RATING	0.30	0.36	1.00	0.33	0.44

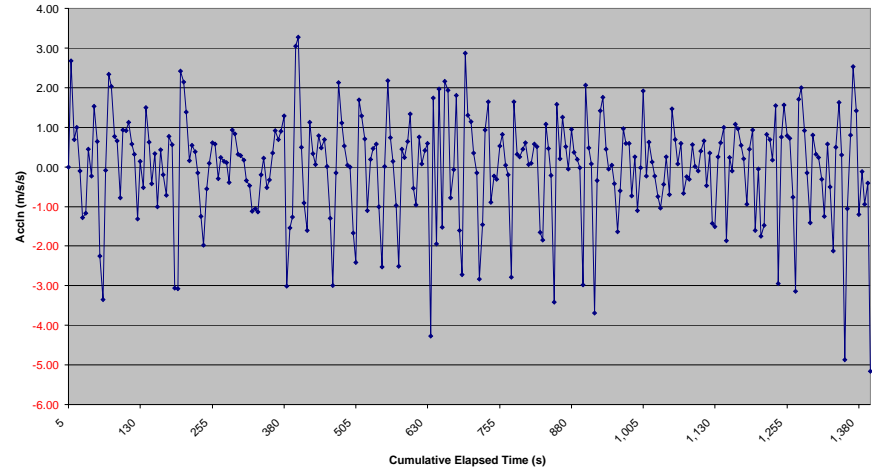
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.77
AVG SPEED EFFICIENCY INDEX	1.28
SUB-SPEED TIME INDEX	1.27
SUB-SPEED DISTANCE INDEX	0.04
LINK SUB-SPEED INDEX (L-SSI)	0.49

Speed/Time Profile



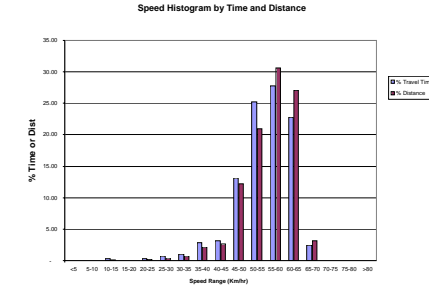
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Changane - Nalazi	ROAD NO.:	R852
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SERIES NO.:	11-2C	SERIES DESCRIPTION:	Normal drive regime, 5 seconds sampling period, repeatability survey				
SURVEY SECTION - FROM (Km):	0.03	TO (Km):	20	SURVEY LENGTH (Km):	20		
TOTAL TRAVEL TIME (Hrs):	0.39	OVERALL AVG. SPEED (Km/hr):	51.9	AVG. RUNNING SPEED (Km/hr):	54.44	LOWEST SPEED (Km/hr):	14.90
		OVERALL SPEED STD DEV.:	7.5	HIGHEST SPEED (Km/hr):	66.74		
AVG ACCLN RATE (m/s/s):	0.99	AVG DECLN RATE (m/s/s):	-1.16	HARSHEST DECLN RATE (m/s/s):	-5.55	NO OF DECLN EVENTS:	123.00
		ACCLN STD DEV.:	1.42			DECLN EVENTS/km:	7.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



OVERALL SPEED HISTOGRAM DATA	Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time		-	-	0.36	-	0.36	0.71	1.07	2.85	3.20	13.17	25.27	27.76	22.78	2.49	-	-	-
% Survey Distance		-	-	0.10	-	0.15	0.40	0.69	2.09	2.63	12.16	20.92	30.60	27.08	3.17	-	-	-

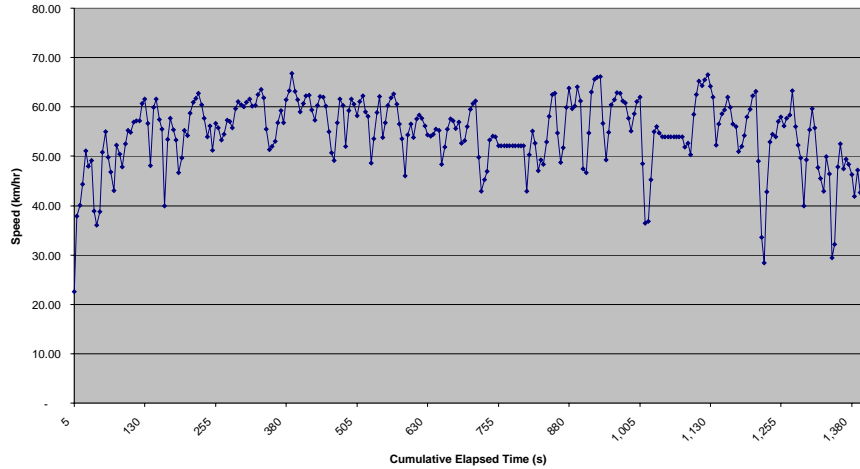
SEGMENT SPEED DATA

Segment Chainages: From/To	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	53.54	57.78	55.40	52.87	37.97
Speed Standard Deviation	23.2	24.1	24.4	23.7	5.7
Acceleration Standard Deviation	0.69	0.50	0.63	0.86	0.38
AVG SPEED EFFICIENCY RATING	1.34	1.44	1.39	1.32	0.95
Travel Time at Speed-Desirable	0.01	-	-	0.01	0.00
SUB-SPEED TIME RATING	1.12	1.00	1.00	1.18	1.61
Distance Travel at Speed-Desirable	0.30	-	-	0.33	0.07
SUB-SPEED DISTANCE RATING	0.06	-	-	0.07	0.01
LOWER LIMIT SUB-SPEED - (Km/hr)	12.51	40.00	40.00	10.13	19.16
SUB-SPEED RATING	0.31	1.00	1.00	0.25	0.48

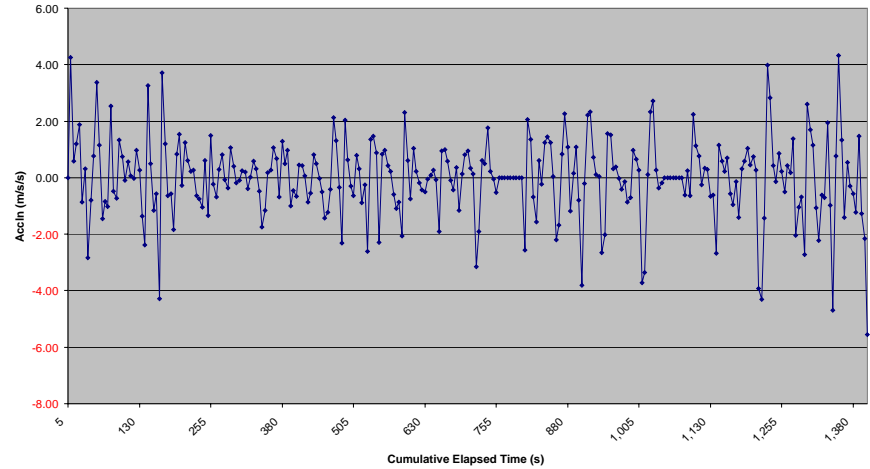
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.77
AVG SPEED EFFICIENCY INDEX	1.31
SUB-SPEED TIME INDEX	1.30
SUB-SPEED DISTANCE INDEX	0.05
LINK SUB-SPEED INDEX (L-SSI)	0.61

Speed/Time Profile



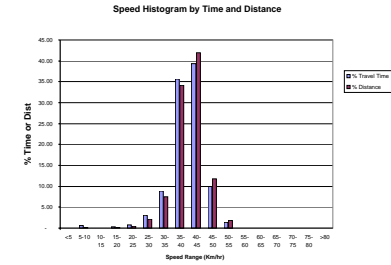
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Changane - Nalazi	ROAD NO.:	R852
SURVEY SERIES NO.:	11-3	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Good
SURVEY SECTION - FROM (Km):	-	SERIES DESCRIPTION:	Slow drive regime, 5 second sampling interval				
TOTAL TRAVEL TIME (Hrs):	0.50	TO (Km):	20	SURVEY LENGTH (Km):	20		
AVG ACCLN RATE (m/s/s):	0.57	OVERALL AVG. SPEED (Km/hr):	39.7	AVG. RUNNING SPEED (Km/hr):	39.65	LOWEST SPEED (Km/hr):	7.68
NO. OF STOPPAGES:	-	OVERALL SPEED STD DEV.:	5.5	HIGHEST SPEED (Km/hr):	54.64	NO OF DECLN EVENTS:	165.00
		AVG DECLN RATE (m/s/s):	-0.67	HARSHEST DECLN RATE (m/s/s):	-4.92	DECLN EVENTS/Km:	9.00
		ACCLN STD DEV.:	0.94				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.55	-	0.28	0.83	3.05	8.86	35.73	39.34	9.97	1.39	-	-	-	-	-	-
% Survey Distance	-	0.12	-	0.13	0.51	2.11	7.47	34.15	41.87	11.78	1.85	-	-	-	-	-	-

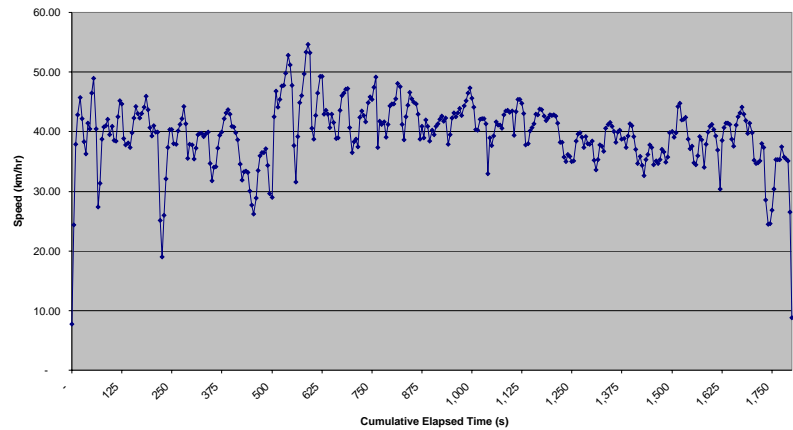
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20
Average Speed (Km/hr)	38.26	43.17	40.74	37.29
Speed Standard Deviation	17.0	18.3	17.6	16.6
Acceleration Standard Deviation	0.59	0.51	0.27	0.44
AVG SPEED EFFICIENCY RATING	0.96	1.08	1.02	0.93
Travel Time at Speed<Desirable	0.08	0.03	0.05	0.09
SUB-SPEED TIME RATING	1.13	1.09	1.07	1.13
Distance Travel at Speed<Desirable	2.75	1.07	1.72	3.30
SUB-SPEED DISTANCE RATING	0.55	0.21	0.34	0.66
LOWER LIMIT SUB-SPEED - (Km/h)	18.27	18.42	19.87	18.83
SUB-SPEED RATING	0.46	0.46	0.50	0.47

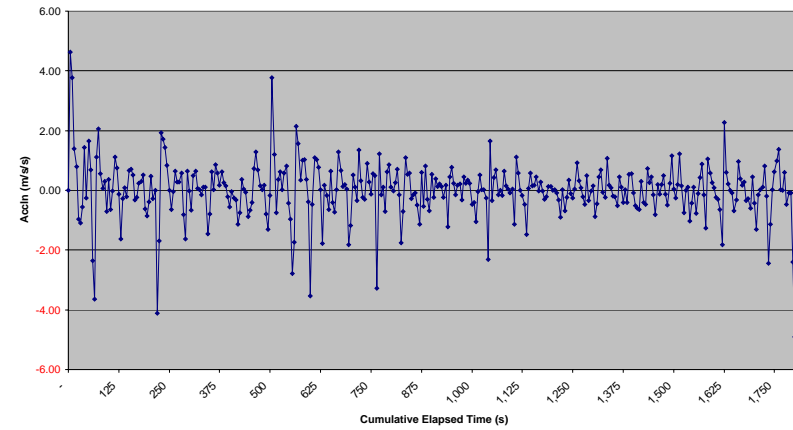
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.01
AVG SPEED EFFICIENCY INDEX	0.99
SUB-SPEED TIME INDEX	1.10
SUB-SPEED DISTANCE INDEX	0.44
LINK SUB-SPEED INDEX (L-SSI)	0.47

Speed/Time Profile



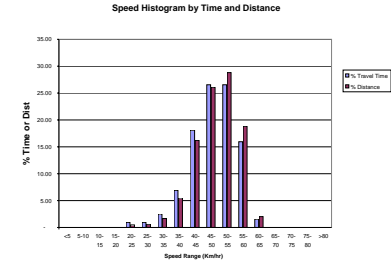
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHOKWE	ROAD NAME:	Chokwe - Fr Maputo	ROAD NO.:	R856
SURVEY SERIES NO.:	12-1	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Fair
SURVEY SECTION - FROM (Km):	0.05	SERIES DESCRIPTION:	Normal driving regime, 5 second sampling interval, repeatability survey				
TOTAL TRAVEL TIME (Hrs):	0.44	TO (Km):	21	SURVEY LENGTH (Km):	21	NO OF DECLN EVENTS:	160.00
AVG ACCLN RATE (m/s/s):	0.82	OVERALL AVG. SPEED (Km/hr):	48.3	AVG. RUNNING SPEED (Km/hr):	48.26	DECLN EVENTS/Km:	6.00
NO. OF STOPPAGES:	-	OVERALL SPEED STD DEV.:	7.1	HIGHEST SPEED (Km/hr):	62.56	LOWEST SPEED (Km/hr):	21.03
ie Speed<5Km/hr		AVG DECLN RATE (m/s/s):	-0.02	HARSHEST DECLN RATE (m/s/s):	-6.64		
		ACCLN STD DEV.:	1.16				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		

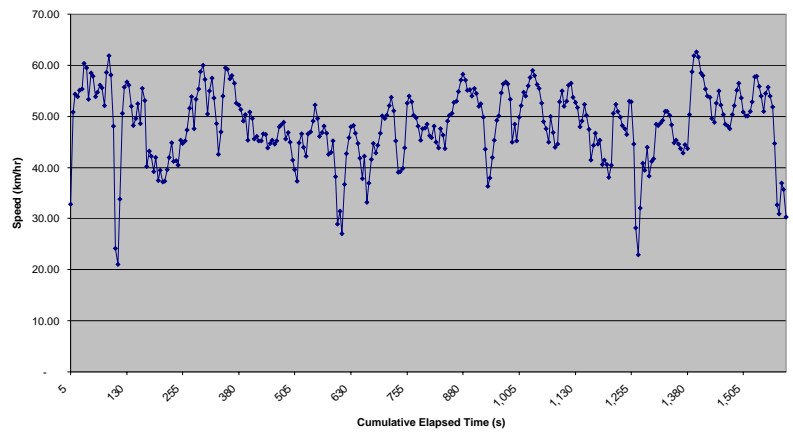


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	0.94	0.94	2.50	6.88	18.13	26.56	26.56	15.94	1.56	-	-	-	-
% Survey Distance	-	-	-	-	0.44	0.55	1.67	5.42	16.19	26.12	28.81	18.81	2.00	-	-	-	-

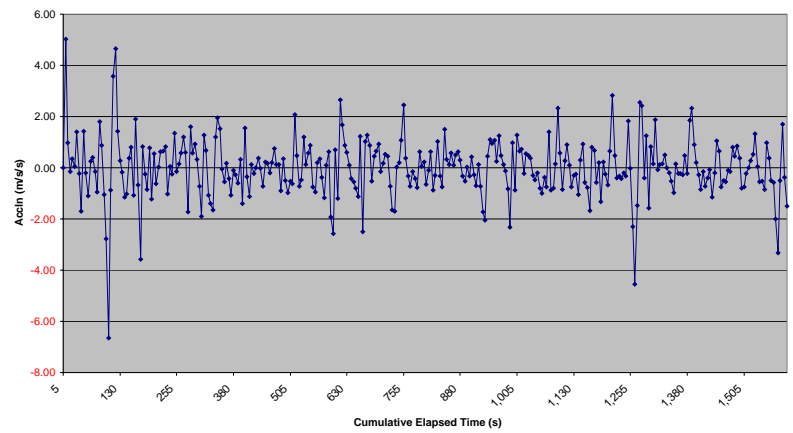
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25
Average Speed (Km/hr)	49.45	45.34	50.55	47.99	48.58
Speed Standard Deviation	21.1	19.9	21.2	20.6	12.5
Acceleration Standard Deviation	0.77	0.49	0.39	0.53	0.29
AVG SPEED EFFICIENCY RATING	1.24	1.13	1.26	1.20	1.21
Travel Time at Speed<Desirable	0.01	0.02	0.00	0.01	0.01
SUB-SPEED TIME RATING	1.17	1.12	1.08	1.21	1.20
Distance Travel at Speed<Desirable	0.48	0.65	0.10	0.28	0.23
SUB-SPEED DISTANCE RATING	0.10	0.13	0.02	0.06	0.05
LOWER LIMIT SUB-SPEED - (Km/h)	13.13	15.94	15.94	12.53	20.77
SUB-SPEED RATING	0.33	0.40	0.40	0.31	0.52

TOTAL TRAVEL TIME INDEX	0.83
AVG SPEED EFFICIENCY INDEX	1.21
SUB-SPEED TIME INDEX	1.15
SUB-SPEED DISTANCE INDEX	0.07
LINK SUB-SPEED INDEX (L-SSI)	0.39

Speed/Time Profile



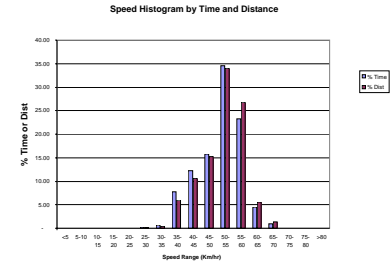
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHOKWE	ROAD NAME:	Chokwe - Fr Maputo	ROAD NO.:	R856
SURVEY SERIES NO.:	12-2	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Fair
SURVEY SECTION - FROM (Km):	0.04	SERIES DESCRIPTION:	Normal driving regime, 5 second sampling interval, repeatability survey				
TOTAL TRAVEL TIME (Hrs):	0.43	TO (Km):	21	SURVEY LENGTH (Km):	21		
AVG ACCLN RATE (m/s/s):	0.78	OVERALL AVG. SPEED (Km/hr):	49.8	AVG. RUNNING SPEED (Km/hr):	50.92	LOWEST SPEED (Km/hr):	25.40
NO. OF STOPPAGES: ie Speed<5Km/hr)	-	OVERALL SPEED STD DEV.:	6.8	HIGHEST SPEED (Km/hr):	67.87	NO OF DECLN EVENTS:	140.00
		AVG DECLN RATE (m/s/s):	-0.02	HARSHEST DECLN RATE (m/s/s):	-3.96	DECLN EVENTS/Km:	7.00
		ACCLN STD DEV.:	1.02				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	-	-	-	0.32	0.65	7.74	12.26	15.81	34.52	23.23	4.52	0.97	-	-	-
% Survey Distance	-	-	-	-	-	0.16	0.44	5.95	10.57	15.17	34.05	26.78	5.56	1.30	-	-	-

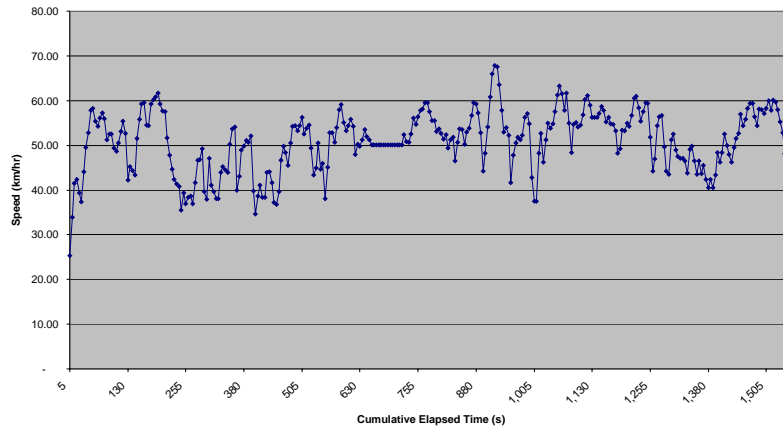
SEGMENT SPEED DATA

Segment Chainages: From/To	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	47.75	49.63	53.85	51.52	56.15
Speed Standard Deviation	20.8	21.8	22.4	21.7	13.5
Acceleration Standard Deviation	0.58	0.46	0.54	0.41	0.19
AVG SPEED EFFICIENCY RATING	1.19	1.24	1.35	1.29	1.40
Travel Time at Speed<Desirable	0.02	0.01	0.00	-	-
SUB-SPEED TIME RATING	1.08	1.05	1.07	1.00	1.00
Distance Travel at Speed<Desirable	0.83	0.47	0.10	-	-
SUB-SPEED DISTANCE RATING	0.17	0.09	0.02	-	-
LOWER LIMIT SUB-SPEED - (Km/h)	16.33	16.09	15.12	40.00	40.00
SUB-SPEED RATING	0.41	0.40	0.38	1.00	1.00

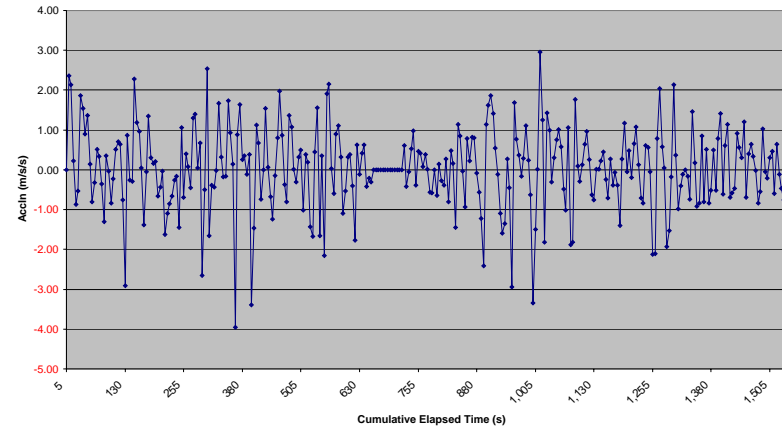
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.80
AVG SPEED EFFICIENCY INDEX	1.28
SUB-SPEED TIME INDEX	1.07
SUB-SPEED DISTANCE INDEX	0.09
LINK SUB-SPEED INDEX (L-SSI)	0.64

Speed/Time Profile



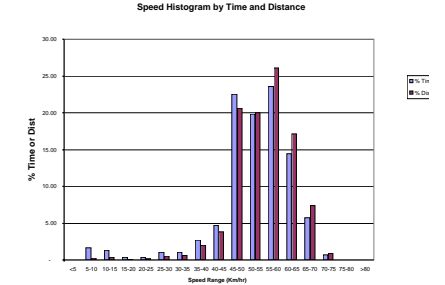
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHOKWE	ROAD NAME:	Chokwe - Fr Maputo	ROAD NO.:	R856
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	12-3	SERIES DESCRIPTION:	Normal driving regime, 5 second sampling interval, repeatability survey				
SURVEY SECTION - FROM (Km):	0.03	TO (Km):	21	SURVEY LENGTH (Km):	21		
TOTAL TRAVEL TIME (Hrs):	0.41	OVERALL AVG. SPEED (Km/hr):	52.0	AVG. RUNNING SPEED (Km/hr):	52.00	LOWEST SPEED (Km/hr):	5.19
		OVERALL SPEED STD DEV.:	11.1	HIGHEST SPEED (Km/hr):	70.75		
AVG ACCLN RATE (m/s/s):	0.91	AVG DECLN RATE (m/s/s):	-1.00	HARSHEST DECLN RATE (m/s/s):	-5.78	NO OF DECLN EVENTS:	139.00
		ACCLN STD DEV.:	1.30			DECLN EVENTS/km:	7.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	1.68	1.35	0.34	0.34	1.01	1.01	2.69	4.71	22.56	19.87	23.57	14.48	5.72	0.67	-	-
% Survey Distance	-	0.22	0.33	0.13	0.15	0.52	0.64	1.99	3.86	20.64	20.03	26.06	17.15	7.37	0.91	-	-

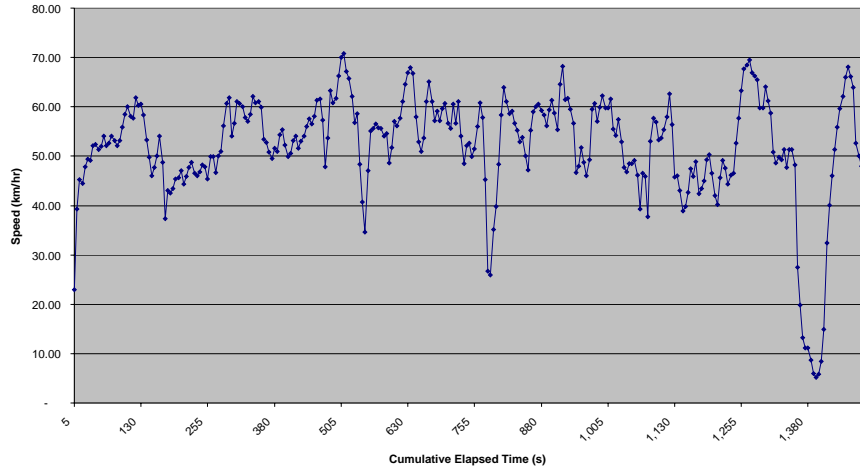
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25
Average Speed (Km/hr)	51.39	56.32	55.10	51.89	37.15
Speed Standard Deviation	22.0	23.4	23.2	22.3	13.0
Acceleration Standard Deviation	0.48	0.55	0.67	0.57	0.63
AVG SPEED EFFICIENCY RATING	1.28	1.41	1.38	1.30	0.93
Travel Time at Speed-Desirable	0.00	0.00	0.01	0.01	0.02
SUB-SPEED TIME RATING	1.21	1.16	1.25	1.03	2.65
Distance Travel at Speed-Desirable	0.14	0.05	0.18	0.22	0.27
SUB-SPEED DISTANCE RATING	0.03	0.01	0.04	0.04	0.05
LOWER LIMIT SUB-SPEED - (Km/hr)	11.19	11.23	8.64	16.66	2.15
SUB-SPEED RATING	0.28	0.28	0.22	0.42	0.05

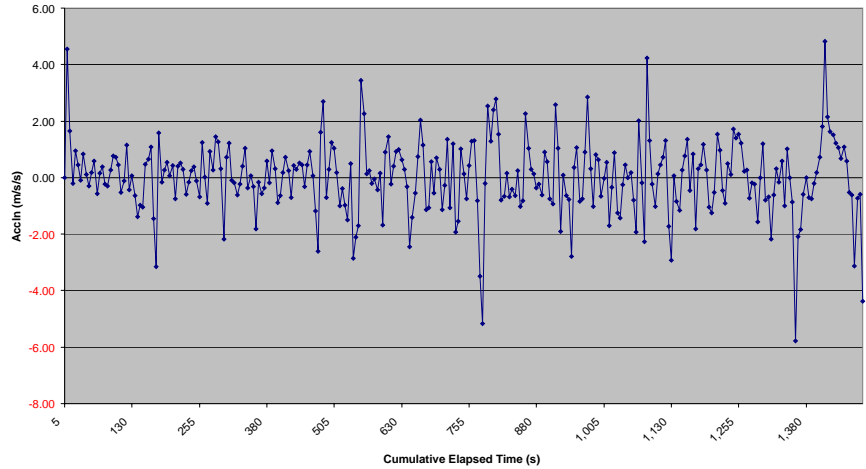
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.77
AVG SPEED EFFICIENCY INDEX	1.26
SUB-SPEED TIME INDEX	1.46
SUB-SPEED DISTANCE INDEX	0.03
LINK SUB-SPEED INDEX (L-SSI)	0.25

Speed/Time Profile



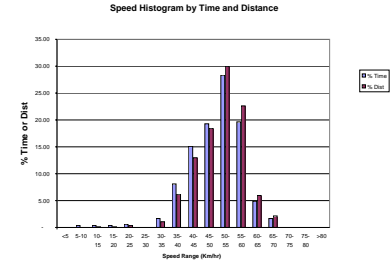
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHOKWE	ROAD NAME:	Chokwe - Fr Maputo	ROAD NO.:	R856
SURVEY SERIES NO.:	12-4	ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Fair
SURVEY SECTION - FROM (Km):	0.03	SERIES DESCRIPTION:	Normal driving regime, 5 second sampling interval, repeatability survey				
TOTAL TRAVEL TIME (Hrs):	0.43	TO (Km):	21	SURVEY LENGTH (Km):	21		
AVG ACCLN RATE (m/s/s):	0.92	OVERALL AVG. SPEED (Km/hr):	49.7	AVG. RUNNING SPEED (Km/hr):	49.69	LOWEST SPEED (Km/hr):	6.46
NO. OF STOPPAGES:	-	OVERALL SPEED STD DEV.:	8.2	HIGHEST SPEED (Km/hr):	67.86	NO OF DECLN EVENTS:	151.00
ie Speed<5Km/hr		AVG DECLN RATE (m/s/s):	-0.97	HARSHEST DECLN RATE (m/s/s):	-8.44	DECLN EVENTS/Km:	6.00
		ACCLN STD DEV.:	1.34				
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.32	0.32	0.32	0.64	-	1.61	8.04	15.11	19.29	28.30	19.61	4.82	1.61	-	-	-
% Survey Distance	-	0.04	0.09	0.12	0.31	-	1.07	6.17	12.99	18.50	30.02	22.59	5.94	2.16	-	-	-

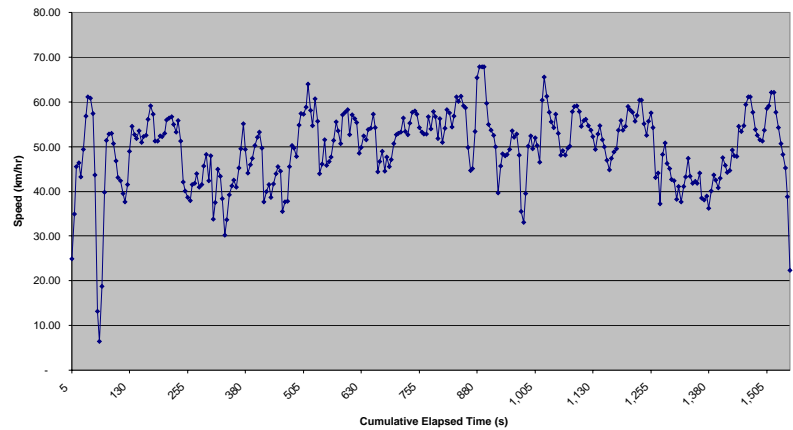
SEGMENT SPEED DATA

Segment Chainages: From/To	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	45.67	50.54	53.39	48.81	53.07
Speed Standard Deviation	20.4	21.4	22.3	21.1	13.2
Acceleration Standard Deviation	0.90	0.54	0.62	0.45	0.34
AVG SPEED EFFICIENCY RATING	1.14	1.26	1.33	1.22	1.33
Travel Time at Speed<Desirable	0.02	0.01	0.01	0.01	0.00
SUB-SPEED TIME RATING	1.27	1.06	1.08	1.06	1.31
Distance Travel at Speed<Desirable	0.70	0.32	0.20	0.37	0.08
SUB-SPEED DISTANCE RATING	0.14	0.06	0.04	0.07	0.02
LOWER LIMIT SUB-SPEED - (Km/h)	11.08	16.42	14.57	16.74	17.33
SUB-SPEED RATING	0.28	0.41	0.36	0.42	0.43

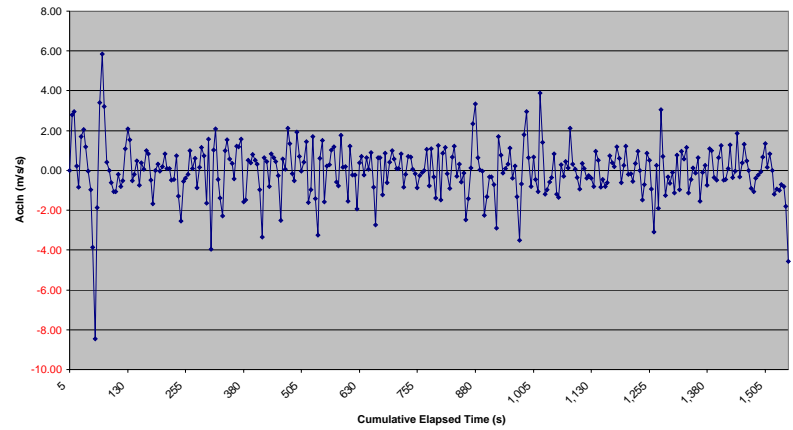
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.80
AVG SPEED EFFICIENCY INDEX	1.24
SUB-SPEED TIME INDEX	1.16
SUB-SPEED DISTANCE INDEX	0.07
LINK SUB-SPEED INDEX (L-SSI)	0.38

Speed/Time Profile



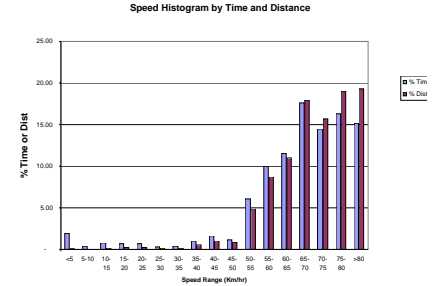
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	GATEMBE	ROAD NAME:	Catembe - Bela Vista	ROAD NO.:	R403
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	13	SERIES DESCRIPTION:	Normal driving regime, GPS in AUTO sampling mode				
SURVEY SECTION - FROM (Km):	0.10	TO (Km):	42	SURVEY LENGTH (Km):	42		
TOTAL TRAVEL TIME (Hrs):	0.63	OVERALL AVG. SPEED (Km/hr):	66.4	AVG. RUNNING SPEED (Km/hr):	61.97	LOWEST SPEED (Km/hr):	0.36
		OVERALL SPEED STD DEV:	18.2	HIGHEST SPEED (Km/hr):	92.69		
AVG ACCLN RATE (m/s/s):	1.45	AVG DECLN RATE (m/s/s):	-1.60	HARSHEST DECLN RATE (m/s/s):	-9.57	NO OF DECLN EVENTS:	123.00
		ACCLN STD DEV:	2.32			DECLN EVENTS/Km:	3.00
NO. OF STOPPAGES:	2	TOTAL STOPPAGE TIME (Hrs):	0.01	AVG STOPPAGE TIME (Sec):	21.50		
ie Speed<5Km/hr							



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	1.89	0.35	0.79	0.70	0.70	0.31	0.35	0.97	1.58	1.14	6.07	9.98	11.57	17.63	14.47	16.31	15.17
% Survey Distance	0.08	0.04	0.16	0.19	0.24	0.12	0.18	0.55	1.03	0.82	4.84	8.72	10.97	17.96	15.73	19.04	19.33

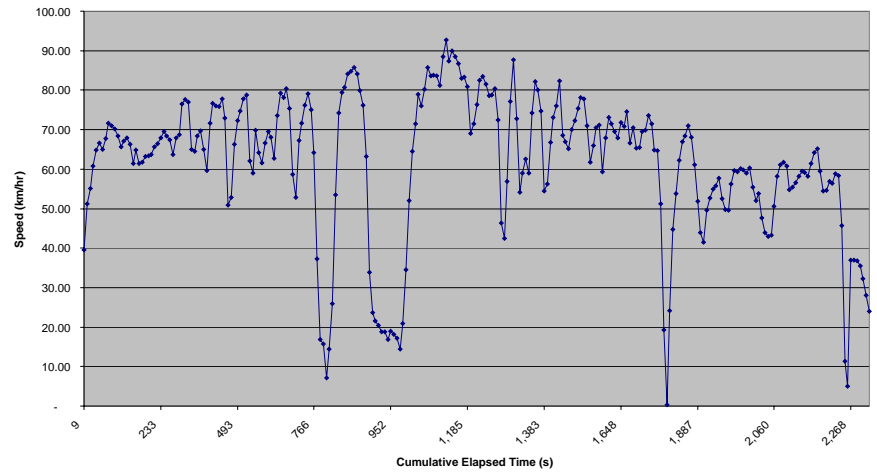
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45
Average Speed (Km/hr)	64.29	69.56	58.82	52.65	82.80	68.89	69.24	53.43
Speed Standard Deviation	20.5	20.4	20.3	19.5	22.3	22.5	20.2	22.0
Acceleration Standard Deviation	0.30	0.61	1.04	0.87	0.33	1.00	0.44	1.01
AVG SPEED EFFICIENCY RATING	1.29	1.39	1.18	1.05	1.66	1.38	1.38	1.07
Travel Time at Speed-Desirable	0.00	-	0.01	0.01	-	0.00	-	0.02
SUB-SPEED TIME RATING	1.27	1.00	2.59	2.97	1.00	1.13	1.00	1.66
Distance Travel at Speed-Desirable	0.10	-	0.17	0.15	-	0.02	-	0.71
SUB-SPEED DISTANCE RATING	0.02	-	0.03	0.03	-	0.00	-	0.14
LOWER LIMIT SUB-SPEED - (Km/hr)	18.99	50.00	-	1.02	4.59	50.00	21.91	50.00
SUB-SPEED RATING	0.38	1.00	-	0.02	0.09	1.00	0.44	1.00

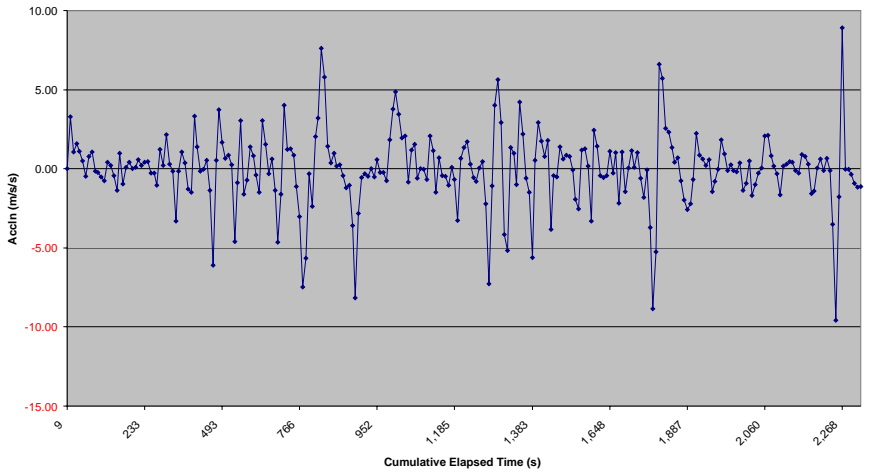
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.75
AVG SPEED EFFICIENCY INDEX	1.25
SUB-SPEED TIME INDEX	1.74
SUB-SPEED DISTANCE INDEX	0.05
LINK SUB-SPEED INDEX (L-SSI)	0.51

Speed/Time Profile



Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	MAPUTO	DISTRICT:	CATEMBE	ROAD NAME:	Catembe - Bela Vista	ROAD NO.:	R403
		ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SERIES NO.:	13 nuvi	SERIES DESCRIPTION:	Normal driving regime, GPS in AUTO sampling mode				
SURVEY SECTION - FROM (Km):	0.15	TO (Km):	38	SURVEY LENGTH (Km):	38		
TOTAL TRAVEL TIME (Hrs):	0.56	OVERALL AVG. SPEED (Km/hr):	67.4	AVG. RUNNING SPEED (Km/hr):	62.01	LOWEST SPEED (Km/hr):	3.51
		OVERALL SPEED STD DEV.:	19.2	HIGHEST SPEED (Km/hr):	93.80		
AVG ACCLN RATE (m/s/s):	1.55	AVG DECLN RATE (m/s/s):	-1.72	HARSHEST DECLN RATE (m/s/s):	-8.73	NO OF DECLN EVENTS:	104.00
		ACCLN STD DEV.:	2.40			DECLN EVENTS/Km:	3.00
NO. OF STOPPAGES:	1	TOTAL STOPPAGE TIME (Hrs):	0.01	AVG STOPPAGE TIME (Sec):	24.00		
ie Speed<5Km/hr)							

OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	1.18	0.39	0.89	0.49	0.64	0.39	0.25	0.39	1.48	2.46	6.10	10.18	8.26	18.64	13.72	18.84	15.69
% Survey Distance	0.06	0.05	0.18	0.13	0.20	0.16	0.11	0.23	0.94	1.76	4.82	8.80	7.64	18.69	14.70	21.73	19.81

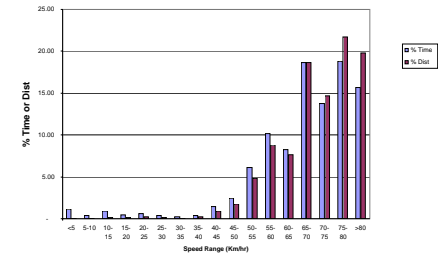
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Average Speed (Km/hr)	67.96	69.24	43.20	82.51	72.38	69.70	53.54	54.03
Speed Standard Deviation	23.1	21.7	20.7	23.1	24.1	21.7	19.5	17.7
Acceleration Standard Deviation	0.60	0.69	1.28	0.44	1.06	0.44	1.13	0.70
AVG SPEED EFFICIENCY RATING	1.36	1.38	0.86	1.65	1.45	1.39	1.07	1.08
Travel Time at Speed-Desirable	0.00	-	0.02	-	0.00	-	0.02	0.01
SUB-SPEED TIME RATING	1.04	1.00	2.04	1.00	1.07	1.00	1.70	1.26
Distance Travel at Speed-Desirable	0.09	-	0.41	-	0.03	-	0.67	0.25
SUB-SPEED DISTANCE RATING	0.02	-	0.08	-	0.01	-	0.13	0.05
LOWER LIMIT SUB-SPEED - (Km/hr)	24.73	50.00	3.73	50.00	22.55	50.00	9.97	21.94
SUB-SPEED RATING	0.49	1.00	0.07	1.00	0.45	1.00	0.20	0.44

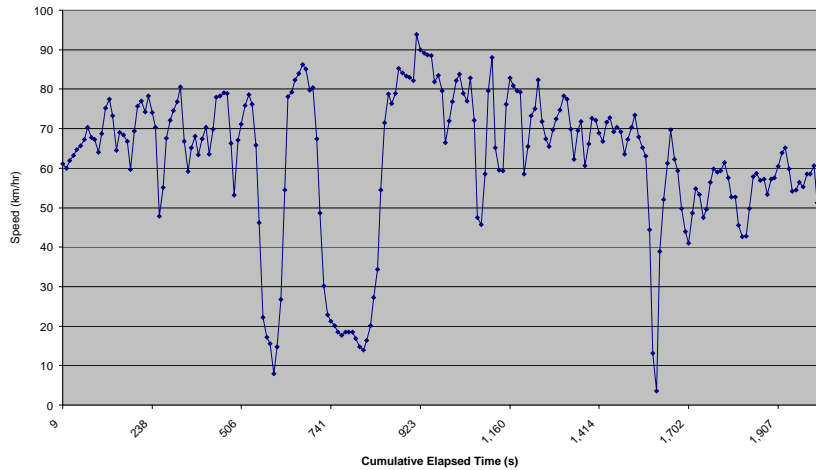
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.74
AVG SPEED EFFICIENCY INDEX	1.22
SUB-SPEED TIME INDEX	1.42
SUB-SPEED DISTANCE INDEX	0.06
LINK SUB-SPEED INDEX (L-SSI)	0.58

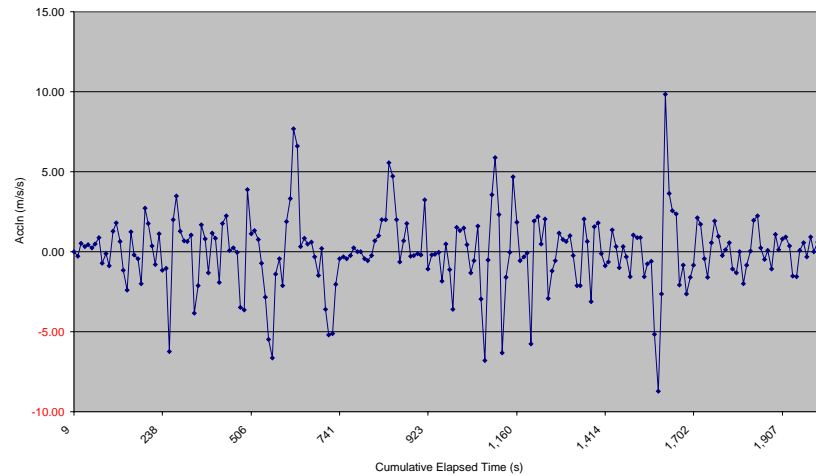
Speed Histogram by Time and Distance



Speed/Time Profile



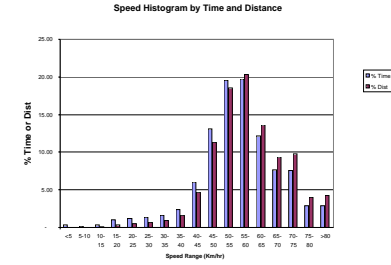
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	CHIBUTO	ROAD NAME:	Chibuto - Changane	ROAD NO.:	R442
SURVEY SERIES NO.:	14	ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Fair
SURVEY SECTION - FROM (Km):	0.03	SERIES DESCRIPTION:					
		TO (Km):	51	SURVEY LENGTH (Km):	51		
TOTAL TRAVEL TIME (Hrs):	0.92	OVERALL AVG. SPEED (Km/hr):	55.6	AVG. RUNNING SPEED (Km/hr):	55.72	LOWEST SPEED (Km/hr):	-
AVG ACCLN RATE (m/s/s):	0.99	OVERALL SPEED STD DEV.:	12.9	HIGHEST SPEED (Km/hr):	85.79	NO OF DECLN EVENTS:	310.00
NO. OF STOPPAGES:	2	AVG DECLN RATE (m/s/s):	-1.12	HARSHEST DECLN RATE (m/s/s):	-10.36	DECLN EVENTS/Km:	7.00
ie Speed<5Km/hr		ACCLN STD DEV.:	1.65	AVG STOPPAGE TIME (Sec):	5.00		
		TOTAL STOPPAGE TIME (Hrs):	0.00				



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	0.30	0.15	0.30	1.05	1.20	1.36	1.66	2.41	6.02	13.10	19.58	19.73	12.20	7.68	7.53	2.86	2.86
% Survey Distance	0.00	0.02	0.08	0.33	0.49	0.66	0.96	1.63	4.68	11.29	18.56	20.33	13.64	9.32	9.74	4.01	4.26

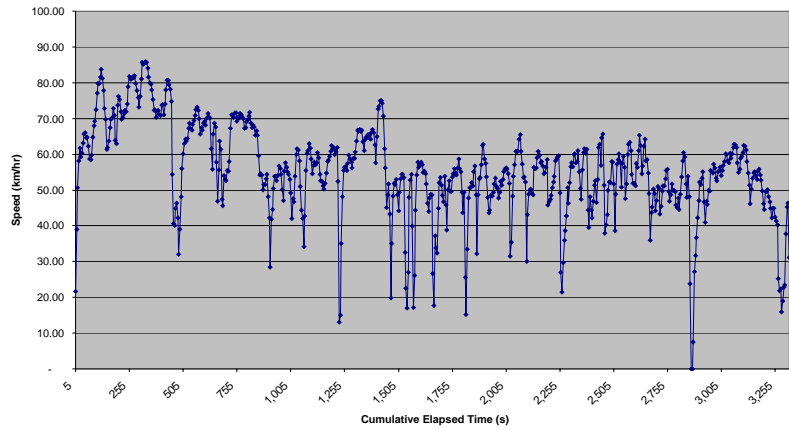
SEGMENT SPEED DATA

Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50	50-55
Average Speed (Km/hr)	67.79	70.32	65.33	55.08	58.93	47.63	51.02	51.78	52.83	51.82
Speed Standard Deviation	18.5	19.3	18.1	16.6	17.3	15.7	15.9	16.2	16.2	16.3
Acceleration Standard Deviation	0.34	0.36	0.35	0.40	0.55	0.79	0.65	0.54	0.43	0.51
AVG SPEED EFFICIENCY RATING	1.36	1.41	1.31	1.10	1.18	0.95	1.02	1.04	1.06	1.04
Travel Time at Speed<Desirable	0.00	0.01	0.00	0.02	0.01	0.05	0.03	0.03	0.03	0.03
SUB-SPEED TIME RATING	1.65	1.20	1.07	1.16	1.80	1.27	1.17	1.19	1.08	1.31
Distance Travel at Speed<Desirable	0.08	0.46	0.19	0.53	0.15	2.02	1.48	1.40	1.61	0.95
SUB-SPEED DISTANCE RATING	0.02	0.09	0.04	0.17	0.03	0.40	0.30	0.28	0.32	0.19
LOWER LIMIT SUB-SPEED - (Km/h)	11.78	22.35	28.44	26.33	10.48	23.74	26.65	25.91	30.32	21.79
SUB-SPEED RATING	0.24	0.45	0.57	0.53	0.21	0.47	0.53	0.52	0.61	0.44

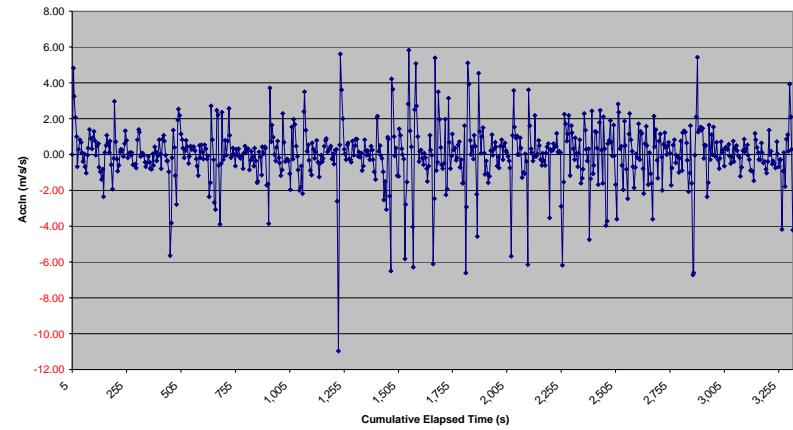
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.90
AVG SPEED EFFICIENCY INDEX	1.11
SUB-SPEED TIME INDEX	1.29
SUB-SPEED DISTANCE INDEX	0.18
LINK SUB-SPEED INDEX (L-SSI)	0.46

Speed/Time Profile



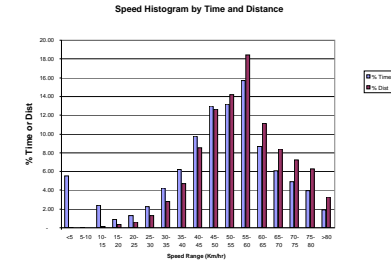
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	NALAZI	ROAD NAME:	Nalazi - Chokwe	ROAD NO.:	R441
SURVEY SERIES NO.:	15	ROAD CLASS:	Tertiary	DESIRABLE SPEED (Km/hr):	50.00	REPORTED CONDITION:	Poor
SURVEY SECTION - FROM (Km):	0.03	SERIES DESCRIPTION:	Normal driving regime, GPS set in AUTO sampling method				
TOTAL TRAVEL TIME (Hrs):	1.97	TO (Km):	96	SURVEY LENGTH (Km):	96		
AVG ACCLN RATE (m/s/s):	1.38	OVERALL AVG. SPEED (Km/hr):	48.9	AVG. RUNNING SPEED (Km/hr):	48.07	LOWEST SPEED (Km/hr):	-
NO. OF STOPPAGES:	20	OVERALL SPEED STD DEV.:	15.1	HIGHEST SPEED (Km/hr):	90.10	NO OF DECLN EVENTS:	561.00
		AVG DECLN RATE (m/s/s):	+1.65	HARSHEST DECLN RATE (m/s/s):	-12.27	DECLN EVENTS/Km:	6.00
		ACCLN STD DEV.:	2.19				
		TOTAL STOPPAGE TIME (Hrs):	0.15	AVG STOPPAGE TIME (Sec):	27.45		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	5.56	0.10	2.37	0.86	1.31	2.25	4.21	6.20	9.76	13.00	13.18	15.69	8.67	6.10	4.89	3.94	1.92
% Survey Distance	0.08	0.02	0.12	0.32	0.61	1.28	2.79	4.74	8.52	12.64	14.17	18.43	11.11	8.38	7.26	6.26	3.27

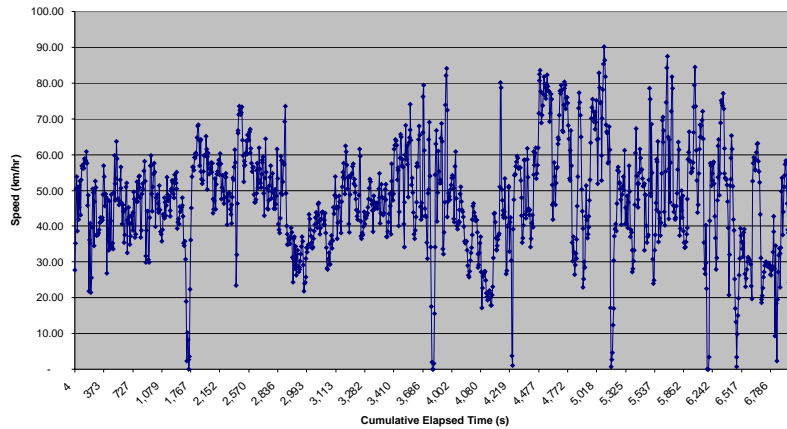
SEGMENT SPEED DATA

Segment Chainage: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	
Average Speed (Km/hr)	44.87	44.53	46.24	45.92	48.60	51.25	63.13	43.31	45.47	55.13	40.75	52.28	60.95	60.84	45.84	53.37	53.47	
Speed Standard Deviation	9.1	9.4	9.2	7.9	9.7	10.1	8.8	13.0	14.1	11.6	13.6	12.9	13.1	12.3	11.6	11.0	10.5	
Acceleration Standard Deviation	0.45	0.48	0.38	0.19	0.33	0.41	0.15	0.46	0.44	0.51	0.79	0.59	0.40	0.46	0.65	0.73	0.43	
AVG SPEED EFFICIENCY RATING	0.90	0.89	0.92	0.92	0.97	1.02	1.26	0.87	0.91	1.10	0.82	1.05	1.22	1.22	0.92	1.07	1.07	
Travel Time at Speed<Desirable	0.04	0.07	0.06	0.08	0.08	0.03	-	0.05	0.07	0.02	0.06	0.06	0.01	0.01	0.04	0.03	0.02	
SUB-SPEED TIME RATING	1.23	1.15	1.14	1.13	7.85	1.10	1.00	1.28	1.16	1.14	1.51	2.15	1.44	1.54	1.39	1.17	1.14	
Distance Travel at Speed<Desirable	1.67	3.24	2.48	3.50	0.50	1.34	-	2.00	2.92	0.75	1.91	1.50	0.51	0.37	1.59	1.10	0.95	
SUB-SPEED DISTANCE RATING	0.33	0.65	0.50	0.70	0.10	0.27	-	0.40	0.58	0.15	0.38	0.30	0.10	0.07	0.32	0.22	0.19	
LOWER LIMIT SUB-SPEED - (Km/h)	31.55	33.98	34.81	36.31	-	3.32	35.40	50.00	26.08	28.81	32.16	19.46	10.38	21.75	20.25	24.27	31.67	33.45
SUB-SPEED RATING	0.63	0.68	0.70	0.73	-	0.07	0.71	1.00	0.52	0.58	0.64	0.39	0.21	0.43	0.41	0.49	0.63	0.67

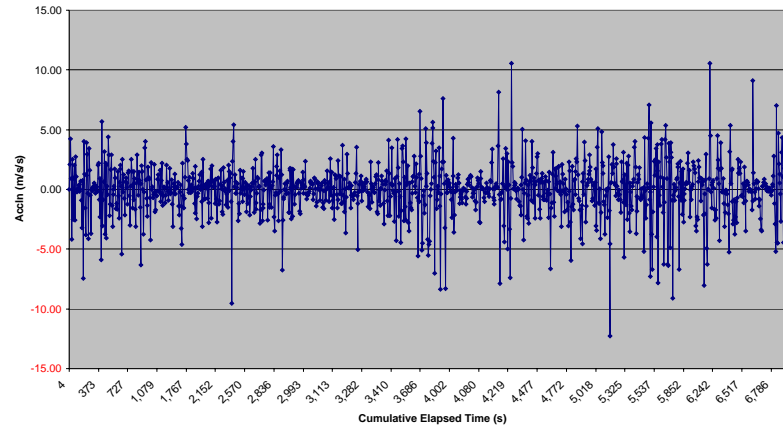
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	1.02
AVG SPEED EFFICIENCY INDEX	0.99
SUB-SPEED TIME INDEX	1.72
SUB-SPEED DISTANCE INDEX	0.33
LINK SUB-SPEED INDEX (L-SSI)	0.55

Speed/Time Profile



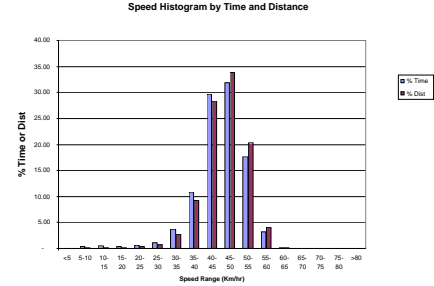
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	COMBOMUNE	ROAD NAME:	Combomune - Macandze	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	16-1	SURVEY SECTION - FROM (Km):	0.03	SURVEY DESCRIPTION:	Normal driving regime, 5 seconds sampling period		
		TO (Km):	50	SURVEY LENGTH (Km):	50		
TOTAL TRAVEL TIME (Hrs):	1.12	OVERALL AVG. SPEED (Km/hr):	44.8	AVG. RUNNING SPEED (Km/hr):	44.79	LOWEST SPEED (Km/hr):	7.90
		OVERALL SPEED STD DEV.:	6.9	HIGHEST SPEED (Km/hr):	60.61		
AVG ACCLN RATE (m/s/s):	0.72	AVG DECLN RATE (m/s/s):	-0.80	HARSHEST DECLN RATE (m/s/s):	-7.02	NO OF DECLN EVENTS:	376.00
		ACCLN STD DEV.:	1.13			DECLN EVENTS/Km:	8.00
NO. OF STOPPAGES:	-	TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		
ie Speed<5Km/hr							

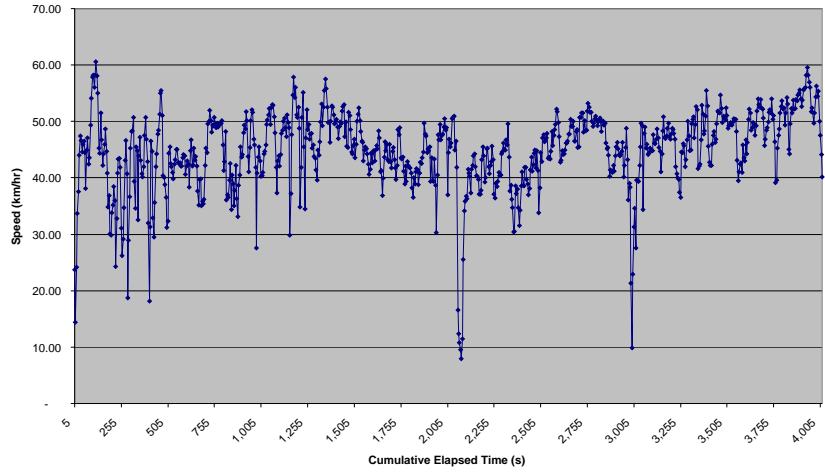


Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	0.37	0.50	0.37	0.62	1.12	3.74	10.83	29.64	31.88	17.56	3.24	0.12	-	-	-	-
% Survey Distance	-	0.08	0.14	0.15	0.32	0.71	2.75	9.17	28.31	33.83	20.29	4.09	0.17	-	-	-	-

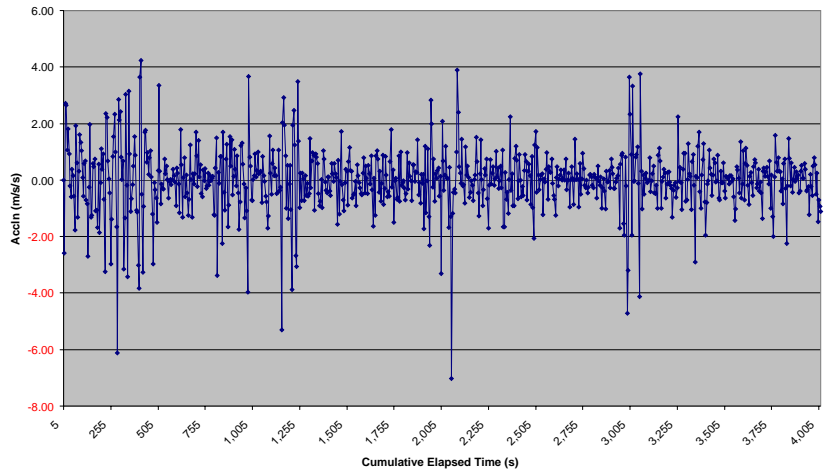
Segment Chainages: From/To	0-5	5-10	10-15	15-20	20-25	25-30	30-35	40-45	45-50
Average Speed (Km/hr)	41.08	43.53	45.74	47.79	43.54	38.67	47.90	42.99	48.14
Speed Standard Deviation	13.1	13.4	13.7	14.0	13.2	12.8	14.0	13.3	14.1
Acceleration Standard Deviation	0.61	0.32	0.45	0.24	0.30	0.40	0.17	0.41	0.24
AVG SPEED EFFICIENCY RATING	1.03	1.09	1.14	1.19	1.09	0.97	1.20	1.07	1.20
Travel Time at Speed-Desirable	0.04	0.03	0.02	0.00	0.02	0.06	-	0.02	0.00
SUB-SPEED TIME RATING	1.29	1.09	1.14	1.01	1.05	1.21	1.00	1.21	1.01
Distance Travel at Speed-Desirable	1.38	0.97	0.58	0.06	0.79	1.97	-	0.73	0.05
SUB-SPEED DISTANCE RATING	0.28	0.19	0.12	0.01	0.16	0.39	-	0.15	0.01
LOWER LIMIT SUB-SPEED - (Km/hr)	17.96	23.23	21.41	25.59	24.85	20.26	40.00	19.72	25.37
SUB-SPEED RATING	0.45	0.58	0.54	0.64	0.62	0.51	1.00	0.49	0.63

TOTAL TRAVEL TIME INDEX	0.89
AVG SPEED EFFICIENCY INDEX	1.09
SUB-SPEED TIME INDEX	1.13
SUB-SPEED DISTANCE INDEX	0.16
LINK SUB-SPEED INDEX (L-SSI)	0.61

Speed/Time Profile



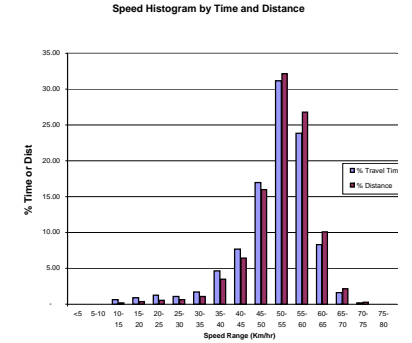
Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

GPS ROAD LINK SPEED SURVEY DATA

PROVINCE:	GAZA	DISTRICT:	COMBOMUNE	ROAD NAME:	Combomune - Macandze	ROAD NO.:	R453
		ROAD CLASS:	Vicinal	DESIRABLE SPEED (Km/hr):	40.00	REPORTED CONDITION:	Poor
SURVEY SERIES NO.:	16-2	SERIES DESCRIPTION:	Normal driving regime, 2 seconds sampling period				
SURVEY SECTION - FROM (Km):	0.01	TO (Km):	50	SURVEY LENGTH (Km):	50		
TOTAL TRAVEL TIME (Hrs):	0.98	OVERALL AVG. SPEED (Km/hr):	50.9	AVG. RUNNING SPEED (Km/hr):	50.91	LOWEST SPEED (Km/hr):	9.59
AVG ACCLN RATE (m/s/s):	0.58	OVERALL SPEED STD DEV.:	9.1	HIGHEST SPEED (Km/hr):	71.16		
NO. OF STOPPAGES:	-	AVG DECLN RATE (m/s/s):	-0.65	HARSHEST DECLN RATE (m/s/s):	-5.47	NO. OF DECLN EVENTS:	822.00
ie Speed<5Km/hr)		ACCLN STD DEV.:	0.88	DECLN EVENTS/Km:	17.00		
		TOTAL STOPPAGE TIME (Hrs):	-	AVG STOPPAGE TIME (Sec):	-		



OVERALL SPEED HISTOGRAM DATA

Speed Band (Km/hr)	<5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	>80
% of Total Travel Time	-	-	0.62	0.91	1.25	1.08	1.70	4.65	7.71	17.00	31.16	23.85	8.27	1.64	0.17	-	-
% Survey Distance	-	-	0.15	0.31	0.54	0.59	1.10	3.47	6.47	15.99	32.13	26.81	10.06	2.14	0.24	-	-

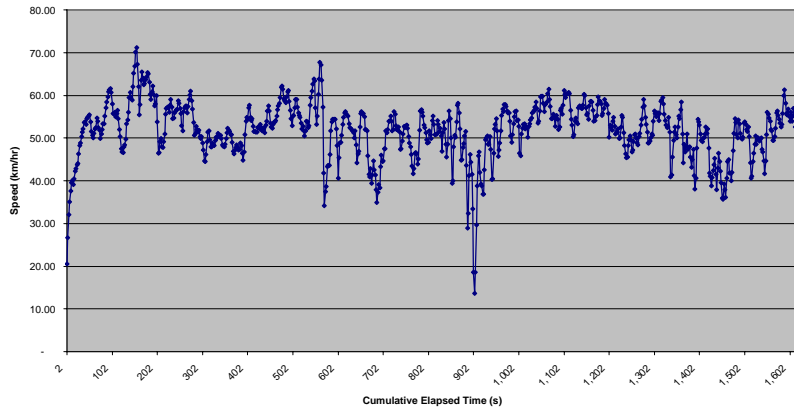
SEGMENT SPEED DATA

Segment Chainages: From/To	45-40	40-35	35-30	30-25	25-20	20-15	15-10	10-5	5-0
Average Speed (Km/hr)	53.56	52.62	48.97	54.07	46.08	53.00	55.90	52.95	53.76
Speed Standard Deviation	15.9	15.7	15.1	15.9	14.9	15.7	16.2	15.8	15.9
Acceleration Standard Deviation	0.17	0.21	0.31	0.18	0.29	0.28	0.24	0.35	0.29
AVG SPEED EFFICIENCY RATING	1.34	1.32	1.22	1.35	1.15	1.33	1.40	1.32	1.34
Travel Time at Speed-Desirable	0.00	0.00	0.01	-	0.02	0.00	-	0.01	0.01
SUB-SPEED TIME RATING	1.18	1.07	1.20	1.00	1.64	1.06	1.00	1.15	1.27
Distance Travel at Speed-Desirable	0.15	0.08	0.35	-	0.37	0.08	-	0.17	0.18
SUB-SPEED DISTANCE RATING	0.03	0.02	0.07	-	0.07	0.02	-	0.03	0.04
LOWER LIMIT SUB-SPEED - (Km/hr)	17.94	21.79	18.18	40.00	9.46	21.96	40.00	19.09	15.58
SUB-SPEED RATING	0.45	0.54	0.45	1.00	0.24	0.55	1.00	0.48	0.39

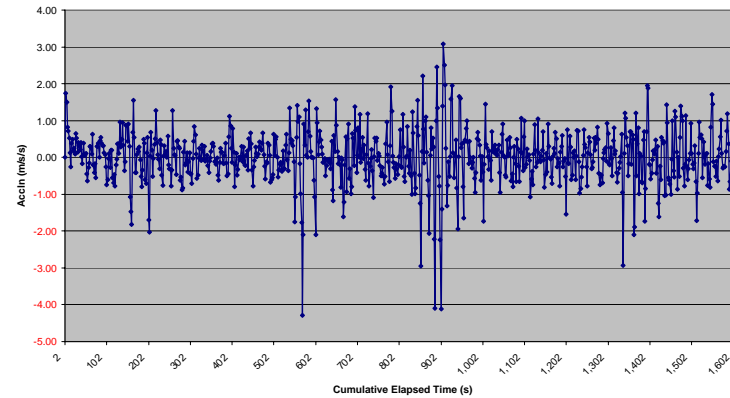
ROAD LINK CONDITION INDICES

TOTAL TRAVEL TIME INDEX	0.79
AVG SPEED EFFICIENCY INDEX	1.30
SUB-SPEED TIME INDEX	1.22
SUB-SPEED DISTANCE INDEX	0.04
LINK SUB-SPEED INDEX (L-SSI)	0.57

Speed/Time Profile



Acceleration/Time Profile



**MOCAMBIQUE ROAD FUND
DEVELOPMENT OF UNPAVED ROAD CONDITION INDICES**

SUMMARY OF RESULTS

Series No.	Road Details				Survey Length (km)	Observed Road Condition	Desirable Speed (Km/hr)	Driving Regime			GPS Receiver		Sampling Method		Sampling Frequency	Road Link Statistics								Road Link Indices						
								Fast	Normal	Slow	Garmin 1	Garmin 2	Time	Dist		Cum Travel Time (Hr)	MEAN Running Speed (Km/hr)	Overall MEAN Speed (Km/hr)	Speed STDEV	Speed Coeff VAR	Accn MEAN	Decln MEAN	Decln Events/Km	Accn & Decln STDEV	Total Travel Time Index	Average Speed Efficiency Index	Sub-Speed Time Index	Sub-Speed Distance Index	LINK SUB-SPEED INDEX (L-SSI)	
																														Province
1	MAPUTO	N200	Secondary	Boane - Bela Vista	60.7	Poor	60		x		x		x		5s		0.90	67.71	67.71	12.28	0.18	0.75	-0.87	5	1.27	0.89	1.11	1.15	0.28	0.71
2-1	GAZA	N221	Secondary	Macarante-Mabalane	69.6	Good	60	x		x		x		5s		0.81	86.40	86.40	15.01	0.17	0.52	-0.61	10	0.85	0.69	1.40	1.19	0.08	0.79	
2-2	GAZA	N221	Secondary	Macarante-Mabalane	70.2	Good	60		x			x		5s		0.98	72.04	72.04	13.19	0.18	0.68	-0.77	5	1.20	0.83	1.21	1.32	0.17	0.78	
3	GAZA	R453	Secondary	Mabalane-Combomune	46.7	Fair	60		x		x		x		5s		0.64	73.48	73.48	16.34	0.22	0.95	-1.12	5	1.72	0.82	1.17	1.31	0.12	0.59
4	MAPUTO	R408	Tertiary	Catuane - R407	61.9	Good	50		x		x		x		5s		0.81	76.58	76.46	17.77	0.23	1.21	-1.38	5	1.99	0.65	1.49	1.38	0.04	0.59
5-1	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50	x			x		x		5s		0.54	78.16	77.78	18.17	0.23	1.51	-1.64	5	2.29	0.64	1.56	1.47	0.04	0.43
5-2	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x		x		5s		0.75	56.28	55.98	11.19	0.20	0.83	-0.98	6	1.40	0.89	1.10	1.29	0.15	0.50
5-3	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.3	Fair	50			x	x		x		5s		1.10	38.56	37.53	9.09	0.24	0.55	-0.59	10	0.85	1.33	0.75	1.33	0.98	0.50
6A	MAPUTO	R406	Tertiary	N200 - Catuane	70.2	Poor	50		x		x		x		5s		1.31	53.73	53.73	15.99	0.30	1.15	-1.36	7	1.84	0.93	1.09	1.34	0.27	0.51
6B	MAPUTO	R406	Tertiary	N200 - Catuane	35.7	Poor	50		x		x		x		5s		0.58	61.11	61.11	14.50	0.24	1.11	-1.39	6	1.88	0.82	1.20	1.28	0.15	0.45
7	MAPUTO	R406	Tertiary	N200 - Catuane	34.7	Poor	50		x		x		x	2s		0.59	58.71	58.71	11.33	0.19	0.47	-0.52	15	0.81	0.85	1.15	1.28	0.15	0.56	
8	MAPUTO	R406	Tertiary	N200 - Catuane	34.6	Poor	50		x		x		x		50m		0.58	61.58	59.31	12.04	0.20	0.72	-0.82	8	1.33	0.84	1.20	1.22	0.15	0.48
9	MAPUTO	R406	Tertiary	N200 - Catuane	34.5	Poor	50		x		x		x		100m		0.56	64.57	62.11	12.39	0.19	1.16	-1.14	5	1.90	0.81	1.24	1.16	0.12	0.51
10-1	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.6	Poor	40		x		x		x		10m		0.25	44.53	41.92	10.49	0.24	0.39	-0.47	32	0.62	0.95	1.14	1.17	0.36	0.40
10-2	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		20m		0.25	42.21	41.02	7.84	0.19	0.62	-0.69	19	0.95	0.98	1.06	1.16	0.41	0.44
10-3	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		40m		0.26	40.62	38.80	8.56	0.21	0.95	-0.97	11	1.34	1.03	1.03	1.20	0.46	0.42
10-4	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.0	Poor	40		x		x		x		80m		0.25	41.42	40.08	7.98	0.19	1.12	-1.07	6	1.56	1.00	1.06	1.15	0.49	0.45
10-5	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		1s		0.25	40.22	40.22	8.73	0.22	0.29	-0.35	41	0.46	0.99	1.04	1.19	0.43	0.43
10-6	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.2	Poor	40		x		x		x		4s		0.26	38.95	38.95	8.63	0.22	0.89	-1.14	11	1.37	1.03	1.00	1.22	0.47	0.42
10-7	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		8s		0.27	37.60	37.60	7.00	0.19	1.10	-1.13	6	1.49	1.06	0.95	1.19	0.56	0.46
10-8	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x		x		x		16s		0.27	37.16	37.16	7.96	0.21	1.41	-1.38	3	1.75	1.08	0.93	1.21	0.68	0.57
10-9	MAPUTO	R453	Vicinal	Rio Matola - Boane	10.1	Poor	40		x			x	Auto	Auto		0.25	38.38	40.20	7.88	0.21	1.27	-1.21	6	1.68	1.00	1.01	1.18	0.43	0.46	
11-1	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40	x					x		5s		0.30	67.49	67.49	11.30	0.17	1.89	-2.15	5	2.58	0.59	1.65	1.25	0.02	0.56
11-2A	GAZA	R852	Vicinal	Changane - Nalazi	20.2	Good	40		x				x		5s		0.40	51.06	51.06	6.41	0.13	0.77	-0.85	7	1.15	0.78	1.26	1.09	0.06	0.57
11-2B	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s		0.39	52.08	52.08	7.02	0.13	0.83	-1.21	6	1.33	0.77	1.28	1.27	0.04	0.49
11-2C	GAZA	R852	Vicinal	Changane - Nalazi	20.3	Good	40		x				x		5s		0.39	54.44	51.92	7.49	0.14	0.99	-1.16	7	1.42	0.77	1.31	1.30	0.05	0.61
11-3	GAZA	R852	Vicinal	Changane - Nalazi	19.9	Good	40			x	x		x		5s		0.50	39.65	39.65	5.46	0.14	0.57	-0.67	9	0.94	1.01	0.99	1.10	0.44	0.47
12-1	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.44	48.26	48.26	7.07	0.15	0.82	-0.82	8	1.16	0.83	1.21	1.15	0.07	0.39
12-2	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.4	Fair	40		x		x		x		5s		0.43	50.92	49.76	6.77	0.13	0.78	-0.82	7	1.02	0.80	1.28	1.07	0.09	0.64
12-3	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.41	52.00	52.00	11.09	0.21	0.91	-1.00	7	1.30	0.77	1.26	1.46	0.03	0.25
12-4	GAZA	R856	Vicinal	Chokwe - Fr Maputo	21.5	Fair	40		x		x		x		5s		0.43	49.69	49.69	8.23	0.17	0.92	-0.97	8	1.34	0.80	1.24	1.16	0.07	0.38
13	MAPUTO	R403	Tertiary	Catembe - Bela Vista	41.9	Fair	50		x		x	x	Auto	Auto		0.63	61.97	66.37	18.15	0.29	1.45	-1.60	3	2.32	0.75	1.25	1.74	0.05	0.51	
14	GAZA	R442	Tertiary	Chibuto - Changane	51.2	Fair	50		x		x		x		5s		0.92	55.72	55.55	12.93	0.23	0.99	-1.12	7	1.65	0.90	1.11	1.29	0.18	0.46
15	GAZA	R441	Tertiary	Nalazi - Chokwe	96.4	Poor	50		x		x	x	Auto	Auto		1.97	48.07	48.89	15.08	0.31	1.38	-1.65	6	2.19	1.72	0.99	1.72	0.33	0.55	
16-1	GAZA	R453	Vicinal	Combomune - Macandze	50.0	Poor	50		x		x		x		5s		1.12	44.79	44.79	6.93	0.15	0.72	-0.80	8	1.13	0.89	1.09	1.13	0.16	0.61
16-2	GAZA	R453	Vicinal	Combomune - Macandze	49.9	Poor	50		x		x		x		2s		0.98	50.91	50.91	9.09	0.18	0.58	-0.65	17	0.88	0.79	1.30	1.22	0.04	0.57
Total Kms Surveyed					1,211.5																									

Network Level Indices
Weighted by Length of Road Surveyed and Desirable Speed

Network Indices				
Total Travel Time Index	Average Speed Efficiency Index	Sub-Speed Time Index	Sub-Speed Distance Index	NETWORK SUB-SPEED INDEX (N-SSI)
0.91	1.19	1.31	0.20	0.56

Annexure VII: Guidelines for Network-Wide Data Collection and Analysis

MOCAMBIQUE ROAD FUND

UNPAVED ROAD CONDITION MONITORING

SPEED SURVEY: FIELDWORK AND DATA PROCESSING PROCEDURE

EQUIPMENT

Survey Vehicle

Light Utility, 4x2 or 4x4

GPS Receiver Specification

Garmin Oregon 300 or equivalent

12 Channel Receiver

Update rate min 1 Hz

USB NMEA full speed mass storage

Micro-SD storage

Time logging options

Velocity logging option

Accuracy 10m GPS, 3-5m DGPS

Ancillary Equipment

Dictaphone and magnetic cassette tapes

Battery chargers

Camera
Memory card

Stationery

Logsheets

Waypoint sheets

SOFTWARE

Data Transfer to PC

The Garmin GPS software in-built for transfer of *gpx* track files to a PC or Laptop.

Track Data Viewing

Garmin's *Mapsource* – self extracting set up file provided.

Data Conversion to Excel

G7toWin – self extracting set-up file provided.

Spreadsheet Software

Microsoft Excel – standard

FIELDWORK METHODOLOGY

Think Safety!!

Park Safe!

Drive Cautiously!

Commencement and Logsheet Completion

At the starting point of the road under survey enter the following onto the logsheet:

- Surveyor's name,
- Date of survey,
- Road name and route number,
- Estimated starting time,
- Starting point location name,
- Ending point location name,
- Weather condition.

GPS Receivers Start-Up

1. Check all the GPS receiver and other equipment: batteries, chargers, cables, memory,
2. Set up the receivers in position with clear view of the sky,
3. Switch on receiver and give the necessary time to acquire satellites,

4. Select time logging method and set sampling frequency at 5s.

Driving Regime

1. Commence driving and attain a steady speed as soon as was practical, aim to achieve this within the first 100m,
2. Maintain steady speed and slow down in response to the condition of the road or other interruptions such as other traffic, pedestrians or livestock.

Recording of Events and Waypoints

Record events and waypoint information on a Dictaphone whilst on the drive.

Where practical and safe take photographs of road condition and important observations and features.

Record the following on the dictaphone:

- Road name and route number,
- Reported condition of the road,

- Starting point location details ie name, chainage, landmark, etc,
- Weather conditions at commencement and end,
- Whilst driving along note all start and end times of significant disruptions, features and observations as guided by the way-point listing and codes,
- Location by distance from beginning of survey section using vehicle odometer,
- Details of the event or feature,
- Time when event ended in relevant cases,
- Ending time and location.

Waypoint Codes

Start - **START** End - **END**
 Livestock - **LS** Pedestrians - **P**
 Traffic - **T** Culvert - **CV**
 Village/Town - **VLT** Junction - **JN**
 Railway – **RY** Curves/Bends - **CB**
 Works - **WKS** Detour - **DTR**
 River Crossing - **RX**
 Road Type: Earth - **ETH**, Gravel - **GRV**, Surfaced - **SFD**, Track - **TRK**
 Road Class: Secondary - **SEC**, Tertiary - **TRY**, Vicinal – **VIC**

Ending Survey Session

At the end of a survey section, parking at a safe place, record the ending time on the Logsheet.

Fill in the logsheet with any information relevant to the survey, capturing the following, amongst others:

- Road condition overview,
- Road geometry,
- Road materials,
- Maintenance works on road etc.

DATA PROCESSING AND ANALYSIS

GPS Data Files Post-processing

Download gps track data at the end of each day and upload to a Laptop or desktop computer into folder entitled *FE_Speed Survey_Province Name* eg *FE_Speed Survey_Maputo Province*.

View data using Garmin's *Mapsource* software and check for integrity.

Re-name raw data file as follows: *Route No_dd_mm_yyyy* eg *N200_23_09_2009*

Backup data to secondary independent location.

Waypoint/Events Information

Play back Dictaphone and record all information logged onto electronic waypoint Logsheets.

Data Consolidation

Open *G7toWin* and convert *gpx* data into comma separated values (*csv*).

Delete and clean file to retain only the following columns in the indicated specific order:

- Point no.
- Coordinates
- Date and time
- Leg length
- Leg time
- Leg speed

Save the file in *Excel* format

Data Transfer

Copy columns generated by data consolidation to relevant *Provincial Indices Spreadsheet* and paste into appropriate worksheet.

Delete data from all cells below imported data.

Results

View and print as required the following results as generated by the *Provincial Spreadsheet*:

- Speed/Time Profiles
- Acceleration/Time profiles,
- Speed distribution histograms,
- Segment ratings,
- Link Indices,
- Network Indices.

DATA FORWARDING TO FE

On completion of survey, save all raw data files and forward to FE Monitoring Division for further analysis.

Further to above also send copies of logsheets, waypoint logsheets and photographs.