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Mikros Systems

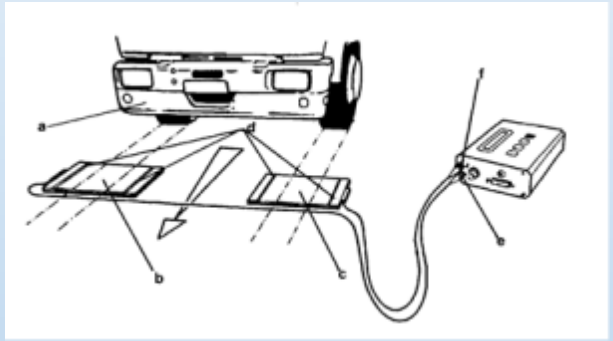
Rob Sik

1980 Mikros Founded

1981 "The Yellow Lane Road"

1984 CTO Pilot study

1984 First Toll Road



1990 Irenco VLM production

1991 Prosoft

1997 SANRAL

1998 Establishment of MTM

1998 COST 323 evaluation

2000 Start of Concessions Toll Roads

2002 Implementation of dual Toll audit

2005 Syntell acquires Mikros

2010 Automated Data Logging

2014 TMH3 Accreditation

2020 Release of RAKTEL 2020 Family

Company Structure

Mikros Systems

Equipment manufacture
Systems Supplier

Mikros Traffic Monitoring

Network monitoring
Service Provider

MTM Integration

TCC
Integration and SLA provider

Mikros KZN

Data Service Provider
And ASOD specialists

Primary Mikros Products

RAKTEL Logger Range (Data Logging & Control)

Selection of input channels:

- Hi performance loop detector with inductive profiling
- Interface to most popular WIM sensors
  - Bending plate
  - Load cell platform
  - Load cell strip
  - Quart crystal strip
  - Piezo Wim
- Ancillary sensors
  - Off scale detection
  - Axle detection
  - Dual tyre detection
  - Lane position
  - Axle width
  - Temperature

Comprehensive Software Suit

TelWin: Local setup and monitoring
TelDialer: Automated outstation poling
MonCam: Video assisted verification

TrafBase: Data management

- Macro and micro data validation
- Build in TT Truck tracking
- System health checking
- Powerful PPA evaluation on individual vehicles
- Data base maintenance
- Reporting (standard and user definable)
- Standard and bespoke data exports

DLL for system integration

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Introduction To TMH3-V2

TMH 3

Specifications for the Provision of Traffic and Weigh-in-Motion Monitoring Services

Committee Draft 2
Jan 2018

Committee of Transport Officials

TMH 14

South African Standard Traffic Data Collection Format

Committee Draft
Format Version 3.20
Issue 04/04/2018

Committee of Transport Officials

Who is COTO?

The South African Committee of Transport Officials

What does TMH stand for?

Technical Methods for Highways

Ensuring uniform methods related to highway engineering in South Africa

This document describes a functional specification for the provision of Traffic and WIM monitoring services. The specifications are aimed at ensuring that such systems are of an acceptable quality and standard, and that collected data comply with certain requirements. The specifications, however, are not suitable for services required for law enforcement purposes and cannot be used for the provision of services.

This Document is the Bible for all Traffic Monitoring Service Providers in South Africa

Parties Involved with TMH3

- Employer (client) 
- Road Authority 
- Service Provider 
- Systems Supplier 
- Certification Agency 

Responsibilities:

Service Provider (SP)

- May only use TMH3 certified equipment
- Has to provide data in accordance to the TMH3 specification

System Supplier (SS)

- Must have monitoring system accredited to TMH3 specifications
- Must provide SP with all the necessary tools, documentation, QA and audit procedures to ensure that the required standards are maintained.
- Must make verification software available*.

SS Certification Procedure

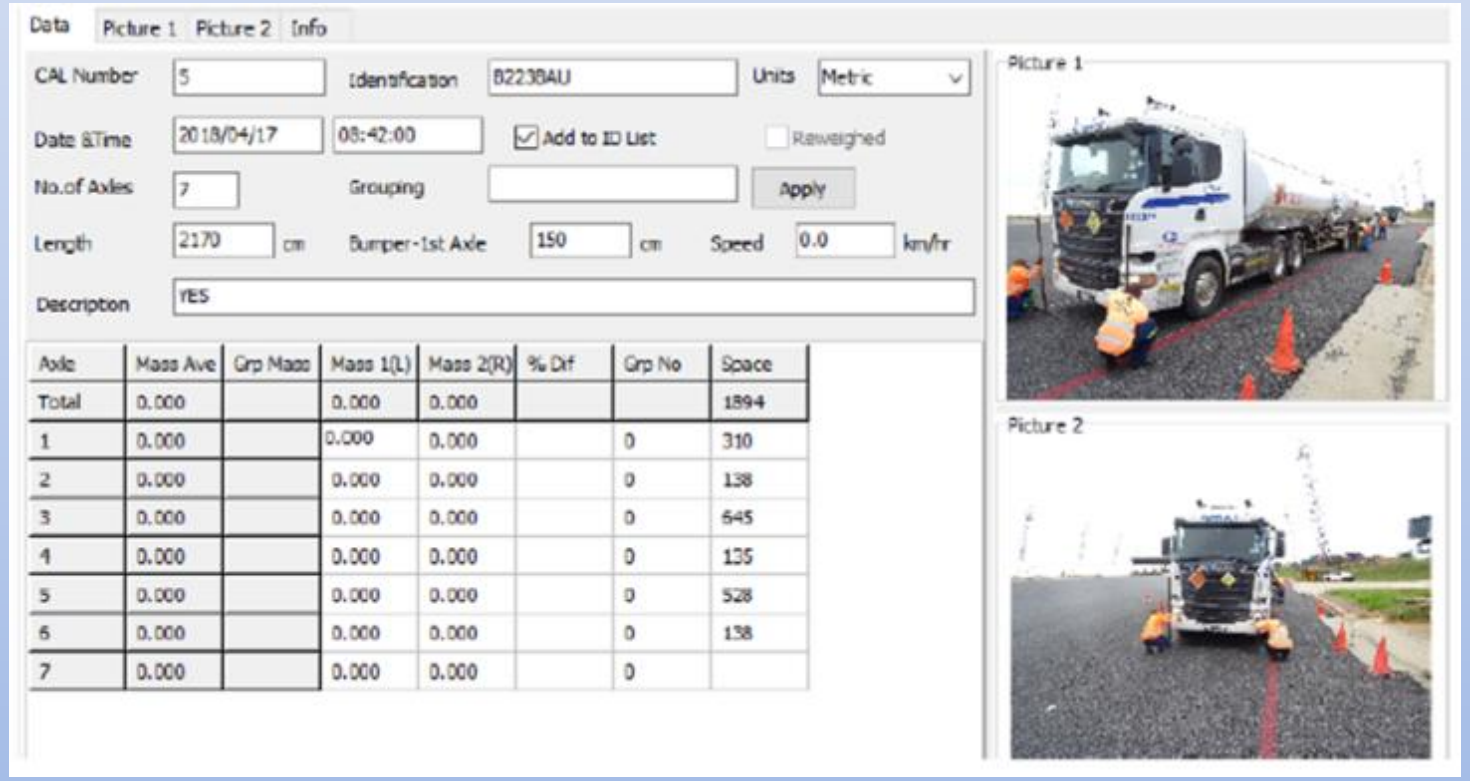
1 Apply with approved Certification agency:

Provide a comprehensive System description and stipulate what Types and Class is applied for.

TMH3 TEST PARAMETER	TEST METHOD EMPLOYED
Vehicle Detection – Normal Travel	Video verification
Vehicle Detection – Straddling	Video verification
Vehicle Detection – Induced Straddling	Video verification
Vehicle Detection – Wrong direction	Example on Video
Vehicle Classification	Video verification
Axle Count detection	Video verification
Vehicle Length (Light vehicles)	Manufacturer Specifications
Vehicle Length (Heavy vehicles)	Manual measurement
Axle Spacings (Light vehicles)	Manufacturer Specifications
Axle Spacings (Heavy vehicles)	Manual measurement
Vehicle speed	Speed Prosecution Camera

2 Conduct verification tests:

These test must be undertaken under approved provisional supervision.



3 Compile required Compliance Matrix:
The compliance matrix to be supplied to Certification Agency.

Results for RAKTEL SYSTEM A (Test site 4205T)

VEHICLE, TRAILER, AXLE AND WHEEL DETECTION									
Vehicle Detection - Normal Trave	7.7 (Table 3)	Yes	0.5%	600	Vehicles	Video Verification	7654	0	27
Vehicle Detection - Normal Strad	7.7 (Table 3)	Yes	5.0%	60	Vehicles	Video Verification	238	0	6
Vehicle Detection - Induced Stra	7.7 (Table 3)	Yes	5.0%	60	Vehicles	Video Verification	3576	2	157
Vehicle Detection - Wrong direct	7.7 (Table 3)	Yes	0.5%	600	Vehicles	Evidence or video	0	0	0
Trailer Detection - Normal Travel	7.7 (Table 3)	Yes	1.0%	300	Trailers	Video Verification	734	1	2
Axle Detection - Normal Travel	7.7 (Table 3)	Yes	0.5%	600	Axles	Video Verification	17076	3	70
Wheel Detection - Normal Travel	7.7 (Table 3)	No	N/A	N/A	Wheels	Video Verification	0	0	N/A
Single/Dual Tyre Detection	7.7 (Table 3)	No	N/A	N/A	Wheels	Video Verification	0	0	N/A
VEHICLE CATEGORIZATION									
Vehicle not or wrongly classified	7.8 (Table 4)	Yes	3.5%	150	Vehicles	Video Verification	7654	20	241
Light as Heavy (or not classified)	7.8 (Table 4)	Yes	2.0%	150	Vehicles	Video Verification	6987	9	120
Heavy as Light (or not classified)	7.8 (Table 4)	Yes	6.0%	150	Vehicles	Video Verification	667	14	29
Heavy incorrectly classified	7.8 (Table 4)	Yes	8.0%	150	Vehicles	Video Verification	615	3	37

4 Undertake a 28 day uninterrupted data collection period:

During this period no adjustments may be made to any part of the Monitoring System (Hardware, Firmware or Software)

Monitoring Data

Good data: Data that have passed the verification tests of the TMH3 specifications

Suspect data: Data that have failed the verification tests and require further attention

Bad data: Data that have failed the verification tests due to system failure

Uncertain data: Data that have failed due to geometry or road/pavement conditions

Missing data: Includes bad data as well as data not submitted on time to the client

Complete data set: A data set for a specific monitoring period that does not contain missing or bad data (only good or uncertain)

Data Submission

The Employer will specify the time period in which authenticated data (automatic or manual) must be submitted.

In the absence of such a specification , the authenticated data must be submitted within a period of **24 hours** after extraction.

Data Submission

The Employer will specify the data management software that must be used for verification.

The SS provided the TrafBase suit for the verifications.

Traffic monitoring system types

Type B1 monitoring systems for long-term traffic monitoring in which a very high level of accuracy is required.

Type B2 monitoring systems when integrated with HS WIM monitoring (but only for lanes in which HS WIM monitoring is undertaken).

Type C1 monitoring systems for long- and short-term traffic monitoring.

System Type	Veh length	Speed	Axle	Tyre Conf
A1/A2	✓	✓	✓	✓
B1/B2	✓	✓	✓	
C1/C2	✓	✓		
D1/D2	(*1)	(*2)	(*3)	
E1/E2	(*4)	✓	✓	

(*1) May be estimated using an assumed average speed for the site

(*2) An average speed may be assumed for the site

(*3) Vehicle units may be identified from axle detectors

(*4) Vehicle units and lengths may be identified/estimated from axle data

Measurement resolutions

Characteristic	Required resolution
Departure time	0.1 second
Vehicle speed	1 km/h
Vehicle length	0.1 m
Bumper-to-1st axle spacing	0.1 m
Axle spacing	0.01 m

Tolerance limits individual detection

Characteristics	Travel	Tolerance limits for various traffic monitoring types									
		A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Vehicle detection											
Vehicle detection	Normal travel	0.5%	1%	0.5%	1%	1%	5%	5%	10%	1%	5%
	Straddling vehicles	5.0%	10%	5.0%	10%	10%	20%	20%	35%	20%	35%
	Wrong dir/reversing	0.5%	1%	0.5%	1%	1%	5%	5%	10%	1%	5%
Trailer, axle, wheel and tyre detection											
Trailer detection	Normal travel	1.0%	2%	1.0%	2%	-	-	-	-	-	-
Axle detection	Normal travel	0.5%	1%	0.5%	1%	-	-	-	-	1%	5%
Wheel detection	Normal travel	2.5%	5%	-	-	-	-	-	-	-	-
Single/dual tyre	Normal travel	0.5%	1%	-	-	-	-	-	-	-	-
Wrong number of axles per vehicle											
Light vehicles	Normal travel	0.5%	1%	0.5%	1%	-	-	-	-	1%	5%
Heavy vehicles	Normal travel	0.5%	1%	0.5%	1%	-	-	-	-	5%	20%

Tolerance limits vehicle categorization

Vehicle category (class)	Tolerance limits for various traffic monitoring types									
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Vehicles not categorised, or which were wrongly categorised by the monitoring system	2.0%	3.5%	3.5%	7.0%	10%	15%	-	-	10%	15%
Vehicles that should have been categorised as light but which were not categorized or categorized as heavy	1.0%	2.0%	2.0%	4.0%	6.0%	10%	-	-	6.0%	10%
Vehicles that should have been categorized as heavy but which were not categorized or categorized as light	3.0%	6.0%	6.0%	12%	20%	30%	-	-	20%	30%
Heavy vehicles wrongly categorized into one of the heavy vehicle subclasses (excluding buses)	4.0%	8.0%	8.0%	15%	-	-	-	-	-	-

Tolerance intervals for speed, length and axle spacing

Characteristics	Range of reference values	Vehicle types (*)	Tolerance limits for various monitoring types			
			A1,A2,B1,B2,C1	C2	D1/D2	E1/E2
Vehicle speed	> 30 km/h	Light & Heavy	±5%	±10%	-	±10%
Vehicle length	3.0 to 5.0 m	Light only	±15%	±30%	-	-
	> 5.0 m	Light & Heavy	±10%	±20%	-	-
Axle spacing	1.0 m to 3.0 m	Light & Heavy	±10%	-	-	-
	> 3.0 m	Light & Heavy	±5%	-	-	-
(*) Excluding motorcycles, bicycles and animal drawn vehicles						

Measurement resolutions WIM

Characteristic	Required resolution
Load measurements	10 kg
Axle-spacing measurement	0.01 m

Tolerance intervals for load measurement

Sensor type	Load	Minimum Value Tested	Tolerance intervals for different accuracy classes		
			Class I	Class II	Class III
Axle load sensors (*3)	Gross vehicle mass	3 500 kg per axle	±8%	±10%	±20%
	Axle group load (*1)		±10%	±12%	±23%
	Single axle load (*2)		±12%	±15%	±25%
Wheel load sensors	Gross vehicle mass	1 750 kg per wheel	No provision for Class I systems	±15%	±25%
	Axle group load (*1)			±18%	±28%
	Single axle load (*2)			±23%	±30%

*1 Excluding groups with one axle but including steering axle groups with more than one axle.

*2 Single axles in single axle groups including steering axle groups with one axle.

*3 Single axle load sensors or with left and right wheel sensors combined

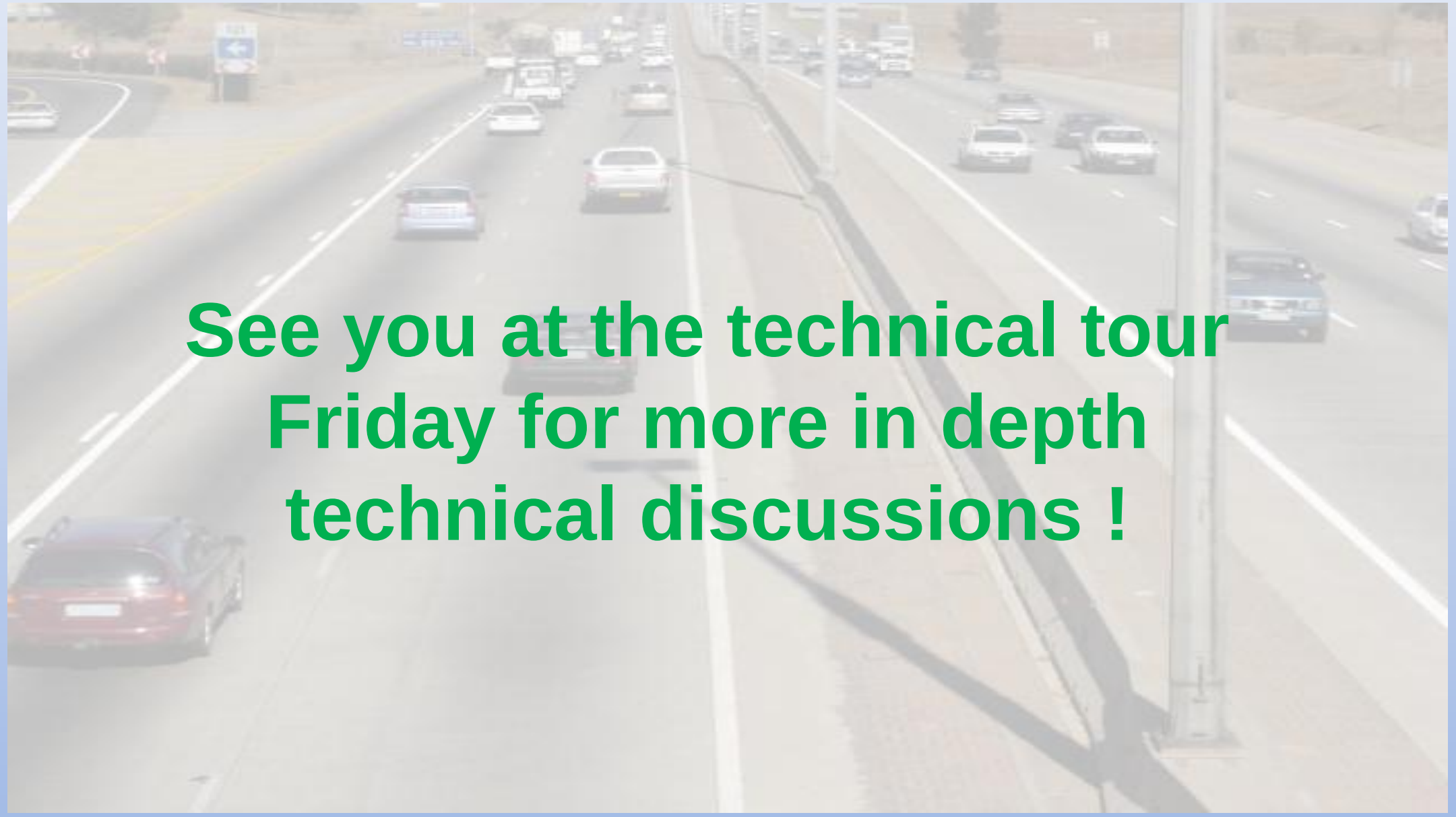
Traffic monitoring requirements	Traffic monitoring system type									
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Vehicle detection - Normal travel	600	300	600	300	300	60	60	30	300	60
Vehicle detection - Straddling veh	60	30	60	30	30	30	30	30	30	30
Vehicle detection – Wrong direction	600	300	600	300	300	60	60	30	300	60
Trailer detection	300	150	300	150	-	-	-	-	-	-
Axle detection	600	300	600	300	-	-	-	-	300	60
Wheel detection	120	60	-	-	-	-	-	-	-	-
Single/dual tyre	600	300	-	-	-	-	-	-	-	-
Number of axles per vehicle - Light	600	300	600	300	-	-	-	-	300	60
Number of axles per vehicle - Heavy	600	300	600	300	-	-	-	-	60	30
Vehicles not/wrongly categorised	300	150	150	75	60	30	-	-	60	30
Light vehicles categorised as heavy	300	150	150	75	60	30	-	-	60	30
Heavy vehicles categorised as light	300	150	150	75	60	30	-	-	60	30
Heavy vehicles wrongly categorised	300	150	150	75	-	-	-	-	-	-
Light vehicle speed > 30 km/h	100	100	100	100	100	100	-		100	100
Heavy vehicle speed > 30 km/h	100	100	100	100	100	100	-		100	100
Light vehicle length 3 to 5 m	100	100	100	100	100	100	-	-	-	-
Light vehicle length > 5 m	100	100	100	100	100	100	-	-	-	-
Heavy vehicle length > 5 m	100	100	100	100	100	100	-	-	-	-
Light vehicle axle spacing 1 to 3 m	100	100	100	100	-	-	-	-	-	-
Light vehicle axle spacing > 3 m	100	100	100	100	-	-	-	-	-	-
Heavy vehicle axle spacing 1 to 3 m	100	100	100	100	-	-	-	-	-	-
Heavy vehicle axle spacing > 3 m	100	100	100	100	-	-	-	-	-	-

HS WIM monitoring requirements	HS WIM monitoring system class (Number of vehicles)		
	Class I	Class II	Class II
Gross vehicle mass	200	200	200
Axle group mass (excl single axles)	200	200	200
Single axle load	200	200	200

Minimum sample size for assessments

Other subject covered in TMH3 document

- Automatic Monitoring Site and System Installation Requirements
- Installed Automatic Monitoring System Assessment
- Monitoring Service Requirements (types and duration)(normal days)
- Monitoring data requirements (TMH13)
- Payment requirements
- Site Works
- LSWIM monitoring
- Manual traffic monitoring requirements


See you at the technical tour
Friday for more in depth
technical discussions !