An Engineering Perspective to Asset Registers

ASSET REGISTER COMPILATION AND MAINTENANCE INCLUDING GUIDELINES ON MAINTENANCE LOGS FOR CONDITION ASSESSMENTS

INFRASTRUCTURE ASSET REGISTERS

Definition:

Asset Register is a record of information on each asset that supports the effective financial and technical management of the assets, and meets statutory requirements. The asset register should also facilitate proper financial reporting and is ultimately the responsibility of the Chief Financial Officer (CFO).

INFRASTRUCTURE ASSET REGISTERS

Minimum requirements of an GRAP compliant asset register:

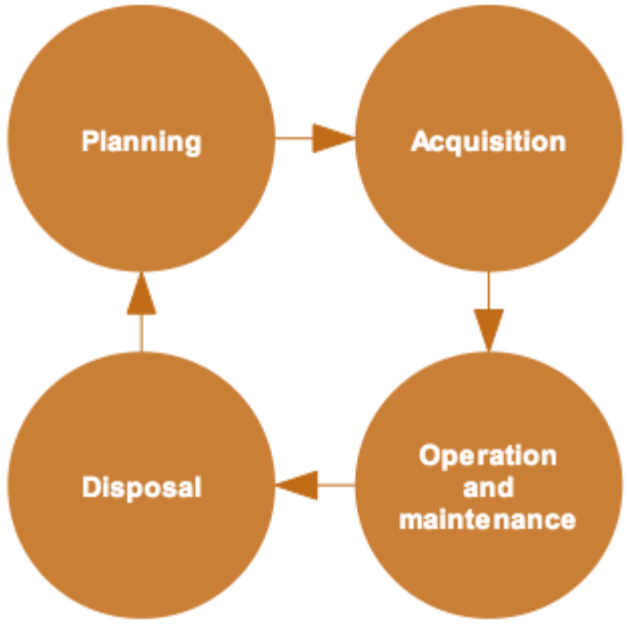
- Detail asset description;
- Bar code, unique identifier, serial number (where applicable), erf number (where applicable) (or other number to distinguish it from other assets);
- Location;
- Purchase price;
- Acquisition date;
- Estimated useful life (original);
- Estimated residual value;
- Remaining useful life;
- Depreciation;

INFRASTRUCTURE ASSET REGISTERS

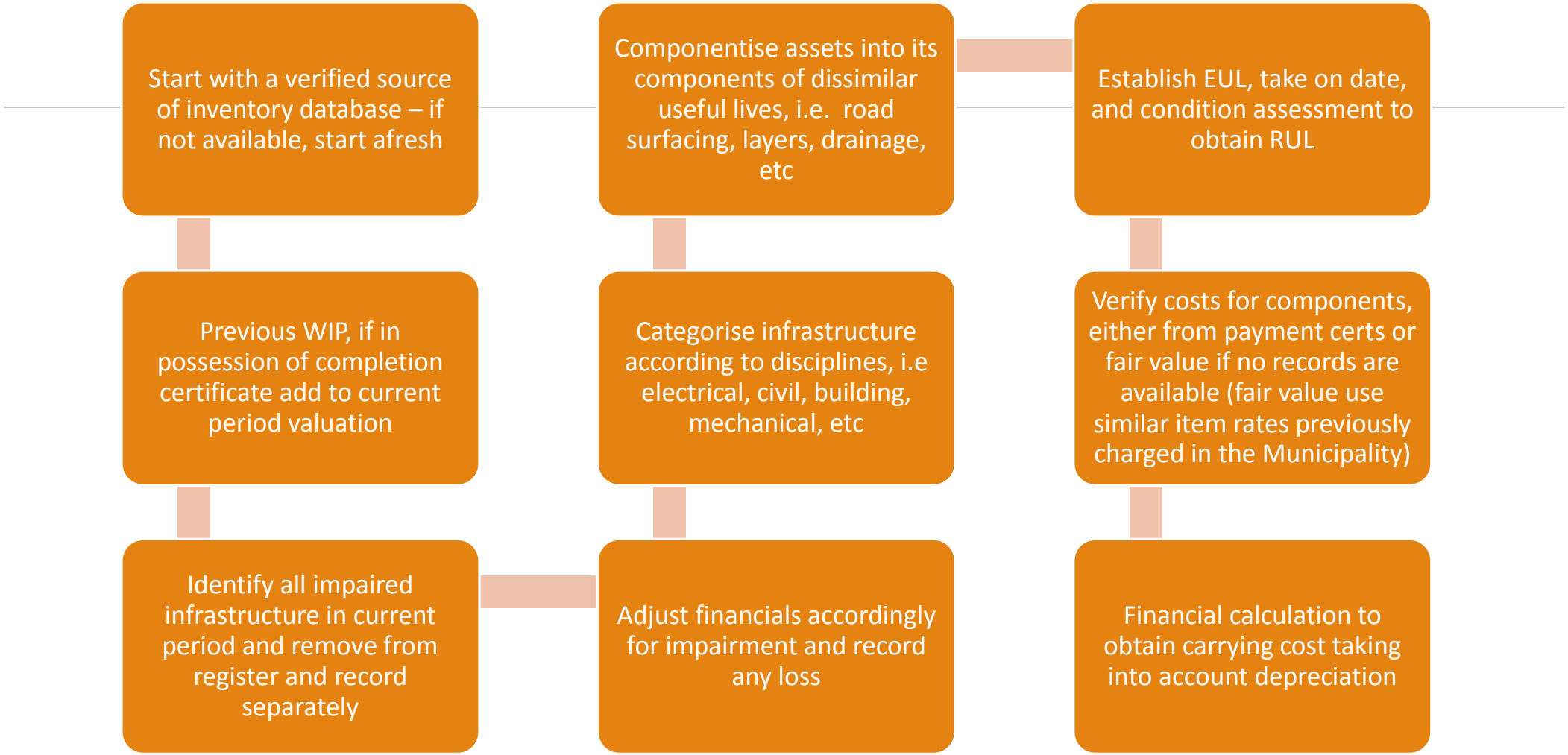
Minimum asset register requirements continued…

- Accumulated depreciation;
- Disposal – date, proceeds, depreciation up to date of disposal;
- Information on a change in accounting estimate as a result of change in useful life or residual value – date reassessed, etc;
- Impairment loss recognised or reversed;
- Carrying amount at the beginning and end of the reporting period;
- Funding source;
- Condition of the asset – this can assist in determining the remaining useful life of an asset and whether it may possibly be impaired; and
- Person responsible for safeguarding and maintaining the asset(s).

Simplified Asset Life Cycle



Asset Register Compilation Process

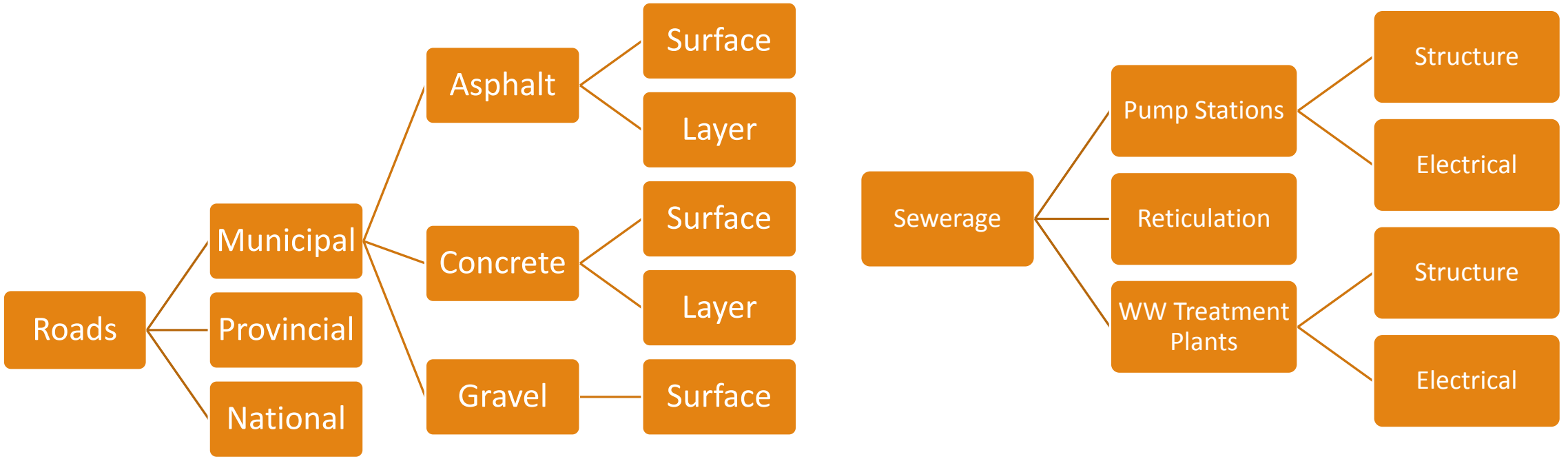


INFRASTRUCTURE ASSET REGISTERS

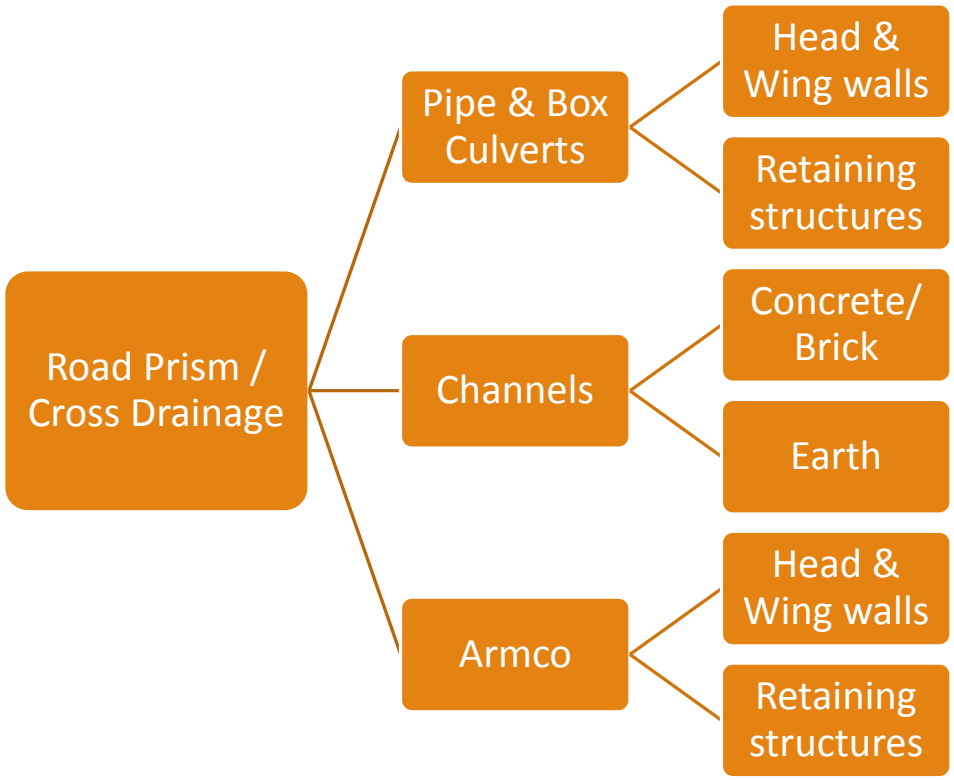
Challenges:

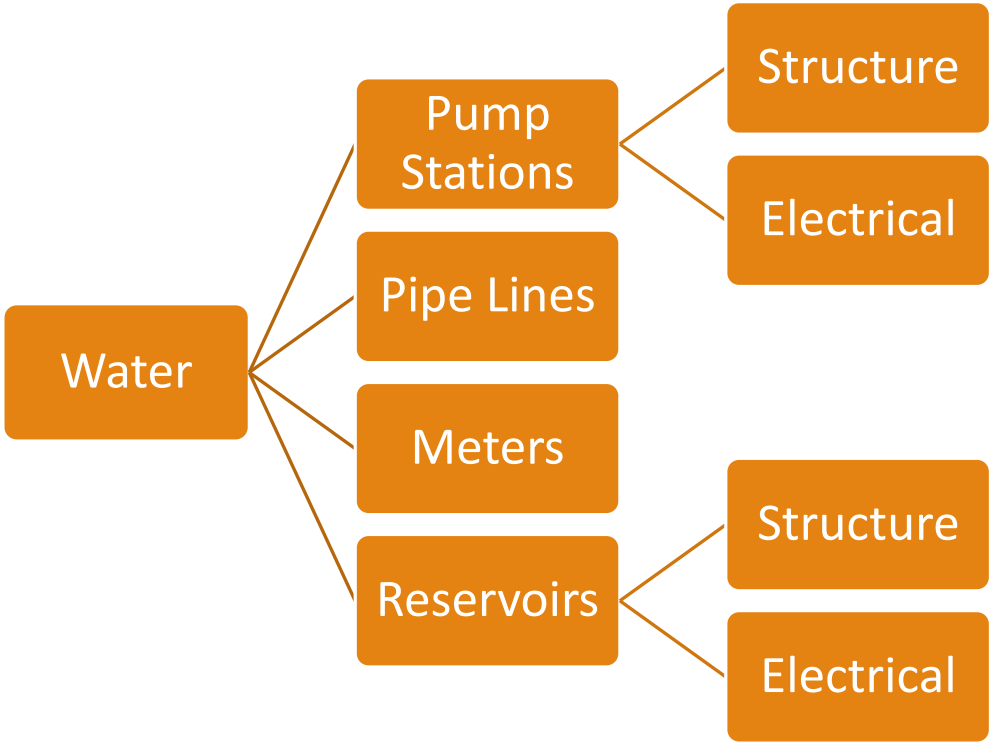
- Lack of historical information of an asset, no as built data, as basic requirement of every infrastructure contract.
- Lack of knowledge of the extent and existence of the network and assets, due in part by amalgamation process with other entities, poor record keeping, staff turnaround.
- Little to no conditional assessments.
- Lack of funding, restricts following a scheduled maintenance programme, if one exists.
- Basic GIS capability such that the infrastructure could spatially viewed and condition assessments filtered.

Componentisation of Assets



Componentisation of Assets





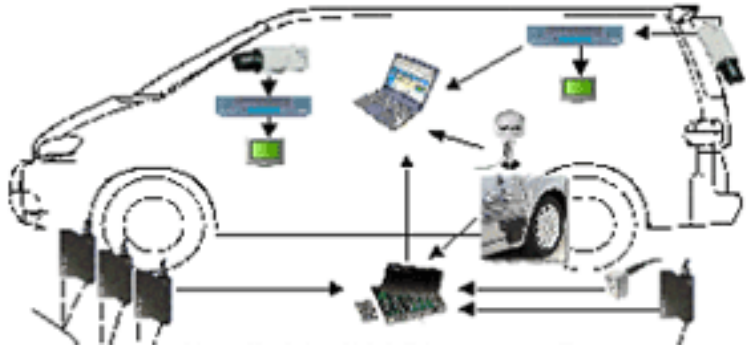
Combining asset register updating and conditional assessments

Advantages:

- Saves time in that two outcomes are achieved at one inspection of the facility.
- Since update of the register is an annual occurrence, it will force annual inspection of all infrastructure.
- A transparent and defendable way to allocate budgets, if based on assessments.
- Most visual inspection data captured has most of the infrastructure data except the financial aspects, so using same data make economic sense.
- Overall asset condition rating is required as input to calculating the remaining useful life, impairments, etc.

Methods of capturing conditional assessments

Various methods exist from very sophisticated automatic high speed capture to relatively simple visual assessments.



Method chosen must be in keeping with extend of network, detail of distress to be captured and its use in the analysis for rehabilitation and maintenance programmes. Sophisticated systems required Similar software to anaylse and integrate data, to generate what If simulations.

Method must also be affordable to the municipality.

Simplest method is visual assessments undertaken by suitably experienced assessors. Challenge are:

- Subjectivity, assessors need periodic benchmarking with colleagues to reset the rating standard.
- Time consuming
- Human errors

Visual Conditional Assessments

This type of assessment is at Network level used for high level budgeting and overall network health assessment.

Identified distress areas will require project level detailed assessment.

Minimum requirements:

- Data capture forms.
- An understanding of the road network, for separation at nodes or segmentation.
- Map of the road network
- Measuring wheel, tape, hand held GPS, straight edge.
- LDV especially for out of town center areas.

Visual Conditional Assessments

Typical forms:

Gravel Roads

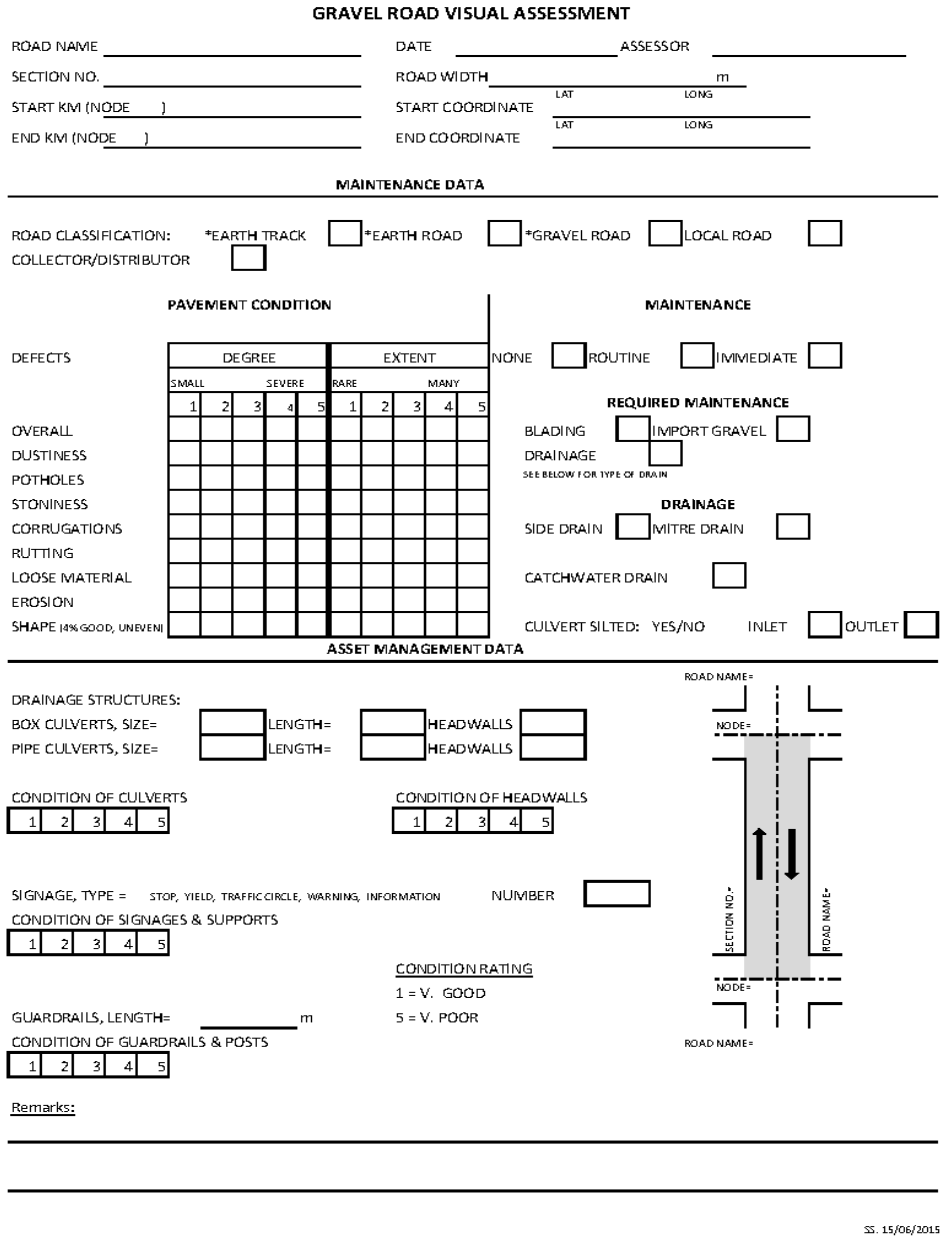
Guideline document for use is TMH12

Pavement Management Systems:

Standard Visual Assessment Manual for

Unsealed Roads

Version 1



GRAVEL ROAD VISUAL ASSESSMENT

ROAD NAME _____ DATE _____ ASSESSOR _____

SECTION NO. _____ ROAD WIDTH _____ m

START KM (NODE) _____ START COORDINATE LAT _____ LONG _____

END KM (NODE) _____ END COORDINATE LAT _____ LONG _____

MAINTENANCE DATA

ROAD CLASSIFICATION: *EARTH TRACK ☐ *EARTH ROAD ☐ *GRAVEL ROAD ☐ LOCAL ROAD ☐ COLLECTOR/DISTRIBUTOR ☐

PAVEMENT CONDITION

DEFECTS	DEGREE (SMALL 1 2 3 4 5 SEVERE)	EXTENT (RARE 1 2 3 4 5 MANY)
OVERALL		
DUSTINESS		
POTHOLES		
STONINESS		
CORRUGATIONS		
RUTTING		
LOOSE MATERIAL		
EROSION		
SHAPE (4% GOOD, UNEVEN)		

MAINTENANCE

NONE ☐ ROUTINE ☐ IMMEDIATE ☐

REQUIRED MAINTENANCE

BLADING ☐ IMPORT GRAVEL ☐

DRAINAGE ☐

SEE BELOW FOR TYPE OF DRAIN

DRAINAGE

SIDE DRAIN ☐ MITRE DRAIN ☐

CATCHWATER DRAIN ☐

CULVERT SILTED: YES/NO INLET ☐ OUTLET ☐

ASSET MANAGEMENT DATA

DRAINAGE STRUCTURES:

BOX CULVERTS, SIZE= ☐ LENGTH= ☐ HEADWALLS ☐

PIPE CULVERTS, SIZE= ☐ LENGTH= ☐ HEADWALLS ☐

CONDITION OF CULVERTS 1 2 3 4 5

CONDITION OF HEADWALLS 1 2 3 4 5

SIGNAGE, TYPE = STOP, YIELD, TRAFFIC CIRCLE, WARNING, INFORMATION NUMBER ☐

CONDITION OF SIGNAGES & SUPPORTS 1 2 3 4 5

CONDITION RATING

1 = V. GOOD

5 = V. POOR

GUARDRAILS, LENGTH= _____ m

CONDITION OF GUARDRAILS & POSTS 1 2 3 4 5

ROAD NAME=

NODE=

SECTION NO.=

ROAD NAME=

NODE=

ROAD NAME=

Remarks:

SS. 15/06/2015

Visual Conditional Assessments

Typical forms:

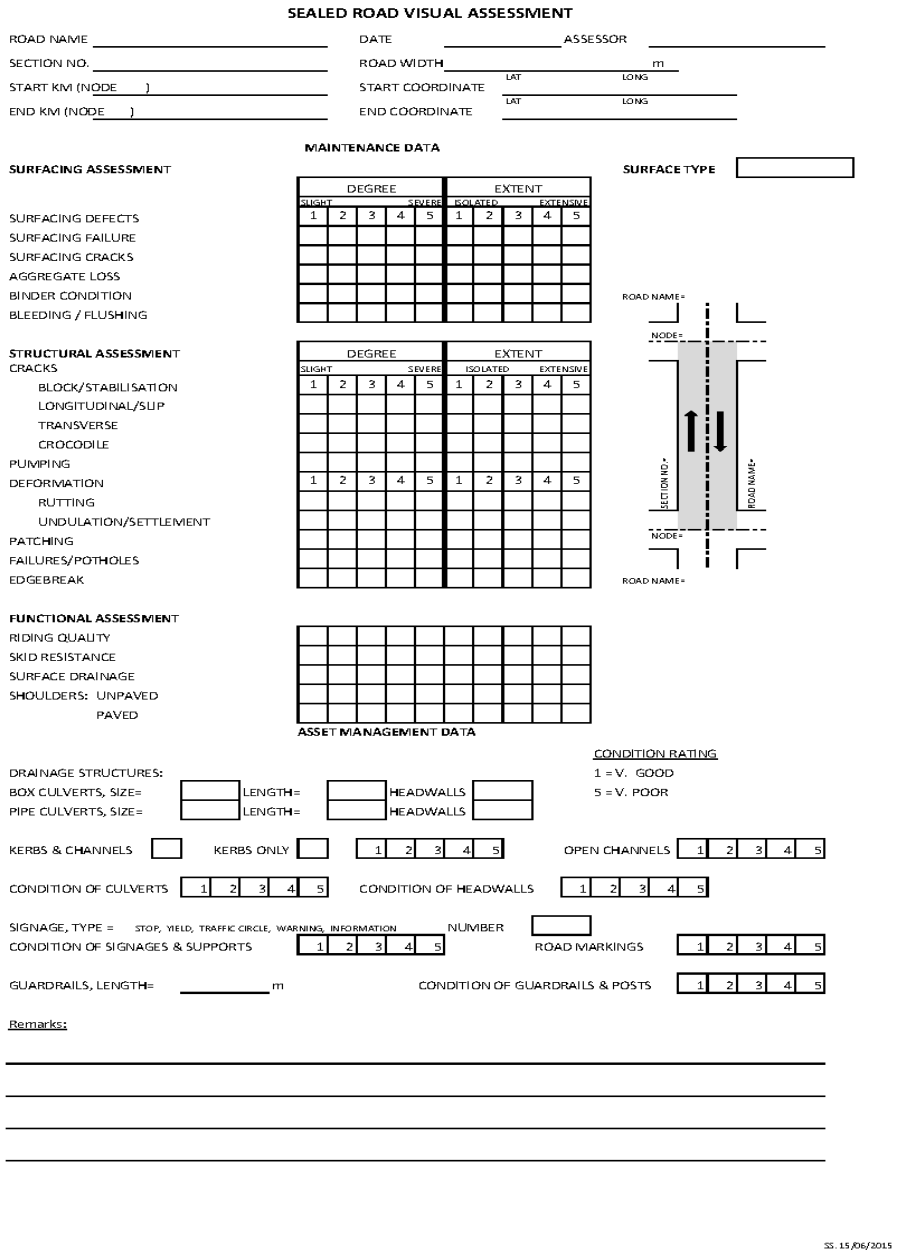
Sealed Roads

TMH 9:1992

Pavement Management Systems:

Standard Visual Assessment Manual for

Flexible Pavements



SEALED ROAD VISUAL ASSESSMENT

ROAD NAME _____ DATE _____ ASSESSOR _____

SECTION NO. _____ ROAD WIDTH _____ m

START KM (NODE) _____ START COORDINATE LAT _____ LONG _____

END KM (NODE) _____ END COORDINATE LAT _____ LONG _____

MAINTENANCE DATA

SURFACING ASSESSMENT **SURFACE TYPE** _____

	DEGREE (SLIGHT 1 2 3 4 5 SEVERE)	EXTENT (ISOLATED 1 2 3 4 5 EXTENSIVE)
SURFACING DEFECTS		
SURFACING FAILURE		
SURFACING CRACKS		
AGGREGATE LOSS		
BINDER CONDITION		
BLEEDING / FLUSHING		

ROAD NAME=

NODE=

SECTION NO.=

ROAD NAME=

NODE=

ROAD NAME=

STRUCTURAL ASSESSMENT

	DEGREE (SLIGHT 1 2 3 4 5 SEVERE)	EXTENT (ISOLATED 1 2 3 4 5 EXTENSIVE)
CRACKS		
BLOCK/STABILISATION		
LONGITUDINAL/SLIP		
TRANSVERSE		
CROCODILE		
PUMPING		
DEFORMATION		
RUTTING		
UNDULATION/SETTLEMENT		
PATCHING		
FAILURES/POTHOLES		
EDGEBREAK		

FUNCTIONAL ASSESSMENT

RIDING QUALITY	
SKID RESISTANCE	
SURFACE DRAINAGE	
SHOULDERS: UNPAVED	
PAVED	

ASSET MANAGEMENT DATA

CONDITION RATING
1 = V. GOOD
5 = V. POOR

DRAINAGE STRUCTURES:
BOX CULVERTS, SIZE= _____ LENGTH= _____ HEADWALLS _____
PIPE CULVERTS, SIZE= _____ LENGTH= _____ HEADWALLS _____

KERBS & CHANNELS ☐ KERBS ONLY ☐ 1 2 3 4 5 OPEN CHANNELS 1 2 3 4 5

CONDITION OF CULVERTS 1 2 3 4 5 CONDITION OF HEADWALLS 1 2 3 4 5

SIGNAGE, TYPE = STOP, YIELD, TRAFFIC CIRCLE, WARNING, INFORMATION NUMBER ☐
CONDITION OF SIGNAGES & SUPPORTS 1 2 3 4 5 ROAD MARKINGS 1 2 3 4 5

GUARDRAILS, LENGTH= _____ m CONDITION OF GUARDRAILS & POSTS 1 2 3 4 5

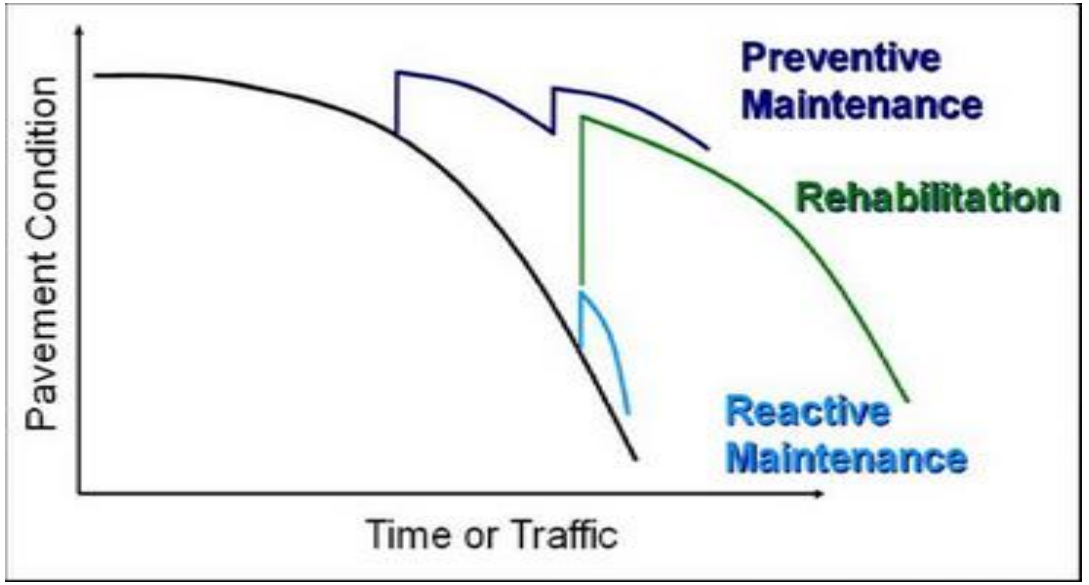
Remarks:

SS. 15/06/2015

Effects of timeous maintenance intervention

With proper maintenance intervention on any asset the life of the asset can be preserved and extended in some instances. If a sealed road surface showing signs of distress is not addressed timeously, water could enter the base course and further more serious damages could result.

End user experiences the discomfort and could result in accidents, claims etc. The remaining useful life reduces drastically and the facility would be impaired sooner rather than later.



Use of conditional data in drawing up a simple maintenance plan

Overall Condition of Pavement

TMH9

Degree	Description
Very good	Very few or no defects. Degree of defects < 3 (less than warning)
Good	Few defects. Degree of structural defects less than warning
Fair	A few defects with degree of defects seldom severe. Extent is only local if degree is severe (excluding surfacing defects)
Poor	General occurrence of particularly structural defects with degrees of warning to severe
Very poor	Many defects. The degree of the majority of the structural defects severe and the extent is predominantly general to extensive

Description of recommended treatments

TMH 9

TYPE	DESCRIPTION
None	The current condition of the road requires no immediate attention. For example, new roads, recently rehabilitated roads, or roads which have recently been maintained effectively .
Routine	Routine maintenance is required, i.e. work that can be done using normal maintenance facilities. For example, repair of potholes, crack sealing, shoulder blading, etc.
Reseal	More extensive work than routine maintenance is needed, aimed primarily at maintaining or improving the existing road surface. Some minor preparation work, such as patching, may be needed before the resurfacing is done.
Light rehabilitation	Similar work to the reseal but extensive preparation work is needed before resurfacing is done. Resurfacing may also include an asphalt overlay (< 50 mm)
Heavy rehabilitation	The road must be put on the rehabilitation programme. Could include pavement reconstruction, additional layers (asphalt included), or settlement repairs, but mainly involves strengthening of the pavement structure.

Description of priorities

Routine Priorities

TMH 9

PRIORITY	DESCRIPTION
A	Urgent attention is required. Safety risk, degree of distress so severe that it is a danger to the road user. The maintenance must be done immediately and deserves continuous attention. For example, dangerous isolated failures.
B	Attention is needed within 6 months in order to prevent further deterioration. For example, crack-sealing of severe cracks, repair of surface failures, etc.
C	Maintenance which should be programmed, such as minor crack sealing and edge repairs.

Description of rehabilitation priorities

Light Rehabilitation

PRIORITY	DESCRIPTION
A	**Within 1 year:** Seal must be done as soon as possible to prevent further deterioration.
B	**Within 2 years:** Reseal should be done in the following financial year. Make provision for it in the estimates.
C	**Within 3 years:** Work which should be scheduled for reseal within the next three years. Re-evaluate in following year.

THM9

Heavy Rehabilitation

PRIORITY	DESCRIPTION
A	**2-year programme:** Attention must be given to defects as soon as possible. Poor to very poor condition with signs of rapid deterioration.
B	**5-year programme:** Attention must be given to defects in the medium term. Project must appear on the 5-year rehabilitation programme.
C	**10-year programme:** This segment should receive attention in the long term. Project should appear on 10-year rehabilitation programme. Consequences of deferment not serious as rate of deterioration is slow or traffic volumes are low.