An Engineering Perspective to Asset Registers

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

Planning → Acquisition → Operation and maintenance → Disposal
Asset Register Compilation Process

Start with a verified source of inventory database – if not available, start afresh

Previous WIP, if in possession of completion certificate add to current period valuation

Identify all impaired infrastructure in current period and remove from register and record separately

Componentise assets into its components of dissimilar useful lives, i.e. road surfacing, layers, drainage, etc

Categorise infrastructure according to disciplines, i.e. electrical, civil, building, mechanical, etc

Establish EUL, take on date, and condition assessment to obtain RUL

Verify costs for components, either from payment certs or fair value if no records are available (fair value use similar item rates previously charged in the Municipality)

Adjust financials accordingly for impairment and record any loss

Financial calculation to obtain carrying cost taking into account depreciation
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

- Roads
  - Municipal
  - Provincial
  - National
  - Asphalt
    - Surface
    - Layer
  - Concrete
    - Surface
    - Layer
  - Gravel
    - Surface

- Sewerage
  - Pump Stations
  - Reticulation
  - WW Treatment Plants
  - Structure
  - Electrical
Componentisation of Assets

- Road Prism / Cross Drainage
  - Pipe & Box Culverts
  - Channels
  - Armco
    - Head & Wing walls
    - Retaining structures
    - Concrete/Brick
    - Earth
    - Head & Wing walls
    - Retaining structures

- Water
  - Pump Stations
  - Pipe Lines
  - Meters
  - Reservoirs
    - Structure
    - Electrical
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 analyse 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

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### Gravel Road Visual Assessment

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECTION NO</td>
<td>ROAD WIDTH</td>
</tr>
<tr>
<td>START KM</td>
<td>START COORDINATE</td>
</tr>
<tr>
<td>END KM</td>
<td>END COORDINATE</td>
</tr>
</tbody>
</table>

#### ROADS CLASSIFICATION

- [ ] PAVEMENT ROAD
- [ ] EARTH ROAD
- [ ] GRAVEL ROAD
- [ ] DIRT ROAD

#### MAINTENANCE DATA

<table>
<thead>
<tr>
<th>MAINTENANCE</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>NEEDED</td>
<td>POSITIVE</td>
<td>IMMEDIATE</td>
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</table>

#### DEPOTS

<table>
<thead>
<tr>
<th>CRACKS</th>
<th>DUSTINESS</th>
<th>POOTHOLE</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>4</td>
<td>5</td>
<td>6</td>
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#### DRAINAGE

- [ ] SIDE DRAIN
- [ ] DRAINAGE
- [ ] CATCHMENT DRAIN

#### ASSET MANAGEMENT DATA

<table>
<thead>
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#### DRAINAGE STRUCTURE

- [ ] BOX CULVERTS, SIZE |
- [ ] PONTO CULVERTS, SIZE |

#### CONDITION OF CULVERTS

<table>
<thead>
<tr>
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#### CONDITION OF MEADOWS

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#### SIGNAGE, TYPE

- [ ] TYPE: GOOD, POOR, INCOMPLETE, INACCURATE, NUMBERED

#### CONDITION OF SIGNAGE & SUPPORTS

<table>
<thead>
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#### CONDITION OF GRASS/WEEDS

<table>
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#### Remarks:

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### Visual Conditional Assessments

**Typical forms:**

**Sealed Roads**

TMH 9:1992

**Pavement Management Systems:**

Standard Visual Assessment Manual for Flexible Pavements
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

<table>
<thead>
<tr>
<th>Degree</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>Very few or no defects. Degree of defects &lt; 3 (less than warning)</td>
</tr>
<tr>
<td>Good</td>
<td>Few defects. Degree of structural defects less than warning</td>
</tr>
<tr>
<td>Fair</td>
<td>A few defects with degree of defects seldom severe. Extent is only local if degree is severe (excluding surfacing defects)</td>
</tr>
<tr>
<td>Poor</td>
<td>General occurrence of particularly structural defects with degrees of warning to severe</td>
</tr>
<tr>
<td>Very poor</td>
<td>Many defects. The degree of the majority of the structural defects severe and the extent is predominantly general to extensive</td>
</tr>
</tbody>
</table>
### Description of recommended treatments

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>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.</td>
</tr>
<tr>
<td>Routine</td>
<td>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.</td>
</tr>
<tr>
<td>Reseal</td>
<td>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.</td>
</tr>
<tr>
<td>Light rehabilitation</td>
<td>Similar work to the reseal but extensive preparation work is needed before resurfacing is done. Resurfacing may also include an asphalt overlay (&lt; 50 mm).</td>
</tr>
<tr>
<td>Heavy rehabilitation</td>
<td>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.</td>
</tr>
</tbody>
</table>
## Description of priorities

### Routine Priorities

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>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.</td>
</tr>
<tr>
<td>B</td>
<td>Attention is needed within 6 months in order to prevent further deterioration. For example, crack-sealing of severe cracks, repair of surface failures, etc.</td>
</tr>
<tr>
<td>C</td>
<td>Maintenance which should be programmed, such as minor crack sealing and edge repairs.</td>
</tr>
</tbody>
</table>
### Description of rehabilitation priorities

#### Light Rehabilitation

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

#### Heavy Rehabilitation

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2-year programme: Attention must be given to defects as soon as possible. Poor to very poor condition with signs of rapid deterioration.</td>
</tr>
<tr>
<td>B</td>
<td>5-year programme: Attention must be given to defects in the medium term. Project must appear on the 5-year rehabilitation programme.</td>
</tr>
<tr>
<td>C</td>
<td>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.</td>
</tr>
</tbody>
</table>