

# Revision of TMH 9 and TMH 12 Visual Assessment Manuals

RPF report back

TMH 9 Revision Committee

7 May 2013

Dr P Paige-Green

# Terms of Reference

- Update and improve TMH 9: Visual Assessment of Flexible Pavements
- Update and improve TMH 12: Visual Assessment of Unsealed roads
- Update and improve SANRAL M3-1: Visual Assessment Manual for Concrete Pavements
- Develop new manual: Visual assessment of Block pavements
- *Must be linked to and compatible with TMH 22*

# Programme and process

Started in October 2012

Deadline for completion – 31 March 2013

Committee:

- Phil Paige-Green - CSIR (Leader)
- Philip Joubert (Link with TMH 22)
- Rob Maguire
- Amy Maharaj (Edit and format)
- Roger Purchase
- Pieter Strauss (Concrete pavements)
- Tinus van Heerden (Flexible pavements)
- Gert van Niekerk
- Gerrie van Zyl (Unpaved roads)
- Andre van der Gryp (Unpaved roads)
- Alex Visser (Block pavements)

# Status

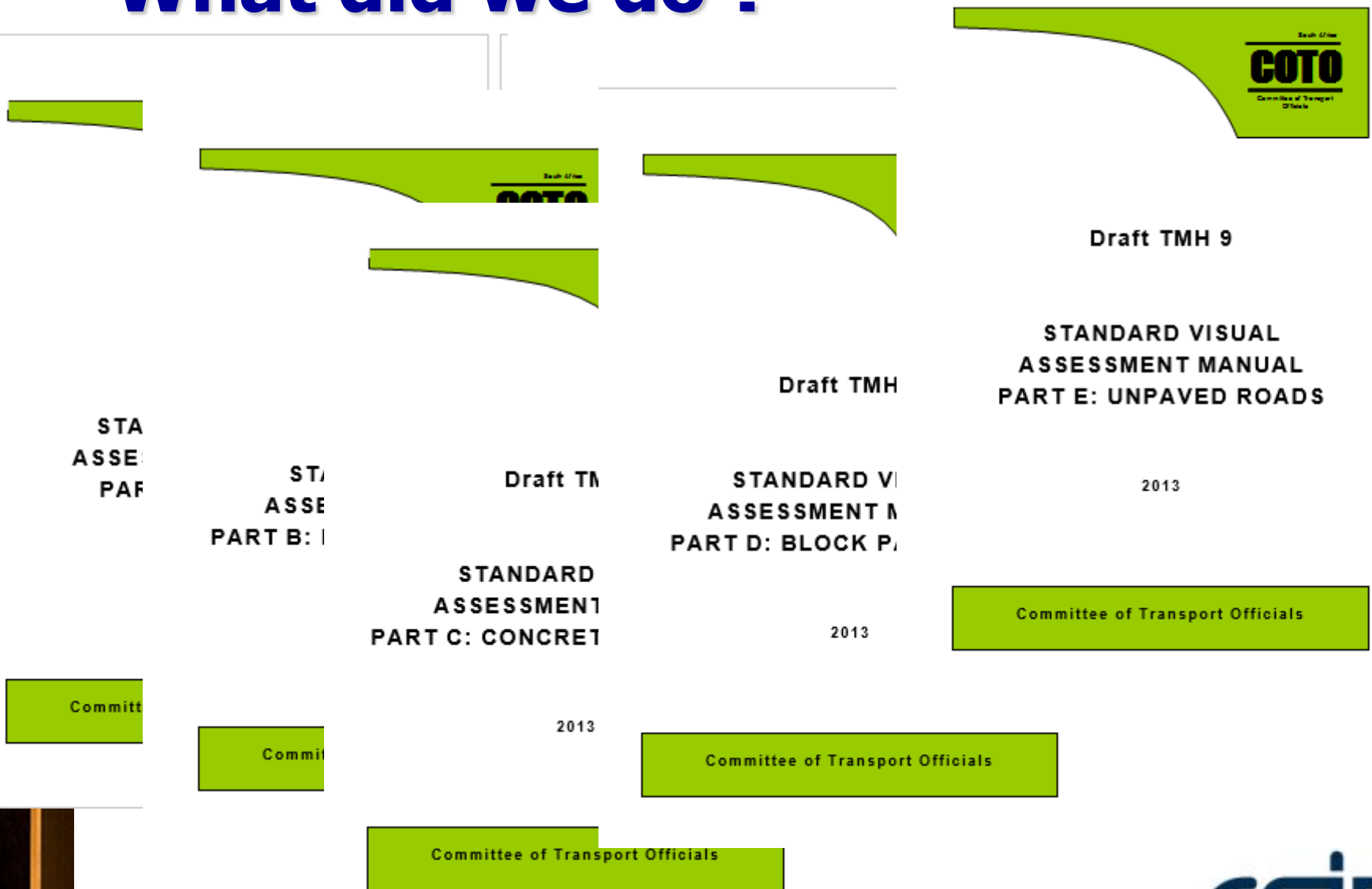
Where are we now –

- Going before RAMS committee on Thursday for initial comment
- Final Drafts for comment – on website
- Open for “public” comment

# What did we do ?

- Looked at existing manuals
- Local and international
- Main aims were:
  - Completeness
  - Consistency/repeatability
  - Ease of use

# What did we do ?



# What did we do ?

## ■ PART A:

- Extract all general information from TMH 9 and TMH 12
- Combine the best of both
- All is applicable to other 4 visual assessment documents (Parts B – E)
- Need to know what to assess and how



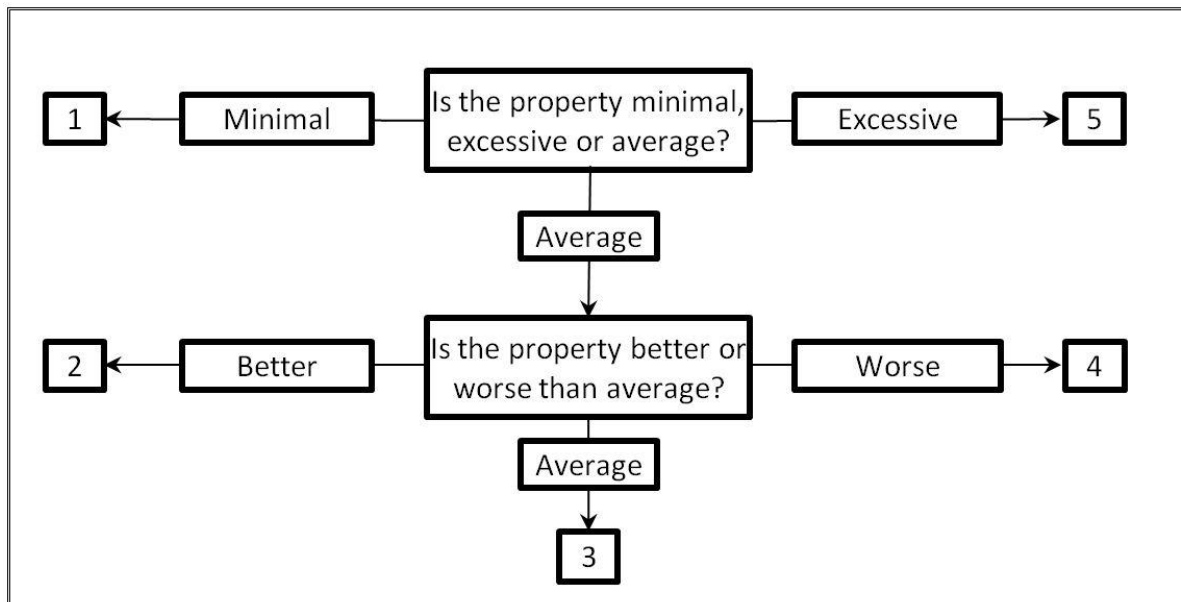


| ITEM   | PAGE |
|--|------|
| A.1. Introduction.....   | A-1  |
| <b>A.1.1.</b> Purpose and background .....                                 | A-1  |
| <b>A.1.2.</b> Evaluation of the condition of the road .....                | A-1  |
| <b>A.1.3.</b> Information to be obtained from visual assessment data ..... | A-2  |
| <b>A.1.4.</b> Layout of the manual .....                                   | A-2  |
| A.2. Attributes of distress .....  | A-2  |
| <b>A.2.1.</b> Different levels of assessment .....                         | A-3  |
| <b>A.2.2.</b> Degree .....   | A-3  |
| <b>A.2.3.</b> Extent.....  | A-4  |
| <b>A.2.4.</b> Examples of degree and extent.....                           | A-5  |
| A.3. Segment lengths .....   | A-6  |
| A.4. Road segment information .....  | A-8  |
| A.5. Assessment procedure and quality assurance .....                      | A-10 |
| <b>A.5.1.</b> Procedure for visual assessment .....                        | A-10 |
| <b>A.5.2.</b> Training of visual assessors .....                           | A-10 |
| <b>A.5.3.</b> Accreditation of visual assessors and assistants .....       | A-11 |
| <b>A.5.4.</b> Quality management plan .....                                | A-12 |
| A.6. Risk assessment .....   | A-12 |
| <b>A.6.1.</b> Safety.....  | A-13 |
| <b>A.6.2.</b> Terminology.....   | A-13 |
| <b>A.6.3.</b> Procedures .....   | A-13 |
| <b>A.6.4.</b> Equipment and inventory.....                                 | A-14 |



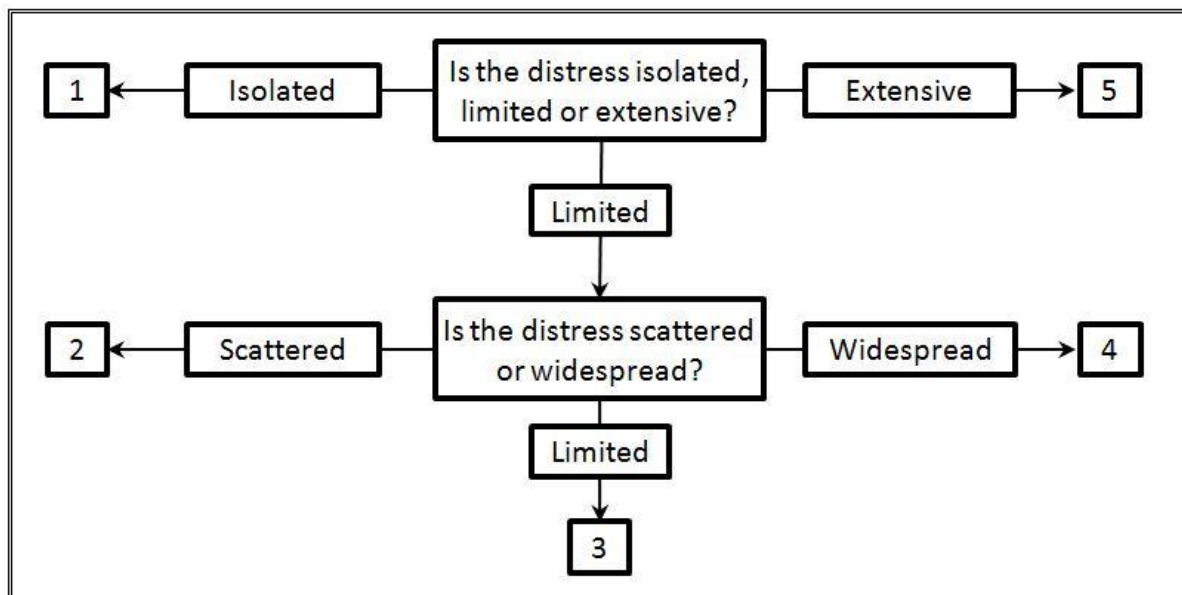
# Part A : Degree/severity

| Degree | Severity          | Description*   |
|--------|-------------------|--|
| 0      | -                 | No distress visible.   |
| 1      | Slight            | Distress difficult to discern. Only the first signs of distress are visible.                                       |
| 2      | Slight to warning | Distress clearly visible but not at degree 3   |
| 3      | Warning           | Start of secondary defects. (Distress notable with respect to possible consequences).                              |
| 4      | Warning to severe | Secondary defects clearly visible but no at degree 5 yet.  |
| 5      | Severe            | Secondary defects are well developed (high degree of secondary defects) and/or extreme severity of primary defect. |



# Part A: Extent

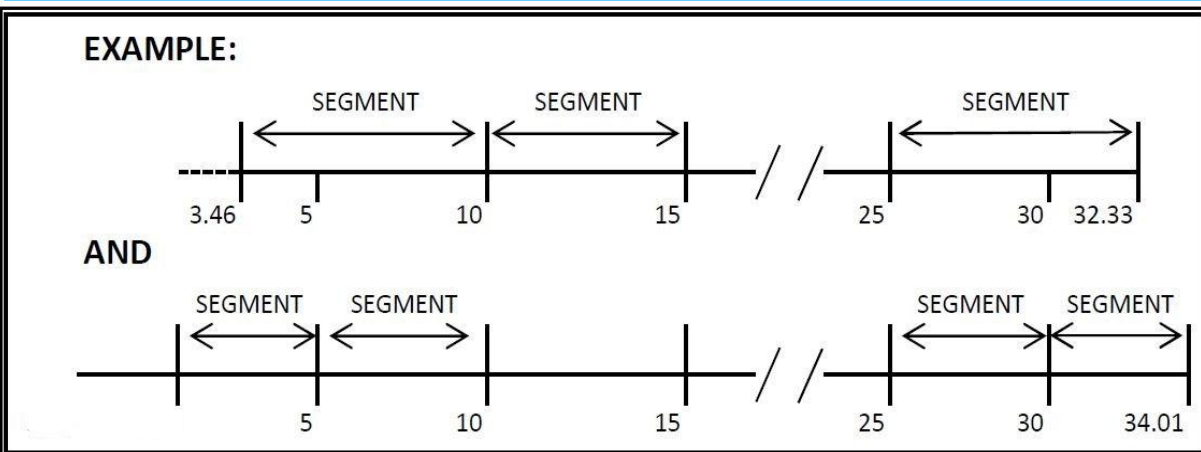
| Extent | Description   | Percentage of length* |
|--------|---|-----------------------|
| 1      | Isolated occurrence<br>Not representative of the segment length being evaluated   | < 5                   |
| 2      | Occurs over parts of the segment length<br>More than isolated   | 5 – 10                |
| 3      | Intermittent (scattered) occurrence over most of the segment length (general), or<br>Extensive occurrence over a limited portion of the segment length. | 10 - 25               |
| 4      | More frequent occurrence over a major portion of the segment length.  | 25 - 50               |
| 5      | Extensive occurrence over the entire segment.   | > 50                  |



# PART A: Segment lengths

| Type of Road | Standard Assessment Length (km) |                            |
|--------------|---------------------------------|----------------------------|
|              | RURAL                           | URBAN                      |
| Flexible     | 2.0                             | Block lengths (max 0.5 km) |
| Concrete     | 0.2                             | 0.2                        |
| Block        | 0.2                             | 0.2                        |
| Unpaved      | 5.0                             | Block lengths (max 0.5 km) |

**Note : Assessment lengths should not exceed  $\pm 50\%$  of standard**



# PART A: Procedure and Quality Assurance

- Procedure
- Training – important – probably biggest debate
  - Accredited trainers ( $\geq 5$  yrs experience)
  - Theoretical and practical – written tests
- Only accredited assessors can be used

## Candidate assessors

2 years of appropriate road engineering experience and/or S3 or Further Education and Training (FET) qualification in civil engineering.

## Assessors

Only be classified as assessors after successfully assessing at least 2 000km of rural or 500km of urban roads within the last two years.

# PART A: Procedure and Quality Assurance

- Accredited assessors
  - May appear onerous
  - Considered essential
  - Still requires calibration before a project
  - Whole assessment may need to be done if not done correctly



# PART B: Flexible pavements

## Table of Contents

| ITEM   | PAGE |
|--|------|
| B.1. General.....                              | B-1  |
| B.2. Engineering assessment (surfacing) .....  | B-1  |
| B.2.1. Current Surfacing.....                  | B-1  |
| B.2.2. Surfacing failures .....                | B-8  |
| B.2.3. Surfacing patching .....                | B-10 |
| B.2.4. Surfacing cracks .....                  | B-12 |
| B.2.5. Binder condition (Dry/Brittle).....     | B-14 |
| B.2.6. Aggregate loss .....                    | B-16 |
| B.2.7. Bleeding / Flushing .....               | B-20 |
| B.2.8. Surface Deformation / Shoving .....     | B-22 |
| B.3. Engineering assessment (structural) ..... | B-25 |
| B.3.1. Cracks.....                             | B-25 |
| B.3.2. Pumping.....                            | B-34 |
| B.3.3. Deformation .....                       | B-36 |
| B.3.4. Patching .....                          | B-40 |
| B.3.5. Failure/Potholes .....                  | B-42 |
| B.4. Functional assessment.....                | B-45 |
| B.4.1. Roughness (Riding Quality).....         | B-45 |
| B.4.2. Skid Resistance .....                   | B-46 |
| B.4.3. Drainage .....                          | B-46 |
| B.4.4. Untraveled way .....                    | B-47 |
| B.4.5. Edge defects.....                       | B-49 |
| B.5. Summary .....                             | B-53 |
| B.5.1. Overall condition of the pavement ..... | B-53 |
| B.5.2. Other problems .....                    | B-53 |
| B.6. Assessment form.....                      | B-55 |

# PART B: Flexible pavements

- No significant changes
- Don't fix what's not broken
- Too many changes will affect current systems (VCI's, national and provincial statistics, etc)
  - Terminology
  - Clarification
  - Re-ordering
  - Minor additions
  - Compatability
  - Editing and formatting

Part B: Flexible Pavements

**4.2.2. Surfacing Failures**

Surfacing failure refers to surfacing failures only and excludes structural failures, which are evaluated in section 5.0. Typical examples of surfacing failure are surface related 'potholes' caused by:

- Spalling of seal or surface around cracks (spalling is defined as the crumbling away of surfacing material around cracks);
- Localised loss of surfacing owing to poor bonding with the underlying layer;
- Disintegration of weak aggregates; and
- Distress owing to seal damage to the surfacing.

**NOTE:** The loss of a surface seal in a circular area is not normally referred to as a pothole if the underlying layer has not been significantly affected (especially in cases of resals or overlays).

Surfacing defects may appear if the preparation of the underlying layer is poor, for example too wet, not clean enough, and in cases where a seal coat has not been used where it was required. Surface failure is the loss of the aggregates and binder in the surfacing layer and therefore results in the exposure of the underlying layer. Where only the aggregate of a seal have been lost, with the binder remaining, the distress is described as aggregate loss (section 5.1.2.3).

The degree of distress for failure is related mostly to the diameter or area of these failures, as given in Table B-4.

Table B-4: Description of Degree of Surfacing Failure

| Degree | Description   |
|--------|---|
| 1      | Failures difficult to discern from moving vehicle. Small areas of surfacing are lost (diameter <math>\leq 50\text{ mm}</math>). Also: singular occurrence of significant failure. |
| 3      | Significant failure visible from moving vehicle (diameter = 100mm). Also: singular occurrence of large failure or concentration of small failures.                                |
| 5      | Failures occur over large areas and/or secondary defects have developed owing to the failures (diameter = 300mm). Also: subsequence of minor failures.                            |

TABLE B-4: Description of Degree of Surfacing Failure

TABLE B-4: Description of Degree of Surfacing Failure

Part B: Flexible Pavements

**4.2.2. Surfacing Failures**

**SURFACING FAILURES**




|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
|    | 1 | X | 2 | 3 | 4 | 5 | Small areas of surfacing are lost (diameter <math>\leq 50\text{ mm}</math>), difficult visible from moving vehicle. |
|   | 3 | 1 | 2 | X | 4 | 5 |   |
|  | 5 | 1 | 2 | 3 | 4 | X | Occur over large areas, failures = 300mm in diameter.   |

TABLE B-4: Description of Degree of Surfacing Failure

TABLE B-4: Description of Degree of Surfacing Failure

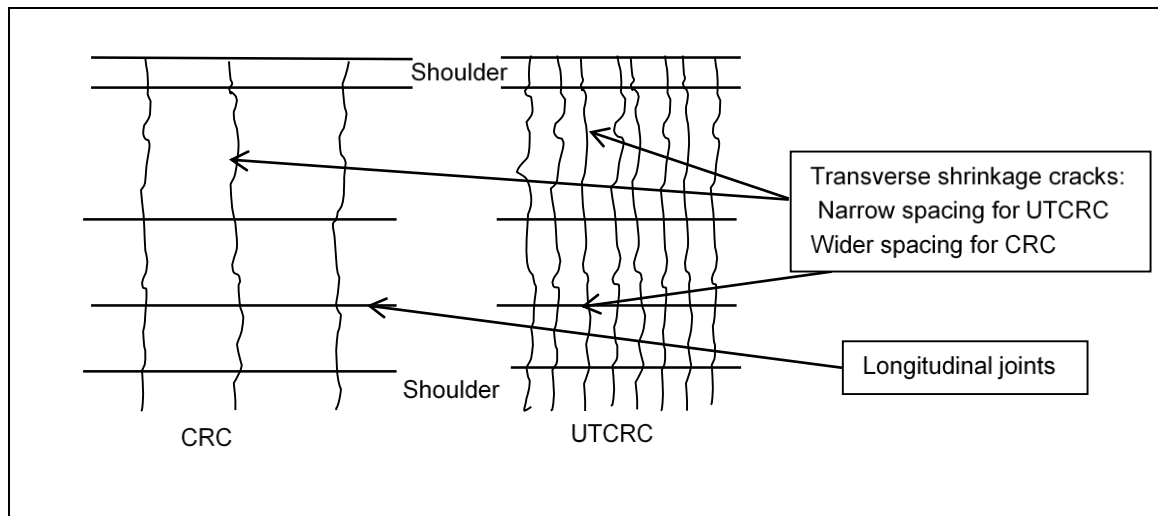
# PART C: Concrete pavements

| ITEM  | PAGE |
|---|------|
| C.1. Introduction .....   | C-1  |
| C.2. General Information.....   | C-2  |
| C.2.1. Road section .....   | C-2  |
| C.2.2. Assessment segment.....  | C-2  |
| C.2.3. Shoulder .....   | C-2  |
| C.2.4. Jointed concrete pavements (PJC or DJC).....   | C-2  |
| C.2.5. Continuously reinforced concrete pavements (CRC) and ultra-thin continuously reinforced concrete pavements (UTCRC) ..... | C-2  |
| C.3. Engineering Assessment .....   | C-3  |
| C.3.1. Random Cracking.....   | C-3  |
| C.3.2. Transverse cracks .....  | C-5  |
| C.3.3. Longitudinal Cracking.....   | C-7  |
| C.3.4. Corner cracking .....  | C-9  |
| C.3.5. Cluster cracking.....  | C-11 |
| C.3.6. Cluster cracking.....  | C-13 |
| C.3.7. Pumping .....  | C-15 |
| C.3.8. Joint seal condition.....  | C-17 |
| C.3.9. Faulting at joints and cracks.....   | C-19 |
| C.3.10. Undulation/Settlement.....  | C-21 |
| C.3.11. Punch outs (UTCRC and CRCP only) .....  | C-21 |
| C.3.12. Shattered slab .....  | C-23 |
| C.3.13. Shattered slab (UTCRC) .....  | C-25 |
| C.3.14. Patching .....  | C-27 |
| C.3.15. Texture .....   | C-29 |
| C.4. Functional Assessment.....   | C-31 |
| C.4.1. Roughness .....  | C-31 |
| C.4.2. Skid Resistance.....   | C-32 |
| C.4.3. Surface Drainage .....   | C-32 |
| C.4.4. Shoulders .....  | C-33 |
| C.5. Summary .....  | C-34 |
| C.5.1. General Notes .....  | C-34 |
| C.5.2. Overall Condition of the Pavement.....   | C-34 |
| C.6. Assessment Form for Concrete Pavements .....   | C-36 |



# PART C: Concrete pavements

- Based on SANRAL M3-1
- Mostly Pieter Strauss
- Had no photos – now has
- Similar to others
- New illustrations



# PART C: Concrete pavements



## Part C: Concrete Pavements

### C.3.8. Joint seal condition

Damage that occurs and which needs to be considered in the evaluation of degree includes seals that stand proud of the surrounding concrete surface, loss of bond with the concrete, seals that have been torn or damaged and obvious loss of elasticity.

The ruler test may be used to assist in the assessment of joint seal condition: Place a steel ruler vertically into the joint. Exert enough pressure to allow proper contact between the sealant and the short edge of the ruler. Turn the ruler through an angle of between 20 and 40 degrees and maintain this position while inspecting the adhesion face. If this action is able to loosen the seal from the sides, it indicates that the seal is in a fair to poor condition and has lost its adhesive ability to stick to the concrete and prevent water and foreign matter to infiltrate the joint.

Table C.8: Description of Degrees of Joint Seal Condition

| Degree | Description   |
|--------|---|
| 1      | Seal still functional well but some indication of ageing and loss of elasticity.  |
| 2      | Not functional i.e. sagging into the joint, protruding above the surrounding concrete and not adhering to concrete or torn. |
| 3      | Seal dislodged from joint allowing water to freely enter the pavement.  |

The extent of joint seal condition should be determined according to the definitions given in table A.2.

## Part C: Concrete Pavements

### JOINT SEAL CONDITION

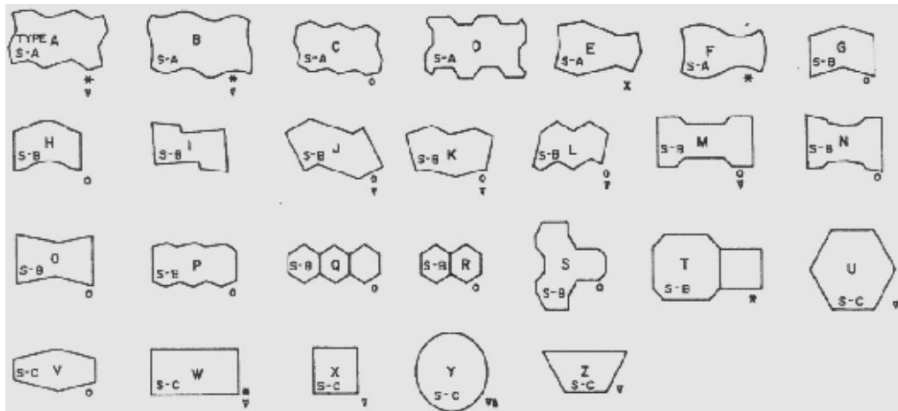
|                             |   |   |   |   |   |
|-----------------------------|---|---|---|---|---|
|                             | 1 |   |   |   |   |
|                             | X | 2 | 3 | 4 | 5 |
| Seal still functional       |   |   |   |   |   |
|                             | 3 |   |   |   |   |
|                             | 1 | 2 | X | 4 | 3 |
| Seal sagging into the joint |   |   |   |   |   |
|                             | 5 |   |   |   |   |
|                             | 1 | 2 | 3 | 4 | X |
| Seal dislodged from joint   |   |   |   |   |   |

# PART D: Block pavements

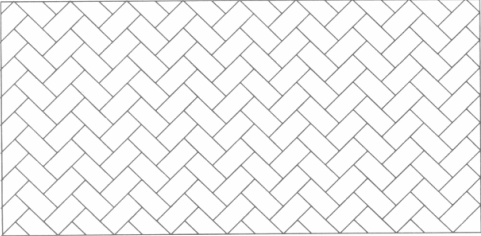
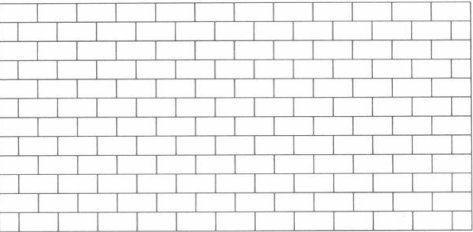
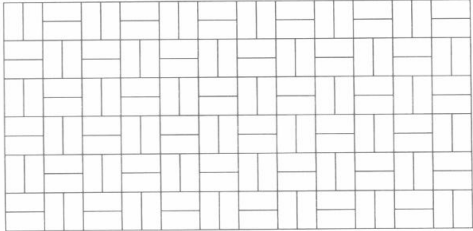
| ITEM   | PAGE |
|--|------|
| D.1. Introduction.....                           | D-1  |
| D.2. General information.....                    | D-2  |
| D.2.1. Block shape.....                          | D-2  |
| D.2.2. Lay pattern.....                          | D-2  |
| D.2.3. Block thickness.....                      | D-3  |
| D.2.4. Chamfers.....                             | D-4  |
| D.3. Engineering assessment.....                 | D-5  |
| D.3.1. General.....                              | D-5  |
| D.3.2. Spalled/ cracked/ broken blocks.....      | D-5  |
| D.3.3. Block surface integrity.....              | D-7  |
| D.3.4. Loss of jointing sand.....                | D-9  |
| D.3.5. Edge restraints.....                      | D-11 |
| D.3.6. Rutting.....                              | D-13 |
| D.3.7. Potholes / patching / reinstatements..... | D-15 |
| D.3.8. Undulations / shoving.....                | D-17 |
| D.4. Functional Assessment.....                  | D-19 |
| D.4.1. Roughness.....                            | D-19 |
| D.4.2. Skid Resistance.....                      | D-20 |
| D.4.3. Surface Drainage.....                     | D-20 |
| D.4.4. Shoulders.....                            | D-21 |
| D.5. Summary.....                                | D-22 |
| D.5.1. Overall condition of pavement.....        | D-22 |
| D.5.2. Comments and other problems.....          | D-22 |
| D.6. Assessment form.....                        | D-23 |



# PART D: Block pavements

- No pre-existing manual
- Mostly Alex Visser
- Input from "committee"
- Introduction and background as there are different principles
  - Eg, chamfers, laying style, block shapes and types, etc



# Part D: Block pavements

|  |                                   |
|--|-----------------------------------|
|   | <p>Herring-bone Lay Pattern</p>   |
|   | <p>Stretcher-bond Lay Pattern</p> |
|  | <p>Basket Weave Lay Pattern</p>   |

| CHAMFERS  |                                    |
|---|------------------------------------|
|   | <p>45</p> <p>45° Angle chamfer</p> |
|  | <p>R</p> <p>Rounded Chamfer</p>    |

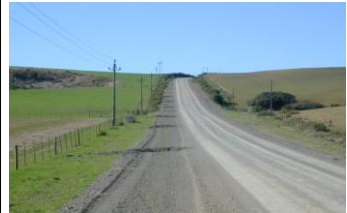


# PART E: Unpaved roads

## Table of Contents

| ITEM  | PAGE |
|---|------|
| E.1. Introduction.....                                  | E-1  |
| E.2. General information.....                           | E-2  |
| E.2.1. Assessment Procedure .....                       | E-2  |
| E.2.2. Moisture Condition .....                         | E-2  |
| E.2.3. Traffic.....                                     | E-2  |
| E.3. Engineering assessment (material properties) ..... | E-2  |
| E.3.1. Gravel Quality and Influencing Factors .....     | E-3  |
| E.3.2. Gravel properties.....                           | E-6  |
| E.3.3. Gravel quantity .....                            | E-6  |
| E.3.4. Subgrade quality .....                           | E-11 |
| E.4. Engineering assessment (surface distress).....     | E-11 |
| E.4.1. Potholes.....                                    | E-11 |
| E.4.2. Corrugations .....                               | E-13 |
| E.4.3. Rutting .....                                    | E-15 |
| E.4.4. Loose Material.....                              | E-17 |
| E.4.5. Stoniness.....                                   | E-19 |
| E.4.6. Erosion .....                                    | E-23 |
| E.5. Functional performance parameters .....            | E-27 |
| E.5.1. Road roughness .....                             | E-27 |
| E.5.2. Trafficability/ passability .....                | E-32 |
| E.5.3. Safety .....                                     | E-34 |
| E.5.4. Drainage on the road (profile/shape) .....       | E-40 |
| E.5.5. Drainage from the road (side of the road).....   | E-42 |
| E.7. Summary.....                                       | E-44 |
| E.7.1. Overall condition of the pavement.....           | E-44 |
| E.7.2. Comments and other problems.....                 | E-44 |
| E.8. Assessment form.....                               | E-45 |

# Part E: Unpaved roads

- Mostly Gerrie van Zyl and Andre van der Gryp
- Tidied up old TMH 12
- Now unpaved and not “gravel” or “unsealed”
- Clarification and some alignment with other Parts
- Some improved photos

| GRAVEL QUANTITY   |  |
|---|--|
|    | > 125 mm<br><br>Good shape and no stone protrusion     |
|   | 50 - 100 mm<br><br>Significant stone protrusion        |
|  | 25 - 50 mm<br><br>More than isolated subgrade exposure |

# Part E: Unpaved roads



Part E: Unpaved roads

**E.5.5. Drainage from the road (side of the road)**

There is obviously a strong interrelationship between the road profile discussed previously (drainage on the road) and drainage from the road. However, the mentioned profile relates more directly to the capacity of the road to shed water without causing erosion, while drainage from the road relates more closely to the impact of standing water on both the wearing course and underlying road structure. Effective operation of adequate side drains is the predominant aspect to be considered during the rating. This includes removal of water from the zone of influence adjacent to the road as well as erosion effects associated with shoulders and undercutting of the road.

Drainage from the road is assessed according to Table E-17 and illustrated in Figure E.3. The descriptors are essentially applicable to roads in flat or slightly sloping terrain. Where grades are steeper, roads assessed as degrees 4 and 5 will act as drainage courses during periods of intensive rainfall leading to severe erosion.

Table E-17: Visual assessment of drainage/road formation

| Rating    | Description   |
|-----------|---|
| Very Good | Well above ground level, slopes or road surface less than 300 mm above natural ground level with effective side drains.   |
| Good      | Slightly above ground level. Road is between 50 and 300 mm above natural ground level. Side drains are present. Stormwater could cross in isolated places.      |
| Moderate  | Level with ground. Road is generally at ground level with ineffective side drains. Stormwater could cross in most places.                                       |
| Poor      | Slightly beneath ground level. Isolated areas of the road are below natural ground level. No side drains are present and localized ponding of water will occur. |
| Very Poor | Canal. Road is the lowest point and serves to drain the entire area.  |

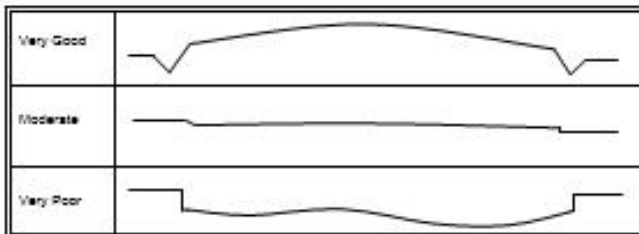


Figure E.3: Illustration of drainage from the road

Provision is made on the assessment form to highlight the main cause/s of a poor or very poor assessment rating (i.e. culvert inlets, side drains, mitre drains and/or road level).

Part E: Unpaved roads

**DRAINAGE FROM THE ROAD (On side)**


|  |                   |   |   |  |  |   |
|--|-------------------|---|---|--|--|---|
|  | Very Good         | X |   |  |  |   |
|  | Well above ground |   |   |  |  |   |
|  | Moderate          |   | X |  |  |   |
|  | Level with ground |   |   |  |  |   |
|  | Very Poor         |   |   |  |  | X |
|  | Canal             |   |   |  |  |   |



# Assessment forms

- Redid all assessment forms in COTO format
- Simplified and fewer errors and omissions if forms are the same
- Recommended but not obligatory
- Some authorities may want additional information

# Assessment forms



## VISUAL ASSESSMENT : FLEXIBLE PAVEMENTS

ROAD AUTHORITY : \_\_\_\_\_ ROUTE CLASS : 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

  
 REGION / SUBURB : \_\_\_\_\_ TRAFFIC : 

|    |   |   |   |    |
|----|---|---|---|----|
| VL | L | M | H | VH |
|----|---|---|---|----|

  
 ROAD NO / STREET NAME : \_\_\_\_\_ GRADIENT : 

|      |     |       |
|------|-----|-------|
| Flat | Med | Steep |
|------|-----|-------|

  
 SEGMENT (FROM - TO) : \_\_\_\_\_ TERRAIN : 

|      |         |       |
|------|---------|-------|
| Flat | Rolling | Mount |
|------|---------|-------|

  
 SEGMENT DIMENSIONS : LENGTH \_\_\_\_\_ m WIDTH \_\_\_\_\_ m

### ENGINEERING ASSESSMENT

| SURFACING                        | TEXTURE | COARSE  | MEDIUM | FINE     | VARYING   |   |
|----------------------------------|---------|---------|--------|----------|-----------|---|
|                                  | VOIDS   | MANY    | FEW    | NONE     | VARYING   |   |
| CURRENT SURFACING : _____        | DEGREE  |         |        |          |           |   |
|                                  | EXTENT  |         |        |          |           |   |
|                                  | MINOR   | WARNING | SEVERE | ISOLATED | EXTENSIVE |   |
|                                  | 0       | 1       | 2      | 3        | 4         | 5 |
| SURFACING FAILURES               |         |         |        |          |           |   |
| SURFACING PATCHING               |         |         |        |          |           |   |
| SURFACING CRACKS                 |         |         |        |          |           |   |
| BINDER CONDITION (DRY / BRITTLE) |         |         |        |          |           |   |
| AGGREGATE LOSS                   |         |         |        |          |           |   |
| BLEEDING / FLUSHING              |         |         |        |          |           |   |
| SURFACING DEFORMATION / SHOING   |         |         |        |          |           |   |

| STRUCTURAL               | DEGREE |         |        |          |           | EXTENT |   |   |   |   |   |
|--------------------------|--------|---------|--------|----------|-----------|--------|---|---|---|---|---|
|                          | MINOR  | WARNING | SEVERE | ISOLATED | EXTENSIVE |        |   |   |   |   |   |
|                          | 0      | 1       | 2      | 3        | 4         | 5      | 1 | 2 | 3 | 4 | 5 |
| BLOCK CRACKS             |        |         |        |          |           |        |   |   |   |   |   |
| LONGITUDINAL CRACKS      |        |         |        |          |           |        |   |   |   |   |   |
| TRANSVERSE CRACKS        |        |         |        |          |           |        |   |   |   |   |   |
| CROCODILE CRACKS         |        |         |        |          |           |        |   |   |   |   |   |
| PUMPING                  |        |         |        |          |           |        |   |   |   |   |   |
| RUTTING                  |        |         |        |          |           |        |   |   |   |   |   |
| UNDULATIONS / SETTLEMENT |        |         |        |          |           |        |   |   |   |   |   |
| PATCHING                 |        |         |        |          |           |        |   |   |   |   |   |
| FAILURES / POTHoles      |        |         |        |          |           |        |   |   |   |   |   |


### FUNCTIONAL ASSESSMENT

|                           |           |          |            |              |                         |             |   |
|---------------------------|-----------|----------|------------|--------------|-------------------------|-------------|---|
| ROUGHNESS                 | Very Good | Good     | Moderate   | Poor         | Very Poor               |             |   |
| SKID RESISTANCE           | Problem   | potholes | patching   | undulations  | gen uneven corrugations |             |   |
| SURFACE DRAINAGE          | Problem   | Adequate | rutting    | Inconsistent | Inadequate              |             |   |
| UNTRAVELLED WAY (unpaved) | Problem   | None     | Safe       | Inconsistent | Unsafe                  |             |   |
| EDGE DEFECTS              | Problem   | eroded   | overgrow n | inclined     | too high                | too narrow  |   |
|                           |           | 0        | 1          | 2            | 3                       | 4           | 5 |
|                           |           |          |            | edge break   | drop off                | edge cracks |   |

### SUMMARY

|                            |                   |       |          |      |                   |
|----------------------------|-------------------|-------|----------|------|-------------------|
| OVERALL PAVEMENT CONDITION | Very Good         | Good  | Moderate | Poor | Very Poor         |
| COMMENTS:                  |                   |       |          |      |                   |
| OTHER PROBLEMS             | service crossings | trees | moles    |      | mechanical damage |

ASSESSOR : \_\_\_\_\_ DATE : \_\_\_\_\_



## VISUAL ASSESSMENT : UNPAVED ROADS

ROAD AUTHORITY : \_\_\_\_\_ ROUTE CLASS : 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

  
 REGION / SUBURB : \_\_\_\_\_ TRAFFIC : 

|    |   |   |   |    |
|----|---|---|---|----|
| VL | L | M | H | VH |
|----|---|---|---|----|

  
 ROAD NO / STREET NAME : \_\_\_\_\_ GRADIENT : 

|      |     |       |
|------|-----|-------|
| Flat | Med | Steep |
|------|-----|-------|

  
 SEGMENT (FROM) : \_\_\_\_\_ TERRAIN : 

|      |         |       |
|------|---------|-------|
| Flat | Rolling | Mount |
|------|---------|-------|

  
 SEGMENT (TO) : \_\_\_\_\_ ROAD TYPE 

|        |       |       |
|--------|-------|-------|
| Gravel | Earth | Track |
|--------|-------|-------|

  
 SEGMENT DIMENSIONS : LENGTH \_\_\_\_\_ m WIDTH \_\_\_\_\_ m  
 MOIST 

|     |       |     |
|-----|-------|-----|
| Wet | Moist | Dry |
|-----|-------|-----|

### MATERIAL INFORMATION / GRAVEL PROPERTIES

| MATERIAL QUALITY | Very Good | Good        | Moderate    | Poor       | Very Poor    |
|------------------|-----------|-------------|-------------|------------|--------------|
| Problem          |           |             | oversize    | clay/silt  | loose gravel |
| MAXIMUM SIZE     | < 13 mm   | 13 - 25 mm  | 25 - 50 mm  | > 50 mm    |              |
| GRADING          | Coarse    | Medium      | Fine        |            |              |
| ESTIMATED 'PI'   | Low       | Medium      | High        |            |              |
| LAYER THICKNESS  | > 125mm   | 100 - 125mm | 50 - 100 mm | 25 - 50mm  | < 25mm       |
| EXPOSED SUBGRADE | none      | isolated    | frequent    | continuous |              |
| SUBGRADE QUALITY |           | Good        | Moderate    | Poor       |              |
|                  | Problem   |             | wet         | clay/mud   | sand         |

### SURFACE DISTRESS / ENGINEERING ASSESSMENT

|                      | DEGREE |         |        |          |           | EXTENT |   |   |   |   |   |
|----------------------|--------|---------|--------|----------|-----------|--------|---|---|---|---|---|
|                      | MINOR  | WARNING | SEVERE | ISOLATED | EXTENSIVE |        |   |   |   |   |   |
|                      | 0      | 1       | 2      | 3        | 4         | 5      | 1 | 2 | 3 | 4 | 5 |
| POTHoles             |        |         |        |          |           |        |   |   |   |   |   |
| CORRUGATIONS         |        |         |        |          |           |        |   |   |   |   |   |
| RUTTING              |        |         |        |          |           |        |   |   |   |   |   |
| LOOSE MATERIAL       |        |         |        |          |           |        |   |   |   |   |   |
| STONINESS : FIXED    |        |         |        |          |           |        |   |   |   |   |   |
| : LOOSE              |        |         |        |          |           |        |   |   |   |   |   |
| EROSION : TRANSVERSE |        |         |        |          |           |        |   |   |   |   |   |
| : LONGITUDINAL       |        |         |        |          |           |        |   |   |   |   |   |

### FUNCTIONAL ASSESSMENT

|                             |           |             |          |                |              |              |            |             |
|-----------------------------|-----------|-------------|----------|----------------|--------------|--------------|------------|-------------|
| ROUGHNESS                   | Very Good | Good        | Moderate | Poor           | Very Poor    |              |            |             |
| TRAFFICABILITY              | Problem   | performance | potholes | stoniness      | rock outcrop | corrugations | rutting    | rut/erosion |
| SAFETY                      | Problem   | loose mat   | clay     | rocky          | vegetation   | steep        | drainage   |             |
| DRAINAGE : ON THE ROAD      | Problem   | Very Good   | Good     | Moderate       | Poor         | Very Poor    |            |             |
| DRAINAGE : SIDE OF THE ROAD | Problem   | Very Good   | Good     | Moderate       | Poor         | Very Poor    |            |             |
|                             |           |             |          | pulvert inlets | side drains  | mitre drains | road level |             |

### SUMMARY

|                            |           |      |          |      |           |
|----------------------------|-----------|------|----------|------|-----------|
| OVERALL PAVEMENT CONDITION | Very Good | Good | Moderate | Poor | Very Poor |
| COMMENTS:                  |           |      |          |      |           |

ASSESSOR : \_\_\_\_\_ DATE : \_\_\_\_\_

# Assessment forms

## VISUAL ASSESSMENT : CONCRETE PAVEMENTS



ROAD AUTHORITY : \_\_\_\_\_ ROUTE CLASS : 

|      |         |       |   |    |
|------|---------|-------|---|----|
| 1    | 2       | 3     | 4 | 5  |
| VL   | L       | M     | H | VH |
| Flat | Med     | Steep |   |    |
| Flat | Rolling | Mount |   |    |

REGION / SUBURB : \_\_\_\_\_ TRAFFIC : \_\_\_\_\_

ROAD NO / STREET NAME : \_\_\_\_\_ GRADIENT : \_\_\_\_\_

\_\_\_\_\_ TERRAIN : \_\_\_\_\_

SEGMENT (FROM - TO) : \_\_\_\_\_

SEGMENT DIMENSIONS : LENGTH \_\_\_\_\_ m WIDTH \_\_\_\_\_ m

### ENGINEERING ASSESSMENT

|                          | TEXTURE |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
|--------------------------|---------|---|---------|---|---|--------|---|---|---|---|----------|---|-----------|---|---|---------|--|--|--|--|
|                          | COARSE  |   |         |   |   | MEDIUM |   |   |   |   | FINE     |   |           |   |   | VARYING |  |  |  |  |
|                          | DEGREE  |   |         |   |   | EXTENT |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
|                          | MINOR   |   | WARNING |   |   | SEVERE |   |   |   |   | ISOLATED |   | EXTENSIVE |   |   |         |  |  |  |  |
|                          | 0       | 1 | 2       | 3 | 4 | 5      | 1 | 2 | 3 | 4 | 5        | 1 | 2         | 3 | 4 | 5       |  |  |  |  |
| RANDOM CRACKS            |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| TRANSVERSE CRACKS        |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| LONGITUDINAL CRACKS      |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| CORNER CRACKING          |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| CLUSTER CRACKING         |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| PUMPING                  |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| JOINT SEAL CONDITION     |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| FAULTING                 |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| UNDULATIONS / SETTLEMENT |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| PUNCH OUTS               |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| SHATTERED SLABS          |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| PATCHING                 |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |
| TEXTURE                  |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |         |  |  |  |  |

### FUNCTIONAL ASSESSMENT

|                     |            |                 |              |              |             |
|---------------------|------------|-----------------|--------------|--------------|-------------|
| ROUGHNESS           | Very Good  | Good            | Moderate     | Poor         | Very Poor   |
| Problem             | punch outs | shattered slabs | patching     | undulations  | faulting    |
| SKID RESISTANCE     | Good       |                 | Moderate     | Poor         |             |
| SURFACE DRAINAGE    | Adequate   |                 | Inconsistent | Inadequate   |             |
| Problem             | rutting    | shoulders       | undulations  | failures     | side drains |
| SHOULDERS (unpaved) | None       |                 | Safe         | Inconsistent | Unsafe      |
| Problem             | eroded     | overgrown       | inclined     | too high     | too narrow  |

### SUMMARY

|                            |           |      |          |               |           |
|----------------------------|-----------|------|----------|---------------|-----------|
| GENERAL NOTES              | Crushing  |      | Blow-up  | Alkali-silica |           |
| OVERALL PAVEMENT CONDITION | Very Good | Good | Moderate | Poor          | Very Poor |
| COMMENTS:                  |           |      |          |               |           |

## VISUAL ASSESSMENT : BLOCK PAVEMENTS



ROAD AUTHORITY : \_\_\_\_\_ ROUTE CLASS : 

|      |         |       |   |    |
|------|---------|-------|---|----|
| 1    | 2       | 3     | 4 | 5  |
| VL   | L       | M     | H | VH |
| Flat | Med     | Steep |   |    |
| Flat | Rolling | Mount |   |    |

REGION / SUBURB : \_\_\_\_\_ TRAFFIC : \_\_\_\_\_

ROAD NO / STREET NAME : \_\_\_\_\_ GRADIENT : \_\_\_\_\_

\_\_\_\_\_ TERRAIN : \_\_\_\_\_

SEGMENT (FROM - TO) : \_\_\_\_\_

SEGMENT DIMENSIONS : LENGTH \_\_\_\_\_ m WIDTH \_\_\_\_\_ m

BLOCK SHAPE : 

|     |     |     |
|-----|-----|-----|
| S-A | S-B | S-C |
|-----|-----|-----|

 LAY PATTERN : 

|    |    |    |    |
|----|----|----|----|
| HB | SB | BW | OT |
|----|----|----|----|

BLOCK THICKNESS (mm) : \_\_\_\_\_ CHAMFER : 

|    |   |    |
|----|---|----|
| 45 | R | 90 |
|----|---|----|

### ENGINEERING ASSESSMENT

|                                      | TEXTURE |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
|--------------------------------------|---------|---|---------|---|---|--------|---|---|---|---|----------|---|-----------|---|---|---|
|                                      | DEGREE  |   |         |   |   | EXTENT |   |   |   |   |          |   |           |   |   |   |
|                                      | MINOR   |   | WARNING |   |   | SEVERE |   |   |   |   | ISOLATED |   | EXTENSIVE |   |   |   |
|                                      | 0       | 1 | 2       | 3 | 4 | 5      | 1 | 2 | 3 | 4 | 5        | 1 | 2         | 3 | 4 | 5 |
| SPALLED / CRACKED / BROKEN BLOCKS    |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| BLOCK SURFACE INTEGRITY (DURABILITY) |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| LOSS OF JOINTING SAND                |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| EDGE RESTRAINT / ANCHOR BEAM DAMAGE  |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| RUTTING                              |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| POTHoles / PATCHING / REINSTATEMENTS |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |
| UNDULATIONS / SHOING                 |         |   |         |   |   |        |   |   |   |   |          |   |           |   |   |   |

### FUNCTIONAL ASSESSMENT

|                     |           |           |              |              |             |           |
|---------------------|-----------|-----------|--------------|--------------|-------------|-----------|
| ROUGHNESS           | Very Good | Good      | Moderate     | Poor         | Very Poor   |           |
| Problem             | failures  | potholes  | loose blocks | undulations  |             |           |
| SKID RESISTANCE     | Very Good |           | Good         | Moderate     | Poor        | Very Poor |
| SURFACE DRAINAGE    | Adequate  |           | Inconsistent | Inadequate   |             |           |
| Problem             | rutting   | shoulders | profile      | failures     | side drains |           |
| SHOULDERS (unpaved) | None      |           | Safe         | Inconsistent | Unsafe      |           |
| Problem             | eroded    | overgrown | inclined     | too high     | too narrow  |           |

### SUMMARY

|                            |                   |       |          |                   |           |
|----------------------------|-------------------|-------|----------|-------------------|-----------|
| OVERALL PAVEMENT CONDITION | Very Good         | Good  | Moderate | Poor              | Very Poor |
| COMMENTS:                  |                   |       |          |                   |           |
| OTHER PROBLEMS             | service crossings | trees | moles    | mechanical damage |           |

# Assessment forms

| MATERIAL INFORMATION / GRAVEL PROPERTIES  |            |            |             |             |              |            |
|---|------------|------------|-------------|-------------|--------------|------------|
| MATERIAL TYPE                             | Ferricrete | Calcrete   | Quartzite   | Chert       | Dolomite     |            |
|   | Sandstone  | Granite    | Shale       | Dolorite    | Varies       |            |
| MATERIAL QUALITY                          | Very Good  | Good       | Moderate    | Poor        | Very Poor    |            |
|   |            | Problem    | oversize    | clay/silt   | loose gravel | loose sanc |
| MAXIMUM SIZE                              |            | < 13 mm    | 13 - 25 mm  | 25 - 50 mm  | > 50 mm      |            |
| GRADING                                   |            | Coarse     | Medium      | Fine        |              |            |
| ESTIMATED 'PI'                            |            | < 6        | 6 - 12      | > 12        |              |            |
| LAYER THICKNESS                           | 0 mm       | 25 - 50 mm | 50 - 100 mm | 100 - 125mm | > 125mm      |            |
| EXPOSED SUBGRADE                          |            | none       | isolated    | frequent    | continious   |            |
| SUBGRADE QUALITY                          | Very Good  | Good       | Moderate    | Poor        | Very Poor    |            |
|   |            | Problem    |             | wet         | clay/mud     | sand       |
| SURFACE DISTRESS / ENGINEERING ASSESSMENT |            |            |             |             |              |            |

| MATERIAL INFORMATION / GRAVEL PROPERTIES  |           |             |             |            |              |            |
|---|-----------|-------------|-------------|------------|--------------|------------|
| MATERIAL QUALITY                          | Very Good | Good        | Moderate    | Poor       | Very Poor    |            |
|   |           | Problem     | oversize    | clay/silt  | loose gravel | loose sand |
| MAXIMUM SIZE                              |           | < 13 mm     | 13 - 25 mm  | 25 - 50 mm | > 50 mm      |            |
| GRADING                                   |           | Coarse      | Medium      | Fine       |              |            |
| ESTIMATED 'PI'                            |           | Low         | Medium      | High       |              |            |
| LAYER THICKNESS                           | > 125mm   | 100 - 125mm | 50 - 100 mm | 25 - 50mm  | < 25mm       |            |
| EXPOSED SUBGRADE                          |           | none        | isolated    | frequent   | continious   |            |
| SUBGRADE QUALITY                          |           |             | Good        | Moderate   | Poor         |            |
|   |           | Problem     |             | wet        | clay/mud     | sand       |
| SURFACE DISTRESS / ENGINEERING ASSESSMENT |           |             |             |            |              |            |



| SEGMENT DIMENSIONS                               |            | LENGTH     |             |             | WIDTH        |          |           |
|--|------------|------------|-------------|-------------|--------------|----------|-----------|
| <b>MATERIAL INFORMATION / GRAVEL PROPERTIES</b>  |            |            |             |             |              |          |           |
| MATERIAL TYPE                                    | Ferricrete | Calcrete   | Quartzite   | Chert       | Dolorite     |          |           |
|  | Sandstone  | Granite    | Shale       | Dolorite    | Various      |          |           |
| <b>MATERIAL QUALITY</b>                          | Very Good  | Good       | Moderate    | Poor        | Very Poor    |          |           |
|  |            | Problem    | oversize    | clay/silt   | loose gravel | loose    |           |
| MAXIMUM SIZE                                     |            | < 13 mm    | 13 - 25 mm  | 25 - 50 mm  | > 50 mm      |          |           |
| GRADING  |            | Coarse     | Medium      | Fine        |              |          |           |
| ESTIMATED 'PI'                                   |            | < 6        | 6 - 12      | > 12        |              |          |           |
| LAYER THICKNESS                                  | 0 mm       | 25 - 50 mm | 50 - 100 mm | 100 - 125mm | > 125mm      |          |           |
| EXPOSURED SUBGRADE                               |            | none       | isolated    | frequent    | continuous   |          |           |
| <b>SUBGRADE QUALITY</b>                          | Very Good  | Good       | Moderate    | Poor        | Very Poor    |          |           |
|  |            | Problem    |             | wet         | clay/mud     | severe   |           |
| <b>SURFACE DISTRESS / ENGINEERING ASSESSMENT</b> |            |            |             |             |              |          |           |
|  |            |            | DEGREE      |             | EXTENT       |          |           |
|  |            |            | MINOR       | WARNING     | SEVERE       | ISOLATED | EXTENSIVE |



*Happy Assessing*

*Thank you*

