SAMPLING PROCEDURE FOR PAVEMENT CONDITION EVALUATION OF LOCAL COLLECTORS AND ACCESS ROADS

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ABSTRACT

Road surface condition evaluation involves the collection of a lot of data on different types of distresses. The exercise consumes a lot of resources if the whole road section length is surveyed and may be prone to errors as a result of surveyors' fatigue. It is therefore important to develop a representative sample to be used when evaluating road condition manually. This study aimed at determining an adequate sample size for condition evaluation of local collector and access roads in urban areas in Tanzania. Two such roads namely Lufungira and Kilimahewa roads respectively were selected for the study. It is recommended that a section sample of 20 m long from the beginning of a 100 m section be used in evaluating the pavement surface condition of such roads. This will result in a reasonably accurate representation of the condition of the whole section with huge savings in resources.

Keywords: *Pavement condition evaluation, road sampling, pavement management, pavement maintenance/rehabilitation.*

1. INTRODUCTION

1.1 Background

Pavement condition information is used to evaluate the current condition, determine rate of deterioration, project future condition, determine maintenance and rehabilitation (M & R) needs, and determine the costs to repair pavement segments. It is also used to establish M & R strategies and is often used to help prioritise M & R fund expenditures (FHWA, 1995). Since so many decisions supported by the Pavement Management System (PMS) are based on the condition assessment, it is important to ensure that the data collected and used is accurate enough to provide the desired level of support. However, since the collection of condition data is the most expensive portion of maintaining the PMS, the cost must be matched to the resources and needs of the adopting agency (FHWA, 1995).

Pavement condition information is important to the overall planning and budgeting of pavement M & R activities. Road surface condition evaluation requires the collection of data of different types of distresses for the whole road network. This process therefore requires a lot of financial resources and time input by labour that cannot be afforded by most authorities overseeing road networks. The exercise is also prone to errors as a result of evaluators' fatigue following long hours of work.

Sampling is conducted by measuring information about a part of the whole that can be used to estimate something about the whole (Thompson, 1992). Standard sampling techniques are used to avoid collecting "unrepresentative" data that could bias the estimates (ASTM, 1992; Brush, 1988). Sampling can be conducted on a network or section basis. The road network is usually divided into homogeneous sections, usually 100 m long in urban area (TRRL, 1987). If individual sections are to be identified as needing maintenance or rehabilitation in the PMS, then the condition of each section must be known. However, this does not mean 100 per cent of the area of the section must be inspected; only a portion of each section can be surveyed by using section sampling (FHWA, 1995). A section sample can be taken and evaluated and the condition observed taken to represent the condition of the whole road section resulting in savings in resources.

This study was therefore aimed at determining a cost-effective section sample for evaluating section condition i.e. a sample that will most accurately predict the condition while minimising resource requirement. The study focuses on local collectors and access roads which form the majority of roads in

municipalities and which are most likely not to be surveyed due to huge resource requirements and perceived less importance. The two lower class roads, i.e. local collectors and access roads, have been particularly targeted because they are also less likely to be surveyed using automated means and the use of a representative sample is more applicable in the case of manual procedure. Local municipalities also face financial crises thus need such initiatives to cut costs on manual surveys while preserving the roads.

1.2 Objective and Scope

The aim of this study was to identify the most cost-effective road section sample size for determining the section condition for local collector and access roads.

The sampling procedure is for section sampling and not network sampling as in most cases the condition of each road section will have to be known so as to plan for needs at the programming and preparation stages. The study is also limited to bituminous pavements and sampling from the beginning of the section as opposed to random selection of subsections. Random selection of subsections as samples is complicated and is not in line with the aim of simplifying the evaluation activity.

2. DEVELOPMENT OF A PAVEMENT CONDITION EVALUATION PROCEDURE

There is no standardised system for rating pavement condition in Tanzania, and consequently no procedure has been adopted for surveying the condition. Before developing a sampling procedure, this study therefore had to develop an index that will be used to evaluate pavement condition. After a thorough review of different indices used throughout the world, the study found the use of the Pavement Condition Index (PCI) to be most appropriate.

Surface distress is damage observed on the pavement surface. Distress surveys are performed to determine the type, severity, and extent or quantity of surface distress. This information is often used to determine a pavement condition index (PCI), which helps compute a rate of deterioration, and is often used to project future condition (Shahin and Kohn, 1979). Surface distress and the current or future PCI values are often used to help identify the type of maintenance treatment needed, timing of maintenance and rehabilitation as well as the fund needs in the PMS process.

Distress surveys can be conducted manually or they can use equipment. In either case, the surface of the pavement is viewed and evaluation is made to determine the type, severity and extent of distresses present on the pavement surface. The type of distress tells what type of damage has developed. The severity tells how bad the damage is. Extent tells how much of the type and severity of damage that is present. All three of these are required to get a full picture of the damage that has developed on the pavement surface and are used to determine the type and timing of maintenance, rehabilitation and reconstruction (FHWA, 1995). The mathematical expression for pavement condition rating (PCI) provides an index reflecting the composite effects of varying distress types, severity, and extent upon the overall condition of the pavement. A Pavement Condition Index (PCI) scale was developed to describe the pavement condition. The scale ranges from 0 to 100, where a PCI of 100 describes a perfect pavement with no observable distresses while 0 describes the worst pavement condition.

The model for computing PCI is based upon the summation of deduct points for each type of observable distress. Deduct values are a function of distress type, severity, and extent. Deduction for each distress type is calculated by multiplying distress weight times the weights for severity and extent of the distress. Distress weight is the maximum number of deductible points for each distress type. The mathematical expression for PCI is as follows:

$$PCI = 100 - \sum_{i=1}^{n} distress\ score \qquad (1)$$

where

n = number of observable distresses; and

distress score = (weight for distress)(weight for severity)(weight for extent)

The number of distress type and level of detail to collect in distress surveys depends on the intended use, method of collection and local conditions. In some areas certain types of distressed are not a problem and it is not necessary to collect data on such distress for roads in that local area (APWA, 1984). The distress types that are locally present were determined by comprehensively sampling the condition of roads and streets in Dar es Salaam. The types of distresses relevant to Tanzania and the values as well as definition of each severity and extent level were also customised.

The contribution of severity levels (i.e. low, medium, high), extent levels (occasional, frequent and extensive) are shown in Table 1. The weights for each distress type have been developed on the basis of the review of the rating methods developed in the United States, Europe, and Canada and as used in other developing and tropical countries. The framework of the adopted PCI system was borrowed from the Northwest PMS (NPMS and Kay, 1992; NPMA, 1994).

Measurements used for flexible pavement in assessing severity and extent were divided into three categories. Levels of severity were ("Low", "Medium" and "High") and levels of extent were ("Occasional", "Frequent" and "Extensive"). Each level was given a value which was used to compute the distress score of a given distress type.

Table 1: Distress weights contributing to PCI deduct scores

Distress Type	Distress Weight	Severity Weight			Extent Weight		
		L	M	H	O	F	E
Ravelling	10	0.3	0.6	1.0	0.5	0.8	1.0
Bleeding	5	0.8	0.8	1.0	0.6	0.9	1.0
Corrugation & Shoving	5	0.4	0.8	1.0	0.5	0.8	1.0
Rutting	10	0.3	0.7	1.0	0.6	0.8	1.0
Potholes	10	0.4	0.7	1.0	0.5	0.8	1.0
Patching	5	0.3	0.6	1.0	0.6	0.8	1.0
Settlement	10	0.5	0.7	1.0	0.5	0.8	1.0
Crack Sealing Condition	5	1.0	1.0	1.0	0.5	0.8	1.0
Alligator Cracking	15	0.4	0.7	1.0	0.5	0.7	1.0
Longitudinal Cracking	5	0.4	0.7	1.0	0.5	0.7	1.0
Edge Cracking	5	0.4	0.7	1.0	0.5	0.7	1.0
Random Cracking	5	0.4	0.7	1.0	0.5	0.7	1.0
Block & Transverse Cracking	10	0.4	0.7	1.0	0.5	0.7	1.0

* L = Low, M = Medium, H = High
* O = Occasional, F = Frequent, E = Extensive

3. STUDY PROCEDURE

3.1 Criteria for site selection

The project sites were chosen if they met the following criteria:

- Roads with low to medium traffic volume in order to avoid accidents and conveniently collect data.
- Roads with as many types of distresses as possible.

Lufungira and Kilimahewa roads were selected for the study. Lufungira Road is a local collector bituminous road joining Sam Nujoma and Shekilango roads. The road length is about 950 m and the carriageway width is 6.1 m, with unpaved shoulders. Kilimahewa Road is an access bituminous road within the University of Dar es Salaam and is about 550 m long with a carriageway width of 5 m, with unpaved shoulders.

3.2 Data Collection

The sampling procedure is based on visual inspection of pavement distress, whereby a standard road section of 100 m was used. This was then divided into ten smaller sub-sections of 10 m each used to build onto the different section sample sizes. Condition survey was carried out on five samples which were 10 m, 20 m, 30 m, 40 m and 50 m long from the beginning of the section. It was assumed that sampling is unlikely to be cost-effective if more than half of the road section is surveyed. Finally, the whole road section i.e. 100 m was surveyed to get the actual condition for comparison with the condition obtained from different sample sizes.

The following information was collected during the pavement survey:

1. Distress Type - identifying each type of distress.
2. Distress Severity - the level of severity of each distress present showing the degree of deterioration of the pavement.
3. Distress Extent - relative area affected by each combination of distress type and severity.

The information was processed to obtain PCI values for each road section sample and for whole section.

Tables 2 and 3 show the results of the condition surveys for Lufungira and Kilimahewa roads respectively. Detailed data for each distress surveyed and computation of the PCI values are shown in the Appendix.

Table 2: Summary of actual and sample PCI values for Lufungira road

SECTION	SECTION SAMPLES PCI					ACTUAL PCI
	10 m	20 m	30 m	40 m	50 m	100 m
1	96.20	91.80	90.20	89.60	89.00	88.50
2	96.25	93.75	90.30	91.00	90.30	91.00
3	94.50	87.75	88.25	86.75	87.80	85.85
4	95.20	94.50	94.50	94.50	94.50	94.50
5	90.80	90.20	89.50	89.50	89.50	89.50
6	93.70	89.50	89.50	89.15	90.35	89.15
7	95.20	92.80	92.80	93.60	91.30	88.55
8	95.20	94.05	93.00	91.25	88.15	85.90
9	92.70	88.60	88.60	88.60	88.60	87.10
Average	94.42	91.44	90.74	90.44	89.94	88.89

Table 3: Summary of actual and sample PCI values for Kilimahewa road

SECTION	SECTION SAMPLES PCI					ACTUAL PCI
	10 m	20 m	30 m	40 m	50 m	100 m
1	81.00	80.30	77.30	78.80	77.60	77.70
2	85.00	79.50	81.00	80.10	79.10	73.50
3	83.50	77.05	74.25	74.25	74.25	68.55
4	83.00	77.65	73.90	73.90	73.90	68.25
5	78.50	80.00	74.15	73.35	73.35	68.85
Average	82.20	78.90	76.12	76.08	75.64	71.37

4. DATA ANALYSIS AND DISCUSSION OF RESULTS

Tables 4 and 5 show the analysis of errors and correlation for samples of different sizes for Lufungira and Kilimahewa roads respectively. An error is the difference between the section sample PCI and the actual PCI, while the percentage error represents the ratio between the error and the actual PCI.

It is obvious from the results that section samples of 10 m long cannot be used as the errors are above the PCI of 5 recommended as allowable error by Shahin and Walther (1990). For Lufungira (local collector) and Kilimahewa (access) roads, section samples of 20 m to 50 m and 30 m to 50 m respectively show acceptable errors and standard deviations. The coefficient of determination, R^2, is approximately the same for section samples of 20 m and 30 m long for both roads. From the correlation point of view, 20 m long samples would be recommended but if allowable error is taken into account, the 20 m long section sample of Kilimahewa access road will not meet the criteria. As any condition estimation with a PCI error of less than 5 is considered to be acceptable, section lengths from 20 m up to 50 m for Lufungira road can be used while section lengths of 30 m up to 50 m for Kilimahewa road can be used.

However, since the Kilimahewa access road condition was poorer and since results have shown that the better the road condition the less the size of the required sample, it is recommended that a 20 m section sample be adopted. However, for badly deteriorated roads and roads with great variations in condition (as shown by the standard deviation for Kilimahewa road), a 30 m section may be considered.

Table 4: Analysis of errors and correlation for samples of different sizes on Lufungira road

Item	Section sample				
	10 m	20m	30 m	40 m	50 m
Error for section 1	7.70	3.30	1.70	1.10	0.50
Error for section 2	5.25	2.75	0.70	0.00	0.70
Error for section 3	8.65	1.90	2.40	0.90	1.95
Error for section 4	0.70	0.00	0.00	0.00	0.00
Error for section 5	1.30	0.70	0.00	0.00	0.00
Error for section 6	4.55	0.35	0.35	0.00	1.20
Error for section 7	6.65	4.25	4.25	5.05	2.75
Error for section 8	9.30	8.15	7.10	5.35	2.25
Error for section 9	5.60	1.50	1.50	1.50	1.50
Average error	5.52	2.54	2.00	1.54	1.21
Percent average error (%)	5.85	2.78	2.20	1.71	1.34
Standard deviation	3.00	2.53	2.34	2.15	0.99
Standard error	2.85	2.44	2.50	2.18	1.17
R^2	0.0201	0.2808	0.2461	0.4275	0.8348

Table 5: Analysis of errors and correlation for samples of different sizes on Kilimahewa road

Section	Section sample				
	10 m	20 m	30 m	40 m	50 m
Error for section 1	3.30	2.60	0.40	1.10	0.10
Error for section 2	11.50	6.00	7.50	6.60	5.60
Error for section 3	14.95	8.50	5.70	5.70	5.70
Error for section 4	14.75	9.40	5.65	5.65	5.65
Error for section 5	9.65	11.15	5.30	4.50	4.50
Average error	10.83	7.53	4.91	4.71	4.31
Percent average error (%)	13.18	9.54	6.45	6.19	5.70
Standard deviation	4.77	3.32	2.66	2.15	2.41
Standard error	4.78	3.50	3.46	2.43	2.70
R^2	0.0013	0.4649	0.4765	0.7416	0.6819

The findings and recommendations are also within the limits of international practice. First, the allowable error of 5 PCI which is the standard for the PAVER system (which established the PCI) has been used in determining the sample size. The findings also agree with the suggestions for evaluating PCI as stated by Shahin and Walter (1990) as follows; "Based on the number of sample units in the total section, a certain number of these units are selected, for example, if there are 40 or more sample units, 10% are surveyed". Consequently, the 20 to 40% sample size will be an acceptable sample for the 10 units. The results are also within the limits described in ASTM International (2003) which specifies sample rates of up to 50%.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

It can be concluded that in surveying the condition of urban local collector and access roads, a 20 m section sample out of 100 m section length (the first 20% of the section length) can be used to produce accurate condition data with great savings in time, labour and financial resources.

5.2 Recommendations

It is recommended that a 20 m section sample out of 100 m section length be used in surveying the condition of urban local collector and access roads. A 30 m long section sample may be considered for badly deteriorated roads and roads with large variations in condition along the section.

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APPENDIX

Table A.1: Deduct scores and PCI values for section 1 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.00	2.80	2.80	2.80	2.80	3.50
Longitudinal cracks	-	1.00	1.00	1.00	1.00	1.40
Block cracks	-	2.00	2.00	2.00	2.00	2.00
Bleeding	1.80	2.40	4.00	3.60	3.60	3.60
Shoving	-	-	-	1.00	1.60	1.00
∑ Deduct score	3.80	8.20	9.80	10.40	11.00	11.50
PCI-Value	96.20	91.80	90.20	89.60	89.00	88.50

Table A.2 Deduct scores and PCI values for section 2 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.00	3.50	3.50	3.50	3.50	3.50
Longitudinal cracks	-	1.00	2.45	1.75	2.45	1.75
Edge cracks	1.75	1.75	1.75	1.75	1.75	1.75
Block cracks	-	-	2.00	2.00	2.00	2.00
∑ Deduct score	3.75	6.25	9.70	9.00	9.70	9.00
PCI-Value	96.25	93.75	90.30	91.00	90.30	91.0

Table A.3 Deduct scores and PCI values for section 3 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	3.50	3.50	3.50	3.50	3.50	3.50
Longitudinal cracks	-	1.75	1.75	1.75	1.75	2.00
Edge cracks	-	5.00	3.50	3.50	2.45	1.75
Block cracks	2.00	2.00	2.00	3.50	3.50	3.50
Shoving	-	-	1.00	1.00	1.00	1.00
Bleeding	-	-	-	-	-	2.40
∑ Deduct score	5.50	12.25	11.75	13.25	12.20	14.15
PCI-Value	94.5	87.75	88.25	86.75	87.80	85.85

Table A.4 Deduct scores and PCI values for section 4 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.80	3.50	3.50	3.50	3.50	3.50
Longitudinal cracks	2.00	2.00	2.00	2.00	2.00	2.00
∑ Deduct score	4.80	5.50	5.50	5.50	5.50	5.50
PCI-Value	95.20	94.50	94.50	94.50	94.50	94.50

Table A.5 Deduct scores and PCI values for section 5 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.80	2.80	3.50	3.50	3.50	3.50
Longitudinal cracks	1.40	2.00	2.00	2.00	2.00	2.00
Edge cracks	5.00	5.00	5.00	5.00	5.00	5.00
∑ Deduct score	9.20	9.80	10.50	10.50	10.50	10.50
PCI-Value	90.80	90.20	89.50	89.50	89.50	89.50

Table A.6 Deduct scores and PCI values for section 6 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	4.90	4.90	4.90	3.50	3.50	3.50
Longitudinal cracks	1.40	2.00	2.00	2.00	2.00	2.00
Edge cracks	-	-	-	1.75	1.75	1.75
Bleeding	-	3.60	3.60	3.60	2.40	3.60
∑ Deduct score	6.30	10.50	10.50	10.85	9.65	10.85
PCI-Value	93.70	89.50	89.50	89.15	90.35	89.15

Table A.7 Deduct scores and PCI values for section 7 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.80	2.80	2.80	2.00	2.80	2.80
Longitudinal cracks	2.00	2.00	2.00	2.00	2.00	2.00
Edge cracks	-	-	-	-	-	1.75
Ravelling	-	-	-	-	1.50	1.50
Shoving	-	-	-	-	-	1.00
Bleeding	-	2.40	2.40	2.40	2.40	2.40
∑ Deduct score	4.80	7.20	7.20	6.40	8.70	11.45
PCI-Value	95.20	92.80	92.80	93.60	91.30	88.55

Table A.8 Deduct scores and PCI values for section 8 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.80	3.50	3.50	3.50	3.50	3.50
Longitudinal cracks	2.00	2.45	3.50	3.50	2.45	3.50
Edge cracks	-	-	-	1.75	3.50	3.50
Bleeding	-	-	-	-	2.40	3.60
∑ Deduct score	4.80	5.95	7.00	8.75	11.85	14.10
PCI-Value	95.20	94.05	93.00	91.25	88.15	85.90

Table A.9 Deduct scores and PCI values for section 9 of Lufungira road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.00	2.00	2.00	2.00	2.00	3.50
Longitudinal cracks	1.40	2.00	2.00	2.00	2.00	2.00
Edge cracks	-	3.50	3.50	3.50	3.50	3.50
Ravelling	1.50	1.50	1.50	1.50	1.50	1.50
Bleeding	2.40	2.40	2.40	2.40	2.40	2.40
∑ Deduct score	7.30	11.40	11.40	11.40	11.40	12.90
PCI-Value	92.70	88.60	88.60	88.60	88.60	87.10

Table B.1 Deduct scores and PCI values for section 1 of Kilimahewa road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	2.00	2.00	3.50	2.00	2.00	2.00
Longitudinal cracks	-	1.40	1.40	1.40	1.40	1.00
Edge cracks	5.00	5.00	5.00	5.00	5.00	5.00
Patching	-	1.80	1.80	1.80	3.00	2.40
Ravelling	-	-	1.50	1.50	1.50	2.40
Potholes	4.00	3.50	3.50	3.50	3.50	3.50
Rutting	8.00	6.00	6.00	6.00	6.00	6.00
∑ Deduct score	19.00	19.70	22.70	21.20	22.40	22.30
PCI-Value	81.00	80.30	77.30	78.80	77.60	77.70

Table B.2 Deduct scores and PCI values for section 2 of Kilimahewa road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	-	2.00	2.00	2.00	2.00	2.00
Longitudinal cracks	-	-	-	1.40	1.40	2.00
Edge cracks	5.00	5.00	3.50	5.00	5.00	5.00
Ravelling	10.00	10.00	10.00	8.00	8.00	5.00
Patching	-	-	-	-	1.00	3.00
Potholes	-	3.50	3.50	3.50	3.50	3.50
Rutting	-	-	-	-	-	6.00
∑ Deduct score	15.00	20.50	19.00	19.90	20.90	26.50
PCI-Value	85.00	79.50	81.00	80.10	79.10	73.50

Table B.3 Deduct scores and PCI values for section 3 of Kilimahewa road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	-	2.00	2.00	2.00	2.00	2.00
Longitudinal cracks	1.00	2.45	2.00	2.00	2.00	3.50
Edge cracks	5.00	5.00	5.00	5.00	5.00	5.00
Alligator cracks	-	3.00	5.25	5.25	5.25	5.25
Ravelling	-	-	-	-	-	2.40
Potholes	3.50	3.50	3.50	3.50	3.50	3.50
Rutting	7.00	7.00	8.00	8.00	8.00	8.00
Patching	-	-	-	-	-	1.80
∑ Deduct score	16.50	22.95	25.75	25.75	25.75	31.45
PCI-Value	83.50	77.05	74.25	74.25	74.25	68.55

Table B.4 Deduct scores and PCI values for section 4 of Kilimahewa road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Transverse cracks	-	3.50	3.50	3.50	3.50	3.50
Longitudinal cracks	-	2.50	1.75	1.75	1.75	1.75
Edge cracks	5.00	5.00	5.00	5.00	5.00	5.00
Alligator cracks	-	-	5.25	5.25	5.25	7.50
Ravelling	3.00	2.45	1.50	1.50	1.50	3.00
Potholes	2.00	2.00	3.50	3.50	3.50	5.00
Rutting	7.00	7.00	5.60	5.60	5.60	6.00
∑ Deduct score	17.00	22.35	26.10	26.10	26.10	31.75
PCI-Value	83.00	77.65	73.90	73.90	73.90	68.25

Table B.5 Deduct scores and PCI values for section 5 of Kilimahewa road

Distress	SECTION SAMPLE LENGTH					
	10 m	20 m	30 m	40 m	50 m	100 m
Alligator cracks	3.00	3.00	3.00	3.00	3.00	7.50
Edge cracks	5.00	3.50	2.45	1.75	1.75	1.75
Ravelling	10.00	10.00	10.00	10.00	10.00	10.00
Potholes	3.50	3.50	3.50	5.00	5.00	5.00
Patching	-	-	0.90	0.90	0.90	0.90
Rutting	-	-	6.00	6.00	6.00	6.00
∑ Deduct score	21.50	20.00	25.85	26.65	26.65	31.15
PCI-Value	78.50	80.00	74.15	73.35	73.35	68.85