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Pavement Condition Data Collection and Evaluation of Riyadh Main Street Network

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Abstract. Pavement condition data is an essential component of any Pavement Management System (PMS). The general purposes of pavement condition data collection and evaluation are to determine the existing pavement condition at the time of inspection, to establish the immediate pavement maintenance needs and to plan for future needs. Riyadh city, capital of the Kingdom of Saudi Arabia, is in the process of developing Pavement Maintenance Management System (PMMS) for the city street network. Pavement data collection and evaluation is one of the system's main components. Pavement condition included structural capacity, roughness, visual condition survey and skid resistance. Structural capacity data was determined using a Dynatest Falling Weight Deflectometer (FWD). Roughness measurements were collected using May's Ride Meter (MRM). Visual condition survey involved developing a distress evaluation form. The form included type, density and severity of the common type of distress found in the network. Skid resistance measurements were collected using Mu meter. The main objectives of this paper are to describe the procedures used to collect pavement condition data and to evaluate the pavement condition data of the city main street network. In general the paper presents the experience of the Riyadh city in collecting and evaluating pavement condition data. The analysis indicated that pavement condition of the city is in good and acceptable condition. However, more attention should be directed to improve skid resistance of the pavement network.

Introduction

Pavement management system (PMS) is becoming widely used for efficient management of highways networks at all levels of government. Regardless of the size of the highway network or the sophistication of the PMS procedure, most PMS strategies can offer assistance at two levels: the network level and the project level. Network level information provides management with broad-based data about the entire system. Information for planning purposes and fiscal analysis is often provided by the network data. On the other hand, project level information can include specific details about engineering design, construction and cost accounting. Obviously the data required for each level differs considerably.

The general purposes of pavement condition evaluation at network level are to assess the existing pavement condition, establish the immediate pavement maintenance needs and to plan for future needs. Pavement evaluation are also used to determine priorities among projects combating for limited funds, estimate short and long term budgets and predict future pavement performance.

Twenty years ago, the area of the city of Riyadh was about 75 km^2. During this period the city was in competition with time to develop its main infrastructures. Today, the city has been expanded to an area of about 1600 km^2. The city road network reached more than 4500 km. The development of street network to the highest standard is one of the main goals of the Riyadh Municipality in order to maintain and provide an acceptable level of riding quality to the users. Recognizing its vital role in preserving the city's street network, the Municipality is now in the process of developing a local Pavement Maintenance Management System (PMMS).

Study Objectives

The main objectives of this study are:

1) To demonstrate the procedures of pavement condition data collection used by the Riyadh city.
2) To evaluate the pavement condition of the Riyadh main street network based on data collected in 1995 and 1996.

Pavement Condition Data Collection Procedures

Pavement condition data and evaluation is the main element of the Riyadh underdeveloped PMMS. Pavement condition data included: distress survey, roughness, structural capacity and skid resistance. Pavement condition data was collected for most of the pavement sections of the network. Distress survey involved developing a distress index. The index included type, density and severity of the common types of distress found in the network. Roughness measurements were collected using May's Ride Meter (MRM). Structural capacity data was determined using Dynatest Falling Weight Deflectometer (FWD). Skid resistance measurements were collected using Mu meter. A description of the procedures used to collect pavement condition data are presented in the following sections:

Visual inspection data

The degree of pavement deterioration is a function of distress type, distress severity, and quantity or density of distress. Because of the large number of conditions possible, producing one index that would take into account all three factors was a considerable problem. To overcome this problem, "deduct values" were introduced as a type of weighing factor to indicate the degree of effect that each combination of distress type, severity level, and distress density has on pavement condition. Based on in-depth knowledge of pavement behavior, input from many experienced pavement engineers, field testing and evaluation of the procedure, and accurate descriptions of distress types, severity levels and their corresponding deduct values were derived so that a composite distress index could be determined.

Studies were carried to find out common types of distresses in Riyadh street network [1;2]. It is found that there are eleven types of basic construction distresses and four types of distresses particularly in areas of patching. These patching areas are the major damaging cause of street deterioration in the Riyadh street network. Having found the common types of distresses, it was proposed, according to the severity level, three grades of distresses. These grades are low, medium, and high. Having finalized these terms of the distresses and levels of severity, an index is developed to reflect the existing situation in Riyadh street network. A local deduct points for each distress severity level combination were established based on local professional judgment The deduct points range from 0 to 5 where 5 means the distress severity level combination has the greatest effect on pavement condition. Distress density was represented by dividing the distress representative area by the sample unit area. The index was called Urban Distress and ranges from 0 to 100 where 100 represents excellent condition. The UDI is calculated as follows [3]:

$$UDI = 100 - 20\sum\left(\frac{T_{ij} * D_i}{100}\right)$$

where,

UDI = Urban Distress Index.
T_{ij} = Deduct points for distress i and severity level j.
D_i = Density of distress i.

To enable the collection of appropriate street distress data, a team of inspectors from the General Directorate for Maintenance & Operation, Riyadh Municipality were given an extensive short course on the new developed index. Each inspector was then sent to a particular section of the network to record the existing distress types, quantities, and severity for each sample unit within that section. Collection of this information was done by actually walking through the section. The inspector's work was regularly supervised by an engineer to ensure work quality. The survey of secondary streets and intersections are still in progress [3].

Roughness data

Roughness is primarily a measure of the riding quality of the roadway pavement surface. Usually riding quality is related to serviceability, which is a measure of the physical characteristics of the pavement surface. Roughness can be defined as the summation of variations in the surface profile of a pavement.

Roughness affects the dynamics of moving vehicles and sometimes it can reach dangerous condition. Roughness increases expenditure on vehicle maintenance. It has an accountable effect on vehicle operating cost, safety, comfort, and speed of travel. Roughness creates water collpoints which combined with increased dynamic loading imposed by moving vehicles, accelerates the deterioration of the pavement structure.

There are many procedures for collecting roughness data. The International Roughness Index (IRI) was selected as the standard [4]. The IRI is a mathematically-defined statistic of the profile in the wheel path of a traveled road surface. The IRI is representative of the vertical motions caused by moving vehicles which affects both vehicle response and the comfort perceived by the occupants. In this study, the Mays Ride Meter (MRM) was used for roughness measurements. One speed is selected for roughness measurements: a standard speed of 40 ± 5 kph for all street classes. Generally, the critical lane (right or middle) was selected for roughness measurement. The critical lane is defined as the lane in a given street with utility cut patching.

The roughness measurement team consists of a driver and a roughness equipment operator. The operator was properly trained to identify each section and critical lane. Data collection and its storage at site takes place through data logger which is connected to roughness equipment. The beginning and end of a particular section are indicated on data logger by pressing the key "mark". Since roughness measurement was taken in urban streets, moving speed of vehicle carrying equipment cannot be controlled at the beginning and end of a section and because roughness readings depend on vehicle speed, roughness measurement was taken for the part of section where the speed of vehicle is in the range 40 ± 5 kph.

After covering all sections of a particular street, roughness data collected is transferred from data logger through a computer to a diskette. The code number of the street was used to name the file. This is done to facilitate easy referral whenever desired. Having surveyed a number of streets, the team return to the base station, then the operator reviews and corrects any mistakes done during that day. The operator then changes the "mark" position in the file to the identification number of the section.

Necessary calculations to find out the International Roughness Index (IRI) and Pavement Serviceability Index (PSI) for each section were performed using the roughness measurement and applying the following adjustments [5; 6]:

$$PSI = 5.0 - 0.0095 \times R - 0.14 \times LOG\ (0.63386 \times R)$$
$$IRI = -384.6154 \times LN\ (0.2 \times PSI)$$

where,

PSI = Pavement Serviceability Index,
R = Roughness Number (cm/km),
IRI = International Roughness Index (cm/km).

Structural capacity data

For many decades, the use of nondestructive deflection testing has been an integral part of the structural evaluation and rehabilitation process. The total measured pavement deflection under a particular load was used as an indicator of its structural capacity. For flexible pavements, it has been established that the maximum deflection can be correlated with the number of load repetitions [7].

The deflection value of a pavement in response to an applied load represents an overall system response of the whole pavement structure. The deflection basin or bowl consists of responses received from top face of each layer of pavement structure. Deflection values directly under the loading point is higher and decreases away from it. This is an important parameter in the analysis of pavement structure. Also, a weaker pavement structure as compared to a stronger pavement structure gives higher deflection values under the same load value. However, the shape of each basin is related to the residual strength of the individual layers of that pavement structure. Deflection data is obtained from directly beneath the loading point up to 1.5 meter.

Dynatest Falling Weight Deflectometer (FWD) was used to carry out the deflection measurements. The measurement team consists of a driver, an operator, and a pickup driver. Pickup vehicle was used to follow the measurement vehicle for safety reasons. Two deflection readings were taken for each lane per section for the network level. However, one test was measured for project level every 100 meter. Each test contains three drops, the first drop was not recorded. A load capacity of 40 KN and 60 KN for industrial areas with loading plate diameter of 300 mm were used to determine the deflection readings. The pavement's mean temperature was also measured during the survey for project level. This was done by drilling a hole about 10 cm deep into asphalt layer.

The test starts by creating a file in the computer which was installed in the vehicle. The file name consists of the code number of the street. Then the operator, in coordination with the driver, takes two tests at a random location within each section. Having tested all the sections of a particular street, the file is closed for that street, then a new file is created in the same way as described above for a new street. At the end of work day the team returns to the base station. The operator then reviews the data which was taken in that day and makes any required correction. The data is then transferred to base station.

Skid resistance data

One of the primary functions of the pavement surface is to provide good friction and steering qualities for the traveling vehicles. The term "surface friction" implies the frictional resistance of the pavement surface to a moving wheel. Thus, friction can be defined as the force developed when a tire, that is prevented from rotating, slides along the pavement surface. The ratio between tractive force and dynamic vertical load on test wheel is known as coefficient of friction. The values of friction coefficient depend upon several factors including tire pressure, tire wear, vehicle speed, environmental conditions and pavement surface materials [8].

The data used in this analysis was extracted from the overall data collection program of the Ministry of Communication's (MOC) Highway Maintenance Management System (HMMS) conducted in 1993. Only the measurements of pavement sections within Riyadh city that did not receive any maintenance since the measurements were included in the analysis. Maintenance may affect skid resistance values and produce misleading results.

The skid resistance was measured using the Mu meter equipment. The Mu meter measures the coefficient of friction between tire and pavement in the yaw mode. The procedure of skid resistance survey adopted by the MOC was well documented in previous studies [9].

Pavement Condition Evaluation

The city of Riyadh is divided into sixteen administrative and maintenance units called Branch Municipality. A branch municipality is an area defined by some main streets and may have a number of main streets within its boundary. These branch municipalities are coded with two digits between 34 and 49. The table shows the branch municipalities, the corresponding code number and the number of pavement sections included in the analysis.

In Riyadh, four performance indicators were used for determining pavement condition. These methods include Urban Distress Index (UDI), Pavement Serviceability Index (PSI), structural adequacy and skid resistance. In the following sections, pavement condition data was analyzed based on: general evaluation, branch municipality, pavement section length, pavement age, availability of drainage system and traffic level.

Table. Branch municipalities and number of pavement sections

Branch municipality	Code number	Number of sections included in the analysis			
		UDI	Roughness	Structural capacity	Skid resistance
Itaigah	34	132	123	121	-
Al Baha	35	248	-	-	-
Al Dirah	36	503	222	340	2
AL Naseem	37	362	468	472	-
Iragah	38	47	-	-	-
Al Silay	39	37	-	-	-
Al- Dariyah	40	71	-	-	-
Al Malaz	41	95	173	121	2
Al Mather	42	128	-	-	47
Al Shmal	43	294	-	-	15
Al Rawdah	44	394	292	379	-
Al Uraijah	45	178	-	-	-
Al Haiyr	46	-	-	-	-
Manfuha	47	339	-	-	11
Al Olaya	48	120	-	-	2
Al Janob	49	85	-	-	-
Total No. of sections		3023	1278	1433	81
Total length (km)		1500	733	774	148

Evaluation of Urban Distress Index (UDI)

A total of 3000 pavement sections were surveyed. This was about 55 percent of the total pavement sections in the city. The total length of these pavement sections is about 1500 km. The overall condition of Riyadh street network is excellent based on the distress survey. Figure 1 shows that 81 percent of the total number of pavement sections are in the excellent condition, which represent approximately 80 percent of the total length. However, very poor group has 0.21 percent and it has a total length of one kilometer. The average Urban Distress Index value of Riyadh pavement sections is 91 (excellent rating).

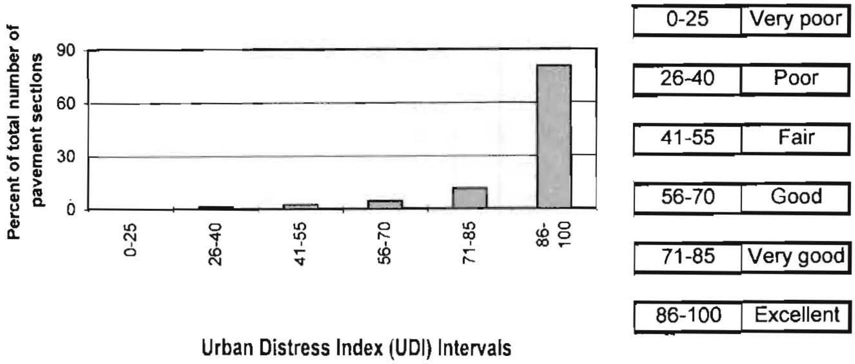

Fig. 1. Urban Distress Index (UDI) for Riyadh pavement sections.

In the branch municipality evaluation, it was found that Al-Dariyah municipality has the highest UDI value. On the other hand, pavement sections condition of Al-Silay municipality are very good as shown in Fig. 2. The rating of the remaining branch municipality based on Urban Distress Index was excellent.

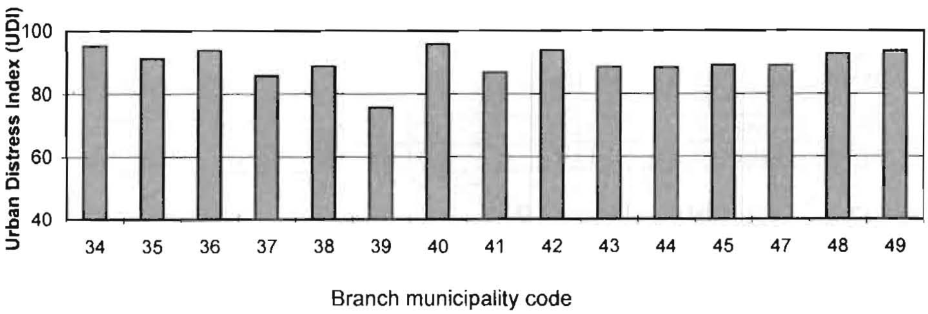

Fig. 2. Average Urban Distress Index (UDI) with branch municipality.

It is known that pavement age is one of the variables that cause rapid deterioration in pavement condition. Pavement age is measured from the date of construction or from the date of the last resurfacing. Pavement sections were grouped, based on distribution of pavement sections age in the available data, into three categories:

Young – pavement sections with age less than 4 years
Moderate – pavement sections with age from 4 to 6 years
Old – pavement sections with age greater than 6 years

The average UDI value of pavement sections within the age group are presented in Fig. 3. It is clear from the figure that UDI values decrease with the increase in pavement age.

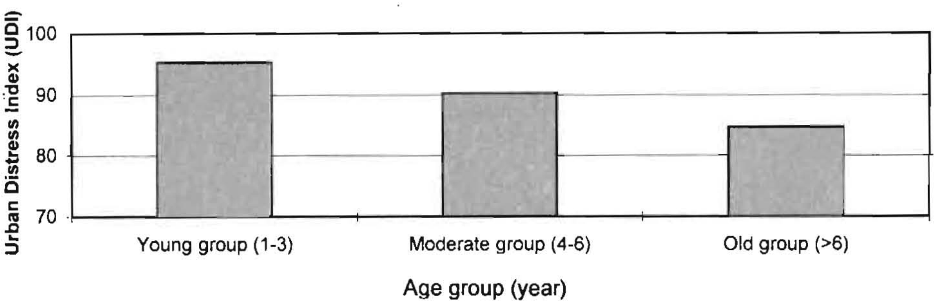

Fig. 3. Average Urban Distress Index (UDI) with pavement age group.

The second variable that can affect the condition of pavement is the availability of drainage system. Therefore, pavement sections were divided into two groups: sections with drainage system and sections without drainage system. It was expected that pavement sections with drainage system will have a better condition than those without drainage system. Figure 4 shows the average UDI value for pavement sections with and without drainage system.

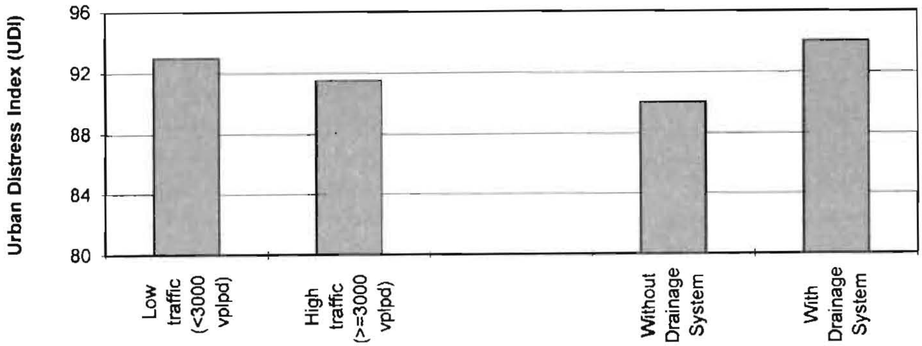

Fig. 4. Average Urban Distress Index (UDI) with traffic level and pavement drainage.

Traffic load is the third variable included in the evaluation that affect pavement condition. A number of techniques were used to measure the traffic load. Average Daily vehicles per lane per day (vplpd). It was classified into two levels; low and high. Low traffic level is less than 3000 (vplpd) and high level is more than or equal to 3000 (vplpd). The average Urban Distress Index (UDI) value for low traffic pavement sections was found to be 93, and 91 for high traffic level, as shown in Fig. 4. As expected, pavement sections tend to deteriorate more with high traffic level. However, the deterioration rate is relatively low mainly because the effect of traffic is very limited due to the fact that most of the vehicles using the city street network are passenger cars.

Evaluation of Pavement Serviceability Index (PSI)

Pavement Serviceability Index (PSI) is based on roughness measurements Pavement Serviceability Index. It is a measure of the riding quality of the pavement surface, which is a measure of the physical characteristics of the pavement surface.

The total number of pavement sections included in the analysis is 1270 with a total length of about 733 Km. This number of pavement sections represents about 25 percent of the total number of the Riyadh pavement sections. The overall evaluation of Pavement Serviceability Index is shown in Fig. 5. The total length of the good condition pavement sections is 527 km (930 pavement sections) and 173 km long of pavement sections with excellent condition. There were no poor or very poor intervals. This result confirms the result obtained in the overall evaluation of the Urban Distress Index.

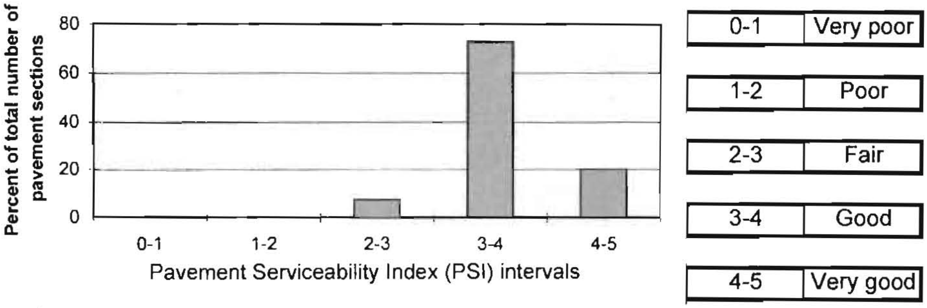

Fig. 5. Pavement Serviceability Index (PSI) for Riyadh pavement sections.

The general condition of pavement sections in the branch municipalities included in the evaluation are good. Figure 6 shows that the average PSI value of pavement sections of Al-Rawdah municipality is 3.93. This represents the highest value obtained. PSI values for the remaining branch municipalities range from 3.08 to 3.70.

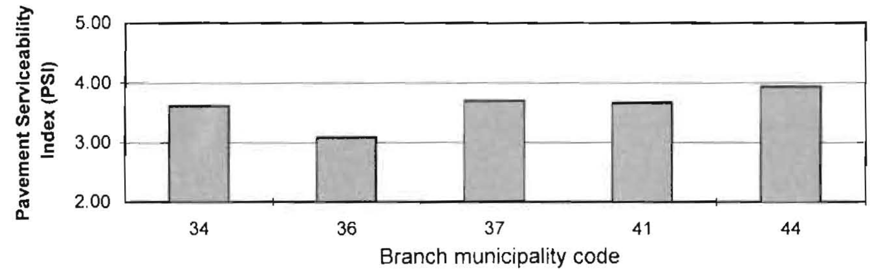

Fig. 6. Average Pavement Serviceability Index (UDI) with branch municipality.

It is known that as pavement section become older, pavement serviceability index will decrease. Figure 7 confirms this fact. Pavement sections age were also grouped into three categories. These categories were young (1-3 years), moderate (4-6 years), and old (greater than 6 years). Figure 7 shows the average pavement serviceability index value for the different age groups.

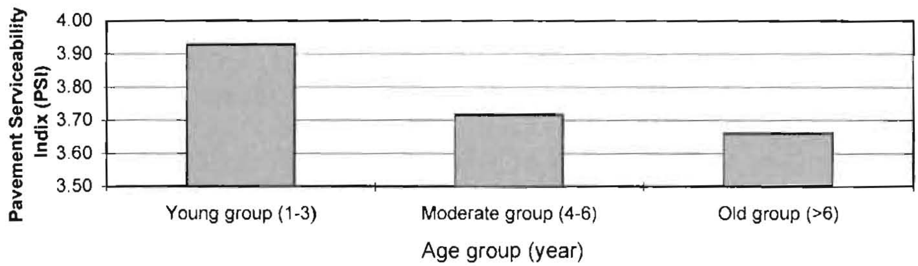

Fig. 7. Average Pavement Serviceability Index (PSI) with pavement age group.

In the evaluation of pavement serviceability index and the availability of drainage system, both pavement sections with and without drainage are in a good condition. Figure 8 shows that the average Pavement Serviceability Index value of the pavement sections with drainage is 3.55, and 3.51 for sections without drainage. The percent of the total number of pavement sections included in this particular analysis was 21 of the total Riyadh pavement sections. However, the difference in PSI values could change if more data was available.

Pavement deterioration is highly affected by traffic volume and vehicle type. As mentioned earlier, two levels of traffic is considered: high and low. The Average Daily Traffic (ADT) values were used to determine the high and low traffic levels. The evaluation of the pavement serviceability index (PSI) with respect to traffic shows that the high traffic pavement sections have low PSI values as shown in Fig. 8. The average PSI value for high traffic level pavement sections was found to be 3.60. This value indicates that these sections are in good riding condition. The average PSI value was 3.83 for low traffic pavement sections.

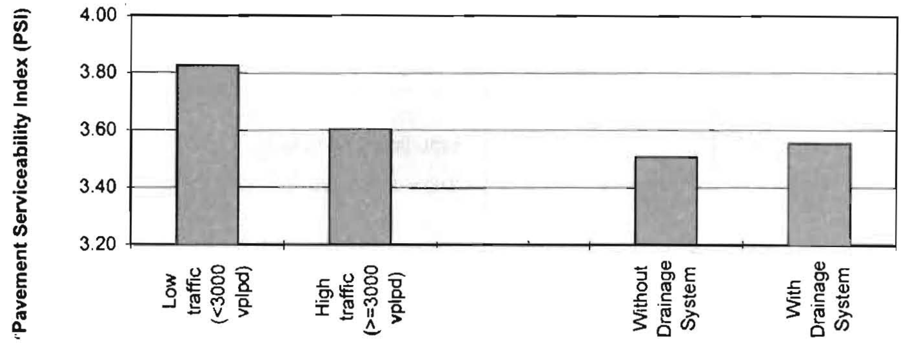

Fig. 8. Average Pavement Serviceability Index (PSI) with traffic level and pavement drainage.

Evaluation of structural adequacy

Deflection measurements are used in the evaluation of the pavement structural adequacy. Pavement deflection values were grouped into intervals of 100μm. The total number of pavement sections included in the deflection evaluation is approximately 25 percent of the total number of the Riyadh pavement sections. Figure 9 shows that the percent of total number of pavement sections within each interval. The percent of total number of pavement sections for intervals greater than 300μm is 10. This result indicates that the condition of the Riyadh street network based on pavement structural adequacy evaluation is good and acceptable.

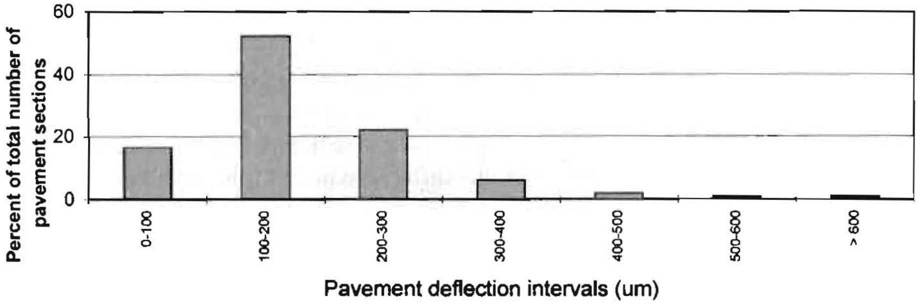

Fig. 9. Pavement deflection of Riyadh pavement sections.

The average deflection value for all branch municipalities investigated in the evaluation was in the second interval (100-200μm) except Al-Naseem municipality as shown in Figure 10. This result confirm the Urban Distress Index evaluation result. Al-Naseem municipality has the second lowest UDI value after Al-Silay municipality.

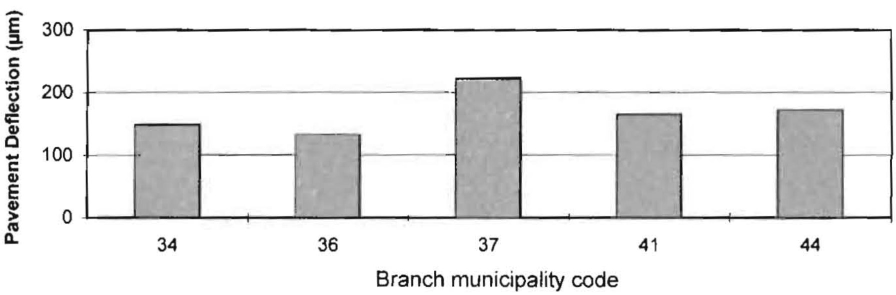

Fig. 10. Average pavement deflection with branch municipality.

Pavement age, traffic load, and drainage are the three variables that directly affect the structural adequacy of the pavement layers. However, because most of the Riyadh street network is relatively new, the differences in the average deflection values between different pavement age group are small as shown in Fig. 11.

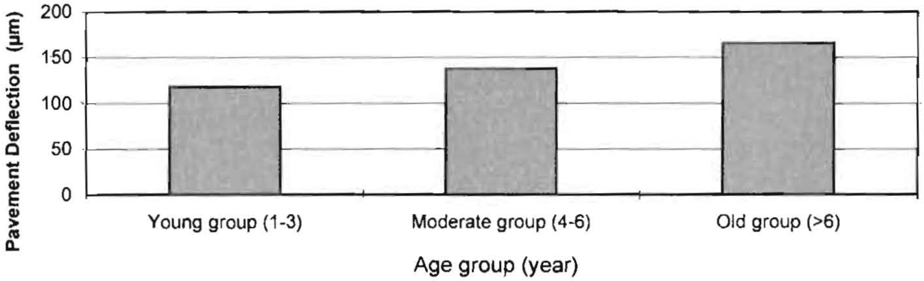

Fig. 11. Average pavement deflection with pavement age group.

Figure 12 shows that the average pavement deflection values for pavement sections with and without drainage facilities were 191 and 220μm, respectively. The total number of pavement sections included in the evaluation of drainage was approximately 21 percent of the total Riyadh pavement sections.

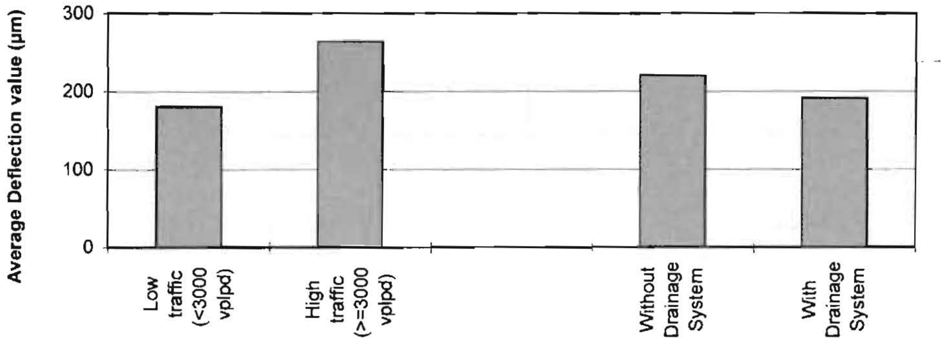

Fig. 12. Average pavement deflection with traffic level and pavement drainage.

Deflectest is usually performed on pavement sections to simulate traffic loads. This test has been carried out to find the pavement response. Based on the data which has been collected, deflection values were high for high traffic pavement sections. The analysis shows that the average pavement deflection for high traffic pavement sections is 263µm and 180µm for low traffic sections as shown in Figure 12.

Evaluation of skid resistance

The goal of skid resistance measurements is to identify the level of friction offered by the pavement surface in the field. This is typically done either directly by measuring the skid level of the pavement surface, or indirectly by measuring the surface texture. In addition to achieve the required skid resistance levels, there should be laboratory tests to measure texture and relate those measurements to observed levels of skid resistance on the road. It is known that skidding accidents occur mostly at wet pavement. Therefore, the data was obtained at wet pavement surface.

The total number of pavement sections included in the evaluation were only 5 percent of the total Riyadh street network. This is because skid resistance data was extracted from the MOC's data collection files. The MOC only test pavement sections under its jurisdiction. Two levels of pavement Skid Number (SN) values were used. An acceptable level (SN > 37) and unacceptable level (SN ≤ 37). The percent of the total number of pavement sections for the skid resistance levels are shown in Fig. 13. The figure indicated that about 15 % of the pavement network need to be corrected to increase the skid resistance.

Seven branch municipalities were included in skid resistance evaluation. The average pavement SN value of all branch municipalities are in the acceptable level. The

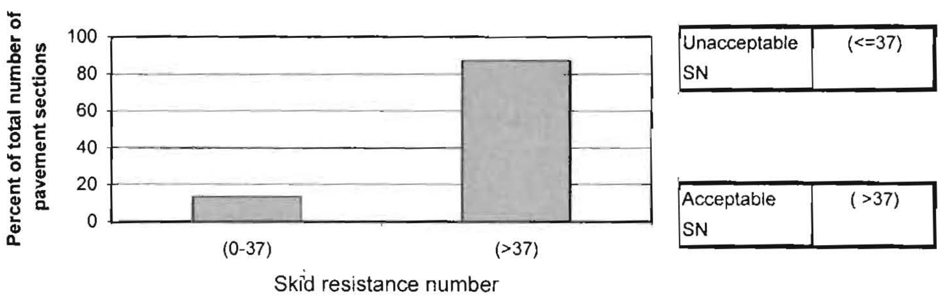

Fig. 13. Pagement skid resistance for Riyadh pavement sections.

range of pavement skid resistance values of branch municipalities were from 46 in Al-Roudah municipality to 53 in Al-Dariyah municipality as shown in Fig. 14.

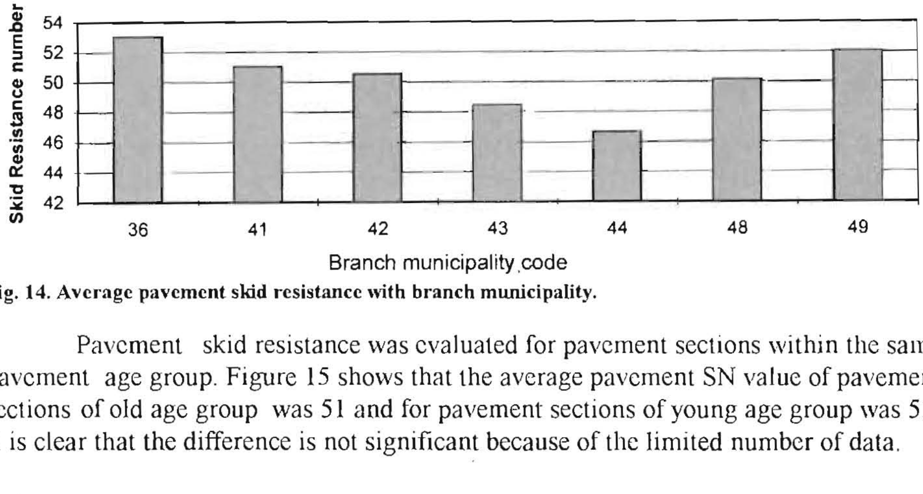

Fig. 14. Average pavement skid resistance with branch municipality.

Pavement skid resistance was evaluated for pavement sections within the same pavement age group. Figure 15 shows that the average pavement SN value of pavement sections of old age group was 51 and for pavement sections of young age group was 53. It is clear that the difference is not significant because of the limited number of data.

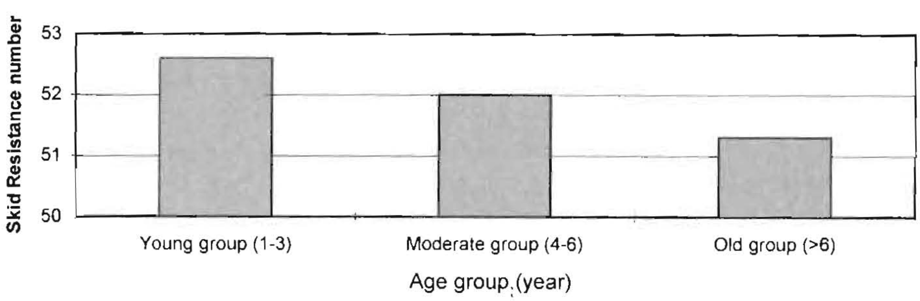

Fig. 15. Average pavement skid resistance with pavement age group.

The level of skid resistance that should be available on highway pavements to provide for safe stop of vehicles is the main question in the highway safety problem area. In this regard, dry pavement is usually quite adequate. However, wet pavement is one of the critical factors of traffic safety. Therefore, drainage is expected to be the main variable affecting in the skid resistance evaluation. Figure 16 shows the average pavement SN value of both pavement sections with and without drainage system.

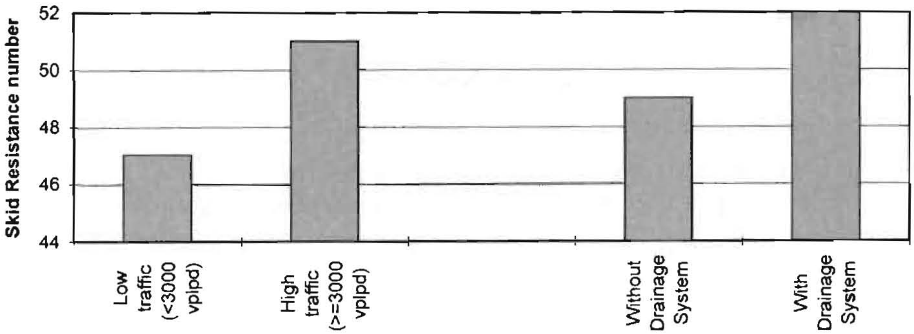

Fig. 16. Average pavement skid resistance with traffic level and pavement drainage.

To avoid accidents caused by low skidding, more attention should be directed to high traffic pavement sections. Figure 16 shows that the average pavement SN of high traffic pavement sections is 51, and 47 for low traffic pavement sections.

Conclusions

Pavement condition data is the backbone of any Pavement Maintenance Management System. A systematic and standard way of collecting pavement condition data is very important in the data evaluation and interpretation. Based on the results obtained from the sample considered in this study, the following may be concluded:

1) About 81% of the total number of pavement sections of the Riyadh main street network have an average UDI rating of "excellent" and 0.21% are in "very poor" condition.
2) The percentage of pavement sections with "very good" and "good" rating, based on roughness measurements, are about 20% and 70%, respectively.
3) The deflection measurements evaluation of the Riyadh main street network indicated that the structural capacity of the network is in good and acceptable condition. However, periodic evaluation of the network structural condition is an essential to preserve and improve the existing condition.

4) The percentage of pavement sections with unacceptable skid resistance number is about 15%. This percentage is considered to be very high. More attention should be directed to improve the skid resistance of the main street network.
5) Finally, the analysis indicated that pavements of Riyadh main street network are in very good condition. However, extensive efforts must be made to preserve and improve the network condition. These efforts can be well organized through a Pavement Maintenance Management System.

References

[1] Al-Mansour, A. "Evaluation of Pavement Condition and Identification of Common Types of Distress on Riyadh Street Network." *Maintenance of Buildings-public Structures and Preventive Measures Symposium*. Umm al-Qura University, 1996.

[2] Al-Swailimi, S.; Al-Mansour, A.; Zahran, S. and Al-Mulhem, M. *Development of Maintenance Management System for Riyadh Street Network. Progress Report No.* 1, Submitted to KACST, 1996.

[3] Al-Swailimi, S.; Al-Mansour, A.; Zahran, S. and Al-Mulhem, M. *Development of Maintenance Management System for Riyadh Street Network." Progress Report* No. 4, Submitted to KACST, 1997.

[4] World Bank. "Road Deterioration in Developing Countries." A World Bank Policy Study, Transportation Department, Washington, D.C., 1988.

[5] Asphalt Institute. *Asphalt Overlay and Pavement Rehabilitation.* Series No. 17 (MS -17), 1977.

[6] Transportation Research Board. *Pavement Roughness and Skid Resistance.* Transportation Research Record 1084, Washington, D.C., 1986.

[7] *ELMOD/ELCON Manual.* Denmark: Dynatest, 1995

[8] Sharaf, E.; Arafah, A. and Al-Mansour, A. *Application and Recommendation of Dry Friction Standards for the Kingdom's Road Network.* Report No. 03/14/16, Research Center, College of Engineering, King Saud University, 1996.

[9] ————. *Applicability and Recommendation of Dry Friction Standards for the Kingdom's Road Network.* Final Report No. C07/16/17, Research Center, College of Engineering, King Saud University, 1996.

جمع بيانات حالة الرصف لشبكة الطرق الرئيسية في مدينة الرياض وتقويمها

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**الإدارة العامة للتشغيل و الصيانة ، أمانة مدينة الرياض، الرياض ؛ المملكة العربية السعودية ،

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ملخص البحث. تعتبر بيانات حالة الرصف عنصراً مهماً من عناصر نظم إدارة الرصف. إن الأهداف العامة من جمع و تحليل بيانات حالة الرصف هي التعرف على حالة الرصف الراهنة ، تحديد احتياجات الصيانة و التخطيط للاحتياجات المستقبلية ، بالإضافة إلى ذلك يستخدم تقويم حالة الرصف لوضع أولويات الصيانة و لتحديد الميزانيات القصيرة و البعيدة الأجل للصيانة المطلوبة. تقوم حاليا مدينة الرياض – عاصمة المملكة العربية السعودية – بتطوير نظام لإدارة أعمال صيانة شبكة الطرق في المدينة ، و يعتبر جمع البيانات المتعلقة بحالة الرصف و تحليلها أحد العناصر الأساسية لهذا النظام. تشتمل بيانات حالة الرصف على الكفاءة الإنشائية، الوعورة، الفحص البصري للعيوب و مقاومة الانزلاق. وتم جمع بيانات الحالة الإنشائية باستخدام جهاز الحمل الساقط (ديناتست)، و تم جمع بيانات الوعورة باستخدام جهاز الوعورة (ميز رايد ميتر)، و يشتمل الفحص البصري للعيوب على تطوير نموذج يشتمل على نوع، كثافة و شدة كل عيب من العيوب الشائعة على شبكة الطرق في المدينة و تم جمع قياسات مقاومة الانزلاق باستخدام جهاز (ميو ميتر). تهدف هذه الدراسة إلى و صف الطرق المتبعة لجمع بيانات حالة الرصف و كذلك إلى تقويم حالة الرصف لشبكة الطرق الرئيسية في المدينة. إن هذه الدراسة تعرض تجربة مدينة الرياض في جمع و تحليل بيانات حالة الرصف .