Airport pavement management decision making – A prioritization tool to select pavement sections requiring M&R treatments

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Airport pavement management decision making – A prioritization tool to select pavement sections requiring M&R treatments

By

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Abstract

An increase in air traffic demand, aging pavement infrastructure, and limited funds make pavement management decision making a difficult process. Pavement management systems (PMS) are essential for pavement management. PAVER, the most common airport pavement management system (APMS) assists pavement managers by identifying the surface condition of pavement sections, however it's based only on the pavement condition index (Greene, Shahin, & Alexander, 2004). Other criteria are taken into account by pavement managers to select the pavement sections that will be maintained or rehabilitated; however these criteria are not included in PAVER or any APMS. For pavement managers, it is very difficult to select the pavement sections that will be repaired because not all the sections in need of M&R can be selected. This research has focused on developing a pavement management decision making tool to help pavement managers prioritize and identify the sections that need M&R, based not only on PCI but on all relevant criteria needed for airport pavement management. The main research question to be answered in this research is: **How can airport pavement management decision making be improved by means of data to identify the pavement sections that need to be maintained or rehabilitated?** The chosen methodology to identify pavement sections in need of maintenance is the absolute Analytical Hierarchy Process (AHP). This research has explored the applicability of this methodology for prioritizing pavement sections in airports. Three major airports in Europe have been chosen as case studies for this research: Amsterdam Airport Schiphol, Brussels Airport, and Heathrow airport. Based on literature research and on these case studies, the required criteria used in airport pavement management for identifying pavement sections to be maintained have been identified. The required data for all criteria has also been identified. Based on all the criteria, the required data, and the AHP methodology, the mentioned tool has been designed. The design of the tool was presented to expert pavement managers to corroborate its applicability before its development. The tool has been developed in Microsoft Excel and its applicability has been illustrated by using partially real data and partially fictitious data. The AHP was successfully implemented allowing pavement managers prioritize large amounts of pavement sections, considering all relevant criteria. This research has revealed that pavement management decision making can be improved by means of data, by the development of tools like the one proposed in this research. It was also shown how big volumes of data can improve pavement management decision making, providing managers relevant information like the remaining structural life of pavement sections. Airports can benefit from this research by reducing the required time for prioritizing pavement sections and selecting those to be maintained or rehabilitated, by minimizing the amount of time spent on projects that will be disregarded, and by strengthening or facilitating the application of predictive maintenance.

Keywords: Pavement management | Maintenance and rehabilitation (M&R) | Analytical hierarchy process | Functional condition | Structural condition |Operational importance |Pavement condition index | pavement management systems (PMS) | Prioritization

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List of acronyms

AASHTO	American Association of State Highway and Transportation Officials
AC	Advisory circular
ACN	Aircraft classification number
AHP	Analytical hierarchy process
APMS	Airport pavement management system
ATM	Air transport movements
BBI	Boeing bump index
BSI	British Standards Institution
CBR	California bearing ratio
CDF	Cumulative damage factor
CDV	Corrected deduct value
CMFE	Continuous friction measuring equipment
CR	Consistency ratio
DOS	Declarative, objective and semantic information
DV	Deduct value
FAA	Federal Aviation Administration
FOD	Foreign object debris
FWD	Falling weight deflectometer
IAM	Institute of Asset Management
ICAO	International civil aviation organization
IRI	International roughness index
LCC	Life cycle cost
LHR	Heathrow Airport
M&R	Maintenance and rehabilitation
NOTAM	Notice to Airmen
PAS	Publicly Available Specification
PCC	Portland cement concrete
PCI	Pavement condition index
PCN	Pavement classification number
PMS	Pavement management system
RWY	Runway
TWY	Taxiway
USACE	U.S. Army Corps of Engineers

Executive summary

This master thesis has the main objective to develop a decision making tool that can help improve airport pavement management decision making. This report is divided into 7 chapters and a brief summary with the most important content of each chapter is presented.

Introduction

The focus of this research is pavement management in airports with high traffic demand, specifically pavements on the airside. According to Ismail, Ismail, and Atiq (2009) pavement management is becoming more complicated due to increasing traffic loads, limited funds, and continuous deterioration of pavement structures. Airport pavement management systems (APMS) are essential tools for pavement managers; however most of these systems have been developed for highways and not for airports. PAVER, a pavement management system, has become the standard system for airports but it is based only on the Pavement Condition Index (PCI) (Greene et al., 2004), leaving apart important criteria that need to be considered before selecting the pavement sections to be repaired. Furthermore, pavement decisions based on PAVER are not optimal for the pavement network since these projects are defined for individual pavement sections considered in isolation from the rest (Gendreau & Soriano, 1998).

The research question to be answered in this research is: How can airport pavement management decision making be improved by means of data to identify the pavement sections that need to be maintained or rehabilitated? To answer this question, four sub-questions need to be answered. The answer to the first sub-question will define how airport pavement management is done and what methodology can be applied to help pavement managers select the pavement sections to be maintained or repaired. The answer to the second sub-question will identify the criteria that need to be considered in airport pavement management. The third will identify the data required for pavement management based on the identified criteria. The fourth will provide a decision making tool that can be applied in airport pavement management based on the answers to the previous questions. The research methodology and structure of the report have been designed based on these questions. The literature review chapter will contribute to the first three sub-questions, then three case studies presented in the second chapter will also contribute answering the first three questions, the fourth chapter will present the design of the tool, which will then be developed and presented in chapter five, just before the discussion chapter, and the report will end with the conclusions chapter.

Literature review

Five main topics are covered in this chapter: airport pavement management, airport pavement management systems, data and information, criteria used in airport pavement management, and methodology to select pavement sections. Pavement management started in the 60’s and was centred on the design of new pavements. The main concern was to determine the best design possible for each project, and projects were accumulated over time. This led to the “bottom-up” approach, which worked well until M&R needs started to appear, funds were limited and the condition of the whole network became more important.

As a consequence the “top-down” approach gained popularity, by giving priority to the network over individual pavement sections (Gendreau & Soriano, 1998). Two levels can be applied in airport pavement management, namely the project level and the network level. The project level deals with specific technical management concerns for individual projects or pavement sections. Specific data about the pavement section, materials, properties of these materials, loads, and costs are required at this level (Gendreau & Soriano, 1998). The network level deals with identifying the projects to be carried out to bring the best result for the pavement network.

The next topic in this chapter was pavement management systems. According to Gendreau and Soriano (1998), all pavement management systems consist of four components: network inventory, pavement condition evaluation, pavement performance prediction, and management planning methods. PAVER, the most common airport pavement management system only takes into account PCI, however more criteria need to be considered. These criteria are the ACN-PCN methodology, roughness, friction and FOD. The PCI represents the superficial condition of a pavement based on observed surface distresses. The ACN-PCN methodology is used to report the relative effect of an aircraft and the load carrying capacity of a pavement (FAA, 2014). Roughness, in simple words, represents the opposite of flatness of a pavement, which may affect the safe operation of aircrafts due to excessive vibrations or g-forces. Friction is the resistance to the motion between the tire and the pavement, which in wet conditions may impact safe operations. FOD is the potential of foreign object to damage aircraft.

To identify the data required for pavement management, primary data as defined by Floridi (2009) has been identified in this research for each of the mentioned criteria. After identifying the primary data of each criterion it was found that the primary data required for the FOD is already included in the PCI.

According to Hajek et al. (2011), prioritization can be based on a single criterion like PCI, or by combining different criteria. A prioritization methodology that has been widely and successfully applied in different industries is the analytical hierarchy process (AHP) (Hummel, Bridges, & Ijzerman, 2014). Furthermore, Ahmed, Vedagiri, and Krishna Rao (2017) evaluated the applicability of AHP for pavement management, and concluded that AHP is suitable for pavement maintenance prioritization. For these reasons, this methodology has been chosen to develop the tool.

Case studies

Three case studies have been selected for this research: Amsterdam Airport Schiphol, Brussels Airport and Heathrow Airport. At Schiphol, the M&R projects are included in a 5-year maintenance plan. The criterion PCI is considered in this airport, and the actual PCI is compared to a trigger level and to an expected level. Pavement sections with a PCI below the predicted or expected level are further examined and rehabilitated if necessary. Parallel to this process, the ACN-PCN methodology is used to identify pavement sections that are being overloaded. Roughness is considered for runways, by comparing the Boeing Bump Index with recommended levels provided by ICAO. Based on the structural and functional condition of the pavements, the required projects are determined. These projects are then prioritized based on the urgency of the project and the importance of the pavement section to the operations of the airport. The operational importance of pavement sections is determined considering different criteria, like the functionality of the pavement, the lighting system in place in the pavement and the amount of traffic movements on the section. Then, a risk analysis including other asset systems like drainage and lighting, and life cycle cost analysis will allow determining which projects will be included in the maintenance plan.

In Brussels Airport a 5-year maintenance plan is also used to define the M&R projects that will be carried out. For the PCI criterion, a trigger level is also employed in this airport and the age of the pavement is also taken into account. When the pavement section is below the trigger level or when the actual PCI level is not accord to the age further inspection and eventually maintenance will be required. At Brussels Airport the ACN-PCN is also used to determine if M&R is required for each pavement section. Roughness is used only after a runway has been rehabilitated, but until now this criterion has not triggered an M&R project and for this reason, is not considered for M&R purposes. When considering friction levels, maintenance will be planned if friction value reaches the minimum level. After the pavement sections have been identified, a prioritization process considering PCI, ACN-PCN, friction for runways and taxiways, and the amount of traffic at the section is carried out to define which sections will be maintained.

For the case of Heathrow Airport, the main criterion for pavement rehabilitation is the PCI. This airport practically operates at maximum capacity, and for this reason, pavement managers are forced to minimize M&R treatments. Even when pavements reach PCI levels close to the minimum levels the required rehabilitation projects cannot be carried out because that would imply closing the section to operations. As the PCI evaluation is only superficial, at LHR parallel to this process pavement sections that need to be constantly monitored are identified depending on the number of rehabilitation treatments that have occurred on the sections and the money spent on each project. The ACN-PCN methodology to identify pavement sections for structural repairs is not considered in this airport because it is believed that by doing so, the number of sections requiring maintenance that would be identified would be more than what is actually possible due to operations restrictions. Roughness is not considered because it has not been a problem at the moment and friction is only considered for rubber removal purposes. When maintenance is not required immediately, the pavement sections identified from the PCI analysis and from direct inspection are prioritized considering the following criteria: functionality of the pavement, aircraft code for which the pavement has been designed, and the number of aircraft movements.

Design of the tool

The tool has been designed based on the collected information in the previous chapters. As the AHP methodology was chosen for the prioritization process, the design of the tool has been done based on the structure required by the AHP. The first step in designing the tool was to define the hierarchy between the identified criteria and sub-criteria as presented in

Figure 1. The basis of the AHP is the pairwise comparisons, which are used for two purposes. Criteria are pairwise compared one to one to identify the weights to be assigned to each criterion, and ratings are pairwise compared one to one to determine the priorities of each alternative. In consequence, the next step was to define the pairwise comparisons for each criterion and to determine the ratings that would be pairwise compared. One of the advantages of the AHP is that it allows the calculation of a consistency ratio which confirms that the pairwise comparisons are consistent. Once this was done, it was possible to present a preliminary blueprint of the tool. This blueprint was presented to the pavement managers in charge at Brussels Airport and Amsterdam Airport Schiphol and to the pavement expert in NACO to assess the applicability of the tool and to modify it if required. The tool was very well received in both airports and some specific changes were done to the blueprint and implemented in the tool.

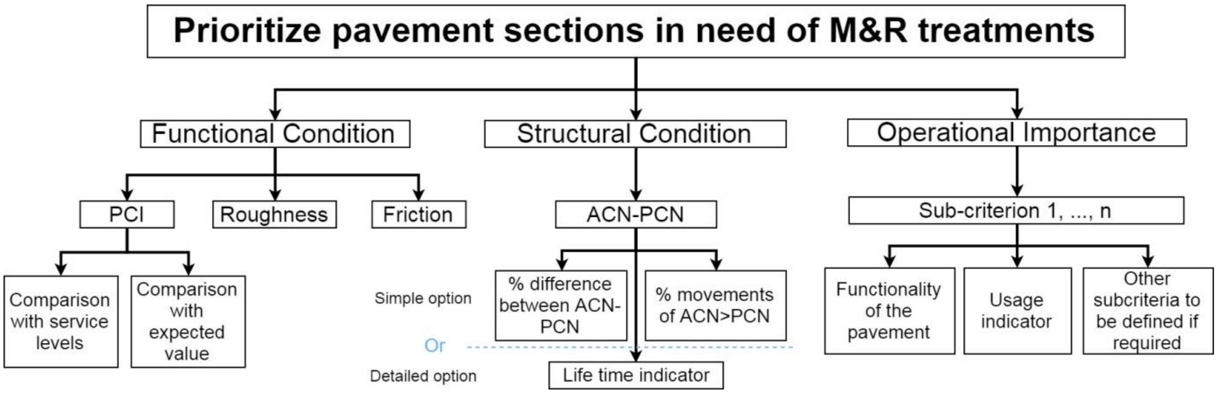


Figure 1. Hierarchy structure of criteria and sub-criteria.

Tool

This chapter is divided into two sections. The first section presents the tool. The order that was chosen to present the tool is according to the names of the sheets given in Microsoft Excel. The main function of each sheet is explained, together with the input (if any), output (if any), main used formulas (if required), and the main features of the tool. In total 24 sheets were created, the names of these sheets are: *Start, Pairwise comparisons, Input data, Tool (complete), Tool (priorities only), PCI, Roughness, Friction, ACN-PCN simple, ACN-PCN detailed, TD PCN, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, Usage indicator, and ACN database.* The second section of this chapter presents an example of the application of the tool by using partly real data provided by Brussels Airport and partly fictitious data as not all of the required data to execute the tool was available.

Discussion

This chapter is divided into three sections; the first section provides an overview of the research by establishing the relations of the tool to the literature research and to the case studies. The second section discusses the potential benefits that the tool can provide to the case studies. The third section discusses the applicability of the tool. When discussing the tool with the literature review, it can be affirmed that the tool proposed here is at the network level as it considers all pavement sections of the pavement network and no projects are determined. Based on the literature review, service levels can be used to establish priorities and this was applied to developing the tool. Ratings were defined according to the service levels and subjectivity to calculate the priorities was minimized.

When discussing the tool in relation to the case studies, one criterion additionally to the literature review was identified: the operational importance. Based on the case studies, one option to evaluate the structural condition of pavement sections was identified; this was named the simple option. Based on this, a second option has been developed in this research and was named the detailed option. The given names relate to the amount of required data. The detailed option provides more relevant information to pavement managers as it allows estimating the remaining structural life of the pavement sections. When the benefits of the tool for the case studies were discussed, it became clear that for Amsterdam Schiphol the main benefit is that the number of projects, which end up being rejected after the prioritization phase is done, will now be minimized. As a consequence time and effort to select pavement sections to be maintained or repaired will be reduced. To Brussels the benefits are that time spent on identifying the pavement sections will also be reduced. To Heathrow Airport the main benefit expected from the tool is that it will contribute moving from corrective maintenance to predictive maintenance.

Estimating the remaining structural life of pavement sections with the detailed option is one of the main contributions of this research toward predictive maintenance. When discussing the applicability of the tool, advantages and drawbacks have been identified. The main advantage is the possibility for pavement managers to prioritize all the pavement sections in the network, considering all the relevant criteria for pavement management at the same time, in one tool. The main identified drawback is related to the high volume of required data and the need to adapt it the required format for the tool. It should be taken into account that different factors can affect the given output. These factors need to be taken into account if consistency and repeatability of results are expected. These factors can be classified in the criteria included in the prioritization process, the pairwise comparisons and the data input.

Conclusions

The main purpose of this chapter is to answer the main research question. One way to improve airport pavement management decision making is the development of tools providing pavement managers a holistic view of the pavement network following a top-down approach. The tool proposed in this research is an example of these types of tools. The absolute analytical hierarchy process is a powerful methodology for prioritization, and has been successfully implemented for prioritizing airport pavement sections in this research. The main question emphasizes the role of data to improve pavement management decision making. Data can contribute improving pavement management decision making if the required relevant information and its required data are known. This research has identified relevant information and required data for pavement management decision making. This will help airports to identify if the required data is available or not, and to collect it in case it's not available. This research provides airport pavement management the opportunity to reduce the required time and complexity to select the pavement sections that will be maintained, and facilitate the application or strengthening of predictive maintenance.

1 Introduction

Many airports around the world are facing a rapid increase in traffic. Due to this increase in aircraft traffic movements, the pressures on airside pavements and the needs for maintenance rise. This increased need for maintenance combined with increased traffic demands complicate the decision to take an asset out of service for maintenance. From exploratory interviews, it was found that the main challenge in pavement management is to select maintenance projects that need to be carried out. Identifying which pavement sections need to be maintained or repaired is not a problem; the problem is selecting the right pavement sections for maintenance and rehabilitation (M&R) when not all of them can be repaired due to budget or time restrictions.

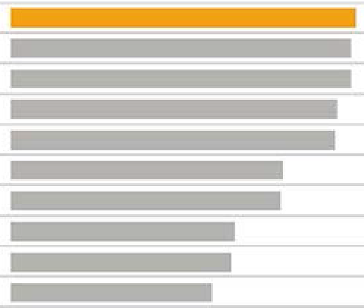
This research has focused on pavement management decision making in airports with high traffic demands. The research will be focused on pavements on the airside of airports, particularly runways, taxiways, and aprons.

The main purpose of this chapter is to present the logic followed to formulate the research problem and the research questions. First, the context of the research will be presented. Then, the main topics that will be treated along the document will be presented to help the reader understand the content of the report. Based on these topics the problem will be defined, followed by the research questions. At the end of this chapter, the structure of the report, together with the relation between chapters and their purpose will be presented.

1.1 Context

According to Tighe, Karim, Herring, Chee, and Moughabghab (2004), proper funding and effective decision making for pavement management have always been a problem. The task of pavement management is becoming more complicated due to three factors: increasing traffic loads, limited funds, and continuous deterioration of pavement structures (Ismail et al., 2009).

Air traffic demand is increasing; this can be evidenced not only by the growth of passengers but also by air transport movements. Globally, In 2005 there were 16 airports with more than 40 million passengers, while in 2015 there were a total of 37 airports (ACI, 2016). In 2015, the global increase in passenger traffic was 6,4%, the biggest increase since 2010 when the growth was of 6,6% (ACI, 2016). The traffic increase in Europe is also evident. Figure 2 presents the top 10 airports in Europe in air transport movements (ATM). In 2016, 8 out of the top 10 airports in Europe showed an increase in air transport movements when compared to 2015.



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Ranking			2016	Compared to 2015 in %
1	Amsterdam	AMS	479	6.3
2	London Heathrow	LHR	473	0.2
3	Paris CDG	CDG	473	0.8
4	Frankfurt	FRA	453	– 0.9
5	Istanbul Atatürk	IST	449	0.4
6	Madrid Barajas	MAD	377	3.1
7	Munich	MUC	374	3.9
8	Rome Fiumicino	FCO	311	– 0.3
9	Barcelona	BCN	305	6.6
10	London Gatwick	LGW	279	5.0

Figure 2. Top 10 airports in Europe by air transport movements - Source: (Schiphol Group, 2017)

Increased traffic demand represents an increase in aircraft movements over the pavements on the airside of the airport. As pavements are loaded with increasing number of loads due to the increase in aircraft movements, the rate of deterioration also increases and pavement sections need to be maintained and repaired more frequently.

Limited funds are another factor that contributes to the complexity of pavement management. During the exploratory interviews, it was mentioned that the available budget is not enough to cover all the required M&R projects.

Asset managers, in this case, pavement managers need to decide what projects will be executed, and selecting the right pavement sections to be repaired will ensure that the condition of the whole network is improved over time, and if not, at least be kept in the same condition in order to guarantee safe operations. This was verified in the exploratory interviews, when it was clearly stated that the main challenge for asset managers in charge of the pavements, is to choose the most appropriate pavement sections for M&R when not all sections can be chosen due to limited funds or time restrictions.

Until now the term pavement management has been mentioned, however no description of the term has been presented yet. The next section will introduce this term as it is the main concept and topic dealt with this research.

1.2 Pavement management

A widely accepted definition of pavement management is given by the American Association of State Highway and Transportation Officials (AASHTO). Pavement management "in its broadest sense encompasses all the activities involved in the planning, design, construction, maintenance, evaluation, and rehabilitation of the pavement portion of a public works program" (AASHTO, 1993, p. 31).

An essential component nowadays of pavement management is pavement management systems (PMS). Ismail et al. (2009) conducted a study to review pavement management, specifically expert systems in pavement management. According to his study, all PMS including airport pavement management systems (APMS) consist of four components: network inventory, pavement condition evaluation, performance prediction models, and planning method. One of the conclusions from his research was that although expert systems exist for more than 20 years ago, most of them are for highway networks. Furthermore, it is clearly stated that study on the application of expert systems to airfield pavements is highly required.

Gendreau and Soriano (1998) carried out an appraisal research of existing airport pavement management systems. One of the conclusions was that the application of PMS's for highways is far greater than for airports. They also mention that PAVER system has become the standard system for airport pavement management. However this system is based only on the pavement condition index (Greene et al., 2004). This index is determined from visual inspection of the pavement surface distresses and represents the observed surface condition of the pavement. As PAVER is only based on the PCI, other important criteria (i.e. the structural condition or riding quality of the pavement) considered by airport pavement managers to select pavement sections for M&R are not included in PAVER.

Information plays a vital role in pavement management decision making. These criteria provide pavement managers different information. For instance, the PCI provides information regarding the functional condition of the pavement. To provide this information, data about surface distresses is required. Other criteria considered by airport pavement managers, will provide different information, but will also need different data depending on the criteria.

These other criteria and the required data need to be identified in this research, and a decision making tool will be the end result of this research. When different criteria need to be taken into account, multi criteria decision making methodologies contribute to reducing the complexity of the decision process. One of these is the analytical hierarchy process (AHP), developed by Saaty in the 70's. This methodology will be the pillar of this research. Next section will introduce this methodology and will present the reasons explaining why it has been chosen for this research.

1.3 Analytical hierarchy process (AHP)

As cited by Hummel et al. (2014), several researchers have applied AHP in different fields and have reported their success in different articles (Zahedi 1986; Golden, Wasil et al. 1989; Shim 1989; Vargas 1990; Saaty and Forman 1992; Forman and Gass 2001; Kumar and Vaidya 2006; Omkarprasad and Sushil 2006; Ho 2008; Liberatore and Nydick 2008). According to Thomas L Saaty and Vargas (2012), psychologists affirm that it is easier and better to compare two different alternatives at the time than more alternatives simultaneously. This is why the pairwise comparison, which will be explained later in this section, is considered the strength of this methodology. Other benefits of this tool according to Hummel et al. (2014), are that the AHP allows for consistency and cross checking between the pairwise comparisons, is easily applicable, has a structure which follows the intuitive way in which managers solve problems, has the possibility to adopt verbal judgements, and has the possibility to evaluate quantitative and qualitative criteria.

This process was developed by Saaty in the 70's, and is explained in detail in Thomas L Saaty and Vargas (2012). To model an AHP problem, a hierarchic structure to represent that problem is needed together with a pairwise comparison to establish relations of the elements within that structure. In a very concise description, this comparison is used to establish weights among the criteria that evaluates a certain decision, but is also used to define priority rankings of the different alternatives under each criterion.

According to Moazami, Behbahani, and Muniandy (2011), analytical hierarchy process is one of the simplest and most useful methodologies for prioritization. Ahmed et al. (2017, p. 170) evaluated the applicability of AHP for pavement management, and concluded that "AHP approach is suitable for the purpose of pavement maintenance prioritization". Additionally, no research was found reporting the application of this methodology in airport pavement management. It's potential applicability in pavement management as Ahmed et al. (2017) affirmed, and its novelty in airport pavement management are some of the main reasons why AHP has been chosen for this research.

The findings of this study suggest that AHP approach is suitable for the purpose of pavement maintenance prioritization

Farhan and Fwa (2009) conducted a study to explore the use of three different forms of analytical hierarchy process (AHP), the distributive mode relative AHP, the ideal mode relative AHP, and the absolute AHP. One of the conclusions of this study was that the absolute AHP is suitable for pavement maintenance and has the operational advantage of evaluating a large number of alternatives, which with the other methods is very unpractical. The authors of this study also explain that the process to arrive in the weights of the criteria and sub-criteria is the same as for the relative AHP method, the difference is at the alternatives level, where a degree of intensity is assigned to each of the alternatives. In Thomas L. Saaty (1986), the absolute AHP is explained in detail and the reader is encouraged to read his work.

For pairwise comparisons, the fundamental scale of values has been widely used, and has been proved to be suitable for many different applications (Thomas L Saaty & Vargas, 2012). This fundamental scale is presented in Table 1.

Intensity of importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
2	Weak	
3	Moderate importance	Experience and judgment slightly favor one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgment strongly favor one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
Reciprocals of above	If activity *i* has one of the above nonzero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*	A reasonable assumption
Rationals	Ratios arising from the scale	If consistency were to be forced by obtaining *n* numerical values to span the matrix

Table 1. The fundamental scale. (Thomas L Saaty & Vargas, 2012)

Taking into account the information given on this section about AHP, the possibility to evaluate great number of alternatives, the possibility to assign weights based on pairwise comparisons, it's popularity and the success stories of its application, its potential applicability in pavements and the fact that it hasn't been applied to airport pavement management are reasons enough to choose this methodology for this research. `The possibility to evaluate a great number of alternatives is very important in this research, because pavement networks of big airports consist of hundreds of pavement sections. For this reason, the absolute AHP will be used in this research.

Assigning weights with a structured approach like pairwise comparisons is also important because these weights will be calculated instead of subjectively guessed. With many alternatives to evaluate, inconsistent comparisons may occur. This limitation is solved with the AHP because it includes a consistency check ensuring that all comparisons are consistent. This consistency check will be detailed later in this report.

The procedure to carry out the AHP is explained in detail in Thomas L Saaty and Vargas (2012). This procedure will be followed in this research and is summarized as follows:

1. Identify the goal of the decision to be made
2. Identify the criteria and sub-criteria that will be considered in the decision making
3. Define hierarchy structure with the criteria and sub-criteria (if any)
4. Define ratings to be assigned to the pavement sections for all criteria and sub-criteria.

5. Pairwise comparison of criteria.
6. Pairwise comparison of sub-criteria under each criterion
7. Pairwise comparison of the alternatives or of the ratings.
8. Evaluate alternatives using the priorities determined from the rating pairwise comparison and from the criteria and sub-criteria pairwise comparison

1.4 Problem definition and research questions

1.4.1 Problem definition

Based on the information provided until now, the problem definition is defined as follows: Increased traffic demand, aging infrastructure, and limited budgets make proper funding and decision making a difficult task in airport pavement management. Airport pavement management systems like the most popular system in use at airports (PAVER) are based on PCI. Despite the unquestionable utility of these types of systems, they do not take into account other criteria and information used by airport pavement managers to select pavement sections that will be repaired according to the available funds. A tool that helps airport pavement managers choose the pavement sections to be repaired using a structured prioritization methodology like AHP, based on the criteria used and not only on PCI does not exist at the moment.

1.4.2 Research questions

Based on the problem definition and the information provided until now, the main research question to be answered in this research is:

How can airport pavement management decision making be improved by means of data to identify the pavement sections that need to be maintained or rehabilitated?

To answer this question, some sub-questions must be answered first. These are:

1. How is pavement management decision making done in airports?
2. What are the criteria used to select the pavement sections that will be maintained or rehabilitated?
3. What data and information are required to identify and select the pavement sections?
4. What tool can be implemented to select the pavement sections that will be maintained or rehabilitated?

1.5 Scope

Airports with low traffic demands will not be considered in this research. The main reason for this decision is that pressure on asset management performance in these airports is not as big as in bigger airports. Furthermore, for small or low traffic airports it is not financially reasonable to invest in sophisticated pavement asset management systems or decision tools. Airports with high traffic demands on the other hand, need sophisticated pavement asset management systems and decision tools; this type of airports will be the focus of this research (Tighe et al., 2004).

1.6 Research methodology

The research structure was designed to answer the sub-questions and then the main research question. The followed steps are presented in the same order as the proposed questions.

1. How is pavement management decision making done in airports?

To answer this question a study consisting of literature study and three case studies was done. The case studies selected for this research were: Amsterdam Airport Schiphol, Brussels Airport and Heathrow Airport. The main consideration taken into account to select the case studies was that they had to have a large number of aircraft operations. As it can be seen in Figure 2, Schiphol and Heathrow have the largest numbers of aircraft movements in Europe. The literature research in relation to this question will focus on identifying and explaining the decision making process of airport pavement management and the pavement management systems used.

2. What are the criteria used to select the pavement sections that will be maintained or rehabilitated?

This sub-question is related to the previous one. Based on the decision making process and the pavement management systems identified in the previous sub-question, the criteria used in this process and in these systems must be identified. The literature research will allow understanding how is the process and steps required for selecting pavement sections to be repaired. Based on this process it may also be possible to identify what criteria are used in this process according to literature. Additionally, by understanding the mentioned process, interviews will be done to verify if the criteria given by literature are used in real cases and to identify other criteria that are not mentioned in the literature.

3. What data and information are required and available to identify and select the pavement sections?

The first step to answer this question is to understand the difference between data and information, and the different types of data. For this purpose, literature research will be done. Based on the criteria found in the sub-question two, the required data and information should be identified. To do this it will be required to understand how these criteria are evaluated. The data and information required for the criteria found in literature should be identified also from the literature research. The data and information required for the criteria found in the case studies must be determined by the same means. The output or data and information identified in this sub-question will be the input for the implementation of the tool in sub-question four.

4. What tool can be implemented to select the projects that will be maintained or rehabilitated?

To answer this question a synthesis of the answers to the previous questions is needed. This will be the most relevant phase of the research and the purpose of this question is to determine the solution to be implemented and create a tool accordingly. Critical aspects to determine the tool to be implemented are the methodology to select pavement sections identified in sub-question one, and the criteria identified in sub-question three. Before creating the respective tool, a blueprint of the tool is required. This blueprint will be checked by panel expert meetings and a final blueprint will be used for creating the tool.

The methodology designed for this research is graphically represented in Figure 3. This will help the reader understand the designed and followed methodology in this research, and will allow easy understanding the logic of this report.

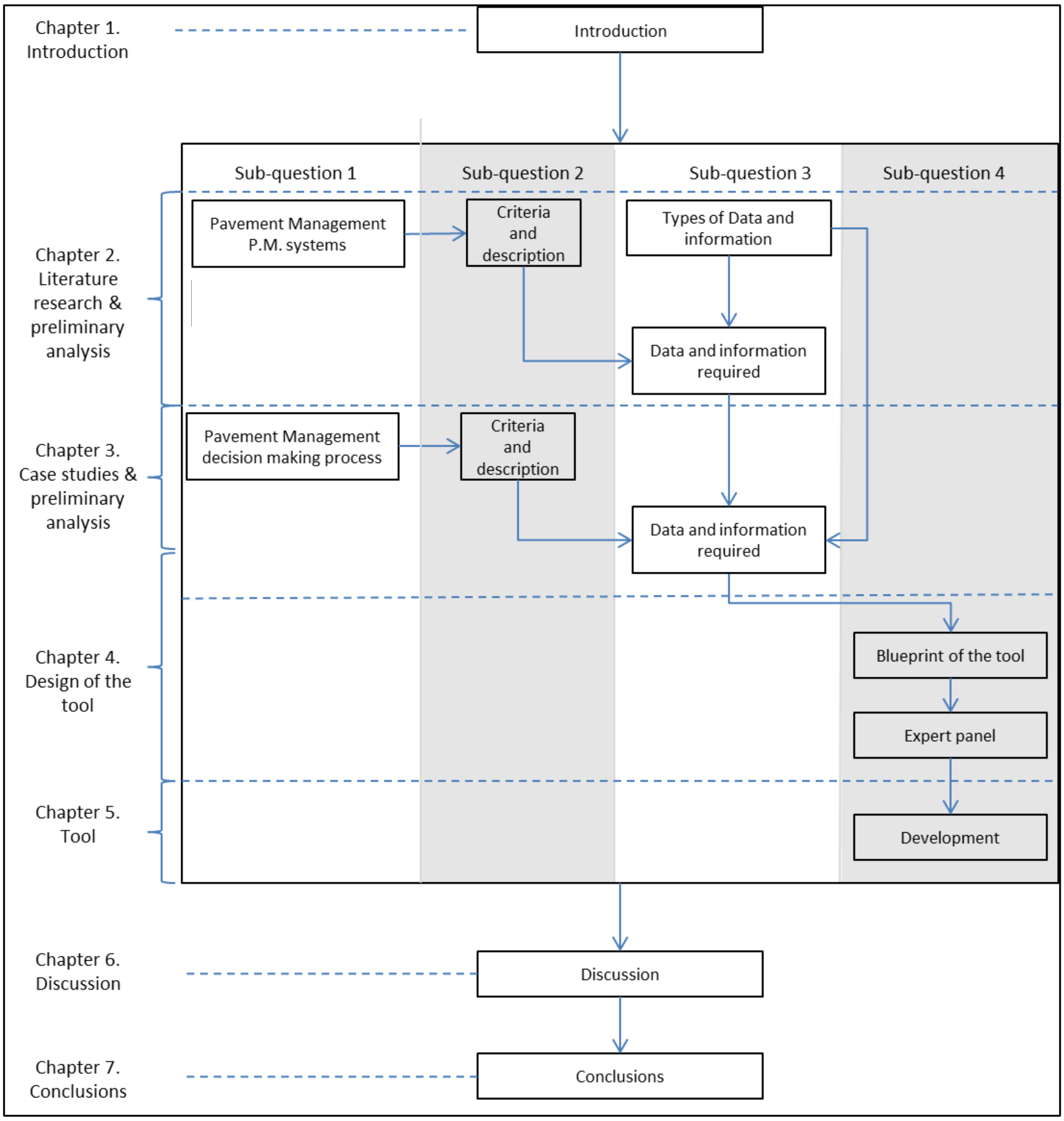

Figure 3. Methodology and structure of the report

1.7 Need for research

Although asset management is a topic that has been widely researched, very few studies have focused on airport asset management, specifically airport pavement management. Scientific research on pavement management systems is far more developed for highway networks than for airports. The main APMS in use is PAVER, this system is based on visual inspections and is the basis of decision making for most airports. Other criteria are used for airport pavement management decision making, but these are not integrated into APMS used at airports. A research focused on finding a way to create a decision making tool to help asset managers choose which pavement sections to repair, by including other required criteria used by airport pavement managers does not exist.

This research will contribute to the academy and practitioners by providing a decision making tool for airport pavement management that does not exist at the moment. To the academy in particular, it will contribute by creating scientific knowledge on airport pavement management, and by evaluating the applicability of the analytical hierarchy process which has not been applied to airport pavement management. Furthermore, this research will propose new ideas for further research, contributing to the development on this field and reducing the gap between highway pavement management's research development and airport pavement management's research.

2 Literature review and preliminary analysis

The purpose of this chapter is to contribute answering sub-questions one, two, and three. In relation to the first sub-question, the topics that will be covered in this chapter are: airport pavement management, and airport pavement management systems. The contribution in relation to sub-question two will be to identify the criteria used for pavement management decision making. For sub-question three, the main contribution from the literature research will be to provide a differentiation between data and information, and to identify the data required for pavement management. The order how this chapter will be presented is as follows: airport pavement management, airport pavement management systems, data and information, criteria, preliminary analysis and a section of conclusions will close the chapter.

2.1 Airport pavement management

It is commonly accepted among pavement management academy that when considering pavement management or airport pavement management, two levels must be considered: project and network level (Gendreau & Soriano, 1998; Ismail et al., 2009).

The origin of pavement management dates back to the mid-60's and it was done only at the project level (Gendreau & Soriano, 1998). Back in these times, pavement management was centred on the design of new pavements. At the project level, the main concern was to determine the best design possible for each project considered in isolation from other projects. The network level at the time consisted of the accumulation of all projects over time. This was the "bottom-up" approach and worked well as long as funds were not limited. When M&R needs started to appear and funds were more limited, the whole network condition became more important, the network level became a major concern, and this led to the "top-down" approach (Gendreau & Soriano, 1998). These two levels of pavement management will be briefly presented, however the reader is encouraged to read Gendreau and Soriano (1998) for a detailed explanation of both levels.

2.1.1 Project level

The project level of pavement management deals with specific technical management concerns for individual projects or pavement sections. This level requires specific data about the pavement section, including materials of the section, properties of these materials, loads, and maintenance and construction costs (Gendreau & Soriano, 1998). Both in highway pavement management and airport pavement management, the main techniques used at this level to select the best alternative for isolated sections are engineering judgement, life-cycle analysis, dynamic programming, and expert systems.

Engineering judgement is usually expressed in guidelines or decision trees and is used in the standard PAVER system. This system is easy to implement, however the recommended M&R strategy may not be the most cost-effective since it corresponds to pre-established choices (Gendreau & Soriano, 1998). Life cycle cost analysis is the most common method for project planning, and can be included in PAVER system. With dynamic programming it is possible to select at "each stage a decision that minimizes the sum of the current stage cost and the cost that can be expected from future stages" (Gendreau & Soriano, 1998, p. 207). A detailed overview of expert systems for pavement management was done by Ismail et al. (2009). According to their research, expert systems are efficient tools for problem solving since they involve knowledge from experts and human reasoning. However, most of these systems have been developed for highways and very few for airports. These systems will be further discussed in section 2.2 of this report.

2.1.2 Network level

Network level deals with deciding which projects should be executed, and when should they be executed to maximize the quality of the network (Gendreau & Soriano, 1998). Projects chosen at this level may not be the best projects for an individual section, but they are the projects that will bring the best result for the whole network.

At the network level, the most common approach is the ranking methods (Gendreau & Soriano, 1998). Ranking methods first determine the M&R treatments to solve the needs for each individual section in the network, then according to some criteria a ranking of all the established projects is assigned and the highest ranked projects are selected until the budget is spent. The criteria usually used for these kinds of rankings are: level of distress of the pavement, net present value, or benefit-cost ratio. One of the problems with this procedure is that decisions are basically project-level decisions, isolated from each other, resulting in network decisions consisting of the sum of isolated project level decisions (Cook & Lytton, 1987). These types of ranking methods follow the "bottom-up" approach.

2.2 Airport pavement management systems (APMS)

According to Gendreau and Soriano (1998) the main role of PMS and APMS is to assist pavement managers in finding strategies for providing and maintaining pavements in a serviceable condition over a period of time in the most cost-effective way. Gendreau and Soriano (1998), provided a synthesis of existing airport pavement management systems (APMS). According to their research, very little academic literature exists specifically for airport pavement management systems. Most of the existing pavement management systems have been developed for highway networks, and most of these have been developed using the PAVER system approach.

All pavement management systems have some functions in common, namely network inventory, pavement condition evaluation, pavement performance prediction, and management planning methods (Gendreau & Soriano, 1998). These four components will be briefly presented in the next sections. As it has been mentioned, PAVER is the standard used in airports and this system will also be explained later in this chapter.

2.2.1 Network inventory

The network inventory in airports consists of branches and sections. A pavement branch is defined as: an identifiable part of the pavement network that is a single entity and has a distinct function. E.g. runways, taxiways and apron areas are all different branches, but one runway is also a different branch than another runway in the same airport (ASTM, 2003). A pavement section is located within a branch, and is a contiguous pavement area with uniform construction, maintenance, usage history, condition, traffic volume and load intensity (ASTM, 2003). This definition of pavement section is very important for this research, as from now on except if indicated the opposite, pavement sections should be understood under this definition.

The network inventory function is the most basic function of any PMS, and provides a complete and structured inventory of the pavement network to be managed (Gendreau & Soriano, 1998). As already mentioned, in this function the network is divided into branches and these branches are divided into sections.

2.2.2 Pavement condition evaluation

The pavement condition evaluation function will give the main input for determining which maintenance and rehabilitation projects will be executed. When considering pavement condition evaluation, two aspects are relevant in this matter: functional condition and structural condition.

For airfield pavements, structural evaluation is based on the structural adequacy of a pavement. The structural condition of pavements is determined by different methodologies. To analyse the structural condition, the physical characteristics of the materials composing the pavements need to be determined and then the effects of loadings and its deformation response are analysed. The data for this evaluation can be collected in different ways, from construction records, on-site destructive testing but also via non-destructive testing i.e. falling weight deflectometer or heavy weight deflectometer (Gendreau & Soriano, 1998). The most common methodology to report the structural condition of a pavement is by the ACN-PCN reporting method. This reporting tool will be explained in the criteria section of this chapter.

Functional evaluation is related to surface distresses, roughness, friction characteristics, and the potential for foreign object damage (FOD) (Hajek et al., 2011; Ismail et al., 2009). The most common functional evaluation of airport pavements is based on the performance evaluation procedure developed in the 1970’s by the U.S. Army Corps of Engineers (USACE) and is the same procedure used by PAVER system. This method is the Pavement Condition Index (PCI). According to (Gendreau & Soriano, 1998, p. 200), this methodology "is now extremely widespread and constitutes a sort of de facto norm in the field". Furthermore, other measures that can be included in particular in the PAVER system are, variations of PCI within a section and the rate of deterioration to determine sections degrading rapidly (Gendreau & Soriano, 1998). One of the limitations of the PCI indicator is that it is a surface distress index and is not a complete functional performance indicator. This index will be presented in detail in the criteria section of this chapter.

2.2.3 Pavement performance prediction

Performance prediction models are very important for pavement managers. Their use differs at project and at network level. At the project level they are used for designing pavements, to perform life cycle cost analysis and to determine best time and pavement condition to perform construction and M&R activities (Gendreau & Soriano, 1998). At the network level, they are used for selecting the optimal M&R strategies and for budget optimization. Performance prediction models can be either deterministic or probabilistic models (Butt, 1991). Deterministic models are used for structural performance models and for functional performance models.

Structural performance models determine the number of cycles of load applications until failure, according to the type of distress being studied (Gendreau & Soriano, 1998). For functional performance prediction models in APMS, the only type of functional performance prediction models are PCI (Gendreau & Soriano, 1998). The most common technique for PCI prediction is multiple regression analysis. This technique is currently employed by PAVER system. According to the research of Gendreau and Soriano (1998), PAVER models were accurate for pavements with high PCI values, in other words for pavements without significant observed surface distresses.

Among probabilistic models, Markovian models have gained popularity in highway networks and are being introduced in APMS (Gendreau & Soriano, 1998). These models consider the deterioration of pavements to be probabilistic, and this deterioration occurs in transitions from one state to an equal or worse condition state in the next period. Gendreau and Soriano (1998) found that errors in predicted PCI were higher using regression models than using Markovian models; however the required data for Markovian models is more extensive than for regression models.

2.2.4 Management planning

The last common component of all PMS's and APMS is the planning module which allows determining which M&R projects should be carried out according to the actual and predicted condition of the pavement sections. Management planning can be done at the project and network levels as already explained. PMSs and APMSs use different techniques at both levels. These techniques have already been mentioned in sections 2.1.1 and 2.2.2.

2.2.5 PAVER

PAVER and MicroPAVER were developed to determine maintenance and rehabilitation needs and priorities for pavement management (Ismail et al., 2009). PAVER is the mainframe and MicroPAVER is executed in microcomputers. When mentioned in this research, both terms should be considered as the same system.

It is interesting to see how PAVER, the most common system in airports is used for pavement management decision making. PAVER is based on the Pavement Condition Index (PCI) and on the rating methodology. Pavements with lower indices are given a higher rating priority, then the best alternative for that pavement is proposed and projects are chosen until there are no more funds for a specific year. This system follows the “bottom-up” approach. At the project level, PAVER has been implemented using different techniques, including engineering judgment, life-cycle cost analysis, and dynamic programming (Gendreau & Soriano, 1998). At the network level, the system is mostly used by applying the ranking method as already mentioned.

2.3 Data and Information

The main purpose of this section is to make the distinction between data and information. This will contribute identifying the data required for pavement management. When reviewing the academic literature for establishing the difference between data and information it was evidenced that there are multiple definitions of the two terms. Borek, Parlikad, Webb, and Woodall (2014) affirm that it is very hard to draw a correct line between data and information because there is no agreement on a clear definition of what information actually is. These two concepts will be frequently used in this document and it is important to make a distinction between the two.

According to Jessup and Valacich (2003, p. 188) data is “raw material – recorded, unformatted information, such as words and numbers.” They even affirm that “data has no meaning in and of itself”. On the other hand, information is “data that has been processed in some way to make it useful” (Mingers, 1996, p. 187) or “information equals data plus meaning” (Checkland & Scholes, 1990, p. 303). The practical utility of these definitions of data and information is undeniable although not rigorous enough as Floridi (2005) suggests. He proposes a more detailed definition named the revised standard definition of semantic information (RSDI).

According to the RSDI, information cannot be data-less, must be well-formed, meaningful, and truthful. This means that information consists of data. Well-formed means that the data is clustered together correctly, according to the rules (syntax) that govern the analysed chosen system, code or language. Meaningful means that the data must comply with the meanings of the chosen system, code or language in question. And, truthfully refers to representing true contents about the referred situation or topic.

Floridi (2009) goes further than just defining information and proposes five classifications of data. These are:

> Primary data: "These are the principal data stored e.g. in a database, for example a simple array of numbers." (Floridi, 2009, p. 19)
>
> Secondary data: "These are the converse of primary data, constituted by their absence (one could call them anti-data)." (Floridi, 2009, p. 19)
>
> Metadata: "These are indications about the nature of some other (usually primary) data. They describe properties such as location, format, updating, availability, usage restrictions, and so forth. Correspondingly, meta-information is information about the nature of information." (Floridi, 2009, p. 19)
>
> Operational data: "These are data regarding the operations of the whole data system and the systems performance" (Floridi, 2009, p. 20)
>
> Derivative data: "These are data that can be extracted from some data whenever the latter are used as indirect sources in search of patterns, clues or inferential evidence about other things than those directly addressed by the data themselves". (Floridi, 2009, p. 20)

Among these types of data, primary data will play a primary role in this research, as this will be the input required for the tool. The purpose of the next section is to define the criteria that have been identified from the literature research, and identify the primary data required for each criterion.

2.4 Criteria and data required in airport pavement management

In this section, the criteria that have been identified for the structural evaluation and for the functional evaluation of pavements will be explained in more detail, and the data required for each will also be presented. It was mentioned that to report the structural condition of pavement sections the ACN-PCN methodology is used, while for functional evaluation the PCI, Roughness, friction and FOD were identified from the literature review. This section will be divided in two parts, one to define the criteria and one to identify the data that each criterion requires.

2.4.1 Definition of criteria

2.4.1.1 Structural evaluation

Aircraft Classification Number (ACN) – Pavement Classification Number (PCN)

To report the structural condition of pavements in airports, the ACN-PCN methodology is used. The structural evaluation will determine the allowed load that a pavement can support for a predetermined period of life, will allow estimating the remaining life of a pavement and will allow assessing the strength of the existing pavement (Gendreau & Soriano, 1998). The federal aviation administration (FAA) developed COMFAA, software that calculates ACN and PCN values according to the established requirements by the International Civil aviation Organization (ICAO).

The ACN is defined as "a number that expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard subgrade strength" (FAA, 2014, pp. 1-1). To define the ACN a single wheel load is calculated at the weight and centre of gravity combination that creates the maximum ACN value, and tire pressures are assumed to be those that are recommended by aircraft manufacturers for the mentioned conditions. The ACN value is defined as two times the calculated single wheel load expressed in thousands of kilograms (FAA, 2014).

The PCN is defined as "a number that expresses the load-carrying capacity of a pavement for unrestricted operations" (FAA, 2014, pp. 1-1). The PCN consists of 5 parts, separated each by a forward slash (/) as follows: Numerical PCN value / Pavement type / Subgrade category / Allowable tire pressure / Method used to determine the PCN. An example of a PCN code is 80/R/B/W/T (FAA, 2014).

To determine the numerical PCN value, as explained in the AC 150/5335-5C of the FAA, two methods can be applied: the 'Using' aircraft method, or the 'Technical' method. The using aircraft method is a simple process and does not require detailed knowledge of the pavement structure. This method is very simple to calculate but is not very accurate.

The technical method is more accurate, but requires more time and resources. The structural composition of the pavement must be known to calculate the allowable load for that pavement structure. The numerical PCN value is determined from an allowable load rating using factors like aircraft gear type, maximum gross aircraft weight and frequency of operation. Once the allowable load rating is determined, the PCN value is the same as the ACN of the aircraft representing the allowable load. One of the benefits of applying the technical method is that it is possible to estimate the remaining life of the pavement by calculating the cumulative damage factor (CDF).). The CDF is a measure of the damage caused to a pavement by the "combined effect of multiple aircrafts in the traffic mix of an airport"(FAA, 2014, pp. A-1).

Generally, for a given pavement structure and given aircraft, the allowable number of operations will decrease as intensity of pavement loads increase. Allowable load ratings are expressed in terms of aircraft and maximum weight, however the frequency of operations also needs to be considered. When the calculated gross weight is greater than the allowable operational gross weight for the pavement, the expected life time of the pavement will be lower (FAA, 2014). The ACN-PCN method uses the equivalent annual departure concept to represent the traffic of the whole fleet mix as a single aircraft.

An important consideration for pavement strengths is the overloading of pavements. Overloading can result from too large loads or from an increased application rate (ICAO, 2013). Two criteria are suggested: first, aircrafts with ACN not exceeding 10% of the reported PCN for flexible pavements, and 5% of the reported PCN for rigid pavements. Second, the number of overload movements should not exceed 5% of the total annual aircraft movements. If these two criteria are met overloads are acceptable and should not adversely affect the pavement (ICAO, 2013). Pavements that are operated under larger ACN values than the reported PCN shorten the designed life, and pavements operated under smaller loads than the reported PCN extend their life.

If pavement is being overloaded, the CDF is greater than 1 and its expected life is reduced. An approach to calculate the reduced pavement life can be done dividing 1 by the CDF caused by the total traffic including the overload. For example if the calculated CDF is 1.64, then the pavement life will be reduced approximately 40% , as 1/1.64 equals 0.61 (FAA, 2014).

With this review, the ACN-PCN methodology has been presented, the two concepts have been defined and it was explained how these two are determined. It was also mentioned that if the technical method is used to determine the PCN, the CDF can be determined. It is clear at this point that if CDF < 1, then the pavement is not overloaded. Contrary, if the CDF>1, the pavement is overloaded and then it is suggested by ICAO to determine the exceeding load in terms of ACN and the number of movements with overload. Two criteria are given by ICAO to determine if the pavement will be adversely affected, if these criteria are not met then the pavement life of the pavement will be reduced. Finally it was mentioned that the CDF can be used to estimate how pavement life will be reduced. These aspects must be remembered as they will play a very important role further in this research. ACN-PCN is used for structural evaluation; another component of pavement evaluation is the functional condition and will be presented in next section.

2.4.1.2 Functional evaluation

Functional evaluation is related to surface distresses, roughness, friction characteristics, and the potential for foreign object damage (FOD) (Hajek et al., 2011; Ismail et al., 2009). The PCI, the most common functional evaluation, based on surface distresses will be presented first, followed by roughness, friction, and FOD.

Pavement condition index (PCI):

The PCI is a measure of the present condition of the pavement based on visual inspections of the distresses observed on the surface. The PCI methodology was developed by the US Army Corps of Engineers, funded by the US Air Force (ASTM, 2003). Two different methodologies are applied depending on the type of pavement, one for asphalt-surfaced pavements, and one for Portland Cement Concrete (PCC) pavements.

Pavement distresses are external indicators of pavement deterioration due to loading, environment, construction deficiencies or a combination of these three. Typical distresses include cracks, rutting, and weathering of pavement surface. In total, 16 different types of distresses are considered for asphalt pavements and 15 for concrete pavements (ASTM, 2003). For a detailed explanation of the different types of distresses found in both types of pavements, the ASTM (2003) should be reviewed.

The PCI is presented on a scale from 0 to 100, failed and excellent condition respectively, see Figure 4. To register the types of distresses and their severity, the pavement is divided in branches, then into sections and then sample units are randomly selected. Traditionally, the PCI is calculated for these sample units and the overall condition of the pavement is determined as a weighted average of the sample units (ASTM, 2003; Hajek et al., 2011). New methodologies include the use of laser scanners and video and image recordings to measure different types of distresses. With these new technologies it is possible to measure the complete pavement section instead of selecting random samples, allowing for better evaluation of PCI.

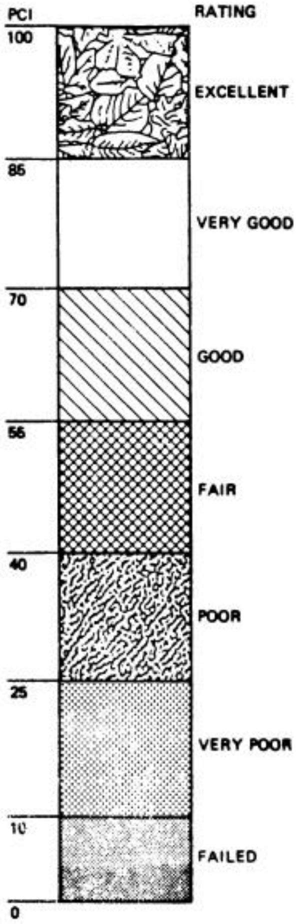

Figure 4. Pavement condition index (PCI) and rating scale (ASTM, 2003)

Roughness:

The FAA defines roughness for airfield pavements in terms of fatigue of aircraft components and other factors which may affect the safe operation of aircrafts i.e. cockpit vibrations, excessive g-forces (FAA, 2009). The FAA developed ProFAA, a computer program that calculates the most used roughness indexes, Boeing Bump index and the international roughness index (Ahmed et al., 2017). For both indexes a value of 0 represents a perfectly smooth pavement, and as value increases roughness also increases. Based on the Boeing Bump index and the bump length, Figure 5 provides the roughness acceptance criteria.

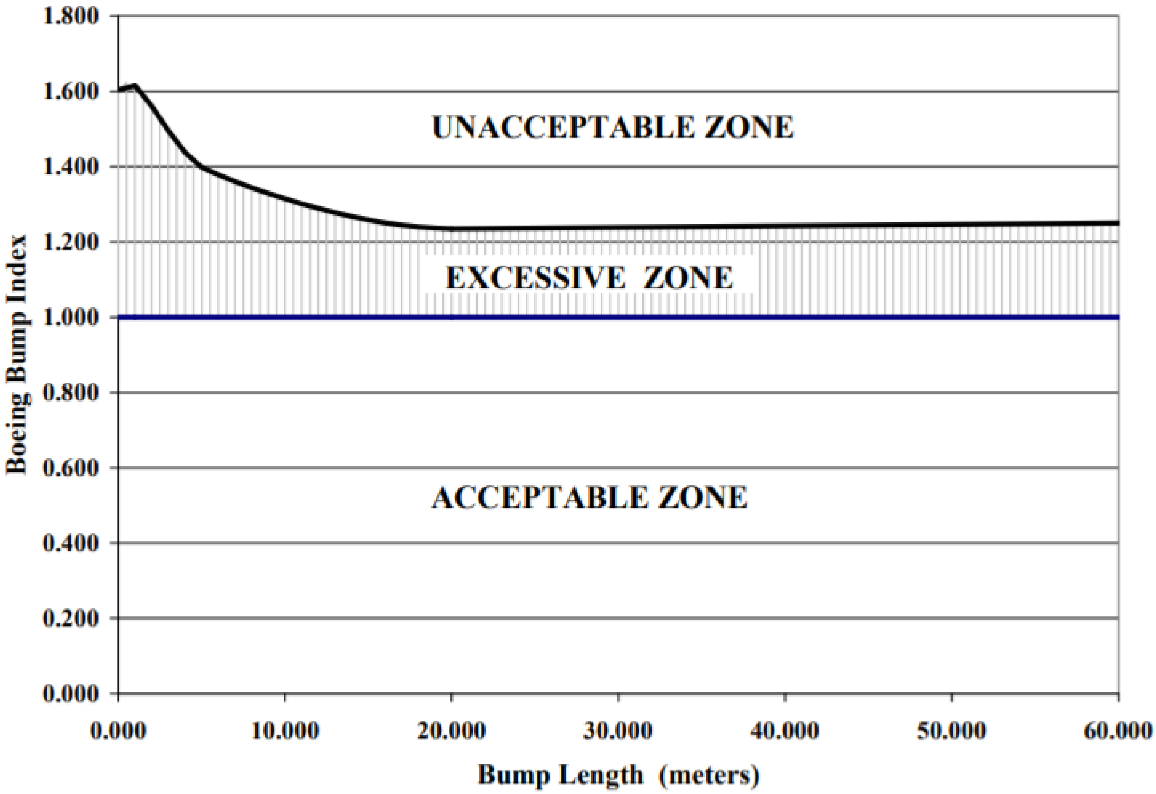

Figure 5. Boeing Bump index - Roughness acceptance criteria. (FAA, 2009)

Pavement friction:

Pavement friction is the resistance to the motion between the tire and the pavement. It is a significant safety concern for aircrafts with greater weight and landing speeds in wet conditions (Hajek et al., 2011). Over time friction reduces mainly due to mechanical wear and polishing action from aircrafts tires rolling and braking on the pavement and the accumulation of contaminants, mainly rubber (FAA, 2004). The FAA provides guidelines for friction monitoring and evaluation. The continuous friction measuring equipment (CMFE) should be used for friction evaluation and friction values for three classification levels are presented in Table 2, provided by the FAA and ICAO. Based on these friction levels, corrective action should be taken and/or texture depth measurements should follow. Additional guidelines on methods and frequencies for contaminants removal are given (FAA, 2004).

	40 mph			60 mph		
	Minimum	Maintenance Planning	New Design/ Construction	Minimum	Maintenance Planning	New Design/ Construction
Mu Meter	.42	.52	.72	.26	.38	.66
Dynatest Consulting, Inc. Runway Friction Tester	.50	.60	.82	.41	.54	.72
Airport Equipment Co. Skiddometer	.50	.60	.82	.34	.47	.74
Airport Surface Friction Tester	.50	.60	.82	.34	.47	.74
Airport Technology USA Safegate Friction Tester	.50	.60	.82	.34	.47	.74
Findlay, Irvine, Ltd. Griptester Friction Meter	.43	.53	.74	.24	.36	.64
Tatra Friction Tester	.48	.57	.76	.42	.52	.67
Norsemeter RUNAR (operated at fixed 16% slip)	.45	.52	.69	.32	.42	.63

Table 2. Friction level classification for runway pavement surfaces. (FAA, 2004)

ICAO provides descriptive terms for friction measurements measured in a common friction measure, the coefficient μ. However these associated descriptive terms should only be considered as an indication, because the terms were developed only for snow and ice conditions. These terms are not presented here, however if desired the reader can direct to Annex 14, ATT A-8. It is further dictated that each aerodrome should develop a specific table according to the measuring device and standard used (ICAO, 2013). As it can be seen in Table 2, the friction levels depend on the used standard but also on the speed used for determining the friction.

According to (ICAO, 2013) friction characteristics of runways should be assessed periodically to determine the slipperiness of the runway. ICAO requires specifying a minimum allowed friction level. When friction characteristics are below the minimum friction level specified by the State, a notice to airmen (NOTAM) must be emitted specifying which portion of the runway is below the minimum friction level, how much it is below and a maintenance action must be carried out without delay.

Due to the need for reporting the friction levels of specific portions of the runway, a common practice but not a regulation is to divide the runways in three sections. Two touchdown zones and one portion between the two touchdown zones. These are represented by the letters A,B,C, where A represents the section closest to the lower runway designation number (ICAO, 2013).

Presence of Foreign Object Debris (FOD):

The presence of FOD is determined by the FOD index which is determined from the PCI by calculating only the distresses/severity levels that can produce FOD (Hajek et al., 2011). However, based on the study of Hajek, this index is generally not used at major airports.

Four components of functional pavement evaluation have been presented, namely PCI, roughness, friction and FOD. For PCI, service levels differ from airport to airport. The FAA has provided roughness acceptance criteria based on the Boeing Bump index, and provided a friction level classification.

2.4.2 Required primary data according to identified criteria

A brief explanation of each of the identified criteria in the previous section will be given in order to identify the primary data used for each. The order in which these will be presented is: ACN, PCN, PCI, Roughness, Friction and FOD. When required a distinction will be made between flexible and rigid pavements.

2.4.2.1 ACN

The ACN according to ICAO standards is determined at the weight and centre of gravity combination that creates the maximum ACN.

For flexible pavements, ACN is reported for four standard subgrade strength categories: high, medium, low, and ultra-low. These categories are determined based on the California Bearing Ratio (CBR) for values of 15, 10, 6, and 3 respectively.

For rigid pavements, ACN is also reported for four standard subgrade strength categories: high, medium, low, and ultra-low. These categories are determined based on the k-value expressed in MN/m3, for values of 150, 80, 40, and 20 respectively.

Based on the given description it is possible to identify the primary data required to determine the ACN of an aircraft, and a distinction between flexible and rigid pavements is required.

For flexible pavements:

- Maximum weight of the aircraft
- Centre of gravity of the aircraft
- Tire pressures at maximum weight and centre of gravity
- CBR of the subgrade.

For rigid pavements:

- Maximum weight of the aircraft
- Centre of gravity of the aircraft
- Tire pressures at maximum weight and centre of gravity
- K-value of the subgrade

Different software can be used to determine the ACN for each aircraft; however the official ACN values are given in manuals by aircraft manufacturers, see Table 3 for example.

AIRCRAFT TYPE	MAXIMUM TAXI WEIGHT/ MINIMUM WT (1) LB (KG)	LOAD ON ONE MAIN GEAR LEG (%)	TIRE PRESSURE PSI (MPa)	ACN FOR RIGID PAVEMENT SUBGRADES – MN/m³				ACN FOR FLEXIBLE PAVEMENT SUBGRADES – CBR			
				HIGH 150	MEDIUM 80	LOW 40	ULTRA LOW 20	HIGH 15	MEDIUM 10	LOW 6	ULTRA LOW 3
747-400, -400F	877,000(397,800) 395,000(179,200)	23.33	200(1.38)	53 19	62 21	74 25	85 29	53 20	59 21	73 23	94 30
747-400ER, -400 ER FREIGHTER	913,000(414,130) 362,400(164,400)	23.40	230 (1.58)	59 19	69 20	81 23	92 27	57 18	63 19	78 21	100 26

Table 3. ACN data for Boeing 747-400.

2.4.2.2 PCN

The description that will be presented in this section and the required data is based on ICAO standards and the AC No: 150/5335-5C is used for this purpose.

As already mentioned there are two methodologies to determine the PCN value. It was mentioned that the technical evaluation method is more accurate and this procedure will be briefly explained in this section to determine the required primary data. The required data will differ depending on the type of pavement.

For flexible pavements the first step is to determine an equivalent thickness of the pavement being evaluated. This equivalent thickness is determined to facilitate the calculation of the effect of the loads on the pavement by using pre-determined materials with known behaviours. The main primary data required for this purpose is:

- Materials of the pavement structure
- Thickness of each layer of the pavement structure
- CBR of the subgrade

Once the equivalent thickness has been determined, the traffic mix using the pavement section needs to be converted into the critical aircraft. For a detailed description of this procedure the AC No: 150/5335-5C should be consulted. However based on this standard, the primary data required to do the conversion is:

- Types of aircrafts using the pavement
- Number of movements for each aircraft
- Wheel load of each aircraft type
- Number of wheels on the main gear of each aircraft type

Based on the converted traffic in terms of the critical aircraft and the equivalent thickness, it is possible to calculate the cumulative damage factor of each aircraft. This is the damage caused by each aircraft considered individually. When the sum of all the CDF is < 1 the PCN value can be reported as the ACN of the aircraft with the greatest CDF. When the CDF > 1, meaning that the pavement is overloaded, the PCN value can be reported as the greatest ACN corresponding to the maximum allowable gross weight of the traffic mix.

To determine the effect of all the traffic mix using the pavement, the wheel load method can be applied. This method is used to convert the traffic of the fleet mix into the traffic of the critical aircraft. For this purpose the following primary data is required:

For rigid pavements, the only difference is that an improved subgrade support is determined instead of an equivalent pavement thickness. The primary data required for this purpose is:

- Materials of the pavement structure
- Thickness of concrete
- Flexural strength of concrete
- Subgrade soil modulus (k value)

2.4.2.3 PCI

A description of the PCI was given in section 2.2.2, in this section the data required for calculating the PCI will be given. The goal afterwards is to classify this data according to the types of data proposed by Floridi. The procedure to calculate the PCI differs for asphalt pavements and for concrete pavements. However both processes have in common that the type of distress and their severity are required.

Asphalt pavements

There are 16 types of distresses considered for asphalt pavements. It is out of scope for this research to explain each of these distresses, for this purpose the reader should refer to ASTM (2003). The first step to calculate the PCI is to identify the types of distresses present on a pavement section. Once this is done their severity must be assessed. Severity levels for most of the distresses are defined in three categories: low, medium, and high; for some there is no definition of severity levels. Each distress and its severity are measured; these can be either in square feet (area) or linear feet (length). The types of distresses, the severity levels and the unit measure are presented in Annex 1.

Once the types of distresses have been classified into type and severity, and measured according to the unit measure presented in Annex 1, a percentage is calculated for each combination of distress and severity. This is done by dividing the measure obtained into the area of the sample of pavement that is being evaluated. The ASTM provides graphs, which are used to obtain deduct values based on the percentages mentioned above. An example of these graphs is given in Appendix 1. Then an iterative process, which will not be presented in this report but is presented in ASTM (2003), is followed. This process ends in determining corrected deduct values (CDV) for each sample being evaluated, these deduct values are also determined from a Corrected deduct values graph provided by the ASTM, and shown in Appendix 1. The highest CDV will be subtracted to 100 which is the highest possible PCI, and the result is the determined PCI value for that sample of pavement.

The primary data required for the PCI calculation has been presented in this section. These data can be summarized as follows:

- Type of distress: 16 possible distresses
- Severity level of distress: Low, Medium, High, or no severity level
- Measure of distress: either area, or length
- Area of the sample of pavement being evaluated
- Deduct values: Obtained from deduct value graphs provided by ASTM, such as Fig 7.
- Corrected deduct values: Obtained from CDV graph provided by ASTM, shown in Fig 8.

Concrete pavements

There are 15 types of distresses considered for asphalt pavements. An explanation of these distresses can be found on ASTM (2003). The first step to calculate the PCI is to identify the types of distresses present on a pavement section. Once this is done their severity must be assessed. Severity levels for most of the distresses are defined in three categories: low, medium, and high; for some there is no definition of severity levels. The measure used for evaluation PCI on concrete pavements is different than for asphalt pavements, the units of measure is the number of slabs of the sample pavement where the distress occurs. The types of distresses, the severity levels and the unit measure are shown in Appendix 1.

Once the types of distresses have been classified into type and severity, and measured according to the unit measure presented in Appendix 1, a percentage is calculated for each combination of distress and severity. This percentage however is done by dividing the number of slabs measured for each distress by the total number of slabs in the sample section. The procedure that follows is exactly the same as the one described for asphalt pavements, with the difference that different deduct values and corrected deduct values are used. Please refer to Appendix 1 to see examples of the graphs used to determine the deduct and corrected deduct values.

In this section the data required for the PCI calculation has been presented. These data can be summarized as follows:

- Type of distress: 15 possible distresses
- Severity level of distress: Low, Medium, High, or no severity level
- Measure of distress: number of slabs for every combination of distress and severity
- Total number of slabs in the sample pavement being evaluated
- Deduct values: Obtained from deduct value graphs provided by ASTM, such as Fig 9.
- Corrected deduct values: Obtained from CDV graph provided by ASTM, shown in Fig 10.

According to the classification of data presented by Floridi (2009), the data just presented can be classified as primary data. This data is the input for calculating the PCI.

2.4.2.4 Roughness

The aviation industry and ICAO refer to the runway roughness measurement as the Boeing Bump method. A brief description of this method will be presented in order to identify the primary data required for this calculation. This description and data to be presented is based on the AC No : 150/5380-9 provided by FAA (2009).

The Boeing Bump index is measured based on the longitudinal elevation profile of a runway. Using wave lengths of up to 120 meters, the bump height and bump length will determine the Boeing Bump Index. To determine the bump height the elevation profile must be determined, and to determine the bump length the location of the point where the bump height occurs and the wave length must be known. The primary data required for calculating the BBI is:

- Elevation profile of the runway
- Longitudinal position of survey points

2.4.2.5 Friction

To determine friction levels on runways airports use continuous friction measuring equipment (CFME). This type of equipment automatically determines friction levels as shown in Table 2. The required primary data is the friction data measured with the CFME.

2.4.2.6 FOD

The FOD index is calculated from the distresses that can cause FOD, also included in the PCI evaluation. The distresses that can cause FOD are presented for flexible pavements and for rigid pavements based on ASTM (2003), and are presented in Appendix 1. The primary data required to determine the potential of FOD is:

- Type of distress
- Severity level of distress

The criteria for the structural evaluation and functional evaluation of pavements, together with the data required for each criterion have been presented in this section. It is now time for a preliminary analysis of the information that has been provided in this chapter.

2.5 Preliminary analysis

As absolute AHP will be the methodology to prioritize pavement sections to be maintained or rehabilitated, it is useful to start identifying the requirements that will be needed when the AHP is carried out. As it was mentioned in section 1.3 the first step is to identify the goal of the decision to be made.

To formulate the goal of the decision to be made the following reasoning is done. Initially it could be thought that the main goal of the decision to be made is to select the M&R projects that will be carried out in the maintenance plan. However one problem was identified from literature review regarding ranking of projects to make network level decisions. The problem is that network level decisions taken in this way end up being the sum of project level decisions. These project level decisions are ideal for pavements considered in isolation but not for the entire network. To overcome this problem, projects should not be chosen at the project level and then added until budget is finished to do network level decisions. For this reason, the initial goal of the decision should not be to select the M&R projects but to *prioritize the pavement sections in the network that most require some kind of M&R treatment.*

With this identified goal based on the literature review, the next step to carry out the AHP is to identify what criteria will be considered in the decision making. The information provided in this chapter already identified some criteria that could be considered. These criteria are: functional condition of the pavement and structural condition of the pavement section.

The next step is to define the hierarchy structure including criteria and sub-criteria. A preliminary hierarchy structure is proposed with the criteria and sub-criteria identified. This hierarchy is presented in Figure 6.

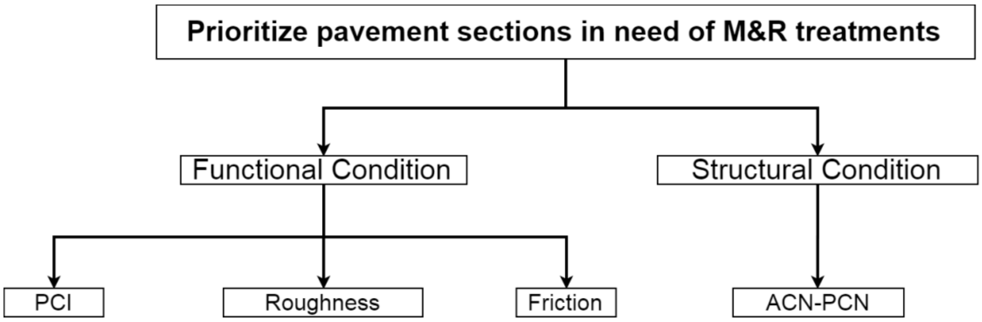

Figure 6. Preliminary hierarchy structure of AHP

After the hierarchy structure is defined, the next step as presented in section 1.3 is to define the ratings that will be assigned to each pavement section at the bottom level of the hierarchy structure. The purpose of defining ratings is to establish priorities. According to Hajek et al. (2011) the following service levels are used for prioritization of maintenance projects: target level of service, minimum acceptable level of service and safety-related level of service. A M&R treatment to maintain a safe operation of aircrafts will have the highest priority level. M&R treatments to maintain the minimum acceptable service level will follow in the priority level. When the service level is met, the next projects in the priority level will try to meet the target service level (Hajek et al., 2011). This suggests that ratings can be defined based on different service. Until now service levels have been presented for roughness and friction; these will be employed further in this research for this purpose.

2.6 Conclusions

Four main topics have been covered in this chapter, airport pavement management, airport pavement management systems, criteria used in pavement management, and required primary data for the criteria identified in this chapter.

Airport pavement management can be applied at two levels, project and network levels, where different techniques are applied at each level. Pavement management systems and APMS consist of four components, namely network inventory, pavement evaluation, pavement performance prediction and management planning. From the criteria identified in the literature review it was identified that the PCI is the most common criteria used in APMS, where PAVER is the most common system in use. However, it was also shown that PCI is not the only criteria used for pavement management. ACN-PCN is a very important criterion used to report the structural condition of pavements, and roughness, friction and FOD are criteria used for functional evaluation.

APMS can be applied at the project and at the network levels. At the network level, ranking is the typical methodology for selecting M&R treatments. One problem was identified from literature review regarding ranking for use at the network level. The problem is that projects at the network level are a result of the sum of project level choices provided for needs of pavement sections considered in isolation from the rest(Cook & Lytton, 1987). Another problem that is not mentioned in literature but can be deducted in consequence is that ranking when done based only on PCI, will enlarge the problem as network level decisions will not only be a sum of project level decisions but will be a sum of project level decisions to meet only one criterion (PCI), leaving apart other important criteria.

From the review done for data and information it was shown that different definitions exist, however as Floridi suggests these are not rigorous enough. Information in this research will be understood as consisting of data, well-formed, meaningful and truthful. And data can be categorized in primary, secondary, metadata, operational and derivative. Primary data will play a vital role in this research in order to identify the data required for the tool but also to check that data is not double counted.

Recalling that the main purpose of this chapter was to contribute answering sub-questions one, two, and three, it must be said that the purpose has been achieved. Related to sub-question one, airport pavement management decision making has been explained cording to literature. In relation to sub-question two, criteria and sub-criteria according to literature have been identified. And related to sub-question three the data, specifically primary data required for each identified criterion has been presented.

3 Case studies

Three case studies have been selected for this research. As it was defined in the scope of this research, the tool to be developed in this research will be valuable for airports with high traffic operations. The three case studies to be presented in this chapter are the biggest airports in the country and main airports in Europe. The case studies are: Amsterdam Airport Schiphol, Brussels Airport and London Heathrow.

As it was already mentioned the purpose of this chapter is to contribute to the first three sub- research questions. For this purpose, for each case study an introduction will be given, then a brief description of the pavement management decision making, followed by the criteria and sub-criteria and an analysis to identify the data required in relation to the identified criteria. After the three case studies have been presented, a new proposed methodology for estimating the structural remaining life of a pavement will be given, then a summary of the results found in this chapter and section of conclusions will close the chapter.

3.1 Amsterdam Airport Schiphol

Amsterdam Airport Schiphol is the airport with most aircraft movements in the Netherlands. In 2016, Schiphol was the airport with most aircraft movements in Europe as it is shown in Figure 2. In this year the airport handled a total of 478,864 aircraft movements. Figure 7 depicts the pavement network layout of the airport.

Figure 7. Amsterdam Airport Schiphol layout

3.1.1 Introduction

This was the first case study of the research. The information collected for this case study was mainly from interviews, which were done face to face and via phone calls. The minutes of these interviews are provided in Appendix 2.

To determine which maintenance and rehabilitation projects will be executed, Schiphol airport draws up a multiple year maintenance plan; this is a 5 year plan. To determine which projects will be included in the plan an analysis of the actual status of the pavement network is done (network level) based on different criteria that will be presented in this chapter. Alternatives for M&R of the pavements are chosen according to the needs of the pavement sections. The alternatives that will be included in the maintenance plan are first prioritized and are then chosen based on a life cycle cost (LCC) analysis and risk analysis. The plan is yearly analysed; the condition of the pavement sections is considered again to determine if the planned year for each project should be anticipated or delayed. This process will be described in more detail in the following paragraphs.

3.1.2 Pavement management decision process in Amsterdam Airport Schiphol

The multiple-year plan as it is called in Amsterdam Airport Schiphol is basically the maintenance plan for the next 5 years, where all the M&R projects are included. Projects in this plan do not include small or routine maintenance such as filling of cracks, rubber removal, or repainting of pavement markings. Projects in this plan are the projects that have an impact on airport operations, covering all the range of projects from simple pavement overlays to complete reconstruction of pavements.

The Airport Project Management System employed at Schiphol is PAVER. As it was already explained, this system divides the pavement network into branches and these are further divided into sections. Inspections of the pavement sections using vehicles to detect the types of distresses and severity of each distress in the pavement sections are given as an input to PAVER; the main output that the system gives is the Pavement Condition Index (PCI) of each section.

The PCI of each pavement section is used for two comparisons. First the PCI is compared with the trigger level established for that section and second the PCI is compared with the family curve behaviour model of that section. At Schiphol, the PCI trigger level is used to determine if a specific pavement section needs to be further examined, as an example the trigger level used for taxiways is 70 on the PCI scale, when a taxiway section is below 70 the section is examined in more detail.

The family curve behaviour model is a graph that predicts the behaviour of pavements in terms of PCI. At Schiphol, 4 family curves are employed to predict pavement behaviour, these are: touchdown zones, runways, taxiways, and concrete pavements. These curves are elaborated based on real data of inspections carried out in the past at Schiphol but also based on the PAVER database. This division is done due to the different behaviour of pavements in each category. Touchdown zones in Schiphol are expected to need rehabilitation every 7 years, while the rest of the runway is expected to need rehabilitation every 14 years. The behaviour of pavements in taxiways is also different than in runways, and in concrete pavements. Concrete or rigid pavements in Schiphol are mainly used for aprons. When the PCI of a section is below the predicted or expected behaviour, the section is also selected for further examination.

Once the sections have been selected for further inspection, depending on the type of distresses found on the section, different tests may be required to identify what type of measure is needed, to bring back the PCI to its desired level. The types of tests include borings or falling weight deflectometer (FWD), other tests are done but this is out of scope of this research. At this point it should be possible to determine the required alternative that will bring the condition of the pavement back to the desired level.

A process that is done parallel to the PCI analysis is related to the ACN-PCN method. For this purpose, the total amount of aircraft movements at the airport is considered and divided according to the use of each pavement. Based on the ICAO recommendations related to the overloading of pavements by comparing ACNs of critical aircrafts to PCNs, additional tests to determine the structural condition of a pavement may be performed and rehabilitation treatments are also planned when necessary.

Another criterion which is used to determine if further inspection is required for a certain runway is related to roughness. This criterion does not apply for aprons and taxiways, since the speed of the aircrafts in these sections is very low compared to take-off and landing speeds. The employed roughness indicator at Schiphol is the Boeing Bump index. Inspections to determine this indicator at Schiphol are only done when there are complaints from the airlines starting from pilots who perceive excessive vibrations or G-forces when landing or departing. If this is the case, the profile of the runway is determined based on a full run test of the pavement, then a software determines de Boeing Bump index, and the sections that do not meet the roughness standards are identified for rehabilitation.

Friction is considered at Amsterdam Airport Schiphol mainly for rubber removal, which is done two or three times per year. Friction is measured about four times a year for each runway and the friction measurements are compared to the recommendations given by ICAO. When the friction is below the maintenance level, a maintenance action is planned and friction levels should never be below the minimum level.

Based on the structural and functional condition of the pavements, the required measures for each section are determined. However, due to budget and time restriction not all the measures can be included in the maintenance plan. For this purpose projects are prioritized based on the urgency of the project and the importance of the pavement section to the operations of the airport.

The urgency is related to the condition of the pavement, both functional and structural. The worse the condition of the pavement, the higher the urgency for repairing. The importance of the pavement section involves other criteria. For example, a runway is more important than a taxiway and an apron. Similarly within taxiways some importance levels apply, for example a taxiway that is part of a taxi route without alternative taxiways is more important than a taxiway with substitute alternatives. Another example is that a primary runway is more important than a secondary runway or a primary taxiway is more important than a secondary or tertiary taxiway. Another aspect to take into account to define importance of taxiways is the lighting system installed. Some taxiways have lighting systems fit to allow operations in weather conditions when visibility is very low and other taxiways are not fit in these circumstances. These lighting systems allow aircrafts to be seen from the control tower. Thus, taxiways with these lights are considered more important than taxiways without the lights.

Another criterion that is considered for choosing the pavement sections to be repaired at Schiphol is related to the condition of other pavement-related assets. These are basically the drainage and the electrical systems. These two systems will have an impact on pavement operations if for example a replacement of the system is required. When the condition of these systems is poor and M&R is required, the priority of the pavement section linked to these systems increases. If pavement condition is also low, the need for maintenance of the pavement will be even higher due to the need for maintenance of the drainage or lighting system installed in this particular pavement section.

After the criteria related to urgency, importance of the pavement section, and condition of related systems has been considered, a preliminary selection of the pavement sections that have to be included in the multiple-year plan is done. To determine the definitive maintenance plan, these pre-selected projects are reviewed from a life cycle cost analysis and risk analysis perspective. This definitive maintenance plan is reviewed every year based on the condition of the pavements and projects are delayed or anticipated if required. Figure 8 summarizes the process in place at Amsterdam Airport Schiphol described in this section.

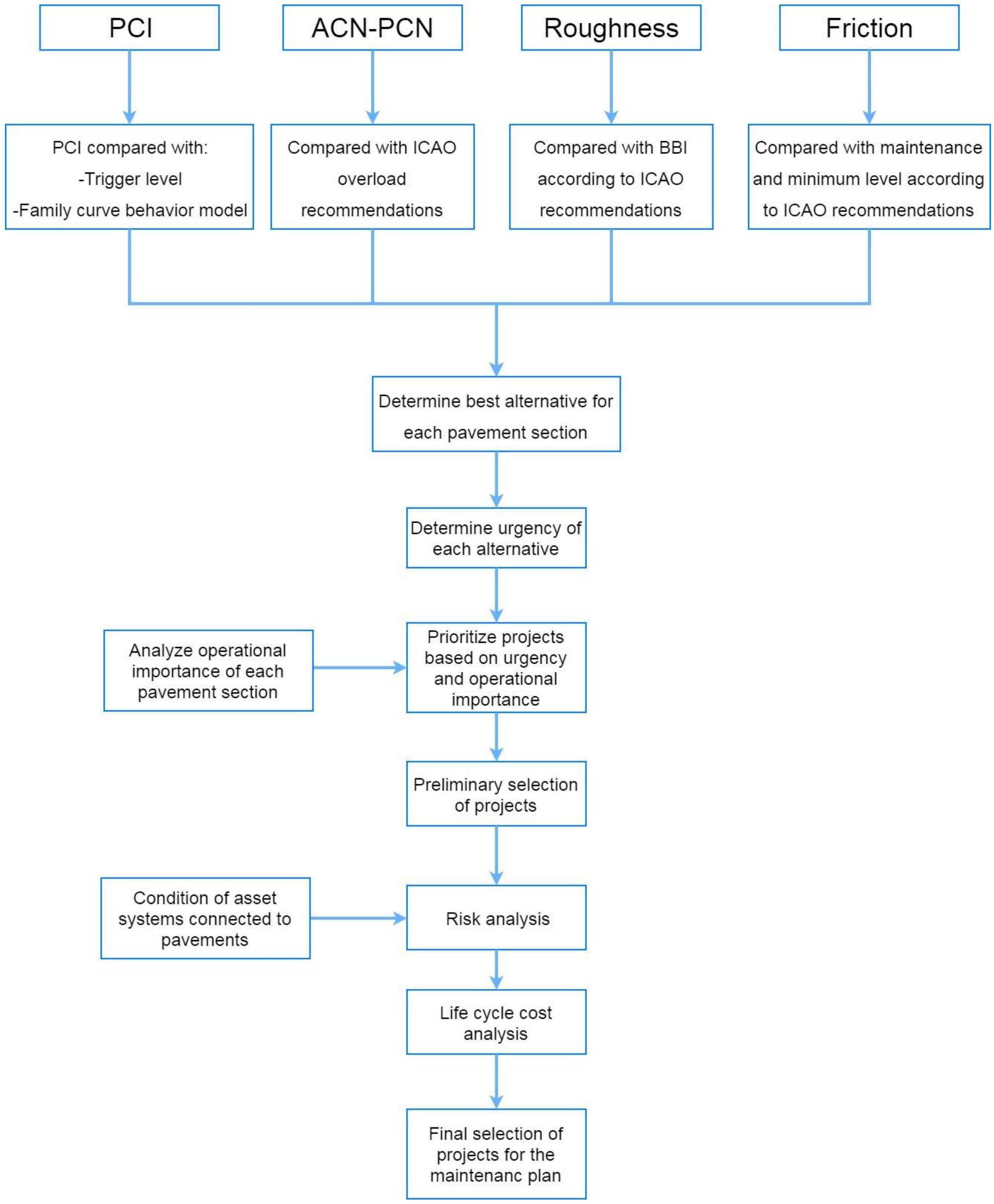

Figure 8. Pavement management process at Amsterdam Airport Schiphol

3.1.3 Criteria, sub-criteria and analysis

As it was already identified in the previous section, different criteria are considered at Amsterdam Airport Schiphol. The purpose of this section is to concisely present the criteria and sub-criteria identified at Schiphol. This differentiation between criteria and sub-criteria is very relevant for the implementation of the AHP.

The main criteria considered at Amsterdam Airport Schiphol can be seen in Figure 8. These criteria are:

- PCI
- ACN-PCN
- Roughness
- Importance of pavement section

To identify the sub-criteria and primary data required, each criterion will be considered separately:

PCI

As already mentioned, two comparisons are done with the PCI. A comparison with trigger level and a comparison with the family curve behaviour model. Further inspection to the pavement section can be caused by one of these two comparisons or by both. These two comparisons can be understood as sub-criteria of the PCI evaluation analysis.

When the PCI is below the trigger level, the pavement section needs further inspection. Contrary, when the PCI is above the trigger level no action is required. This could be understood from a different perspective and say that pavements below the trigger level probably require some kind of M&R treatment. This implies there is a prioritization process going on based on the comparison between PCI and the trigger level.

Similarly occurs for the comparison of the PCI with the family curve model. The PCI in this case is compared with its expected PCI value, and when the actual PCI is below the expected PCI, then further inspection is required for that section. This also implies that a prioritization occurs at this point and pavements that have lower PCI value than expected are prioritized over pavements that are behaving as expected.

Required primary data:
For both sub-criteria, clearly the main input and primary data will be the PCI index of each pavement section. As already discussed in the chapter before, the PCI requires other primary data however for this comparison process the PCI can be considered as the primary data. Additionally for the comparison between PCI and trigger level, clearly the trigger levels will be part of the primary data required. For the comparison with the expected behaviour, the expected PCI for each section will be required as well.

ACN-PCN

For the analysis based on ACN-PCN at Schiphol, two sub-criteria have been identified: 1) The ACN of the aircrafts exceeding the reported PCN, but not exceeding it more than 10% for flexible pavements and 5% for rigid pavements; 2) The number of movements of these aircrafts. When the amount of movements of aircrafts exceeding the reported PCN is less than 5% of the total annual aircraft movements, the pavement should not be adversely affected.

Required primary data:
For this analysis the main input is clearly the PCN of the pavement section in consideration. This value is determined at Schiphol every 10 years for each pavement section in the airport. The primary data required for the PCN calculation was already identified, however for this analysis the PCN value itself will be considered as primary data.

To determine if the pavement is being overloaded according to ICAO, the required primary data is the ACN of the aircrafts operating on the pavement and number of movements for each type of aircraft.

Roughness

It must be noted that roughness will only be considered for M&R if there are complaints from the pilots. Only then further investigation to the runway will be required. No sub-criteria were identified for this criterion based on the process at Schiphol. The BBI will be determined and rehabilitation will be planned according to ICAO recommendations. In Figure 5 the roughness acceptance levels have been presented.

Required primary data:

As shown in Figure 5 when pavements have a BBI below 1 they are in the acceptable range and no maintenance is required. When pavements enter the excessive range, maintenance is encouraged and if pavements enter the unacceptable range, pavements need to be taken out of service. The main input for this is clearly the Boeing Bump Index. It was already discussed that to calculate the BBI the profile of the runway will be the primary data. However, airports like Schiphol have BBI available and this would be the primary data. To determine if the pavement falls under the excessive or unacceptable levels, the bump length will be also part of the required primary data.

Importance of pavement section

Different criteria were mentioned to be considered to evaluate the importance of a pavement section. It was mentioned that runways are more important than taxiways and aprons; this will be named functionality of the pavement from this point on. It was also mentioned that a primary runway is more important than a secondary, also applicable for taxiways; this will be named the operation classification. Specifically for taxiways other criteria were also identified: existence of alternative routes and installed lighting system. These last two can be considered as sub-criteria of the sub-criteria functionality of the pavement.

Required primary data:

For functionality of the pavement: The required primary data for this sub-criterion is the functionality of the pavement to which the pavement section belongs. It can be runway, taxiway or apron.

For the operation classification: At Schiphol this classification is known, it can be primary, secondary or tertiary. This will be the primary data for this sub-criterion.

Existence of alternative routes: Determining the existence of alternative routes in a pavement network like the one at Schiphol can be very complex. Alternative routes will vary depending on many factors, like location of the pavement section or direction on which the pavement section is being operated. At Schiphol the existence of alternative routes is analysed based on expert knowledge and is not a systemic process.

Installed lighting system: The primary data required is the type of lighting system in place for each section. It is also required to know the type of lighting system required to allow aircraft operations under low visibility weather conditions.

3.2 Brussels Airport

Brussels Airport is the airport with most aircraft movements in Belgium. In 2016 a total of 223,668 aircraft movements were handled. Figure 9 depicts the layout of the pavement network. Brussels Airport counts with 3 runways and a relatively broad pavement network compared to Schiphol.

Figure 9. Brussels Airport layout

3.2.1 Introduction

This was the second case study of the research. The collected information in this case study came mainly from face to face interviews and via phone calls. The minutes of these interviews are provided in Appendix 2.

The decision making process for pavement management at Brussels Airport is simpler than in Amsterdam airport. For pavement condition evaluation, the same criteria as in Schiphol are used, except for roughness. For importance of the pavement section the only criterion considered at Brussels is the number of operations on the pavement section. The process in detail is described in the following paragraphs.

3.2.2 Pavement management decision process at Brussels Airport

Similarly to Schiphol, Brussels Airport has a maintenance plan where the required M&R projects for the next 5 years are included. Instead of PAVER the used APMS is ROSY. The pavement network is also divided in branches and sections. The input given to this system is also the type of distresses found on the section pavement and their severity. A vehicle is used to measure the different distresses and the severity, and this data is input for ROSY. In the past, the APMS in use at Brussels was PAVER and has recently changed to ROSY, however the output of both systems is the same.

Based on the PCI of each section and depending on the functionality of the pavement (taxiway, runway or apron), a trigger level is employed as one criterion to determine if further inspection is required for a particular pavement section. The second criterion is the age of the pavement section. Age is the number of years since its construction or since the last major rehabilitation performed to the pavement. For example if one section of pavement has a low PCI value and its age is short, then further inspection is required for this pavement.

After identifying the sections that require further inspection, these sections are visually inspected and tests are performed to determine with more certainty the M&R alternatives required for each section.

The ACN-PCN is also used at Brussels Airport to determine if M&R is required for each pavement section. To plan a rehabilitation treatment for any pavement section in Brussels due to ACN-PCN, the % of overloads proposed by ICAO and mentioned in the literature research are used. Instead of allowing a maximum overload of 5% for rigid pavements as ICAO suggests, at Brussels independently of the type of pavement the allowed overload is of 10%. Nothing was mentioned about the allowed number of movements with overload, however this number should be limited to 5% according to ICAO. Pavement sections with greater overloads will have higher priority than pavements with less or without overload. For example, if a pavement section has 1% of overload, the section will be planned for maintenance. Certainly a pavement section with higher overloads will have higher priority for maintenance planning.

The roughness indicator used at Brussels Airport is the Boeing Bump index, this index is used only after a runway has been rehabilitated. However, this indicator is not used in this airport to determine sections that need some type of M&R measure. When considering friction levels, maintenance will be planned if friction value reaches 0,6, using the Airport Surface Friction Tester at a speed of 60mph or 95km/h. The minimum friction level used at Brussels Airport is 0,47. When looking at Table 2 it can be seen that the maintenance level in this table for this test and at this speed is 0.47. This suggests that friction levels at Brussels Airport are stricter than those presented in Table 2.

After the pavement sections have been identified, a prioritization process follows in order to identify which sections need to be maintained before others. The criteria used at Brussels Airport for this decision are PCI, ACN-PCN, friction for runways and taxiways, and the amount of traffic at the section.

To select the most appropriate solution for the selected sections, four criteria are taken into account: durability of the solution, execution time of the repair, cost of the repair, and importance of the section. When the pavement section has a low importance, the execution time and durability of the solution will be less relevant than the cost of the solution. Oppositely when the section has a high operational importance, the cost will be less relevant, and durability and execution time will have a bigger impact on the decision. Figure 10 summarizes the process in place at Brussels Airport described in this section.

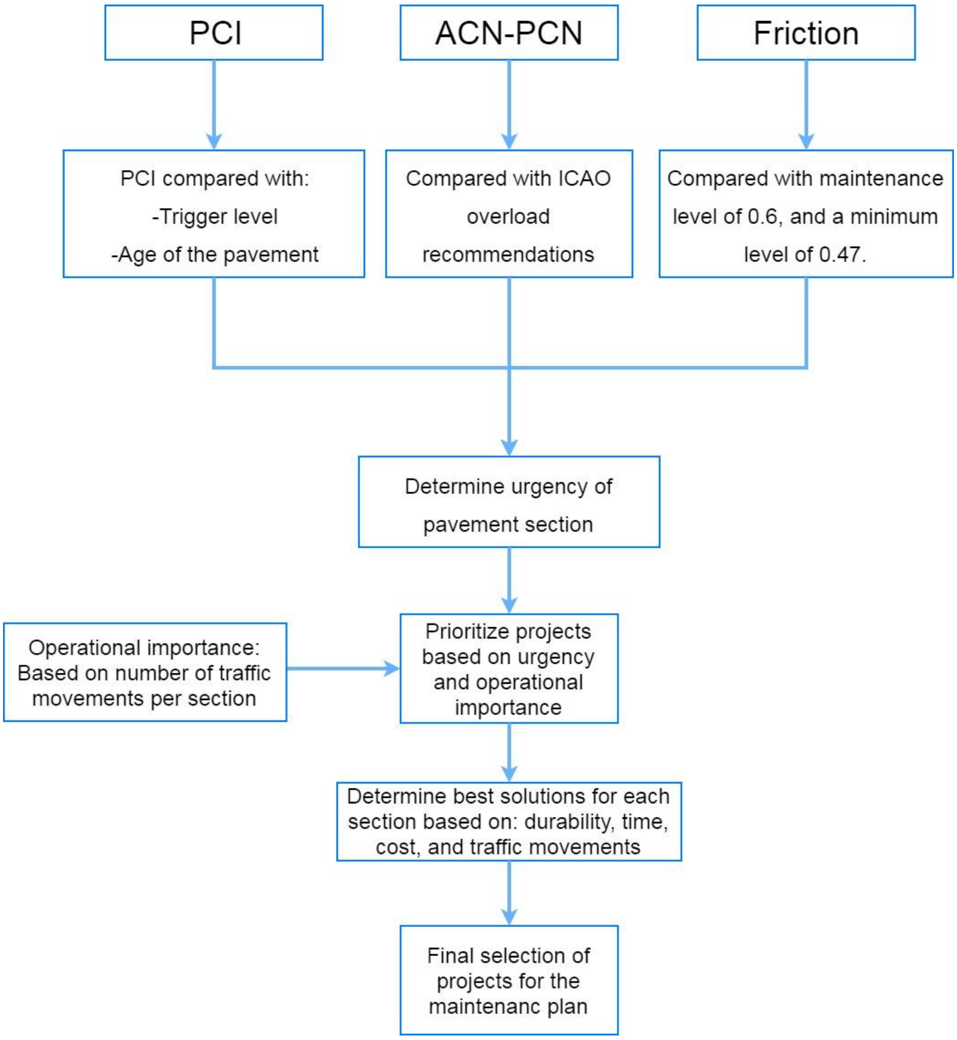

Figure 10. Pavement management decision making process in Brussels Airport

3.2.3 Criteria, sub-criteria and analysis

Different criteria are considered at Brussels Airport. The purpose of this section is to concisely present the criteria and sub-criteria identified at this airport.

The main criteria considered at Brussels Airport can be seen in Figure 10. These criteria are:

- PCI
- ACN-PCN
- Friction
- Importance of pavement section, namely number of operations.

To identify the sub-criteria and primary data required, each criterion will be considered separately:

PCI:

Two comparisons are also done at Brussels Airport. A comparison between the actual PCI and the trigger levels depending on the functionality of the pavement; just like at Schiphol. The other comparison is with the age of the pavement. This comparison is different at Schiphol, but the purpose is the same. When the PCI is analysed based on its age what is being done is comparing the actual PCI with the expected PCI value.

Primary data required:
The required data for this analysis is the same as in Schiphol: PCI of each pavement section, trigger levels, expected PCI of each pavement section.

ACN-PCN:

No sub-criteria were identified for this criterion. The analysis is done in a similar way as for Schiphol, however the allowed overload is 10% independently of the functionality of the pavement.

Required primary data:
The data required for this analysis is the same as the one presented for Schiphol for this criterion.

Friction:

For this criterion it was not possible to identify sub-criteria used in Brussels Airport. The decision to do corrective action to pavements due to friction is based on the levels mentioned in Table 2. These levels are presented by ICAO and FAA. ICAO does not specify how to use these levels; the only guideline is that whenever the Mu value is below the maintenance planning level, then the runway should be further evaluated to determine the required corrective action. When the Mu value is below the minimum level, the guideline is to do corrective action as soon as possible. At Brussels the maintenance planning level is 0.47 and the minimum friction level is 0.34. Friction is measured on both directions as dictated by ICAO, and the average on both directions is compared to the established levels.

Required primary data:
Based on this description, the required primary data for determining corrective actions due to friction is, the friction data (Moazami et al.) on both directions of the runway.

Importance of pavement section:

The only sub-criterion used at Brussels to determine importance of pavement section is the number of operations; this is the required primary data.

3.3 Heathrow Airport (LHR)

Heathrow Airport is the airport with most aircraft movements in the UK, serving the city of London. In 2016, Heathrow Airport was the second airport with most aircraft movements in Europe after Schiphol, as it is shown in Figure 2. In this year the airport handled a total of 473,231 aircraft movements. One of the main differences between LHR and Schiphol is that

Heathrow only counts with 2 runways and handles practically the same volume as Schiphol. The layout of this airport can be seen in Figure 11

Figure 11. Heathrow Airport layout

3.3.1 Introduction

The third case study of this research is Heathrow Airport. The information collected for this case study was from interviews done via phone call, and a questionnaire. The minutes of these interviews are provided in Appendix 2.

The decision making process for pavement management at Heathrow Airport is different than in Schiphol and Brussels. The decision making process for pavement management at Heathrow Airport is motivated by a different aspect than in Brussels and in Amsterdam, this aspect is the need to keep the pavements operating as much as possible. LHR is an airport that operates at 99% capacity from early in the morning until late at night when the last flight is scheduled. The main criterion used in this airport is PCI. ACN-PCN, roughness and FOD, are not considered for pavement decision making; and friction is only considered for rubber removal. The process in detail is described in the next section.

3.3.2 Pavement management decision process at LHR

In London Heathrow there is also a five-year maintenance plan where the required M&R projects for the next 5 years are included. The PCI monitoring is outsourced and this company uses PAVER to calculate the PCI for all pavement sections of the airside pavements network. The network is also divided in branches and sections. The observed distresses are measured by a vehicle that runs over all the pavements, and when needed visual inspectors check the pavements. To determine the PCI of all the pavement sections, the airport is divided in 3 areas, each year one area is inspected, which means that every 3 years the PCI is determined for all pavement sections on the airside.

For the case of LHR, the main criterion for pavement rehabilitation is the PCI. As it was already mentioned this airport practically operates at maximum capacity, and for this reason pavement managers are forced to minimize M&R treatments. At LHR the service levels established for PCI have different names than in Brussels and Schiphol. These levels are: adequate, degraded, and unsatisfactory. When a pavement section is classified as degraded then a repair action should be carried out before it falls to unsatisfactory. The transition point between adequate and degraded could be considered as the trigger level, and the transition from degraded to unsatisfactory could be considered as the minimum level. To plan these M&R treatments, the expected life time of pavement sections is determined according to the expected behaviour of the pavement until it is expected to be in degraded condition. These plans are reviewed annually and depending on how the PCI varies, some projects can be anticipated or delayed accordingly. For example runways at LHR are planned to be rehabilitated every 10 years even when PCI values would suggest doing rehabilitation more often. It is not possible to take a runway out of service with a higher frequency due to the high traffic demands in this airport. It was mentioned that the southern runway is much more deteriorated than the northern runway and although rehabilitation is required it is not an option; the PCI is kept above the minimum level by doing local repairs that do not require taking the runway out of service. According to the interviewee one of the problems at LHR is that pavement sections are usually rehabilitated when they have already failed and not before.

The evaluation of pavements using PCI is limited because it only represents the superficial observed condition of the pavements. In LHR to overcome this limitation, parallel to the PCI analysis the amount of money spent on M&R for a particular pavement section is a criterion analysed. According to the interviewee, the number of repairs a pavement has had and the cost of these repairs are related to the underlying condition of the pavement section. An example was given to clarify this concept; there is an area of a taxiway where usually the PCI is above the minimum level, however this area is repaired more frequently than any other pavement section in the airport. The reason is because the subgrade is very unstable; causing cracking on the concrete slab over it, and eventually rupture of the slab. By considering the historic amount of money spent for M&R on pavement sections, it is possible to identify pavement sections that regardless of the PCI need more attention than others. These pavement sections will be inspected more frequently than others, and as soon as a problem appears the section is repaired.

Other criteria like friction, ACN-PCN, and roughness are not really considered in LHR for identifying pavement sections in need of M&R, according to the interviewee. Friction levels of the runways are measured two times a year; however this criterion is only used for rubber removal at LHR. According to the information provided in the interviews, no rehabilitation has been planned due to friction levels of the runways. Again, the main restriction to M&R is that there is no time to close the runways due to its high demand-capacity ratio. The other reason is that friction levels do not become a safety issue because runways are rehabilitated every 10 years and in this time friction does not drop below the minimum levels, according to experience at LHR. ACN-PCN is not used as a criterion to select pavement sections; however PCN values for all pavements are known and calculated every 10 years. Roughness is not considered at LHR, since until now there have been no issues related to this topic. FOD is not used for any maintenance criteria; FOD is detected with ground radar and removed.

After the pavement sections have been identified either from the PCI analysis or from the inspection of sections with high frequency of failure, a prioritization process follows in order to identify which sections need to be maintained before others. This prioritization process however, is only possible for predictive maintenance, and in LHR great part of the maintenance is corrective.

For the prioritization process, the main considered criterion is the importance of the pavement section. Sections that belong to the runways have the highest priority. When prioritization needs to be done between aprons and taxiways, the main criterion taken into account is how restrictive the asset is for traffic operations. There is no priority difference between the two runways, however for the taxiways some criteria are applied to define which taxiway sections are more important. The first criterion is the code of the taxiway, if the code is F then this section has priority over a section with code E because traffic can be transferred from a section code E to a section code F, but not the other way around. This coding is assigned depending on the size of aircrafts; code-F aircrafts are bigger than code-D aircrafts and cannot transit on pavements designed for code D. For taxiways specifically, another criterion is the number of aircraft movements that are handled on that section. Taxiways that connect certain terminals are busier than others, and these will have priority over the ones with lesser traffic. The process just described is summarized in Figure 12.

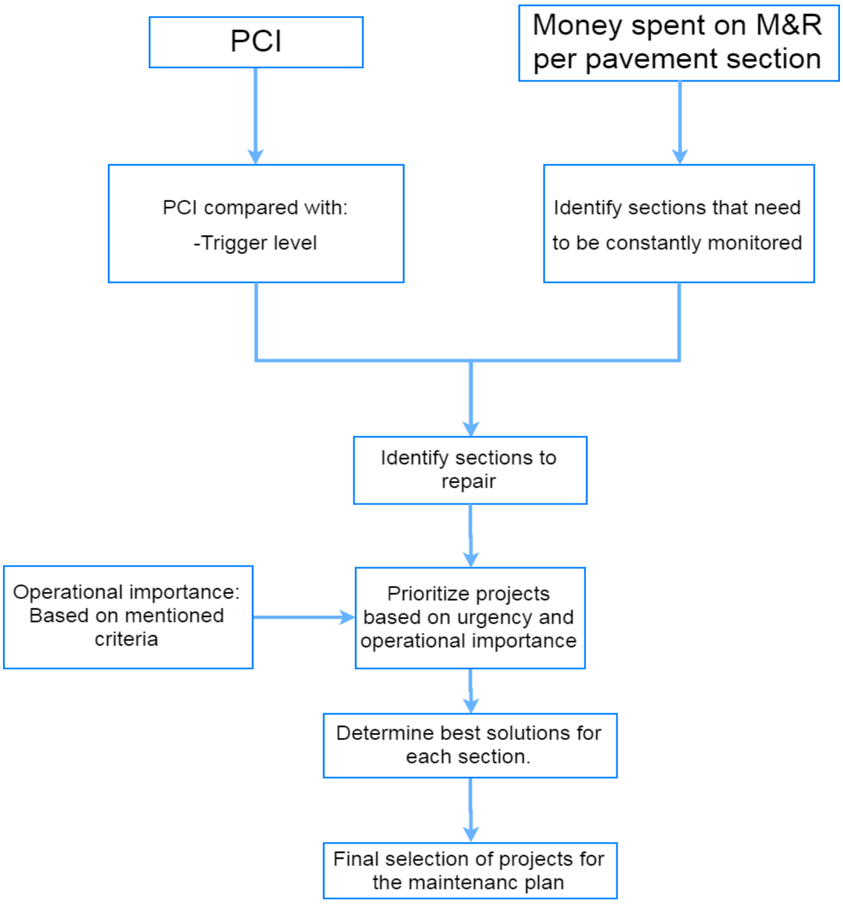

Figure 12. Pavement management decision making process in Heathrow Airport

3.3.3 Criteria, sub-criteria and analysis

Different criteria are considered at Heathrow Airport. The purpose of this section is to concisely present the criteria and sub-criteria identified at this airport.

The main criteria considered at LHR can be seen in Figure 12. These criteria are:

- PCI
- Structural condition
- Importance of pavement section

To identify the sub-criteria and primary data required, these criteria will be considered separately:

PCI:

PCI is only compared to a trigger level; this level determines the transition from an adequate condition to a degraded condition as it is called in LHR. Three levels are used, 85, 70, and 55, for runways, taxiways and aprons respectively. Minimum acceptable levels are also relevant at LHR because sometimes pavements drop close to these minimum levels and a major rehabilitation to restore its condition to a desired level is not possible due to the congestion of the airport. In these cases localized treatments are carried out just to ensure condition does not drop below acceptable level, until a major rehabilitation is possible to be done.

Required primary data:

The required primary data for this analysis is clearly the PCI of each pavement section, the trigger level, and the minimum level depending on the type of pavement.

Structural condition:

According to the interviewee, the structural condition of the pavement is related to the amount of money spent on that particular pavement section. Based on this criterion the pavements are frequently inspected and based on engineer judgement alternatives are selected to repair sections when required.

Required primary data:

The required data can be established for identifying the pavements that need to be frequently monitored but not for identifying the structural condition of the pavement as it is done based on experts' experience. Thus, the required data for identifying these sections is: the money spent on each M&R treatment for each pavement section. This data is required for a comparable period of time otherwise old pavements will represent the highest expenditures without meaning that their condition is worse than newer pavements.

Importance of pavement section:

The main sub-criterion for this purpose is functionality of the pavement. Runways are prioritized over taxiways and aprons. Specifically for taxiways it was mentioned that the aircraft code for which the pavement was designed is another sub-criterion, where code F have the highest priority. The aircraft code for which the pavement was designed is related to the sub-criterion existence of alternative routes used at Schiphol. Other sub-criterion identified here is the amount of operations on each pavement. These sub-criteria are used to determine the importance of the pavement section to operations; the main consideration is that when a failure of a pavement represents a threat to airport operations this pavement will receive the highest priority.

Required primary data:
For these identified sub-criteria the required primary data are the type of pavement to which the section belongs, the code of the pavement and the number of aircraft movements.

3.4 Additional evaluation alternative based on ACN-PCN methodology

Brussels and Schiphol use the ACN-PCN methodology for pavement management. The objective of pavement managers, by analyzing the ACN-PCN is to determine if the pavement is being overloaded and how will this overload impact the pavement. When the pavement is not being overloaded it is expected that the structural pavement life will last at least 20 years counting from the moment when the last PCN was determined. When the pavement is being overloaded, the structural pavement life will be shorter than 20 years counting from the moment when the last PCN was determined.

By determining the ACNs greater than the PCNs and the number of operations of these aircrafts, as it is currently done at Brussels and Schiphol it is possible to determine if the pavement is being overloaded but nothing is said about its remaining structural life. An additional methodology or evaluation alternative based on ACN-PCN methodology to determine the remaining structural life of the pavement is proposed based on (FAA, 2014).

3.4.1 Methodology to Determine remaining structural life:

The methodology that will be described here depends on the following equations:

$$10\text{^}\left(\frac{Log\ Npcn}{\sqrt[2]{\frac{ACNcrt}{PCN}}}\right) = Nexp$$ *Equation 1. Conversion of number of expected movements*

Where:
- Nexp: Number of expected traffic movements to failure converted to movements of the critical aircraft.
- Npcn: Number of traffic movements used when PCN was determined converted into movements of the aircraft equivalent to the PCN.
- ACNcrt: ACN of the critical aircraft today

$$CDF = \frac{number\ of\ aplied\ loads}{number\ of\ loads\ required\ to\ failure}$$ *Equation 2. Cumulative damage factor*

Where number of loads required to failure will be the number of movements of the fleet mix converted into movements of the critical aircraft when the PCN was determined. The number of loads required to failure will vary depending on the ACN-PCN.

When ACN is different than PCN, the number of loads required for failure can be determined using equation 1, given by (FAA, 2014). The CDF can be understood as the remaining structural life and is derived from Miner's rule that states that damage of a structural element can be expressed as the ratio of applied loads over loads required to fail the structural element (FAA, 2014). It must also be remembered that when CDF is equal to 1, then the pavement has spent all its structural life.

Based on these equations, it is possible to estimate the remaining life a given pavement section. The following procedure will explain how this is done.

By modifying the ACN-PCN ratio from 0.5 to 1.2, and taking into account that the ACN-PCN methodology assumes 10,000 operations, then this number will be used to determine Nexp. Figure 13 has been elaborated to show these values.

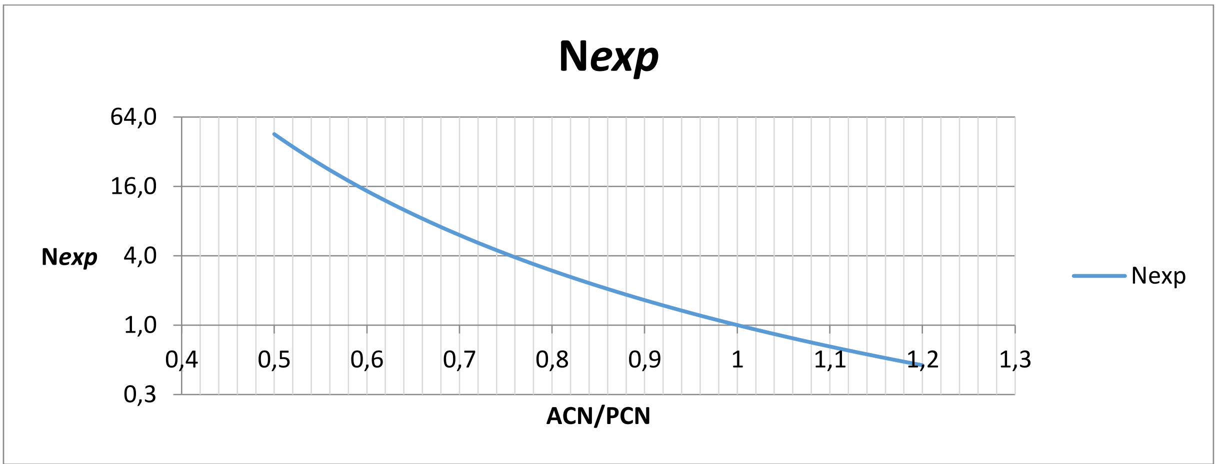

Figure 13. Nexp for different ACN-PCN ratios

10,000 is the assumed number of operations and N*exp* is expressed in terms of 10,000 movements. N*exp* can also be interpreted as the number of times that the expected number of operations until failure can be bigger than the number of movements used to calculate the PCN. It can be seen in the previous graph when ACN-PCN is about 0.8, the expected number of movements to failure is around 3 times bigger than the number of movements considered when the PCN was calculated. In other words, when a pavement is being operated by aircrafts with lower ACNs values (lighter aircrafts) than expected, then the expected life of the pavement will increase. Similarly when ACN-PCN exceeds a value of 1, the expected number of movements until failure decreases dramatically. For example for an ACN-PCN of 1.2 the number of expected movements until failure is around 0.4 of the amount of movements considered when the PCN was determined.

Now applying equation 2 given by (FAA, 2014), the CDF can be calculated. The number of loads required to failure in this case will be the equal to the number of loads of the traffic mix when the PCN was calculated converted to movements of an ACN equivalent to the PCN determinded. The number of loads applied in this case is equal to the number of loads of the traffic mix since the PCN was calculated until today converted to the ACN of the critical aircraft, added to the forecasted traffic movements converted also to the ACN of the critical aircraft. Taking into account that CDF will be 1 when pavement has spent all its structural life it is possible to estimate the number of years the pavement will last.

In the last paragraph it was mentioned that the number of loads of the traffic mix are converted to the ACN of the critical aircraft, or to the ACN equivalent to the PCN. Since the loads applied to a pavement are from different types of aircrafts, the combined effect of all the fleet mix must be determined and expressed in an equivalent number of loads. Equation 3, given in (FAA, 2014) can be used for this purpose. To do this conversion, all the movements of every aircraft need to be converted to the desired ACN or critical ACN one by one. Then, all the converted movements are summed and the number of applied loads to use in equation 2 is ready.

$$\frac{Log\ Neq}{Log\ Ni} = \sqrt[2]{ACNi/ACNcrt}$$

Equation 3. Conversion of number of operations into equivalent operations of critical aircraft

Where:

- Neq: number of equivalent loads of the number of movements of the aircraft i, converted into movements of the critical aircraft.
- Ni: Number of movements of the aircraft i.
- ACNi: ACN of the aircraft i.
- ACNcrt: ACN of the critical aircraft.

Primary data:

In this case, the required data for the analysis is:

- ACN of each aircraft
- PCN of each pavement section
- Year when PCN was determined
- Number of operations per aircraft used to determine the PCN
- Historic traffic fleet mix since the PCN was reported until the actual year
- Forecasted traffic growth

This methodology to determine the remaining structural life provides an estimation of the remaining structural life of the pavement. However the data required is much greater than the approach of determining the % of overloads.

3.5 Results

From the previous sections it was possible to identify one criterion that was not considered before in the literature review, this is the importance of the pavement section. Additionally different sub-criteria were identified for the criteria already presented and the primary data required for each. Table 4 presents the criteria, sub-criteria and primary data that have been identified from the case studies.

Criteria	Schiphol		Brussels		Heathrow	
	Sub-criteria	Primary data	Sub-criteria	Primary data	Sub-criteria	Primary data
PCI	Comparison with service levels	PCI index of each section trigger levels Minimum acceptable levels	Comparison with trigger levels	PCI index of each section Trigger levels Minimum acceptable levels	Comparison with trigger levels	PCI index of each section Trigger levels Minimum acceptable levels
	Comparison with family curve behaviour model	PCI index of each section Expected PCI	Comparison with age	PCI index of each section Age	NA	NA
ACN-PCN	% difference between ACN-PCN	ACN of aircrafts operating on each section	% difference between ACN-PCN	ACN of aircrafts operating on each section	NA	NA
	% movements of ACN>PCN	Number of movements per aircraft on each section	% movements of ACN>PCN	Number of movements per aircraft on each section	NA	NA
Roughness	NA	BBI if available, otherwise profile of the runway	NA	NA	NA	NA
	NA	Bump length when BBI is available	NA	NA	NA	NA
Friction	NA	Friction data originating from friction test	NA	Friction data originating from friction test	NA	Friction data originating from friction test
Operational importance	Functionality of pavement	Runway, Taxiway or Apron	NA	NA	Functionality of pavement	Runway, Taxiway or Apron
	Classification (primary, secondary, tertiary)	Number of operations	NA	NA	Classification (primary, secondary, tertiary)	Number of operations
	Existence of alternative routes	Data to be determined based on experts' judgment	NA	NA	NA	NA
	Usage	Number of operations	Usage	Number of operations	Usage	Number of operations
	Light system installed	Type of lighting system	NA	NA	NA	NA
	NA	NA	NA	NA	Aircraft code for which the pavement was designed	Aircraft code

Table 4. Criteria, sub-criteria and primary data identified from case studies

With the information provided in this chapter, some criteria identified in the literature review were verified to be used in the pavement management process at the airports, namely PCI, ACN-PCN, roughness, and friction. Additionally the criterion operational and all the sub-criteria at the bottom level have been identified from the case studies. An additional alternative methodology related to the ACN-PCN methodology together with its required data has been proposed and presented in this chapter.

3.6 Conclusions

Three airports have been presented as case studies of this research, Amsterdam Airport Schiphol, Brussels Airport, and London Heathrow. All three of them are the biggest airports in their respective countries and Schiphol and Heathrow the two airports with most traffic movements in Europe in 2016.

For each case study, the criteria and sub-criteria used for pavement management decision making have been presented together with the required primary data. Comparing the criteria in the literature review with the criteria from the case studies, it was found that FOD is not considered by any of the three airports. Additionally another main criterion was found to be used in common in the three airports; this is importance of the pavement section. Two sub-criteria were found to be used for PCI evaluation, namely comparison with service levels and comparison with expected PCI. It was also found how ACN-PCN is considered in pavement management decision making; two sub-criteria suggested by ICAO are used for this purpose. Roughness was only considered at Schiphol and only if there are complaints coming from the pilots. Friction is considered in all three airports, however mainly for rubber removal purposes.

Particularly for the criterion importance of the pavement section, six sub-criteria were identified. However, only usage and functionality will be included as predetermined sub-criteria in the tool. The remaining sub-criteria, namely classification, existence of alternative routes, installed light system, and aircraft code for which the pavement was designed will not be included as predetermined criteria in the tool. The main reasons for this decision are presented as follows.

The sub-criterion *classification (primary, secondary, tertiary)* is determined by the number of operations on that particular pavement section. However usage is also determined by the number of operations. If both sub-criteria are included, it would be double counted and the priorities calculated wouldn't convey truthful information. The number of total movements provides a more sensitive evaluation, which confirms it as a better choice to be included in the tool over *classification*. The sub-criterion *existence of alternative routes* is a very good indicator, because there could be pavement sections where aircrafts necessarily need to cross and priority should be higher. The problem with this indicator is that many considerations are needed to determine if the section has alternative routes or not. Two examples of these considerations could be the installed lighting system and the aircraft code for which the pavement has been designed. These two were identified from the case studies, and are presented as different sub-criteria from existence of alternative routes however they are all related. Additionally, the installed lighting system criterion is not applicable at all airports, as weather conditions change from place to place, and some pavement network layouts may not require this type of lighting systems. The aircraft code for which the pavement has been designed will not be included in the tool as it is used to determine if a pavement section has alternative routes.

Based on the way the ACN-PCN is considered for pavement management decision making based on the ICAO sub-criteria, another alternative methodology has been proposed. This alternative requires much more data but gives more valuable information for pavement managers as it gives an estimation of the remaining structural life of the pavement section. It can be said that by applying this proposed methodology, pavement managers will have declarative and semantic (DOS) information according to the definition given by Floridi (2005).

The purpose of this chapter was to contribute to the first three sub-questions. With the information already presented in the literature review and with the information presented in these case studies it can be said that these three sub-questions have been answered. The pavement management decision making process has been described for the three case studies, the criteria, sub-criteria and required data for the prioritization process have been identified.

4 Design of the tool

The main purpose of this chapter is to contribute to answer sub-question four, and the main outcome of this chapter is the blueprint of the tool to be implemented. It was already mentioned that the prioritization methodology to be applied is Analytical Hierarchy Process (AHP). This chapter is organized according to the procedure required for AHP, presented in section 2.4.2.

The goal of this decision process should be clear by now. It has been established that the goal is to prioritize pavement sections in need for M&R treatments. Different criteria have been identified from the literature review and from the case studies; however a hierarchy structure has not been defined yet. The first part of this chapter will define the criteria and sub-criteria that will be part of the tool and the corresponding hierarchy structure.

The second part of this chapter will present how pairwise comparison of criteria and sub-criteria will be computed in the tool, in order to define their weights. The third part will define the ratings that will be used to evaluate the alternatives, and will present how pairwise comparison at the bottom level of the hierarchy structure will be done. The fourth part will explain how the tool will evaluate the priorities for each alternative. Then the results from the panel expert round will be presented, followed by the final blueprint and final conclusions of the chapter.

4.1 Criteria and sub-criteria

To identify the criteria and sub-criteria to be included in the tool, the criteria found from the literature review and case studies need to be taken into account. From the literature review two main criteria were identified: functional condition and structural condition of the pavement sections. From the case studies one more criteria was identified: importance of the pavement sections.

With this information it is already possible to define the first level of the hierarchy structure, this is presented in Figure 14.

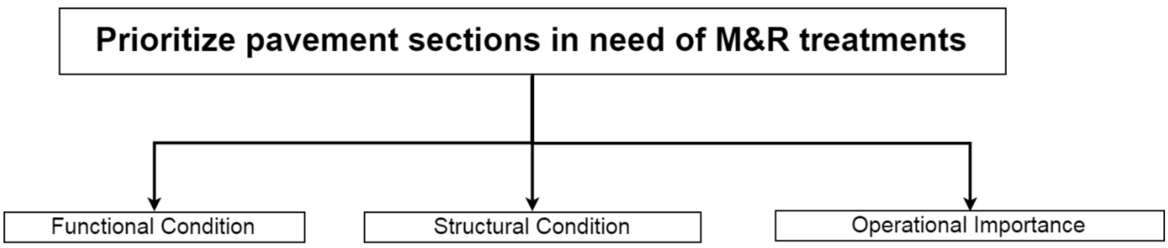

Figure 14. First level of the hierarchy structure

The sub-criteria to be included in the tool will be presented according to each of these main criteria.

4.1.1 Functional condition sub-criteria

The functional sub-criteria identified from the literature review were: PCI, roughness, friction, and FOD. From the case studies it was evidenced that the sub-criteria were: PCI, roughness and friction. The only sub-criterion that was not used in the three airports was the FOD index. Additionally as it was shown in section 2.6, the required primary data for calculating the FOD index is part of the data required for calculating the PCI. For these two reasons it has been decided that this will be the only sub-criterion that will not be part of the tool.

Additionally for the PCI, two sub-criteria were identified: comparison with service levels and comparison with expected PCI value. For roughness and friction no sub-criteria were identified. Thus, the hierarchy structure for the criterion functional condition can be represented by Figure 15.

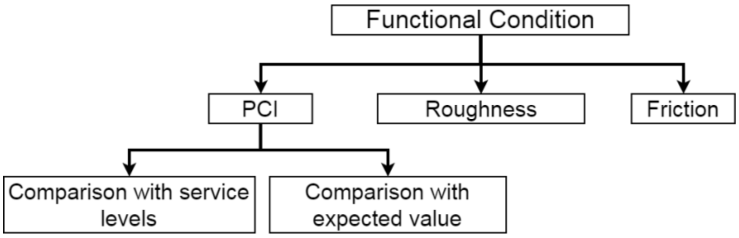

Figure 15. Hierarchy structure of Functional condition

4.1.2 Structural Condition sub-criteria

From the literature review the only method to evaluate structural condition was the ACN-PCN evaluation. From the case studies it was shown that Schiphol and Brussels use the ACN-PCN methodology, based on ICAO overload recommendations and is named in this research as the simple option. A second option has been developed in this research and was presented in section 3.4, this option will also be included in the tool.

At Heathrow it was mentioned that the money spent on M&R was a criterion used to identify pavement sections that require more monitoring than others. For the development of the tool, the amount of money spent on M&R will not be considered a sub-criterion of the structural condition. Prioritization based on the amount of money spent on a pavement section would not result in sections whose structural condition is worse. This criterion is used for identifying pavement sections that need more monitoring as already said. The hierarchy structure for structural condition, taking into account the mentioned considerations can be represented by Figure 16.

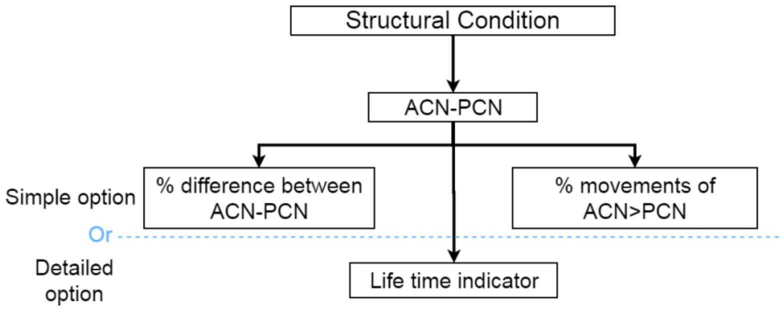

Figure 16. Hierarchy structure of Structural condition

4.1.3 Operational Importance of pavement section sub-criteria

As it can be seen in Table 4, six different sub-criteria were identified from the case studies. From these sub-criteria, only functionality of the pavement and number of movements on the pavement section were used both at Schiphol and at Heathrow. None of the other sub-criteria were used in common by the studied airports. This can be explained by the different network pavement layouts that all three airports have. A clear example can be seen on the layout at Schiphol. The Polderbaan is the North-West runway, seen on the upper left of Figure 7. The taxiway connecting this runway with the rest of the airport is very important because there are no alternative routes.

It wouldn't make sense to try to establish fixed sub-criteria for the importance criterion, because these differ per airport. However, to carry out the analytical hierarchy process the sub-criteria must be identified. For this reason instead of trying to find a *fit for all* sub-criteria, it is proposed a *fit for purpose* approach. The tool will be designed in a way that airports can define their own sub-criteria according to their needs and experience. Two criteria will be predefined, functionality of the pavement and number of movements on the pavement section. Figure 17, represents the fit for purpose hierarchy structure of the criterion operational importance of pavement section.

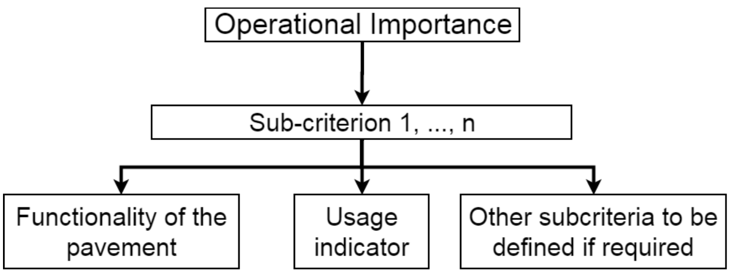

Figure 17. Hierarchy structure of importance of pavement section criterion.

4.1.4 Complete hierarchy structure

Based on the hierarchy structures just presented, the complete hierarchy structure determined for the tool is represented by Figure 18.

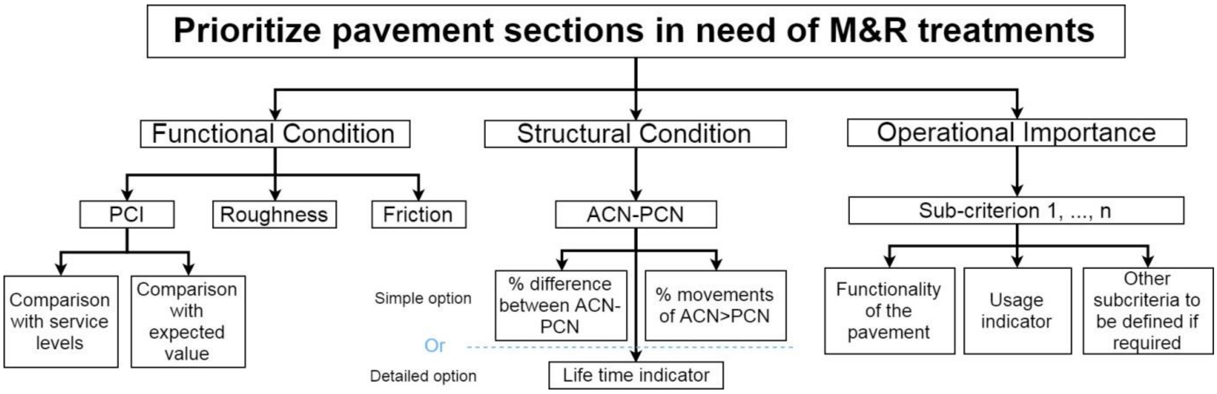

Figure 18. Complete hierarchy structure of the tool

4.2 Pairwise comparison of criteria and sub-criteria

This section will present how the pairwise comparison of criteria and sub-criteria will be done for developing the tool. This comparison will be done using the fundamental scale already presented in Table 1. The purpose of the pairwise comparison as already mentioned is to determine the weights to be assigned to each criterion and sub-criterion. This comparison is an input to be given by the airport according to their specific needs and experience.

4.2.1 Main criteria comparison

Three main criteria need to be compared in the first level, these are: functional condition, structural condition and importance of pavement section. Table 5 presents how preferences should be entered.

Criteria	Functional condition	Structural condition	Importance of pavement section
Functional condition			
Structural condition			
Importance of pavement section			

Table 5. Pairwise comparison of main criteria

The green cells need to be filled according to the fundamental scale. The orange cells do not need to be filled as these will be the reciprocal of the values entered in the green cells. The white cells will always be one as these represent the comparison of any criterion with itself, and do not need to be filled. The correct way to fill the green cells is by comparing the criteria in the column to the criteria in the row. If for example functional condition is considered to be extremely more important than structural condition, then a value of 9 must be entered on the green cell comparing functional condition and structural condition. It must be mentioned that the amount of comparisons will increase as the number rank of the comparison matrix increases. The amount of comparisons required will be: n*(n-1)/2. Where n is the rank of the comparison matrix

4.2.2 Sub-criteria comparison

To do the pairwise comparison for sub-criteria the process is the same as for the main criteria. For the case of structural condition, the only identified sub-criterion is the ACN-PCN methodology. Clearly for this case no pairwise comparison is needed. Following this explanation, Table 6, Table 7, Table 8, represent the pairwise comparison of the sub-criteria identified for functional condition, importance of the pavement section and the sub-criteria of PCI evaluation, respectively.

Criteria	PCI	Roughness	Friction
PCI			
Roughness			
Friction			

Table 6. Pairwise comparison of sub-criteria of functional condition

Criteria	Sub-criterion 1	Sub-criterion …	Sub-criterion n
Sub-criterion 1			
Sub-criterion …			
Sub-criterion n			

Table 7. Pairwise comparison of sub-criteria of Importance of pavement section

Criteria	Comparison with trigger levels	Comparison with expected PCI
Comparison with trigger levels		
Comparison with expected PCI		

Table 8. Pairwise comparison of sub-criteria of the sub-criterion PCI

Similar pairwise comparison tables would be needed depending on the existence of sub-criteria of the sub-criteria identified for importance of pavement section.

4.3 Pairwise comparison at the bottom level

The pairwise comparison at the bottom level is the comparison between the alternatives to be prioritized. As already mentioned, the comparison will not be done for all the pavement sections as this would be extremely dispendious due to the large amount of pavement sections. This was the main reason for selecting the absolute AHP. The first step to define how pairwise comparison will be done at the bottom level is to define the ratings to be used. These ratings must be defined for the lowest level of the AHP. Once these ratings have been determined, the pairwise comparison of these ratings can be done. The order in which these ratings will be defined is from left to right considering

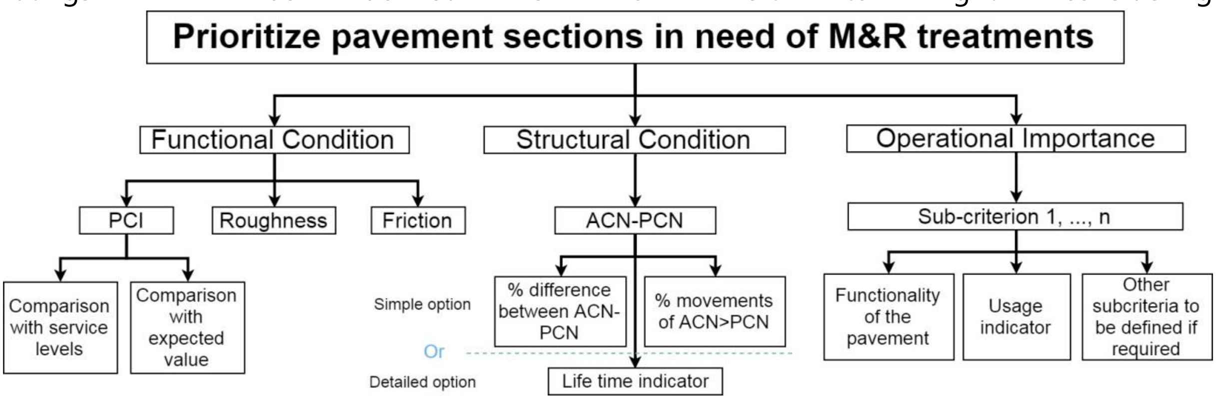

Figure **18**.

4.3.1 Comparison with service levels

Ratings

To define the ratings for the comparison with the PCI service levels; the trigger levels and minimum acceptable levels are used. Nine ratings are proposed to evaluate all the alternatives, these ratings are shown in Figure 19. When the actual PCI of the pavement section is above the trigger level, the rating will be Above TL and will have a minimum priority. When the actual PCI is below the minimum level, the rating will be Below ML. between the trigger level and the minimum level, seven ratings will be distributed proportionately. The closer the actual PCI is to the minimum level, the higher the priority will be assigned for that pavement section.

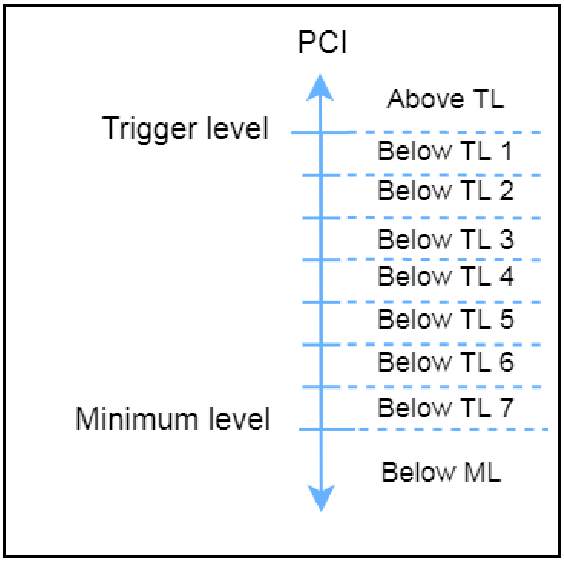

Figure 19. Ratings for the comparison with service levels

Figure 19 is a general representation of the ratings to be used in this comparison. It must be remembered that the trigger level and minimum level will change depending on the functionality of the pavement. This means that pavements with different functionality and the same PCI value will not be necessarily assigned the same rating. To understand these ratings will be assigned to each pavement the next example is given.

Suppose that an airport has established the following PCI service levels:

Funtionality	Trigger level	Minimum level
Runway	70	50
Taxiway	60	40
Apron	50	30

Table 9. PCI service levels - Example

Now imagine two pavement sections with the following characteristics:

Section #	Functionality	Actual PCI
1	Runway	62
2	Taxiway	62
3	Apron	30

Table 10. PCI levels for imaginary pavement sections- Example

For the imaginary taxiway section, the actual PCI is above the trigger level, so the rating to be assigned to this section according to Figure 19 would be *Above TL*. For the imaginary apron pavement section the rating to be assigned would be *Below TL7,* because the actual PCI is equal to the minimum level. For the runway the actual PCI is between the trigger level and the minimum level, so the rating to be assigned is within ratings *Below TL1* and *Below TL7*. To determine which rating will be assigned the following analysis is required. The difference between the trigger level and the minimum level is 20 points on the PCI scale. There are 7 ratings divided proportionally on this 20 points, this means that each rating has a range of 20/7, or 2.9 points approximately. The rating to be assigned to this pavement section with an actual PCI of 62 is *Below TL3* with range: (64.3-61.4] approximately.

Pairwise comparison

The procedure to do the pairwise comparison based on rankings is similar to the procedure for the pairwise comparison of criteria and sub-criteria. The user of the tool will need to do the pairwise comparison as it is shown in Table 11.

Ratings	Very high	Just above trigger level	Just below trigger level	Just above minimum level	Below minimum level
Very high					
Just above trigger level					
Just below trigger level					
Just above minimum level					
Below minimum level					

Table 11. Pairwise comparison of sub-criteria of sub-criterion comparison with service levels.

4.3.2 Comparison with expected level

Ratings

For this comparison it must be taken into account that when the actual PCI value is above the expected value then the pavement is behaving better than expected and priority on this case will be very low. However when the PCI is below the expected value, priority increases. As the difference between expected value and actual value increases so will do the priority. Initially, a predetermined difference of 2 points on the PCI scale was used to define a change from one rating to another when the actual value was below the expected value. However, after the panel expert meeting at NACO, these ratings have been defined differently. The ratio between the Actual PCI and the expected PCI will be used to determine the ratings. Values greater than 1 will be assigned to the rating *Better than expected*, and values of this ratio between 1 and 0 are assigned proportionately to 8 different ratings as shown in Figure 20.

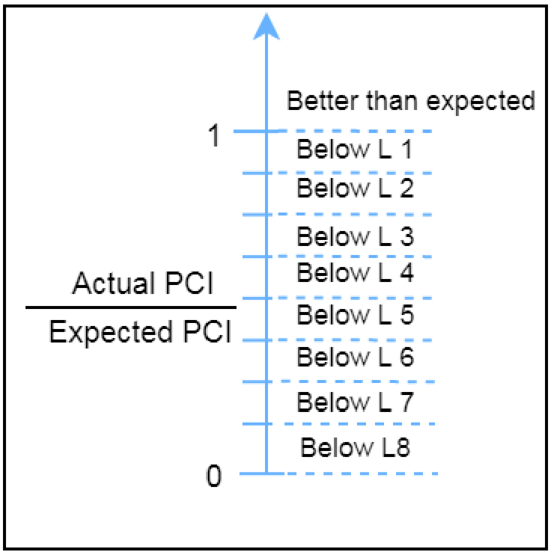

Figure 20. Ratings for the comparison with expected level

Figure 20 is a general representation of the ratings to be used in this comparison. It must be remembered that expected level will change for each alternative.

Continuing with the example given in section 4.3.1 suppose now that the same pavement sections have the expected PCI values, shown in Table 12.

Section #	Functionality	Actual PCI	Expected PCI
1	Runway	62	60
2	Taxiway	62	60
3	Apron	30	60

Table 12. Expected PCI values for imaginary pavement sections – Example

The ratings to be assigned for the runway and taxiway pavement sections are *Better than expected*. For the apron, the rating is within *Below L1* and *Below L8*. The actual PCI/Expected PCI ratio for the apron section equal 0.5. As there are 8 ratings to be distributed within 1 unit, each rating has a range of 0.125 as shown in Table 13. The rating to be assigned for this section is *Below level 4*.

Ratings	Lower limit
Better than expected	1
Below level 1	0,875
Below level 2	0,75
Below level 3	0,625
Below level 4	0,5
Below level 5	0,375
Below level 6	0,25
Below level 7	0,125
Below level 8	0

Table 13. Lower limits for the ratings of comparison with expected value

Pairwise comparison

Initially the tool will have a predefined pairwise comparison of the ratings just presented. This is done to reduce the amount of input that the user needs to give to the tool. However, the tool will be elaborated in a way that allows the user of the tool to modify this pairwise comparison. The predetermined comparison can be seen in Table 14

Ratings	Better than expected	Below level 1	Below level 2	Below level 3	Below level 4	Below level 5	Below level 6	Below level 7	Below level 8
Better than expected	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9
Below level 1	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8
Below level 2	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7
Below level 3	4	3	2	1	1/2	1/3	1/4	1/5	1/6
Below level 4	5	4	3	2	1	1/2	1/3	1/4	1/5
Below level 5	6	5	4	3	2	1	1/2	1/3	1/4
Below level 6	7	6	5	4	3	2	1	1/2	1/3
Below level 7	8	7	6	5	4	3	2	1	1/2
Below level 8	9	8	7	6	5	4	3	2	1

Table 14. Predefined pairwise comparison with expected PCI.

As it can be seen on Table 14, as number of ratings increase so will do the number of pairwise comparisons. It should also be reminded that only the green cells are to be filled. The orange cells are the reciprocal of the values entered on the green cells.

4.3.3 Roughness

Before going in detail of the ratings to be applied it must be remembered that roughness is only considered for runways. Additionally, from the case studies it was found that only Schiphol considers roughness for pavement management, and only when pilots complained. Taking this into account, the tool will have this criterion as an optional criterion and the user of the tool will be able to enable or disable its consideration.

Ratings

To define the ratings for roughness Figure 21 must be taken into account. Independently of the bump length, when the Boeing bump index is below 1 the pavement is in acceptable condition and nothing has to be done. In cases when only the BBI is available but not the bump length the following two ratings will be assigned in the tool: acceptable zone (BBI<1) and not acceptable zone (BBI>1).

When the bump length is available more detailed ratings can be determined. Figure 21, presents five ratings for roughness. These ratings were developed in the following way. BBI values below 1 will be assigned the rating acceptable zone. BBI values in the excessive zone according to Figure 21 can be assigned to three different ratings. These ratings are the result of dividing the excessive zone in Figure 21 in three parts called, Excessive level 1, excessive level 2, and excessive L3. BBI values on the unacceptable zone are assigned to the rating not acceptable zone.

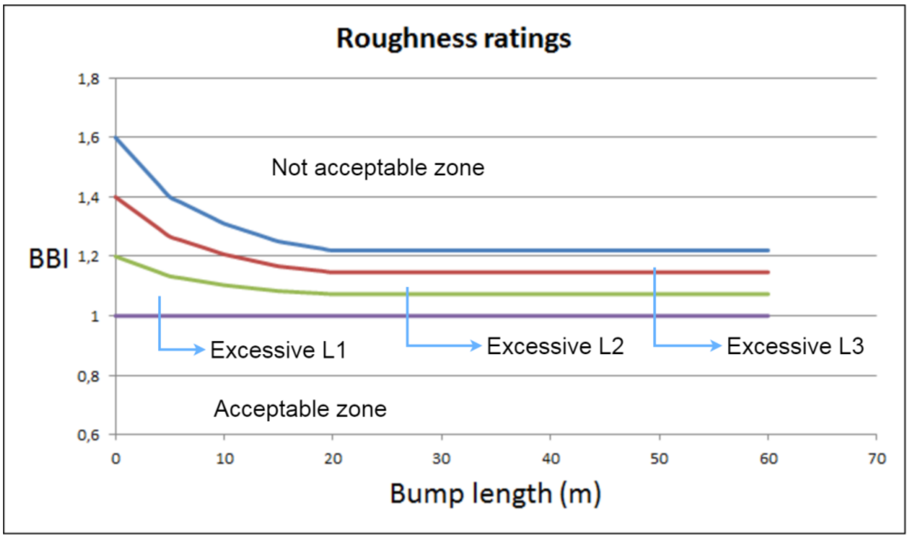

Figure 21. Ratings assigned for roughness

Pairwise comparison

There two possibilities for the pairwise comparison. The first one is in case the bump length is not available; then a matrix 2x2 must be filled by the user of the tool comparing the acceptable zone with the not acceptable zone.

When the Bump length is available the pairwise comparison shown in Table 15 is predetermined in the tool, but the user can modify these comparisons if desired.

Ratings	Not Acceptable zone	Excessive L3	Excessive L2	Excessive L1	Acceptable zone
Not Acceptable zone	1	3	5	7	9
Excessive L3	1/3	1	3	5	7
Excessive L2	1/5	1/3	1	3	5
Excessive L1	1/7	1/5	1/3	1	3
Acceptable zone	1/9	1/7	1/5	1/3	1

Table 15. Pairwise comparison of roughness ratings

4.3.4 Friction

As for roughness, friction is only considered for runways. Additionally, Heathrow do not consider friction for pavement management as it was found in the case studies. Taking this into account, the tool will have this criterion as an optional criterion and the user of the tool will be able to enable or disable its consideration.

Ratings

To define the ratings to be applied to friction, Table 2 must be taken into account. Depending on the methodology used for measuring the friction, and the speed used different maintenance planning levels and minimum levels apply. However, there will be five ratings as exposed in Figure 22.

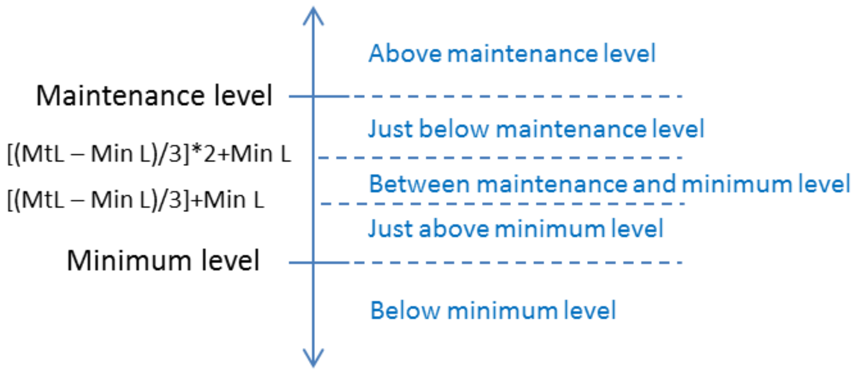

Figure 22. Ratings for Friction

Pairwise comparison

A predefined pairwise comparison will also be given in the tool, and the user can modify these comparisons according to their needs. Table 16 shows these predefined comparisons.

Ratings	Below minimum level	Just above minimum level	Between maintenance and minimum level	Just below maintenance level	Above maintenance level
Below minimum level	1	3	5	7	9
Just above minimum level	1/3	1	3	5	7
Between maintenance and minimum level	1/5	1/3	1	3	5
Just below maintenance level	1/7	1/5	1/3	1	3
Above maintenance level	1/9	1/7	1/5	1/3	1

Table 16. Pairwise comparison of friction ratings.

4.3.5 ACN-PCN

For the ACN-PCN criterion it must be taken into account that two possibilities have been identified to determine the effect on the pavement due to overloads. One is by identifying the amount of overloads and the second one by estimating its remaining life. Depending on the availability of data and desires of the user, one of the two options can be chosen.

Ratings

The ratings for the first option are predetermined in the tool for each sub-criterion and are presented in Figure 23.

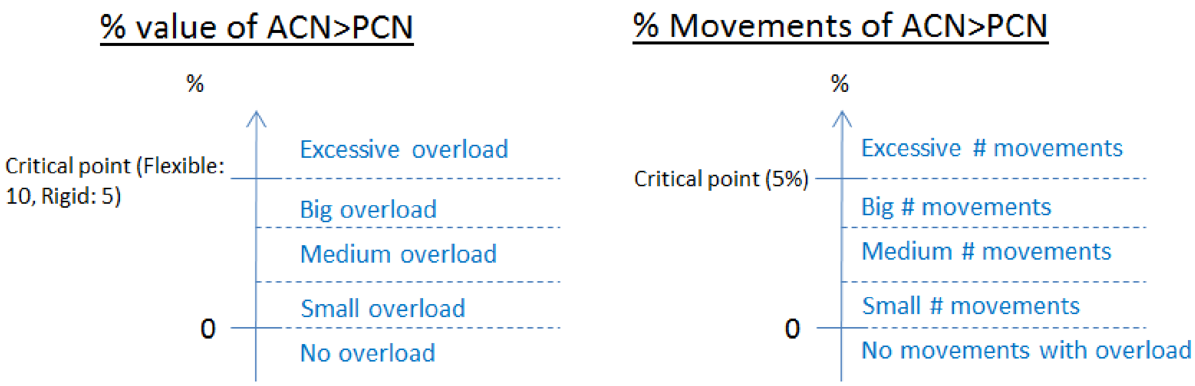

Figure 23. Ratings for overload sub-criterion in ACN-PCN.

Pairwise comparison

Table 17 presents the predetermined pair wise comparison for the ratings of % value of ACN>PCN. A pairwise comparison with the same values will be predetermined for % of movements of ACN>PCN, the only difference will be the name of the ratings used.

Ratings	Excessive overload	Big overload	Medium overload	Small overload	No overload
Excessive overload	1	3	5	7	9
Big overload	1/3	1	3	5	7
Medium overload	1/5	1/3	1	3	5
Small overload	1/7	1/5	1/3	1	3
No overload	1/9	1/7	1/5	1/3	1

Table 17. Predetermined pairwise comparison for the % value of ACN>PCN

Ratings

The second case is related to the remaining life estimation. To define the ratings to be assigned for this criterion, an indicator has been proposed. The indicator is the ratio between the expected life of the pavement and the life expected according to the ACN-PCN methodology which is 20 years. To compute this indicator different mathematical operations are needed as it was previously described in section 3.4. The indicator will be given as a positive number. When the value of the indicator is above 1 it means that the pavement is expected to last more than 20 years, when the indicator is below 1, life is expected to be shorter. The ratings proposed are presented in Figure 24. Note that when the indicator value is above 1, the assigned rating will be *longer life expected* and will have the lowest priority. For indicator values below 1, eight ratings will be proportionately distributed as shown in Figure 24

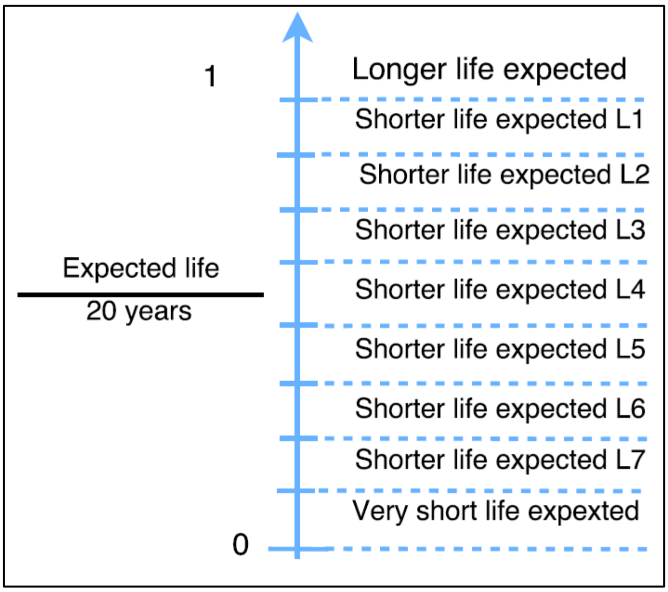

Figure 24. Ratings for indicator of expected life.

Pairwise comparison

The predetermined pairwise comparison is presented in Table 18. The user will be allowed to modify these comparisons according to their needs.

Ratings	Very short life expected	Short life expected L5	Short life expected L4	Short life expected L3	Short life expected L2	Short life expected L1	Long life expected
Very short life expected	1	3	4	5	6	7	9
Short life expected L5	1/3	1	3	4	5	6	7
Short life expected L4	1/4	1/3	1	3	4	5	6
Short life expected L3	1/5	1/4	1/3	1	3	4	5
Short life expected L2	1/6	1/5	1/4	1/3	1	3	4
Short life expected L1	1/7	1/6	1/5	1/4	1/3	1	3
Long life expected	1/9	1/7	1/6	1/5	1/4	1/3	1

Table 18. Pairwise comparison ratings for indicator of expected life

4.3.6 Importance sub-criteria

Only two sub-criteria were used in common in Schiphol and Heathrow related to this criterion, namely functionality of the pavement and amount of movements on the pavement section. These two will be predetermined in the tool, and ratings and the pairwise comparison will be defined. As it was shown other 5 sub-criteria were identified from the case studies but these are not used in more than one airport and will not be predetermined in the tool. Following the *fit for purpose* approach the tool will need to be customized according to the needs of each user. For this a workshop is proposed in order to define the sub-criteria that need to be included, together with its hierarchy structure, ratings and pairwise comparisons.

4.3.6.1 Functionality of the pavement

Functionality of the pavement can be a runway, a taxiway or an apron. A pairwise comparison of the three is required and needs to be done by the user as shown in the Table 19. Note that these comparisons have not been predetermined because it highly differs per airport. For example for LHR a runway will be highly prioritized over a taxiway or an apron, while at Schiphol this is not necessarily true.

Ratings	Runways	Taxiways	Aprons
Runways	1		
Taxiways	#DIV/0!	1	
Aprons	#DIV/0!	#DIV/0!	1

Table 19. Pairwise comparison of functionality of the pavement

4.3.6.2 Amount of movements on the pavement section

To define the ratings in this case it is necessary to define an indicator that expresses the amount of movements on the pavement section. This amount of movements must be understood as a measure of the number of aircrafts that use a determined pavement section in order to differentiate which sections are more important than others in terms of airport operations. The indicator determined for this purpose is usage level, defined as the ratio between the number of operations of a particular pavement section and the biggest amount of operations that a section of the same functionality had. Figure 25, shows the ratings used related to this indicator and Table 20 its pairwise comparison

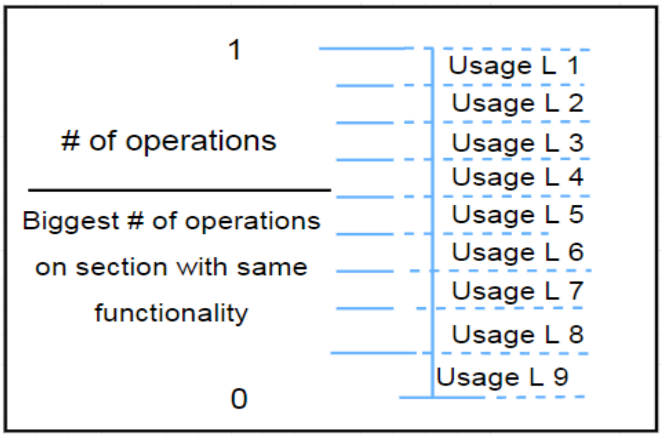

Figure 25. Ratings for usage indicator.

Pairwise comparison

Ratings	Use intensity L1	Use intensity L2	Use intensity L3	Use intensity L4	Use intensity L5	Use intensity L6	Use intensity L7	Use intensity L8	Use intensity L9
Use intensity L1	1	2	3	4	5	6	7	8	9
Use intensity L2	1/2	1	2	3	4	5	6	7	8
Use intensity L3	1/3	1/2	1	2	3	4	5	6	7
Use intensity L4	1/4	1/3	1/2	1	2	3	4	5	6
Use intensity L5	1/5	1/4	1/3	1/2	1	2	3	4	5
Use intensity L6	1/6	1/5	1/4	1/3	1/2	1	2	3	4
Use intensity L7	1/7	1/6	1/5	1/4	1/3	1/2	1	2	3
Use intensity L8	1/8	1/7	1/6	1/5	1/4	1/3	1/2	1	2
Use intensity L9	1/9	1/8	1/7	1/6	1/5	1/4	1/3	1/2	1

Table 20. Pairwise comparison usage intensity indicator.

4.4 Evaluate priorities for each alternative

To evaluate the priorities of each alternative, it is required to first define the weights of each considered criterion and sub-criterion in the hierarchy structure. The eigenvector method will be used to determine the priority vectors. According to Thomas L Saaty and Vargas (2012), this is the best method to calculate the priority vectors. To see the complete explanation on how to calculate the priority vectors the reader should refer to Thomas L Saaty and Vargas (2012). To determine the priority vector it is known that:

$$\mathbf{A}\mathbf{w} = \begin{pmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \vdots & \vdots & \ddots & \vdots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{pmatrix} \begin{pmatrix} w_1 \\ \vdots \\ w_n \end{pmatrix} = \begin{pmatrix} nw_1 \\ \vdots \\ nw_n \end{pmatrix} = n\mathbf{w}.$$

Where n and w are the largest eigenvalue and an eigevector of A, respectively. The eigenvector, so the priority vector can be obtained from solving the following equation system:

$$\begin{cases} \mathbf{A}\mathbf{w} = \lambda_{\max}\mathbf{w} \\ \mathbf{w}^T\mathbf{1} = 1 \end{cases}$$

Where λmax is the maximum eigenvalue of A, and $\boldsymbol{l} = Transposed\ (1, \dots, 1)$

4.4.1 Weights calculation for criteria and sub-criteria

The procedure to calculate the weights for criteria and sub-criteria is the same. To illustrate this process the weights of the criteria functional condition, structural condition and importance of the pavement section, an example will be presented.

Assuming the user has made the pairwise comparison as shown in Table 21. The summation of each column is calculated. Then each cell of the pairwise comparison is divided by the sum of that column, resulting in Table 22. Then the values on each row are averaged and the result is the weight of each criteria.

Criteria	Functional condition	Structural condition	Importance of pavement section
Functional condition	1,00	3,00	5,00
Structural condition	0,33	1,00	3,00
Importance of pavement section	0,20	0,33	1,00
Sum	1,53	4,33	9,00

Table 21. Example of pairwise comparison of main criteria.

Criteria	Functional condition	Structural condition	Importance of pavement section	Weights
Functional condition	0,65	0,69	0,56	0,63
Structural condition	0,22	0,23	0,33	0,26
Importance of pavement section	0,13	0,08	0,11	0,11

Table 22. Example of weights calculation for main criteria

4.4.2 Priorities calculated at bottom level

The procedure to calculate the priorities at the bottom level is the same. To illustrate this procedure the priorities calculated for the expected PCI comparison ratings are given, see Table 23 and Table 24.

Ratings	Better than expected	Below level 1	Below level 2	Below level 3	Below level 4	Below level 5	Below level 6	Below level 7	Below level 8
Better than expected	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9
Below level 1	2	1	1/2	1/3	1/4	1/5	1/6	1/7	1/8
Below level 2	3	2	1	1/2	1/3	1/4	1/5	1/6	1/7
Below level 3	4	3	2	1	1/2	1/3	1/4	1/5	1/6
Below level 4	5	4	3	2	1	1/2	1/3	1/4	1/5
Below level 5	6	5	4	3	2	1	1/2	1/3	1/4
Below level 6	7	6	5	4	3	2	1	1/2	1/3
Below level 7	8	7	6	5	4	3	2	1	1/2
Below level 8	9	8	7	6	5	4	3	2	1
Sum	45,0	36,5	28,8	22,1	16,3	11,5	7,6	4,7	2,8

Table 23. Pairwise comparison for ratings used in expected PCI comparison.

Ratings	Better than expected	Below level 1	Below level 2	Below level 3	Below level 4	Below level 5	Below level 6	Below level 7	Below level 8	Priorities
Better than expected	0,022	0,014	0,012	0,011	0,012	0,015	0,019	0,026	0,039	0,019
Below level 1	0,044	0,027	0,017	0,015	0,015	0,017	0,022	0,030	0,044	0,026
Below level 2	0,067	0,055	0,035	0,023	0,020	0,022	0,026	0,035	0,050	0,037
Below level 3	0,089	0,082	0,069	0,045	0,031	0,029	0,033	0,042	0,059	0,053
Below level 4	0,111	0,110	0,104	0,091	0,061	0,044	0,044	0,053	0,071	0,076
Below level 5	0,133	0,137	0,139	0,136	0,123	0,087	0,066	0,071	0,088	0,109
Below level 6	0,156	0,164	0,173	0,181	0,184	0,175	0,132	0,106	0,118	0,154
Below level 7	0,178	0,192	0,208	0,226	0,246	0,262	0,263	0,212	0,177	0,218
Below level 8	0,200	0,219	0,243	0,272	0,307	0,349	0,395	0,424	0,353	0,307

Table 24. Priority vector matrix calculation for expected PCI

4.4.3 Consistency check

A very important step that has not been discussed until now is the consistency check required for AHP. This step consists on assessing the consistency of the pairwise comparisons. When there are only two comparisons, there is no need for a consistency check. However when the number of comparisons increases, the more important becomes the consistency check. A simple example given in literature is that when A is better than B, and B is better than C, it should follow that A is better than C. For a detailed explanation and description of the consistency check the reader should refer to Thomas L Saaty and Vargas (2012).

Thomas L Saaty and Vargas (2012) propose a consistency ratio to determine if the pairwise comparison is consistent enough. If this ratio is below 0.1, the comparison is said to be consistent enough, when it exceeds 0.1 the values entered on the pairwise comparison should be reviewed and modified to reduce the inconsistence of the comparison.

The consistency ratio is defined as the ratio between the consistency index and the random consistency index, as explained as follows:

$$CR = CI/RI$$

Where:

CI is consistency index expressed as: $CI = (\lambda\mathrm{max} - \mathrm{n})/(\mathrm{n} - 1)$

According to Thomas L Saaty and Vargas (2012), $\lambda\mathrm{max}$ can be obtained by multiplying the resulting vector of adding the columns of the pairwise comparison matrix with the weights vector. And n is the number of columns or rows of this matrix.

Different values for random consistency index have been presented by different authors, however according to Rao Tummala and Ling (1998) the most accurate random indexes are the ones given by Saaty. These values are presented in Table 25.

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0,52	0,89	1,11	1,25	1,35	1,4	1,45	1,49

Table 25. Random consistency index. (Thomas L Saaty & Vargas, 2012)

The consistency check is required for all the pairwise comparisons that will be done in this decision making process. At the top level a consistency index will be required for the pairwise comparison between the functional condition, the structural condition and the importance criterion. At the next two levels a check will be done if there are more than 2 criteria to compare. For example a consistency check will be done when comparing PCI, Roughness and Friction. At the bottom level a consistency check will be required for all the ratings. An example of this consistency check is given as follows.

For the pairwise comparison given in Table 23, the results in Table 26 are obtained. In this case as the CR is below 0.1, the pairwise comparison is considered to be consistent and nothing else has to be done.

Consistency check	
n	9
λ max	9,60
CI	0,08
RI	1,45
CR	0,05

Table 26. Consistency check example for PCI comparison with expected PCI

4.4.4 Definitive priorities calculation

To determine the priority of each pavement section the tool will do the following operations:

The required data will be used to relate each pavement section to each rating as it has been already defined. This is at the bottom level, which means that a priority will be determined for each sub-criterion at the bottom level. For each alternative, every priority will be multiplied by the determined weight of each parent sub-criterion. Then a weighted average will be calculated to determine the priority found for that parent sub-criterion, this will be multiplied again by the weight of the next parent sub-criterion, and a weighted average will determine the priority at that level. This process is done until the weighted average is calculated for the functional condition, structural condition and importance. This will be the end result of the tool and will provide a number from 0 to 1, where 1 would be maximum priority and 0 minimum priority.

4.5 Expert panel meetings

Based on the information provided in the previous chapters, a preliminary design of the tool was developed. The purpose of this section is to present the main results from the meetings with expert pavement managers. The goal of these meetings was to present the preliminary design of the tool to validate its applicability, and receive feedback that could be used to improve the tool. Additionally it was found that the tool can contribute to the learning process of the experts in pavement management decision making as it will be discussed. The preliminary design is not shown in this report as only small changes were required, and it is very similar to the final design which will be presented in next section.

4.5.1 Expert panel meeting at Amsterdam Airport Schiphol

The meeting at Schiphol was with the senior asset manager of airside maintenance. During this meeting the design of the tool was presented and explained in order to receive feedback about the applicability and usefulness of the tool. The feedback received from this meeting can be grouped into feedback about the criteria included in the tool, the AHP methodology, the flexibility of the tool, and the data required by the tool. Pros and cons, and opportunities identified from this meeting will be presented in this section.

Related to the criteria included in the tool, the main comment was that the tool includes the most important criteria used in the pavement management decision making process. For the sub-criteria considered for the PCI sub-criterion it was mentioned that it is very important to give priority to the sections that are deteriorating faster, and this is possible as the sub-criterion *comparison with expected value* is included in the tool. Related to the sub-criterion roughness, it was mentioned that this was an important criterion to take into account. Friction was considered to be an important sub-criterion as well, however it was mentioned that it is difficult to define rehabilitation treatments based on this sub-criterion as it will be explained later in this section.

Specifically for the PCN it was mentioned that including this criterion was of great value, as the existing software only use PCI. It was also stated that PCN at the moment is only used to report that the evaluated infrastructure is capable of servicing operations for the coming 10 years, however ACNs operating in the sections are continuously changing and this can be taken into account with the proposed tool.

About the functional importance criterion it was affirmed that it is good to be able to identify which sub-criteria should be used in the tool, but it was also mentioned that *amount of movements on the pavement section* was a good starting point for the decision process. It was also mentioned that including this criterion in the decision making process would help to present to higher organizational levels which pavements should be prioritized by taking into account criteria different than the condition of the pavements.

The AHP methodology was unknown for the asset manager. After explaining how the methodology works and how it was going to be applied by the tool, the possibility to assign weights to the considered criteria was considered to be positive. Additionally one of the perceived advantages of this method was that it could be useful to make sure that assigned weights were not over estimated. It was also mentioned that it was good to have predetermined pairwise comparison matrixes, as this could be time consuming and could reduce the potential applicability of the tool.

Related to the flexibility of the tool the main comment was that it was good to allow the user to select the criteria and sub-criteria to be included in the tool. It was mentioned that this would enable the possibility to analyze different outcomes by including different combinations of criteria in the analysis.

In relation to the data, the main concern was that the tool requires a considerable amount of data, and this data is in different systems. It was mentioned earlier that it is difficult to define rehabilitation based on friction. The reason is that the measured data can be difficult to interpret because it has a high variance attributed to the quality of existing friction test methods. In relation to the required data for the ACN-PCN methodology it was mentioned that for the simple option all the data was available; however, for the elaborated option the required data was available only for the runways, but that ground radar data could currently be used for collecting the required data for taxiways and aprons.

Additionally it was mentioned that at the moment efforts are being done to implement data visualization, and it was affirmed that implementing data visualization techniques to the output given by the tool could be very interesting in further stages. Other idea was to include financial criteria in the future. As a final remark during this meeting it was mentioned that the tool had the potential to be implemented at the airport, but some pilot tests were required in advance.

4.5.2 Expert panel meeting at Brussels Airport

In this meeting the design of the tool was presented and explained similarly as it was done at Schiphol. The feedback received from this meeting can be grouped into feedback about the criteria included in the tool, the flexibility of the tool, the data required by the tool, and its applicability. Pros and cons, and opportunities identified from this meeting will also be presented in this section.

About the criteria included in the tool, the main comment was that all important criteria are included. The tool was compared with ROSY, and it was mentioned that in terms of criteria the tool is more complete as it includes criteria that ROSY doesn't. It was also discussed why ages of the pavement sections are not a sub-criterion of PCI in the tool, and it was agreed that the sub-criterion comparison with expected value serves the same purpose as age.

In relation to the flexibility of the tool it was mentioned that it was good to allow the user to select the criteria to be included in the prioritization process. This way, it is possible to exclude roughness and friction from the process, since from his experience these two criteria at Brussels Airport have not been reasons for rehabilitation.

In terms of data, it was mentioned that all the data is available except for the data required by the elaborated PCN option. Interest was also shown in the possibility to start collecting this data in case the tool will be applied at the airport, however this would require some years before having it ready for all the pavement sections. It was also mentioned that one of the problems with the required data is that it is in different software and in different formats and needs to be adapted to Microsoft Excel (in case this software is used for the tool).

Regarding the applicability of the tool it was stated that some trials would be required at a first stage. This would be done to verify that the prioritization given by the tool is according to what is currently being done at the airport. An advantage of this tool when compared with ROSY is that the latter one requires 24 hours to run, while the tool will probably require less time. It was also said that it was an interesting tool because despite of not being a software, it includes all relevant criteria and it could be used to define at the network level where to start with M&R treatments.

4.5.3 Expert panel meeting – NACO

In relation to the ratings assigned to the sub-criterion *Comparison with expected value*, it was argued that a better division of the ratings would be in a relative scale instead of an absolute scale. To explain this better the following example is given. Consider two pavement sections, A and B. Section A has an actual PCI of 60 and expected PCI of 80. Section B has an actual PCI of 20 and expected PCI of 40. The difference in both cases is 20 points on the PCI scale, however section B has a 50% of its expected PCI value while section A has a 75% of its expected value. For this reason a better division for the ratings can be done by defining a relative indicator. This indicator can easily be defined as the actual PCI divided by the expected PCI.

Related to the ratings presented in Figure 21, these ratings have been adjusted according to the feedback received. As it can be seen in this figure, the three ratings between the acceptable zone and the not acceptable zone are proportionally divided when the bump length is close to 0 m. Before, the three ratings were not proportionally divided.

For the simple option related to the ACN-PCN criterion it was discussed how the two sub-criteria *% value of ACN>PCN* and *% movements of ACN>PCN* assign priorities to the pavement sections. The main outcome from this discussion is that when the % value of ACN>PCN exceeds the 10% or 5% for flexible and rigid pavements respectively, the % of movements of ACN>PCN does not need to be considered in the analysis, and a high priority needs to be assigned in this case. The % of movements of ACN>PCN needs to be considered when the % value of ACN>PCN is within the limits defined by ICAO.

In relation to the detailed option for the ACN-PCN methodology it was recommended to do the distribution of the ratings for the expected life indicator for values from 1 to 0 equally, and not from 1 to 0.5 as it has been proposed. The main reason for this is that priorities for pavements with expected life indicators below 0.5 should be differentiated. For example, there is a big difference in terms of priorities between a pavement section that has an indicator of 0.5 and one section with an indicator of 0.1. The first one still has a predicted life of 50% of its initial expected life, while the second one only has a predicted life of 10% of its initial expected life.

In relation to the final output of the tool some suggestions were given. It was mentioned that it would be very useful if for the final priority vector, critical values could be assigned in order to differentiate between high priority, medium priority and low priority. The main argument given for this suggestion is that it is very difficult for a pavement manager to make this division as many criteria and sub-criteria are involved in the prioritization process. However as this process is a mathematical outcome, maybe these critical points can be identified with the tool. The second suggestion related to the outcome of the tool was to represent the outcome using some kind of data visualization technique in order to facilitate the understanding of the output data.

4.6 Final blueprint of the tool

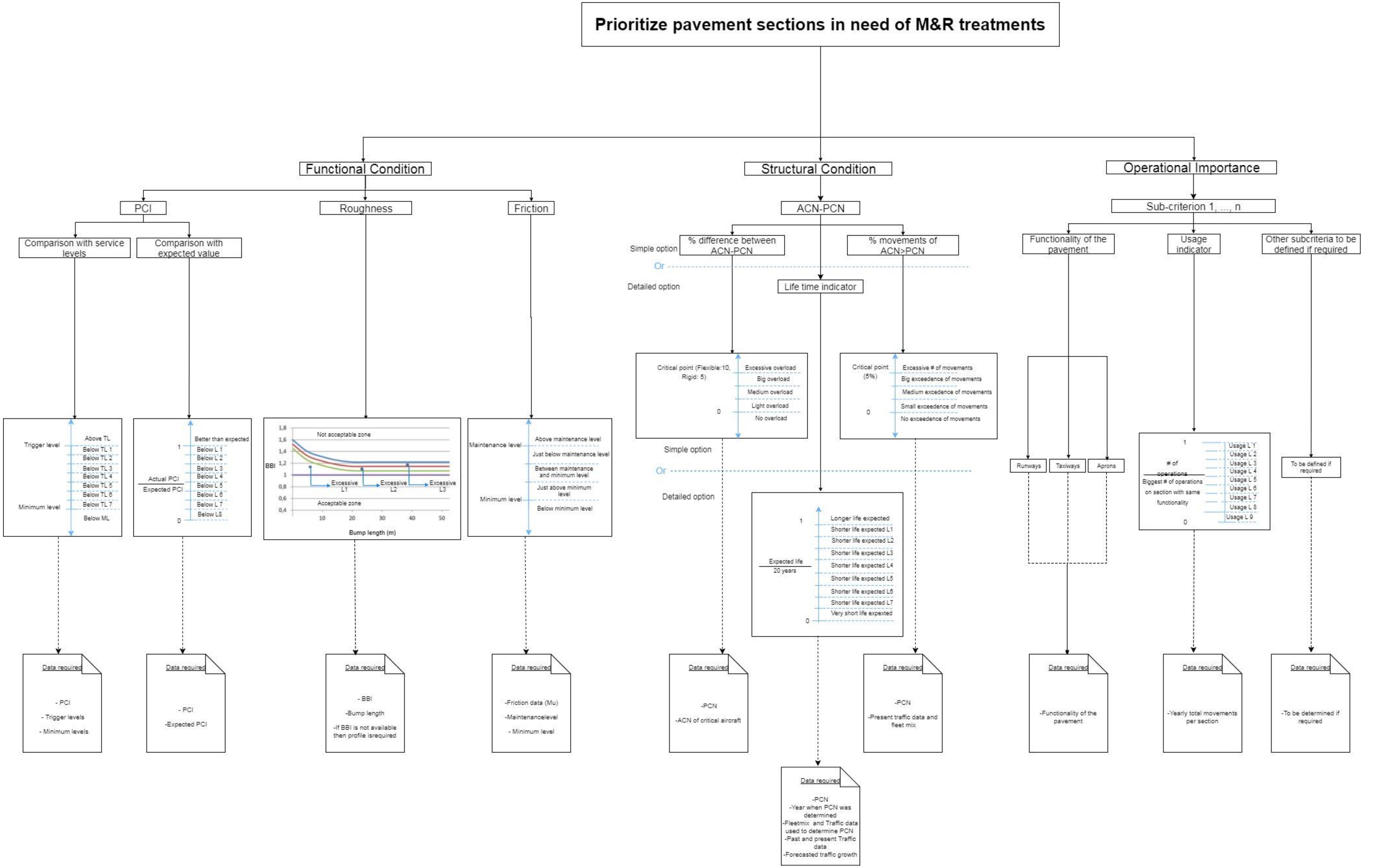

Figure 26. Final blueprint of the tool

4.7 Conclusions

Based on the case studies and the literature review, the main criteria and the corresponding sub-criteria have been determined. Based on this, the complete hierarchical structure to be applied in the tool has been presented. Some of these criteria were found to not be used in all airports, like roughness and friction. The tool was developed in a way to allow the user to enable or disable them for the prioritization process according to their particular needs.

As there are cases where there exist two possibilities for considering a particular criterion, like the case with the ACN-PCN methodology. In this case the user will be able to choose which methodology to apply to evaluate the structural condition on the pavement; this will heavily depend on the availability of data. Particularly for the criterion importance of pavement section the tool will provide two predetermined sub-criteria, number of movements on the pavement section and the type of pavement. As it was identified in the case studies, there are different sub-criteria considered at airports, however, is not possible to predefine them in the tool because they highly differ per airport. For this reason the user will need to determine the additional sub-criteria that need to be included in the decision making process. A workshop in this case could be a good solution to define the sub-criteria to be included. Based on these sub-criteria the tool will be customized to the needs of each airport, following the fit for purpose philosophy instead of the fit for all.

Ratings on how each sub-criterion at the bottom level will evaluate all the alternatives were presented and how these ratings will be pairwise compared. The procedure or pairwise comparison that the tool will follow to compute the weights to be assigned to each criterion and sub-criterion has also been presented. Based on the primary data identified in the previous chapters, each alternative will be assigned a rating for each sub-criterion at the bottom level. Finally, the tool will calculate the priority for each alternative and the output will be a positive number between 0 and 1, the greater the number the higher the priority.

With this chapter, the main purpose of answering sub-question 4 has been fulfilled. The question was: What tool can be implemented to select the pavement sections that will be maintained or rehabilitated? With the information provided in this chapter, the design of the tool has been presented and its development will be presented in next chapter. The main objective of this tool is precisely to help pavement managers identifying the pavement sections that will be maintained or rehabilitated, which answers the proposed question.

5 Tool

The previous chapter presented the design of the tool that was elaborated in this research. The main purpose of this chapter is to present the tool that has been developed in Microsoft Excel. To understand how the tool has been built, all the Excel sheets that were created will be presented. The required input and the given output by the tool will also be presented in this chapter. The employed formulas will be presented when necessary, and the main features of the tool will also be explained here. If at any moment the explanation of the tool given in the first part of this chapter is not enough to fully understand how the tool functions, the second section of this chapter will clarify any doubt. The second and last section of this chapter will present an example of the applicability of the tool by using mostly real data provided by Brussels Airport and some fictitious data that was not available.

5.1 Presentation of the tool

The tool will be presented in the same order as the Excel sheets developed to build the tool. The main function of each sheet will be explained, together with the input (if any), output (if any), main formulas (if required), and the main features of the tool. In total 24 sheets were created, the names of these sheets are: *Start, Pairwise comparisons, Input data, Tool (complete), Tool (priorities only), PCI, Roughness, Friction, ACN-PCN simple, ACN-PCN detailed, TD PCN, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, TD Year1, Usage indicator, and ACN database.*

The main consideration for presenting the sheets in this way is to facilitate the process that the user will need to follow to run the tool. If the chosen option for evaluating the structural condition is the simple option, after filling the required input in the first three sheets as it will be shown, it will be possible to get the results which are presented in the next two sheets of the tool. If the detailed option is chosen, then all sheets starting with the name *TD will* need to be filled.

5.1.1 Sheet: Start

The main purpose of this sheet is to provide the user with the main instructions required to run the tool. These instructions are provided in the form of steps or questions that must be followed or answered. These instructions are presented as follows:

1. Define whether roughness and friction will be included in the process or not.
2. Define which methodology will be used to evaluate the structural condition: simple option or detailed option.
3. Provide trigger and minimum service levels.
4. Do the pairwise comparisons.

5. Provide the data required, depending on the methodology chosen to evaluate the structural condition.
6. In case the detailed option was chosen, the year after the PCN was determined and for which data is available must be specified.
7. See results. These are provided in two sheets: *Tool (complete), Tool (priorities only).*

The input that must be given in this sheet is used mainly to identify the sub-criteria that will be included in the prioritization process; the first two instructions serve this purpose. The input in the third instruction is used to define the ratings of the sub-criterion *comparison with service levels* shown in section 4.7. Instructions 4 and 5 will not require input data in this sheet but will result in provision of data of other sheets as it will be explained later. The input from the sixth instruction is used as a command for the tool to identify until which year traffic data should be considered in case the detailed option has been chosen. The last instruction requires no input but will show the main output of the tool to the user.

The main features that can be evidenced in this sheet are the possibility of choosing whether roughness and friction will be included in the tool or not, and the possibility to choose which methodology will be used to evaluate the structural condition. This last decision should be based on the availability of data.

5.1.2 Sheet: Pairwise comparisons

As the name of this sheet suggests, its main purpose is to provide the pairwise comparisons according to the scale provided in Table 1. The pairwise comparisons that need to be input are the ones that have not been predetermined and need to be done by the user. Additionally from the pairwise comparisons, the purpose of this sheet is to do the consistency check for each pairwise comparison, and warn the user in case the consistency ratio is bigger than 10% which means the comparison has to be checked by the user. The pairwise comparisons required in this sheet are:

1. Pairwise comparison of main criteria
2. Pairwise comparisons of functional sub-criteria
3. Pairwise comparisons of operational importance sub-criteria
4. Pairwise comparison of PCI sub-criteria
5. Pairwise comparison of ACN-PCN sub-criteria. Only required if the simple option is chosen
6. Pairwise comparison of pavement functionality

The input to this sheet will be the intensities of importance, so the pairwise comparisons. For the first five pairwise comparisons, the input will be used to define the weights of each criterion and sub-criterion as explained in section 4.4.1. The input given in the sixth pairwise comparison will be used to calculate the priorities of each rating of the sub-criterion functionality of the pavement. The output given in this sheet (weights and priorities) will be used to calculate the total or final priority of each pavement section. The output (consistency ratio) is provided to the user to validate that the pairwise comparison is consistent, or to indicate to the user that the pairwise comparison has to be reviewed.

The most important formulas used in this sheet are to calculate the weights or priorities resulting from the pairwise comparisons. These values are calculated using the procedure described in sections 4.4.1 and 4.4.2. The formulas used to do the consistency check have also been presented in section 4.4.3.

5.1.3 Sheet: Input data

The purpose of this sheet is to collect all the required data to identify the pavement sections that will be considered in the prioritization process, and to collect specific data related to the functional evaluation, structural evaluation and the operational importance of each pavement section.

The data collected in this sheet is required for every section and is listed as follows:

1. Branch ID: always required to run the tool
2. Section ID: always required to run the tool
3. Pavement functionality: always required to run the tool
4. Actual PCI: always required
5. Expected PCI: always required
6. Bump length (meters): Required if roughness is considered.
7. BBI: Required if roughness is considered
8. Mu value: Required if friction is considered
9. PCN: always required
10. Critical aircraft: Required if simple option to evaluate structural condition is chosen
11. Amount of movements of critical aircraft: Required if simple option to evaluate structural condition is chosen
12. Total amount of movements: Required if simple option to evaluate structural condition is chosen
13. Expected traffic growth: Required if detailed option to evaluate structural condition is chosen

Once the input in this sheet is given, it will be possible to run the tool if the simple option for evaluating the structural condition has been chosen. As this is a sheet basically created to give input for the tool, very few formulas are expected to be used. The only formulas used in this sheet are to extract specific data based on the input given. For example from the PCN, specific data can be extracted such as: type of pavement (flexible or rigid), and subgrade code. From the subgrade code, the k value and CBR can be determined using the tables provided by (FAA, 2014) and presented in Appendix 3. Similarly from the type of aircraft the ACN value can be determined, for this purpose a database was developed and will be presented when the sheet *ACN database* is explained.

The main features that can be evidenced in this sheet are that the required data will adapt depending on the criteria included in the analysis. When roughness and/or friction are not considered, the cells where this input is required will turn grey and it will be obvious for the user that this data is not required. The same applies depending on the option chosen for evaluating the structural condition.

5.1.4 Sheet: Tool (complete)

The main purpose of this sheet is to present the output of the tool. As its name indicates this sheet presents all the calculated priorities, together with the values to determine these priorities. The user does not need to give any input in this sheet, all the input used in this tool originates from the sheets already explained if the simple option is chosen, and from other sheets that will be explained later in this chapter if the detailed option is chosen. A complete list with all the provided data in this sheet is presented in Table 27.

As it can be seen in Table 27, some of the data presented in this sheet is the same data that is used as input for the previously explained sheets. Additionally, in this sheet the ratings assigned to each pavement section and all the priorities are presented. The data used as input is presented again in this sheet in order to present all the relevant data that explains the ratings and calculated priorities. The user will be able to understand the calculated values; this will be illustrated with the example provided at the end of this chapter.

			Data Field
Pavement inventory			Branch Id
			Section Id
			Pavement Functionality
Functional Condition	PCI	Comparison with service levels	Actual PCI
			Comparison with service levels - Rating
			Comparison with service levels - Priorities
		Comparison with expected value	Expected PCI
			Actual PCI/Expected PCI
			Comparison with expected value - Rating
			Comparison with expected value - Priorities
			PCI - Priorities
	Roughness		Bump length (meters)
			BBI
			Rating
			Roughness - Priorities
	Friction		Mu value
			Rating
			Friction - Priorities
			Functional condition priorities
Structural Condition	Both options		PCN
			CBR
			K value
	Simple option	% ACN-PCN difference	Critical aircraft
			ACN of critical aircraft
			Amount of movements of critical aircraft
			Total amount of aircraft movements
			% ACN-PCN difference
			% ACN-PCN difference - Rating
			% ACN-PCN difference - Priorities
		% movements with overload	% movements with overload
			% movements with overload - Rating
			% movements with overload - Priorities
			Structural condition priorities (simple option)
	Detailed option		Expected traffic growth
			Expected life time indicator
			Rating
			Structural condition priorities (detailed option)
Operational Importance		Functionality of the pavement	Functionality of the pavement
			Priorities
		Usage indicator	Biggest number of operations on section with the same functionality
			Usage indicator
			Usage indicator ranking
			Priorities – usage indicator
			Operational importance priorities
			Total Priority

Table 27. Data provided in the sheet: Tool (complete)

The most relevant data provided in this sheet are the ratings assigned to each pavement section for each sub-criterion, the ratings assigned to each pavement section for all sub-criteria, and the priorities calculated for all the alternatives. The main output of this sheet and of the tool is the total priority. The formulas used for assigning the ratings were conditional formulas provided by Microsoft Excel. To illustrate this, consider Table 28 already presented in section 4.3.2. The formula given in the Excel satisfies the next conditions:

If:

- Actual PCI of pavement section is greater or equal to 1, then the rating is: *Better than expected.*
- Actual PCI of pavement section is greater or equal to 0.875 and smaller than 1, then the rating is: *Below level 1* (This condition is similar for the other ratings, but with different limits).

• Ratings	Lower limit
Better than expected	1
Below level 1	0,875
Below level 2	0,75
Below level 3	0,625
Below level 4	0,5
Below level 5	0,375
Below level 6	0,25
Below level 7	0,125
Below level 8	0

Table 28. Lower limits for the ratings of comparison with expected value

The formulas for calculating the priority for each sub-criterion were of the *vlookup* type provided by Microsoft Excel. Depending on the rating assigned a priority is assigned to that rating based on the pairwise comparisons. For example, for the sub-criterion *comparison with expected value,* if the rating *Better than expected* is assigned to a pavement section, then the formula would command to search for this rating on Table 24 and return the priority value contained on the last column of this matrix. For this example the returned value will be a priority of 0.019.

The priorities calculated for each sub-criterion are one of the required inputs for calculating the priorities of the criterion on top of these sub-criteria as shown in the hierarchical structure presented in section 4.7. The second required input are the weights assigned to each sub-criterion, and criterion determined from pairwise comparisons as was shown in section 4.4.2. The total priority calculated for each pavement section follows the same logic of weighted average taking into account the weights of the main criteria and the priorities of each pavement section calculated for each main criteria. Table 29 provides priority values for sub-criteria, criteria and the total priority for three imaginary pavement sections. This example will help understand how the priorities are calculated. In this example, roughness and friction are not considered. The functional condition priority value calculated for pavement section A is 0.31. This value results from a weighted average of 0.31 (priority of section A for the sub-criterion comparison with service levels) and 0.31 (priority of section A for the sub-criterion comparison with expected value), the weights used for this calculation are 67% and 37% respectively. The process to calculate the priority of section A for the structural condition is exactly the same but the weights this time are 75% and 25% which result from a pairwise comparison. The process to calculate the priority for total operational importance is the same, again with different weights. To calculate the total priority for section A the same process is followed, and the exact calculation is presented as follows:

$$\begin{aligned}&\text{Total priority of section A}\\&= (\text{Priorities of Total functional condition x weight of functional evaluation})\\&+ (\text{Priorities of Total structural condition x weight of structural evaluation})\\&+ (\text{Priorities of total operational importance x Weight of operational importance})\end{aligned}$$

$$\text{Total priority of section A} = (0.31 \text{ x } 0.33) + (0.5 \text{ x } 0.33) + (0.5 \text{ x } 0.33) = 0.44$$

Pavement section	Functional Evaluation (33%)			Structural Evaluation (33%)			Operational Importance (33%)			Total Priority
	Priorities-Comparison with service levels (67%)	Priorities-comparison with expected value (33%)	Priorities - Total functional condition	Priorities-% difference ACN-PCN (75%)	Priorities - % movements with overload (25%)	Priorities - Total structural condition	Priorities - Functionality of the pavement (50%)	Priorities - Usage indicator (50%)	Priorities - Total operational importance	
A	0,31	0,31	**0,31**	0,50	0,50	**0,50**	0,70	0,31	**0,50**	**0,44**
B	0,08	0,08	**0,08**	0,13	0,13	**0,13**	0,23	0,08	**0,15**	**0,12**
C	0,02	0,02	**0,02**	0,03	0,03	**0,03**	0,07	0,02	**0,05**	**0,03**

Table 29. Total priority calculation example

As already mentioned, the main output of this sheet is the total priorities calculated for every pavement section.

5.1.5 Sheet: Tool (priorities only)

The main purpose of this sheet is to summarize the data presented in the sheet *Tool (complete)*. As it was shown in Table 27, many data is presented in this sheet and can be confusing to the user. The sheet described here presents the most important data, which are the priorities of each pavement section. Table 27 shown in the previous section is actually the data shown in this sheet.

5.1.6 Sheet: PCI

This sheet contains the pairwise comparisons for the two sub-criteria of the PCI. The main purpose of this sheet is to calculate the priorities corresponding to each rating shown in Figure 19 and Figure 20. The values given in these two pairwise comparisons are predetermined and the user does not need to modify these values in order to run the tool. The output of this sheet will be used in the sheet *Tool (complete)* to calculate the priority of the PCI criterion. The output of this sheet when observing Table 29 would be 0.31 for pavement section A for both sub-criteria of the functional evaluation. In this example roughness and friction were not considered, so these two ratings would be used to calculate the priority of section A for the functional evaluation.

5.1.7 Sheet: Roughness

The objective of this sheet, similar to the previous sheet is to calculate the priorities for the ratings presented in Figure 21. A predetermined pairwise comparison as was shown in Table 15 is provided in this sheet and the user does not need to modify its values to run the tool. As it can be seen these ratings depend on two variables: the bump length and the BBI. A database containing all the points of the four lines drawn in Figure 21, for all possible bump lengths was developed. A portion of this database is shown in Table 30. This database will allow assigning the rating for each pavement section on the sheet *tool (complete)*. The formula given to assign these ratings in the sheet *tool (complete)* is a *vlookup* formula combined with a conditional *if* formula provided by Microsoft Excel. First the bump length will be located in the database and then the conditional formula will assign the BBI to one of the ratings.

Lower limits for each rating				
	BBI			
Bump length (meters)	Not acceptable zone	Excessive L3	Excessive L2	Excessive L1
0	1,60	1,40	1,20	1,00
1	1,56	1,37	1,19	1,00
2	1,52	1,35	1,17	1,00
3	1,48	1,32	1,16	1,00
4	1,44	1,29	1,15	1,00
5	1,40	1,27	1,13	1,00
6	1,38	1,25	1,13	1,00
7	1,36	1,24	1,12	1,00
8	1,35	1,23	1,12	1,00
9	1,33	1,22	1,11	1,00
10	1,31	1,21	1,10	1,00

Table 30. Lower limits for the ratings of roughness.

5.1.8 Sheet: Friction

The function of this sheet is to calculate the priorities related to the ratings shown in Figure 22. For this purpose a predetermined pairwise comparison as shown in Table 16 was elaborated in this sheet. As the maintenance planning levels and the minimum levels depend on the friction test carried out and the speed used to do the test, the same table shown in Table 2 is used in this sheet. When the user inputs in the sheet *start*, the type of test and speed used to carry out the test the ratings for each pavement section can be assigned, and with these the priorities determined.

5.1.9 Sheet: Usage indicator

The function of this sheet is to calculate the priorities related to the ratings shown in Figure 25. For this purpose a predetermined pairwise comparison as shown in Table 20 is used in this sheet. The output of this tool will be used in sheet *tool (complete)* to assign the ratings and priorities of each pavement section for the sub-criterion of the operational importance.

5.1.10 Sheet: ACN-PCN simple

This sheet contains a predetermined pairwise comparison (Table 17) to calculate the priorities associated to each rating shown in Figure 23. These priorities are then assigned to all the pavement sections in the sheet *tool (complete)*.

5.1.11 Sheet: ACN-PCN detailed

This sheet serves two main purposes, first to calculate the priorities based on the pairwise comparison shown in Table 18, related to the ratings shown in Figure 24. The second purpose of this sheet is to calculate the expected life time indicator. With this indicator it is possible to assign the right rating to all the pavement sections in the sheet *tool (complete)*. The user does not need to give any input in this sheet, unless the values given in the predetermined pairwise comparison need to be modified.

The process followed to calculate the life time indicator has already been in section 3.4. Summarizing, the ACN of the critical aircraft of each pavement section and the PCN are needed. The ratio between ACN and PCN (see Figure 13) will allow to estimate the expected number of operations of the critical aircraft for a life time of 20 years. With the real traffic data that will be presented in the next sheets, the indicator can be determined. To understand this process better the following images present fictitious data used in the tool to determine the life time indicator, see Figure 27.

Section 1

ACN of critical aircraft	83
PCN	80
ACN/PCN	1,04
# of loads used for PCN calculation	39914
Growth %	1% Note: This growth is assumed to be constant
allowed ops (# of times)	0,84
years to failure	15
Indicator	0,75

Year	# of movements	accumulated # of movements	CDF	1-CDF	year
1	2205	2205	0,07	0,93	1
2	2205	4410	0,13	0,87	2
3	2112	6522	0,20	0,80	3
4	2205	8727	0,26	0,74	4
5	2205	10932	0,33	0,67	5
6	2205	13137	0,39	0,61	6
7	2205	15342	0,46	0,54	7
8	2205	17547	0,53	0,47	8
9	2205	19752	0,59	0,41	9
10	2205	21957	0,66	0,34	10
11	2227	24184	0,72	0,28	11
12	2249	26434	0,79	0,21	12
13	2272	28706	0,86	0,14	13
14	2295	31000	0,93	0,07	14
15	2318	33318	1,00	0,00	15
16	2341	35658	1,07	0,07	16
17	2364	38023	1,14	0,14	17
18	2388	40410	1,21	0,21	18
19	2412	42822	1,28	0,28	19
20	2436	45258	1,36	0,36	20

Figure 27. Screenshot of portion of the sheet: ACN-PCN detailed.

Figure 27 shows fictitious data to calculate the life time indicator. The value of this indicator for the data shown in this figure equals 0.75. The ratio between the ACN and the PCN equals 1.04. Using the values presented in Figure 13, the expected allowed number of operations for a period of life of 20 years is 0.84. This suggests that if the pavement is loaded with an aircraft with an ACN of 83 when the PCN value is 80, then only 84% of the operations considered when the PCN was calculated will be allowed if the pavement is supposed to last 20 years. Taking this into account, the next step is to calculate the cumulative damage factor for every year based on real traffic data. It is important to note that the *# of loads used for PCN calculation* and the *# of movements* for each year are movements of the total fleet mix on each pavement section converted into movements of the critical aircraft, using the equations given in section 3.4. Looking at Figure 27, it can be seen that the CDF reaches a value of 1 for the year 15, meaning that the expected life time for this pavement section under the shown conditions is of 15 years. The ratio between 15 years and 20 years gives a life time indicator a value of 0.75. With this indicator it is possible to assign the rating *Shorter life expected L2* to this pavement section and then a priority value of 0.037, see Table 31.

Ratings	Lower limit	Priority
Longer life expected	1	0,019
Shorter life expected L1	0,875	0,026
Shorter life expected L2	0,75	0,037
Shorter life expected L3	0,625	0,053
Shorter life expected L4	0,5	0,076
Shorter life expected L5	0,375	0,109
Shorter life expected L6	0,25	0,154
Shorter life expected L7	0,125	0,218
Very short life expected	0	0,307

Table 31. Ratings and priorities for the life time indicator

5.1.12 Sheet: TD PCN

TD stands for traffic data, which suggests that the function of this sheet is to collect the traffic data that was used for the PCN calculation. The user will need to input data in this sheet if the option chosen to calculate the priority of the structural condition is the detailed ACN-PCN methodology. Fictitious data has been input in this sheet and is presented in Figure 28 to illustrate the data required in this sheet. The total converted movements, in this case 20,484 movements, are the converted movements of the total fleet mix considered to calculate the PCN value. In this example all the movements of each aircraft are converted into movements of an Airbus 350-900 which would be the critical aircraft in this case. The cells shown in green are the cells that the user will need to fill.

Section 1

Critical aircraft	A350-900 Preliminary
ACN Critical aircraft	65,3
Total converted movements	20484,5

Aircraft	ACN (F/A/W)	# of movements	# of converted movements into critical aircraft
S-60	20,3	10	4
B747-SP	37,9	9000	1029
B747-SP	37,9	10000	1115
Dual Wheel 20	3,2	10	2
B737-800	42,8	10	6
A380 (BLG) 492	46,7	20	13
B747-400ER	56,7	6000	3316
A350-900 Preliminary	65,3	15000	15000

Figure 28. Screenshot of portion of the sheet TD PCN.

5.1.13 Sheets: TD Year 1- TD Year 10

The sheets TD Year 1 to TD Year 10 are structured in the same way as sheet TD PCN. Figure 29 provides an example with fictitious data for one pavement section. As it can be seen the critical aircraft for this case is the A350-900, and all traffic data is converted into movements of this aircraft. As it can be seen in Figure 29, the output of this sheet (1431,2 total converted movements) is used as input in sheet *ACN-PCN detailed*. Green cells as for the previous sheet need to be filled by the user.

Section 1

Critical aircraft	A350-900 Preliminary
ACN Critical aircraft	65,3
Total converted movements	1431,2
Total ops	5975,0

Aircraft	ACN (F/A/W)	# of movements	# of converted movements into critical aircraft
S-60	20,3	2000	69
B747-SP	37,9	500	114
B747-SP	37,9	365	90
Dual Wheel 20	3,2	800	4
B737-800	42,8	890	244
A380 (BLG) 492	46,7	20	13
B747-400ER	56,7	1300	797
A350-900 Preliminary	65,3	100	100

Figure 29. Screenshot of portion of the sheet TD Year 1

5.1.14 Sheet: ACN database

This sheet contains a database that relates ACN values with 225 different aircrafts. This database is very important for the structural condition evaluation independent of the option chosen. The user only needs to input the aircraft and with this database the tool determines the ACN of the aircraft. This database was built using the software provided by ICAO, named ACN1.0. A portion of this database is presented in Table 32, and the complete database is presented in Appendix 4.

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
Airbus	A321-100 opt	85,4	46,7	49,2	54,7	60,5	53,1	56	58,7	60,9
Airbus	A321-200 std	89,4	49,4	52	57,6	63,2	56,5	59,4	62,1	64,3
Airbus	A321-200 opt	93,9	52,2	55,1	61	66,6	60,1	63	65,8	68
Airbus	A330-200 std	230,9	57	61,9	71,6	96,8	53,3	61,2	72,6	84,7
Airbus	A330-200 opt	233,9	57,9	62,9	72,9	98,6	54,1	62,2	73,8	86,2
Airbus	A330-200 236,9t	236,9	57,8	62,7	72,7	98,3	54	62,1	73,7	86
Airbus	A330-200 238,9t	238,9	57,8	62,7	72,7	98,3	53,9	62	73,6	86
Airbus	A330-200 FR 233,9t	233,9	57,8	62,8	72,7	98,4	54	62,1	73,7	86
Airbus	A330-200FP 227,9t	227,9	56,1	60,7	70,1	94,8	52,4	60	71,2	83,1
Airbus	A330-300 std	230,9	57,7	62,7	72,6	98,2	53,9	62	73,6	85,9
Airbus	A330-300 opt	233,9	59	63,7	74	100,1	55,2	63,5	75,3	87,7
Airbus	A330-300 235,9t	235,9	58,8	63,5	73,7	99,7	55,1	63,3	75	87,5
Airbus	A340-200 std	257,9	52,8	56,9	65,7	88,9	48,1	55,2	65,7	77,1
Airbus	A340-200 opt	260,9	53,5	57,7	66,7	90,2	48,7	55,9	66,6	78,2

Table 32. ACN database

5.2 Application of the tool

As already mentioned in the beginning of this chapter, the tool has been applied using partly real data and partly fictitious data. This section will present the data used to run the tool and the results given by the tool. Before continuing it is required to know that the sub-criteria roughness and friction have not been considered in this example. Additionally the chosen option to evaluate the structural condition is the simple option. The pairwise comparisons that are not predetermined were filled and none of the predetermined pairwise comparisons have been modified in order to reduce the complexity of the example that will be presented. The real data provided is from Brussels Airport, and the fictitious data was given in order to complete the missing data, mostly for the aprons.

5.2.1 Data

The data that has been entered in the tool will be presented in the same order as the sheets were presented. As the simple option was chosen, it was only needed to enter data in the first three sheets of the tool.

Data entered in the sheet Start

Figure 30 shows the data entered in the first sheet of the tool. On the left side of this image, the numbers represent the number of the instruction to be followed, and the data is entered on the green cells. It can be seen that for instruction number 4, no data was given as friction will not be considered in this case.

1. Fill in the PCI trigger and minimum levels for runways, taxiways and aprons.

PCI Service levels per pavement functionality			
Pavement Functionality	Runway	Taxiway	Apron
Trigger level	70	70	55
Minimum level	55	55	40

2. Will roughness be included in the prioritization process? no

3. Will friction be included in the prioritization process? no

4. If friction will be included in the prioritization process please specify what measurement test and speeds are used.

Measurement test	
Speed	

5. Specify which option (simple option or elaborated option) will be used to evaluate the Structural condition criterion. ACN-PCN simple option

Figure 30. Screenshot of data entered in the sheet: Start.

The next step as stipulated in this sheet is to fill in the green cells in the sheet *Pairwise comparisons*. Figure 31 shows the data filled in this sheet for the pairwise comparison of the main criteria. The remaining data filled in this sheet for the other pairwise comparisons is provided in Appendix 5.

Pairwise comparison of main criteria

This pairwise comparison is needed to calculate the weight of each main criteria

a. Comparison matrix

Criteria	Functional condition	Structural condition	Operational importance
Functional condition	1,00	1,00	1,00
Structural condition	1,00	1,00	1,00
Operational importance	1,00	1,00	1,00
Sum	3,00	3,00	3,00

d. Output

Criteria	Weights
Functional condition	0,33
Structural condition	0,33
Operational importance	0,33

Figure 31. Screen shot of data entered in the sheet: Pairwise comparisons

The next step is to fill the green cells in the sheet *input data*. A total of 255 pavement sections have been entered in this sheet, together with all the data required and explained in the previous section. To see all the data entered in this sheet, please see Appendix 6. A portion of this data is presented in Table 33.

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Alpha 1	1	1	TAXIWAY	F	100	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	2	2	TAXIWAY	F	100	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	3	3	TAXIWAY	F	71	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	4	4	TAXIWAY	F	73	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 3	2	5	TAXIWAY	F	58	55	106/F/A/W/T	106	A	High 15	NA	C-130	600	1518
Alpha 3	3	6	TAXIWAY	F	85	55	106/F/A/W/T	106	A	High 15	NA	C-130	600	1518
Alpha 5	2	7	TAXIWAY	F	96	55	66/F/A/W/U	66	A	High 15	NA	C-130	99	436
Alpha 5	3	8	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	C-130	99	436
Alpha 6	1	9	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 6	2	10	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 6	3	11	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 7	1	12	TAXIWAY	R	100	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	2	13	TAXIWAY	R	100	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	3	14	TAXIWAY	R	43	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655

Table 33. Portion of data entered in the sheet Input data.

Having entered all these data, the tool calculates the priorities for all the criteria and sub-criteria as explained in section 5.1. The results given in the sheet *tool (complete)* can be found in Appendix 7. However a portion of the results given in the sheet *tool (only priorities)* is presented in Table 34. For the complete results given in this latter sheet please refer to Appendix 8.

Branch and section	Pavement section count	Functional Evaluation			Structural Evaluation			Operational Importance			Total Priority
		Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities-% difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	
Apron 52-2	52	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 53-2	53	0,307	0,076	0,230	0,035	0,035	0,035	0,072	0,019	0,045	0,103
Apron 54-2	54	0,053	0,026	0,044	0,035	0,035	0,035	0,072	0,019	0,045	0,041
Apron 55-2	55	0,307	0,076	0,230	0,035	0,035	0,035	0,072	0,019	0,045	0,103
Apron 56-1	56	0,307	0,053	0,222	0,035	0,035	0,035	0,072	0,019	0,045	0,101
Apron 56-2	57	0,307	0,109	0,241	0,035	0,035	0,035	0,072	0,019	0,045	0,107
Apron 56-3	58	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 56-4	59	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 60-3	60	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 60-4	61	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Bravo 1-1	62	0,026	0,019	0,024	0,035	0,035	0,035	0,227	0,307	0,267	0,108
Bravo 1-2	63	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 1-3	64	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 1-4	65	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 3-1	66	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 3-2	67	0,026	0,019	0,024	0,035	0,035	0,035	0,227	0,019	0,123	0,060

Table 34. Portion of the results presented in sheet tool (only priorities).

5.2.2 Additional feature added to the tool

As it was recommended during the expert panel meeting with ir. Mooren from NACO, an additional feature has been added to the tool. During this meeting it was suggested to present the results by assigning a color to each final priority that would be meaningful to the user of the tool. For this purpose three priority levels were identified, namely highest priority, medium priority and lowest priority. To identify the values related to each of these priority levels the following procedure was done.

For the highest priority level, a rating that would represent the highest priority for each sub-criterion was assigned, and the total priority was calculated as it is calculated for all the pavement sections. For the lowest priority level, the same procedure was followed but assigning the ratings that would represent the lowest priority for each sub-criterion. For the medium priority level, when possible a rating that would exactly represent the priority in the middle of the scale was assigned. This was not possible for all the sub-criteria, and for the sub-criterion functionality of the pavement under the criterion operational importance the rating assigned to this level was the rating of a taxiway. The reason for assigning a taxiway is because at least in Brussels, taxiways are less important than runways but more important than aprons, meaning that taxiways have medium priority.

After doing this, the next step was to assign a color to each priority level. The colors assigned were red for the highest priority level, orange for the medium priority level, and green for the lowest priority level. Table 35, depicts the priorities assigned to each priority level and the colors assigned to each.

Branch and section	Pavement section count	Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
1Highest Priority	0,10	0,31	0,31	0,31	0,50	0,50	0,50	0,70	0,31	0,50	0,44
2Medium Priority	0,20	0,08	0,08	0,08	0,13	0,13	0,13	0,23	0,08	0,15	0,12
3Lowest Priority	0,30	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033

Table 35. Priorities and colors assigned to highest priority level, medium priority level, and lowest priority level

Having these colors assigned to these priority levels, it was possible to formulate the tool accordingly in order to assign a color depending on the defined color scale. Pavement sections with lower priorities than the highest priority level would have a less intense red color, the closer the values were to the medium priority level, the closer the color would be to orange and the lower the value for each pavement section's priority the closer the color would be to green. The results are provided in the sheet tool (only priorities) and are shown in appendix 9. A portion of these results is presented in Table 36.

Additionally, after assigning the colors a bar was introduced for each pavement section on each cell representing the priorities of the main criteria, namely the functional condition, the structural condition and the operational importance. These bars graphically represent the size of the value contained in each cell and is compared per criterion with all the pavement sections. As it can be seen in Table 36, these bars help to identify immediately which criterion is contributing the most to the total priority for any pavement section, but also to identify how big is this contribution when compared to the other pavement sections.

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Total Priority
1Highest Priority	0,307	0,503	0,504	0,438
2Medium Priority	0,076	0,134	0,152	0,121
3Lowest Priority	0,019	0,035	0,045	0,033
Inner 08-3	0,019	0,035	0,222	0,092
Inner 09-1	0,031	0,035	0,267	0,111
Inner 09-2	0,019	0,035	0,267	0,107
Inner 09-3	0,079	0,035	0,267	0,127
Inner 10-1	0,019	0,035	0,132	0,062
Inner 10-2	0,019	0,035	0,132	0,062
Juliet-1	0,019	0,035	0,132	0,062
Juliet-2	0,217	0,035	0,132	0,128
Juliet-3	0,019	0,035	0,132	0,062
Juliet-4	0,217	0,035	0,132	0,128
Nov 1-1	0,019	0,035	0,123	0,059
Nov 2-1	0,019	0,035	0,123	0,059
Nov 2-2	0,213	0,035	0,123	0,124
Nov 4-2	0,019	0,503	0,123	0,215
Nov 4-3	0,019	0,503	0,123	0,215
Nov 5-2	0,019	0,035	0,123	0,059
Nov 6-3	0,019	0,035	0,123	0,059
Nov 6-4	0,241	0,035	0,123	0,133
Outer 01-1	0,019	0,035	0,123	0,059
Outer 01-2	0,019	0,035	0,123	0,059
Outer 02-1	0,019	0,035	0,123	0,059
Outer 02-2	0,019	0,035	0,123	0,059
Outer 03-1	0,019	0,035	0,140	0,065
Outer 03-2	0,019	0,035	0,140	0,065

Table 36. Portion of the results given in sheet tool (only priorities)

6 Discussion

In the previous chapters all the sub-questions have been answered and the main output of this research, the tool, has been presented. In this chapter an overview relating the tool with the literature review and the case studies will be presented, as well as potential benefits for airports. Additionally, the tool will be discussed to identify advantages and disadvantages that can affect its applicability. The discussion presented in this chapter will be crucial for answering the main research question in the next and final chapter.

6.1 Overview

The answer to the first research question describing how pavement management decision making is done has been given based on the literature review and the case studies. The methodology to identify pavement sections that need to be maintained was also identified in the literature review and has been successfully applied to developing the tool. This methodology is the absolute Analytical Hierarchy Process. The answers to the second and third research questions were also identified from the literature review and from the case studies. The answers to both were presented in section 4.7 where the final blueprint of the tool was given. The answer to the fourth research question was just presented in chapter 5, and was the result of implementing the design of the blueprint in Microsoft Excel.

6.1.1 Relation of the tool to literature review

In the literature review it was mentioned that two levels of airport pavement management exist, project and network levels. The tool proposed here is at the network level as it considers all pavement sections of the pavement network and nothing is considered in terms of identifying the appropriate solution or projects to be carried out. That would be the next step, and would be at the project level of pavement management.

It was also mentioned that airport pavement management systems (APMS) consist of four components: network inventory, pavement evaluation, pavement performance prediction and management planning. However most of these APMS only consider PCI, meaning that pavement evaluation is incomplete, and performance prediction is only a prediction of the PCI. The tool proposed in this research includes the most relevant criteria taken into account by pavement managers. This tool, similarly to all existing APMS requires a network inventory to define the assets to be managed. The prioritization process carried out by the tool considers both structural evaluation consisting of the ACN-PCN methodology, and functional evaluation consisting of PCI, roughness and friction. Related to pavement performance prediction, the tool takes into account performance prediction for functional and structural condition. Functional performance prediction is considered by comparing the actual PCI of each pavement section with expected PCI values. Structural performance prediction is considered by both options proposed in this research, although the detailed option provides a direct indicator of expected structural life.

From the literature review it was found that ranking is a typical methodology for selecting M&R treatments. First, projects are identified for each individual section and then projects are ranked and selected accordingly until budget is spent. A problem of ranking is that chosen projects at the network level are a result of the sum of projects considered in isolation from the rest to solve needs of individual pavement sections (Gendreau & Soriano, 1998). Furthermore this problem is enlarged because projects at the network level are not only the sum of projects proposed to solve isolated pavement sections but also based on only one criterion, PCI in most of the cases. The tool presented here does not have this problem as no projects are being determined, but pavement sections in need of M&R based on all the criteria for the whole network are being identified. By doing so, pavement managers will be able to determine strategies at the network level. Based on these strategies, the next step would be to define the projects that will be carried out. The process to be followed by applying the tool, would be a top down approach opposite to the Bottom-up approach which works when funds are not limited.

It was mentioned in the literature review that service levels can be used to establish priorities. When this was possible, ratings were defined according to the service levels and priorities were calculated based on these service levels. The main benefits from doing this were, time reduction due to predefined pairwise comparisons, and reduction of subjectivity as ratings were clearly defined. This will be further discussed later in this chapter.

The tool has been built following international standards and recommendations mainly from ICAO and FAA. Specifically for roughness, friction, and ACN-PCN methodology, the ratings have been designed based on the recommended levels of ICAO. This means that the tool prioritizes pavement sections as they get closer to the boundaries established by ICAO. Thus, an airport that uses the tool for the first time will be able to immediately identify the pavement sections that are reaching or are already below these boundaries. Identifying these pavement sections will clearly help the airport keep the pavements according to recommendations.

6.1.2 Relation of the tool to case studies

The scope of the research was focused on airports with high traffic demand and a broad pavement network. The chosen case studies were three main airports in Europe, Brussels Airport, Amsterdam Airport Schiphol and London Heathrow, of which these last two had the biggest amount of movements in Europe in 2016. The criteria that were found from the literature review were complemented with the criteria that were considered in these three airports, and how each sub-criterion was considered for pavement management decision making.

Specifically for the functional condition criterion, it was found that PCI, roughness and friction are three sub-criteria considered in airports. PCI was found to be used in all three airports, furthermore, most of the existing APMS are based on this index. This criterion is required to define priorities of pavement sections when considering functional condition.

Roughness was only considered at Schiphol, and only after complaints are received from pilots. The reason why roughness is not considered at Brussels and Heathrow is because they haven't experienced any problems related to roughness. However, at airports like Schiphol soil conditions are prone to contribute to roughness problems. For these airports, including this criterion in the prioritization process is encouraged. For airports where roughness is not a big issue, including this criterion is still recommended as the final priorities calculated won't be affected unless roughness is evidenced to be a problem. This will help identifying pavement sections to be maintained before pilots complaints start. Furthermore, identifying roughness problems by calculating the BBI is a simple process when the profile of the runway is available. The calculation of the BBI can be done by applying different available software like PROFAA, a free version provided by FAA.

From the case studies it was found that friction was considered mainly for rubber removal actions, since deposits of rubber contribute to reductions of friction levels. However, friction can still be below the minimum levels after rubber has been removed, and clearly a different action is needed. The tool has been built to allow the user to execute the prioritization calculation without the need to consider friction. However, this is a very important criterion and users are encouraged to include it in the tool. As it was already mentioned, the tool is intended to be applied at the network level, which means that the calculated priorities for the complete pavement network help identify which sections need M&R treatments, but do not identify the required solution. For the specific case of Brussels Airport, even though it was mentioned that friction has not been the cause for doing major rehabilitation of pavements, this criterion should still be included because when friction is low together with other criteria, other solutions different than rubber removal may be more appropriate, and when friction is good the final priority won't be affected.

The sub-criterion FOD which was found in literature was not considered in any of the three airports. Additionally all the primary data required to calculate the FOD index is already included in the PCI. For these two reasons this sub-criterion was not included in the tool.

For the structural condition, the ACN-PCN is the only criterion that was found from the literature review and from the case studies. One of two options to consider the structural condition based on the ACN-PCN methodology can be chosen in the tool. These two have been named the simple and the detailed option. The names given relate to the amount of data required and the accuracy of the output given by each option. In consequence, the simple option requires less data than the detailed option, but this option is less accurate than the detailed option.

The detailed option allows estimating the remaining structural life of a pavement section and based on this estimate, ratings and priorities are assigned. With the simple option, it is only possible to determine whether a pavement section is being overloaded beyond acceptable limits or not, based on which ratings and priorities are assigned. The main advantage of the detailed option over the simple option is that a pavement can be overloaded by applying bigger loads, by applying more loads, or a combination of both, and this will be accounted for with the detailed option. For these reasons prioritizing based on the estimated life time indicator (detailed option) will result in a more accurate identification of pavement sections with structural M&R needs.

During the expert panel meeting at Amsterdam Airport Schiphol an important comment was done related to the ACN-PCN methodology. Currently this methodology is used mainly to report and prove that a pavement section has the structural strength to allow operations for the coming 10 years, but ACNs are constantly changing and what was stated in the report may not be true anymore due to these changes. The detailed option proposed in this research, is of special value in this sense because it takes into account not only the exceedance in loads (ACNs) but also the amount of loads. Furthermore the detailed option not only considers the actual ACNs and actual number of loads on the pavement but also the ACNs and loads since the moment when the PCN was determined, which certainly will have an impact on the structural life of the pavement.

As already mentioned, the main limitation of the detailed option for prioritizing pavement sections on their structural condition is the amount of needed data. From the expert panel meetings at Brussels and Amsterdam it was evidenced that neither one had the complete data for choosing this option. However, at Amsterdam Schiphol, ground radar data is being used to collect traffic data for runways that would comply with the requirements of the detailed option, and this ground radar data could also be used to collect the required data for taxiways and aprons. This suggests that although the data is not available at the moment, this data can be collected and prioritization with the detailed option is feasible.

The criterion operational importance was considered in the three case studies, and was for this reason included in the tool. In total six sub-criteria were identified for this criterion, however these sub-criteria differed substantially between the three airports. Only functionality of the pavement and usage indicator were found to be considered in all three airports, and for this reason these two were included in the tool. The fact that these two are included in the tool does not mean that all airports can evaluate the operational importance of a pavement section based on these sub-criteria only. It is important to highlight that evaluating operational importance based on these two sub-criteria may be over simplistic for some airports and may not reflect the real operational importance for certain specific pavement sections.

The reason why it was not possible to identify common sub-criteria for the operational importance besides usage and functionality of the pavement is because every airport has different network layouts, and particular characteristics that affect operational importance of pavement sections in many different ways. Only usage and functionality have been included in the tool however the tool should be customized to each airport depending on specific characteristics. The sub-criterion existence of alternative routes is a very important consideration that needs to be included but the way its determined will differ from airport to airport. Additionally, other sub-criteria may be applied to evaluate operational importance of pavement sections that have not been mentioned in this report. To customize the tool for operational importance, the sub-criteria that will be included need to be identified, the ratings need to be specified for each sub-criterion, and the required data needs to be identified and collected. When this is done, pairwise comparisons of ratings and sub-criteria will be required to assign priorities and weights respectively.

6.2 Potential benefits of the tool to the case studies

As presented in section 3.1, pavement management in Amsterdam Schiphol first identifies projects based on the mentioned criteria, and these projects are prioritized to select the ones to be included in the maintenance plan. This prioritization process is done by assessing the urgency of the projects and their importance to airport operations. As a consequence of this process (first identifying solutions for each pavement section and later prioritizing the projects to define which ones will be included in the maintenance plan) proposing some projects end up being useless efforts, since they will not be carried out. In fact, the percentage of these projects being disregarded after the prioritization at Schiphol is approximately 40% according the asset manager in charge.

The prioritization process based on urgency and operational importance is very complex without the tool, because there are many projects, intended to solve different problems related to different criteria. Additionally, all the projects are required from the pavement condition point of view but not from the operational importance point of view. The amount of time and effort spent on proposing the projects and prioritizing them until their final selection for the maintenance plan can be overwhelming.

By applying the tool, the output is the result of the prioritization process at the network level. As this prioritization already includes the operational importance criterion, the sections that will have a high priority are those that are required from the condition and from the operational importance points of view. As a consequence of this process the number of projects which end up being rejected will be minimized. This means that time that was wasted on proposing projects which will not be carried out, is also minimized. Time will further be reduced by applying the tool because instead of analyzing all the projects one by one to define which are more urgent and more important to airport operations, the tool will automatically do it.

In Brussels Airport, as it was described in section 3.2 the main criteria are PCI, ACN-PCN, and friction. Based on each criterion individually, pavement sections that need maintenance are identified, and then prioritized depending on the number of movements on each section. The tool will reduce time spent on identifying the pavement sections that need to be repaired or maintained and time spent on prioritizing the pavement sections because this is automatically done by the tool. One more expected benefit for Brussels airport is that the operational importance evaluation will be more accurate. The reason behind this statement is that nowadays at Brussels Airport, only usage criterion is considered and this is over simplistic.

As mentioned in section 3.3, great part of the maintenance done at Heathrow Airport is corrective maintenance. The main criterion considered in this airport is the PCI, and based on this index pavements are kept above the minimum levels by doing corrective actions. The tool proposed in this research will contribute to move from corrective maintenance to predictive maintenance. By including both sub-criteria included under the PCI criterion, it will be possible to identify pavement sections that are below the trigger level and getting closer to the minimum level, but also to identify those sections that are degrading at faster rates than they are expected to. Estimating the remaining structural life of pavement sections with the detailed option is one of the main contributions of this research towards predictive maintenance.

As PCI is only an indication of the superficial condition of the pavement, identifying sections requiring structural treatments may not be feasible with PCI. To overcome this problem, LHR uses the amount of money spent on maintenance and the number of times that pavement sections have been maintained to identify which pavement sections need to be constantly monitored. However, identifying which pavement sections need to be constantly monitored says nothing about the structural life of a pavement section. The ACN-PCN criteria will allow identifying those pavement sections that are expected to have structural problems in the future. According to the interviewee, doing a PCN study would probably result in more pavement sections requiring maintenance than the ones that can actually be repaired. However, the advantage of including the ACN-PCN criteria in the tool is that it will identify which pavement sections will have structural problems, but also prioritize according to the urgency of these problems. This would be of great help at LHR as it would allow choosing the most critical sections before they fail.

Another expected benefit for Heathrow Airport is related to the operational importance of pavement sections. When all the sections are very important to airport operations as it is the case here, the tool thanks to the criterion operational importance will allow prioritizing between sections even when there are small differences.

6.3 Discussion of the applicability of the tool

The results presented in section 5.2. were intended to illustrate the applicability of the tool. The data used for this purpose was partially provided by Brussels and partially fictitious data. Additionally the pairwise comparisons were done by the author of this report resulting in weights and priorities that may not be the same as if these pairwise comparisons had been done by the pavement manager in charge at Brussels Airport. For these reasons these results will not be analysed. The purpose of this section is to discuss the applicability and usefulness of the tool.

The main advantage of the tool is related to one of the goals of this research, which was to include the main criteria taken in account by pavement managers, besides the PCI. This goal was achieved, since three main criteria are included in the tool, and PCI is just one sub-criterion of one criterion identified in this research. The fact that there is no APMS that prioritizes pavement sections based on the most important criteria considered by airport pavement managers, is solved with this tool and is an advantage over APMS. Without the tool, airport pavement managers have to identify the pavement sections that need maintenance for each criterion separately. Once the sections have been identified, these need to be prioritized based on urgency and operational importance without a proper prioritization methodology. With the tool this process is done all at once, giving an overall view of the complete network and for all criteria.

However including all of the criteria and-sub-criteria in the analysis has a drawback related to the required data. Some sub-criteria require as main input the output from different systems. The PCI data will be the output from software like PAVER or ROSY. Although both systems provide the same information, the format and files used are different. The roughness criterion as it is in the tool, requires as input the BBI and the bump length which are the output of software like PROFAA, based on the profile of the runways. The ACN-PCN criterion requires as input data from different databases depending on how this data is stored at each airport.

The tool was developed to try to minimize the need for manipulating data before entering it. For instance, the user does not need to input the ACN of each aircraft, since a database relating the type of aircraft with the ACN was created. However, data manipulation can further be reduced, if for example the tool could calculate the PCI, the BBI and bump length. One more example that could reduce data manipulation would be by formulating the tool in order to allow ground radar data to be processed into required data by the ACN-PCN criterion. These are few examples of how the applicability of the tool would certainly be improved, however implementing these improvements were out of scope for this research.

The tool has been developed in Microsoft Excel. One of the considerations taken for taking this decision was to allow users to modify the tool when required. This is an added value, as pavement managers will most probably have the skills to modify the tool and include the sub-criteria needed for the operational importance criterion in Microsoft Excel. On the other hand, Microsoft Excel has limitations when considering data visualization. The colour scale has been assigned together with the bars under the main criteria as it is shown in Table 36, however more sophisticated data visualization techniques are not easy to implement or even feasible in Microsoft Excel. A clear example of this would be a GIS representation of the calculated priorities.

One important aspect that was taken into account in order to improve applicability of the tool is time consumption. Clearly, the required time to execute the tool reduces the potential applicability of the tool, for this reason the tool was developed to reduce required time as much as possible. The methodology chosen for the prioritization process was AHP and this methodology can be very time consuming. In total fourteen pairwise comparisons are needed to determine weights and priorities in the developed tool. To reduce the required time for pairwise comparisons, all the pairwise comparisons at the bottom level except for sub-criterion pavement functionality have been predetermined. Only six pairwise comparisons need to be done by the user when both friction and roughness are included in the analysis.

Another important aspect that could hinder the potential applicability of the tool is the subjectivity for defining priorities. The only pairwise comparison at the bottom level that will have some subjectivity is the comparison between runways, taxiways and aprons for the sub-criterion functionality of the pavement. For this particular case it is not possible to assign a predetermined pairwise comparison as priorities will greatly differ from airport to airport. For all the other pairwise comparisons at the bottom level, subjectivity has been minimized by assigning predetermined pairwise comparisons. Nevertheless, for defining the weights of criteria and sub-criteria, subjectivity will still be present when pairwise comparisons are done.

An important consideration that needs to be discussed is the repeatability of the results. If the prioritization process is carried out by one person, and the prioritization process is repeated again by another or the same person for the same pavement sections at the same point in time the results should be the same. Different factors can affect the given output that need to be taken into account if consistency is expected. These factors can be grouped into the criteria included in the prioritization process, the pairwise comparisons and the data input.

The first reason why repeatability of results can be affected, are the criteria and sub-criteria considered in the prioritization process. The tool was developed to allow the user to choose if roughness and friction will be included, clearly results won't be the same if the output is calculated evaluating different criteria. If additional sub-criteria will be included under the criterion operational importance, it is important to be consistent when the tool is used again and include the same sub-criteria.

The next factor that can affect repeatability of results is the pairwise comparisons. This is a very important aspect, especially when the tool is used by different people. Pairwise comparisons will certainly differ when they are done by different people, unless these have been done in common agreement. The outputs of pairwise comparisons of criteria and ratings are weights and ratings respectively. If these pairwise comparisons differ then the weights and the priorities will be different, and as a consequence the main output of the tool will differ. The solution to this problem turns out to be an opportunity for the pavement management department at the airport. As already said, the only solution in this case is to have common agreement on the pairwise comparisons. This may sound simpler than it actually is, especially for the pairwise comparison at the top level involving the functional condition, structural condition, and operational importance. The comparison done by the pavement management department will probably be different than comparison done by airport operations department. Reaching agreement on the importance of each criterion will not only contribute to the repeatability of results but will also contribute to a more accurate prioritization process, and will improve communication between the two departments.

The third aspect that can affect repeatability of results is the data input in the tool. Although this might come across as obvious, different reasons can result in different data input. The tool has been designed to evaluate pavement sections, understanding a section as defined in section 2.2.1. Data input for the criterion PCI should not be a problem, since the PCI is calculated for each pavement section. However, friction measures are not necessarily organized according to these sections. As mentioned in section 2.3, a common way to measure friction is by dividing the runway in three parts. If this is the case, there could be more than one pavement section in each part of the runway. The simplest solution would be to enter the same friction value for the sections within one part of the runway. The other solution is to divide friction measurements per section. The latter is recommended as friction levels may differ per section, and this could result in a more detailed prioritization. The BBI and bump lengths input to the tool should also be done making sure that the data entered belongs to the right pavement section.

The required traffic data for the ACN-PCN criterion should also be per pavement section. However, some airports will not have this data for each pavement section, but per branch. The simplest solution is to enter the same traffic data for all the sections within the branch; however the added value of the tool will be achieved by making the differentiation for each section. One more case worth mentioning is some aircrafts may not be included in the ACN database provided in the tool. If this happens while the user is entering the ACNs of the aircrafts, the database should be updated by including that particular aircraft. Nevertheless, for the example given in section 5.2 using real data from Brussels Airport, all the aircrafts were already in the database.

7 Conclusions

Based on the information in the previous chapters and after answering the sub-questions and discussing the tool, the objective of this chapter is to answer the main research question and present the main conclusions of the research. The limitations of the research will also be presented, and finally, recommendations will be given.

7.1 Main conclusions and answer to research question

The main research question proposed in this research was:

How can airport pavement management decision making be improved by means of data to identify the pavement sections that need to be maintained or rehabilitated?

This question could be interpreted in two different ways, related to the use of the word *how* in the beginning of the question. *How* can be understood as *in what way*, but it can also be understood as *in which aspect*. An answer to both possibilities will be presented here.

One way to improve airport pavement management decision making is the development of tools providing pavement managers a holistic view of the pavement network following a top-down approach. A holistic view should be understood as a view of the complete pavement network where all considered criteria by pavement managers are taken into account. Following the top-down approach means considering the whole pavement network first and then identifying the solutions that will bring the most benefit for the complete network.

This research has identified the most important criteria required by airport pavement managers to select the pavement sections that will be maintained or rehabilitated. These criteria have been integrated into the developed tool, and before this research, no system or tool had included all these criteria. The result of this research could then be said is an important contribution towards the development of tools providing a holistic view of the pavement network.

Pavement management decision making involves tremendous amounts of data and information, however pavement managers as human beings need to base their decisions on a portion of all the available information which is relevant. The proposed tool was developed by identifying first what the relevant information was, and second by identifying the required data to convey such information. Thus, two main statements can be done referring to in which way pavement management can be improved by means of data. First, data can contribute improving pavement management decision making if the relevant information or goal of the information is known. Second, data can improve pavement management if the data required to produce relevant information is known. By doing the analogy with the tool, the relevant information is not the PCI of a specific pavement section, or the PCN, Mu value, or the type of pavement. Relevant information is the functional condition, the expected remaining structural life, and the operational importance of a pavement section when compared to the rest. And even more relevant information is the priority of each pavement section for maintenance and rehabilitation. In this research, relevant information and the required data have been identified. This will help airports to determine if the required data is available or not, and to collect it in case it's not available.

An important contribution of this research is the *detailed ACN-PCN methodology* to estimate the remaining structural life of pavement sections. This methodology has proven that more data can improve pavement management decision making, however this was only possible by identifying first what the relevant information was (remaining structural life), and then the required data to provide that information. The amount of data required by this option is much greater than the amount of data required by the simple option, but at the same time the information provided by the first one is far more relevant.

The prioritization methodology that was chosen for this research, namely the absolute analytical hierarchy process has been successfully implemented in this research. Related to the main research question, this research has proven that a way to improve airport pavement management decision making is by adopting structured prioritization methodologies like the AHP. This methodology contributes reducing subjectivity related to weighing the criteria that will be considered in the decision making process and related to assigning ratings to the pavement sections. Employing service levels to define the ratings contributed to reducing the required time for the prioritization and reduced the inherent subjectivity of the pairwise comparisons.

Having covered the answer to the question related to *in which way*, now an answer will be provided in relation to *in which aspects*. The main aspect to be improved is time. From the case studies it was revealed that first the pavement condition is taken into account and then either projects or sections are prioritized considering urgency and operational importance. The proposed tool will automatically prioritize pavement sections considering functional condition, structural condition and operational importance at the same time. This will reduce the time spent for the prioritization process. For one case study, a major concern was that many projects after the prioritization phase are disregarded meaning that time spent on identifying these projects before the prioritization phase is wasted. This research has contributed solving this problem as pavement sections contrary to projects are prioritized. The time required to identify the projects to be carried out will only be required after prioritizing the pavement sections to be repaired. As a consequence, the total required time in pavement management decision making will be reduced by decreasing the required time for prioritizing, and by minimizing the time spent on projects being disregarded.

Complexity is another aspect that can be reduced to improve airport pavement management decision making. Without a structured tool as the one proposed in this research, the complexity related to the prioritization process is very high because there are many pavement sections to consider and to evaluate based on different criteria and sub-criteria. The analytical hierarchy process implemented in the tool has contributed to reducing the complexity of the prioritization process by allowing prioritizing all the pavement sections considering all the criteria and sub-criteria at the same time.

Another aspect that can contribute to improving pavement management decision making is by doing predictive maintenance. Data plays a vital role for this objective, as it can provide relevant information to pavement managers about the condition of the pavements and its expected life allowing planning actions before pavements fail. A perfect example and one of the main contributions of this research towards predictive maintenance is the detailed ACN-PCN methodology. This methodology allows estimating the remaining structural life of a pavement section, without the need to perform tests *in-situ* but based on data that is or can be available at airports.

7.2 Limitations

This section will present the main limitations that have been identified in this research. These limitations need to be considered when reading the main conclusions already presented, and will allow providing the main recommendations to be presented at the end of this chapter.

7.2.1 Limitations of the research

Two limitations have been identified in relation to the scope boundaries of the research. The horizontal boundaries of this research are restricted to the identified and included criteria in the tool. It has been mentioned that these criteria were limited to the pavements, but when considering pavement management the horizontal boundaries are beyond the pavement itself as other asset systems need to be considered as well. The most important systems that need to be considered are electrical and drainage, criteria for these have not been included in the scope of this research. The second limitation is regarding the vertical boundary. The research was limited to the network level of pavement management, meaning that the project level was not considered in this research.

An important limitation that needs to be considered is related to the results of the tool. The data that was input was mostly real data provided by Brussels Airport, however not all the required data was available and it had to be completed with fictitious data. This precludes the possibility to validate the results, as they cannot be fully compared to a real life case scenario.

7.2.2 Limitations of the methodology

The chosen methodology for the prioritization process was the absolute analytical hierarchy process (AHP). The main reasons for choosing this methodology were its vast popularity and success stories among practitioners, its clear weight determination for criteria and sub criteria, its potential applicability on pavement management, its novelty on airport pavement management, and that it allowed the comparison of many alternatives at the same time. This does not mean that it is the only prioritization methodology that can be applied to airport pavement management, and other methodologies could be tested.

7.2.3 Limitations of the tool

The tool has been discussed in detailed in section 6.5, from this discussion the main limitations of the tool can be identified. Most important is the need for data syntax before inputting to the tool. The chosen software for developing the tool was Microsoft Excel, which has limited the potential of data visualization techniques. Another limitation is the need to formulate the tool in case new sub-criteria need to be included under the criterion operational importance as it is recommended to be done.

7.3 Recommendations

Based on the conclusions and limitations, recommendations for further research and recommendations to the industry will be presented in this section.

7.3.1 Recommendations for further research

It is known that pavement management does not limit to the pavement structure itself, other asset-systems need to be considered as well, like electrical and drainage systems. The recommendation is to do further research to identify exactly which systems need to be taken into account for pavement management, how are these systems related to the pavement, and what criteria need to be considered. Another recommendation is to do a similar research but at the project level, and identify the potential benefits for pavement management at the project level after prioritizing pavement sections. This would certainly complement this research and allow towards the development of a holistic tool integrating the network and the project level.

In this research it was not possible to determine unified criteria that need to be considered to prioritize based on the operational importance of pavement sections. A research aiming to propose a model able to determine the operational importance of pavement sections would improve the applicability of the tool. Specifically for the sub-criterion existence of alternative routes a research focused on the existence of alternative routes will certainly contribute to propose a model able to determine the operational importance of pavement sections.

Knowing the required data to prioritize pavement sections in need of maintenance or rehabilitation, it would be interesting to research which data sources would adapt easier to these data requirements. This would be of great value for airports that do not have the complete data for evaluating the structural condition under the detailed option proposed in this research.

As mentioned already, the AHP was found to be successful for airport pavement management. However, other methodologies could be tested. It would be interesting to do research focused exclusively on identifying suitable prioritization methodologies for airport pavement management and compare them with the AHP.

It has been mentioned that the achieved results in this research could benefit from different data visualization techniques. It would be of great value to identify what are the most suitable techniques to present the results of the tool proposed in this research. Special attention should be given to the applicability of GIS. Also related to data visualization techniques, it would be very useful to find a way in which the pavement structure and other pavement related asset systems could be presented integrally.

7.3.2 Recommendations to industry

The recommendations that can be given to the industry will be provided for software developers and for potential users of the tool.

For software developers, there is plenty of room for improvement of APMSs. Most of the existing software only includes PCI; however this research showed how pavement management could benefit from including the most important criteria for pavement management. This tool could be the basis for the development or improvement of existing software in airport pavement management. A software or a system that would allow users prioritize pavement sections using the AHP as done in this research, but without the need for data syntax would be an important development for the industry.

For possible users of the tool, it is recommended to do pilot tests before relying on the output given by the tool. Additionally it is recommended to do the prioritization process by considering all the criteria that can be included in the tool if the data required is available.

Additionally, to minimize the number of projects being disregarded as it has been identified, the pairwise comparisons to assign weights to criteria should be done in coordination between pavement management department and airport operations. This will also contribute to a better communication between departments.

Specifically for the operational importance criterion, it is recommended to complement the sub-criteria to be included according to the particular needs of each airport. This is recommended to be done in coordination between the pavement management department and the airport operations department. Furthermore, it is recommended to include the sub-criterion existence of alternative routes. However before including it is necessary to determine how it will be determined. Sub-criteria like installed lighting system or aircraft code for which the pavement has been designed, are related to the sub-criterion existence of alternative routes and these relations need to be identified.

For prioritizing based on the structural condition criterion, the recommendation is to use the detailed option as it gives more relevant information than the simple option. If the data required for the detailed option is not available, it is recommended to start its collection for future implementation.

The tool has been developed according to ICAO recommendations; however these specifications might change in future. If this is the case, it is important to update the tool accordingly in order to comply with the new specifications.

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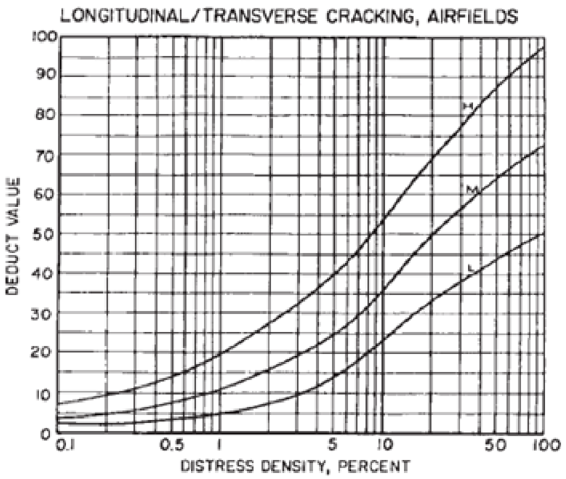
Appendix 1 – Type of distresses and deduct values

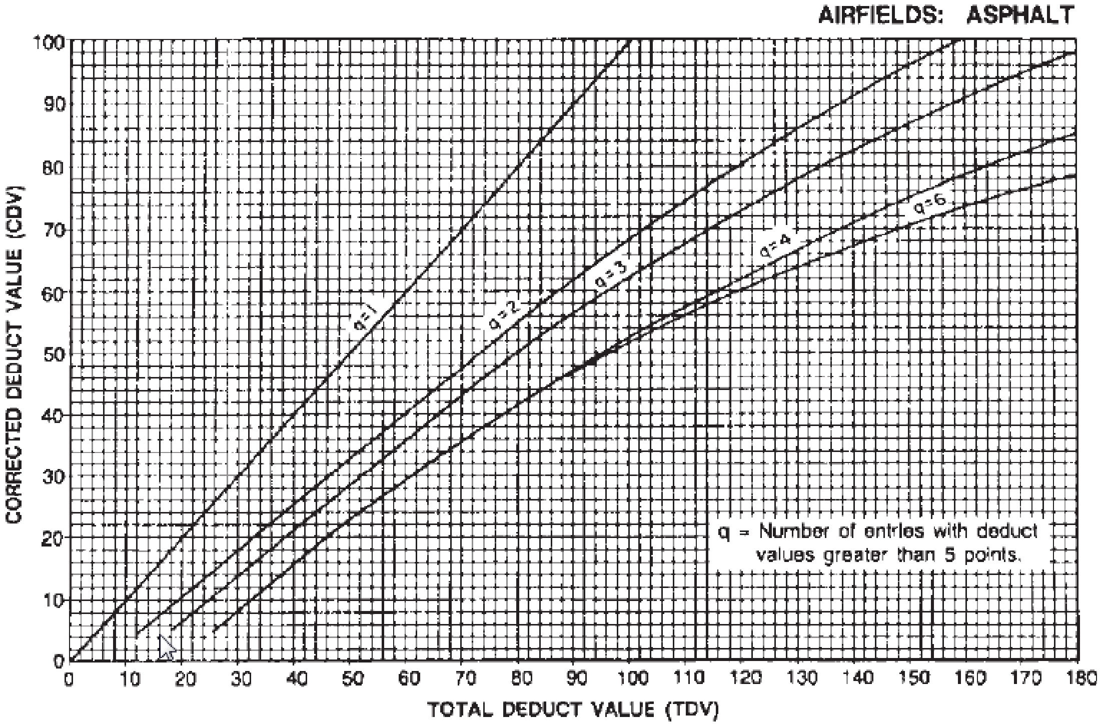
Type of distresses for flexible pavements:

Type of distress	Severity levels	Unit measure
1. Alligator cracking	Low, Medium, High	Square feet
2. Bleeding	No severity levels	Square feet
3. Block Cracking	Low, Medium, High	Square feet
4. Corrugation	Low, Medium, High	Square feet
5. Depression	Low, Medium, High	Square feet
6. Jet Blast Erosion	No severity levels	Square feet
7. Joint Reflection cracking	Low, Medium, High	Linear feet
8. Longitudinal and Transverse Cracking	Low, Medium, High	Linear feet
9. Oil Spillage	No severity levels	Square feet
10. Patching and utility cut patching	Low, Medium, High	Square feet
11. Polished Aggregate	No severity levels	Square feet
12. Raveling and Weathering	Low, Medium, High	Square feet
13. Rutting	Low, Medium, High	Square feet
14. Shoving	Low, Medium, High	Square feet
15. Slippage Cracking	No severity levels	Square feet
16. Swell	Low, Medium, High	Square feet

Deduct values for Longitudinal cracking – Flexible Pavements:



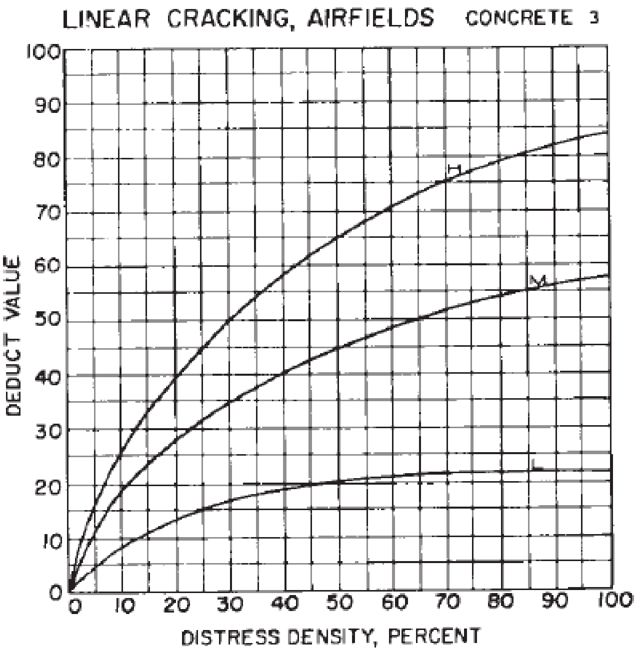
Corrected deduct values for Longitudinal cracking – Flexible Pavements:



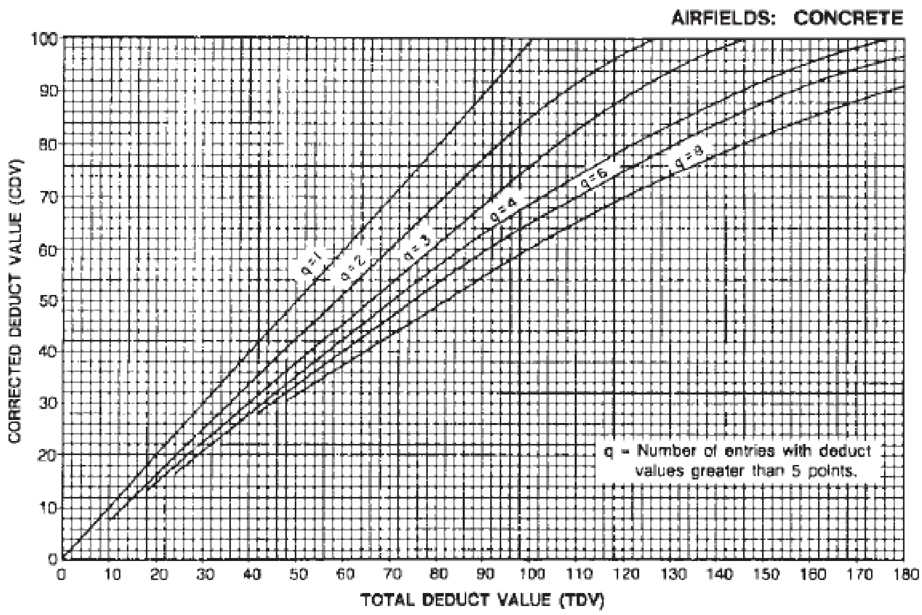
Type of distresses for rigid pavements:

Type of distress	Severity levels	Unit measure
1. Blow up	Low, Medium, High	Number of slabs
2. Corner Break	Low, Medium, High	Number of slabs
3. Longitudinal, transverse, and diagonal Cracks	Low, Medium, High	Number of slabs
4. Durability ("D") cracking	Low, Medium, High	Number of slabs
5. Joint Seal Damage	Low, Medium, High	Number of slabs
6. Patching, Small	Low, Medium, High	Number of slabs
7. Patching, Large	Low, Medium, High	Number of slabs
8. Popouts	No severity levels	Number of slabs
9. Pumping	No severity levels	Number of slabs
10. Scaling, Map Cracking, and Crazing	Low, Medium, High	Number of slabs
11. Settlement or Faulting	Low, Medium, High	Number of slabs
12. Shattered slab/Intersecting Cracks	Low, Medium, High	Number of slabs
13. Shrinkage Cracks	No severity levels	Number of slabs
14. Spalling (transverse and longitudinal joint)	Low, Medium, High	Number of slabs
15. Spalling (Corner)	Low, Medium, High	Number of slabs

Deduct values for Longitudinal cracking - Rigid Pavements:



Corrected deduct values for Longitudinal cracking - Rigid Pavements:



Distresses that can cause FOD on flexible pavements are:

Type of distress
Alligator or Fatigue Cracking: only when severity level is high.
Block cracking: For severity levels medium and high.
Joint reflection Cracking: For medium and high severity levels
Longitudinal and Transverse Cracking: For medium and high severity levels
Patching and utility cut patch: For medium and high severity levels
Raveling and weathering: For medium and high severity levels

Distresses that can cause FOD on rigid pavements are:

Type of distress
Corner break: For medium and high severity levels
Longitudinal, transverse, and diagonal cracks: : For medium and high severity levels
Durability Cracking: For medium and high severity levels
Patching small: For medium and high severity levels
Patching large: For medium and high severity levels
Scaling, Map Cracking, and Crazing: For medium and high severity levels
Spalling: Possible at all severity levels
Spalling (corner): Possible at all severity levels

Appendix 2 – Interviews minutes

Amsterdam airport interviews

Interviewee 1 – Senior asset manager

1st interview:

Question: What APMS do you use? And how?

Answer: For the total network of pavements at the airside we use MicroPaver. It divides the network on branches and sections, based on the construction phase. For these branches and sections over our area and we do visual inspections and we maintain the service level between 70-50. For example, 70 is a trigger level for further investigation for RWYs, TWYs and aprons. And 50 is the minimum service level.

Question: If a pavement section is very close to the minimum PCI level, then what?

You don't want to go below that minimum level, so after the visual inspections at network level, then you can see the prediction in time and then you can make a decision in time when to resurface. Normally we have some standards about renovation of runway, the touchdown is once in 8 years and runway once in 15 yrs. So we can see the PCI level and then we make a decision will it come on 15 years or earlier and can make the decision in time.

Question: How do you monitor the PCI of the pavements?

Answer: We have a family curve for each type of pavement and we see if the section is going to follow the normal family curve, if it's not normal we have to investigate what's going on that section. The trigger for further information is the PCI, based on that information we go to project level to see what is necessary for that branch or section.

Question: How do you know if it's not normal?

Answer: We have different family curves. One family for Runway asphalt, we have a family curve for the runway touchdown zone, a family curve for concrete, and a family curve for asphalt taxiways. Concrete is for aprons. Family curves are based on experience but also on the MicroPaver database. The more inspections, the more accurate the family curve can be described.

Question: Can you get other information than the PCI from Paver?

Answer: PAVER only gives PCI information. We call that, the network level. When we choose sections for maintenance then we go to project level. We want to know more about that section. Depending on the distress type we do deflection measurements, drillings and some other inspections necessary for that type of section. This is to see what measures are necessary to get the PCI back to 100. Measures can be a simple overlay or a complete reconstruction of the pavement. The PCI is only visual inspection and we want to know more about the type of damage in the section.

Question: Do you also take into account friction levels for decisions?

Answer: ICAO and EASA estipulate that you have to measure the texture depth frequently, and has to be higher than one millimeter. The texture depth is based on ICAO, we have to measure friction few times a year. This is only for runways, for taxiways there is no regulation.

The friction measurements are done with friction tests equipment. We do this about 4 times a year for each runway and this are the friction measurements used for maintenance. You also have friction measurements for operational use, when there is snow or standing water on the runway, then the operational measurements are done by the operational department. That's to inform the pilots about the conditions and circumstances of the runway.

In terms of maintenance, friction is used to remove rubber in the touchdown area, 2 times or 3 times a year, based on the friction measurements. For friction there is a friction level table in ICAO, we use that table.

Question: Do you also take into account roughness for decisions?

Answer: The roughness indicator of the total construction is the ride quality index. You measure the profile of the runway and you can simulate starting and landing of several types of aircrafts, so you can see the reaction of the plane on the roughness of the runway. However we only calculate the roughness if there are complaints coming from the pilots.

Question: Do you take into account the operational importance of the pavement sections.

Answer: We have 5 main runways and they all have the same importance. There's no difference between the runway importance. For taxiways, the importance of each taxiway has several considerations to take into account. For example weather conditions; there are special routes for special weather conditions and the taxiways in these routes are very important.

For taxiways when there is fog or other weather situations when they can't see the taxiway from the tower, they have to route the aircraft via taxiways with special lighting systems. These routes are known by airport operations and these routes are very difficult to take out of service for maintenance.

Question: How often is the PCI calculated?

Answer: Mostly every two years, depending on how the distress is for that section evolving in time. If you see some strange types of distresses or unexpected PCIs then you can make a decision to measure it the next year again. Mostly we have an interval of maintenance of asphalt once every 15 years, and for concrete pavements once every30 years. So we can see how the PCI of the section is in time and if needed then we choose to do inspections more often.

Question: The PCI is calculated according to literature based on random samples. How is it calculated in Schiphol?

Answer: At this moment we have more techniques to do the inspection for all pavement sections. This is done by some vehicles with cameras and sensors; they are able to evaluate the whole pavement based on new techniques.

Question: Do you have the PCN values for all the sections in the network?

We calculate de PCN once in 10 years. The last time was done 2016 for all the network.

2nd interview:

Question: Let's suppose we have identified the sections and the measures needed for those sections. How do you define which projects are more important?

Answer: Based on the urgency and use of that section. For example when you have a taxiway vs a runway, the taxiway is less important than the runway. So you assign importance, based on the urgency and priority of the function of the area. If you have a main runway and a secondary runway, the main runway is important and the secondary runway less important. Runways are the highest priority. Taxiways less, especially when you have an alternative route. Aprons, depending on the type of aircraft, the amount of stands available, and the capacity of the airport.

Question: What else you take into account for prioritizing these sections besides the function or importance of the pavement?

Answer: The potential risk of the measures, we not only compare to pavements but also attached systems to the pavements. You have to consider the condition of the sewage systems or the electrical systems. You have to make a decision based on the total function of the area. Some parts have problems with the sewage system beneath airside constructions and those have higher priority because of the risk profile of that damage.

Question: IS there an index like deterioration rate or expected PCI vs real PCI?

Answer: You can use the family curve to see if the section is following the expected deterioration or is going quicker or slower, you can also get a prediction in time over the deterioration of the PCI. You can do it for prediction use but also can see if it's higher or lower than the normal range. It's a prediction of the software, so for every section based on date of construction, inspection information, the program knows degradation in time, so for every section you can make a unique curve of the degradation of that section. Based on the family curve you use, you can predict the degradation in time.

Question: If there are complaints on the roughness of the runway, then what do you do?

Answer: Then we make measurements of the whole runway. Then you can import the profile into the software and you can see what the effects are on several aircraft types of the profile of the runway and then you can see the G-force on the seat of the pilot and the Gforce on the centre of the aircraft and that gives an indication where the problems on the runway are. This is not exactly but gives you additional information how to deal with the problem, it gives you a picture on what is happening on the runway.

Question: What do you do if you find there is a problem in roughness?

Answer: Then you have to do a renewal of the surface of that section. We had some problems with the runway crossings at Schiphol airport, then you make a new profile for that crossing and then you have to get it out of order and resurface that area.

Interviewee 2 – Senior asset manager

Question: How often do you calculate the PCI?

Answer: Once a year. That it is automated for runways and taxiways. In aprons we have aircraft, so it's different and we do it manually. Also because it's a different structure of concrete, so it's difficult with the laser. So, its automated for cracks, but it also needs a manual check. It might see a light as a crack, and we have to remove this from the results, because a straight crack is probably not a crack.

The software has automated crack detection, with results in a percent unit, a variable, with 650 sections that create airside. And the PCI index is then managed in the system called Paver.

Question: How do you use the aircraft movements forecast?

Answer: We have a 10 years forecast. This is used for the PCN value, we need the fleet mix to calculate the cumulative ACN values for aircraft type. The forecast of fleet mix is for the whole airport and then we make a division depending on how the runways are used. Airport operations are in charge of giving the expected growth which is usually between 3.5-4%. It is a forecast in consultation with airlines. We recalculate every 2 years to see what is the real forecast, as it can go faster or slower.

Question: Do you use aircraft movements for taxiways?

We don't have aircraft movements for taxiways. We have a special monitor program for viaducts and therefore we can measure the type and weight for the aircrafts in combination with flight numbers. Somewhere in the database we should be able to get this information but at the moment we don't do it. It would also be useful to see where to invest depending on the use of the taxiway or section of taxiway.

Brussels Airport

Interviewee 3– Airside works manager

First interview:

Question: What APMS do you use? And how?

Answer: In the past we were using MicroPaver to keep manage our aircraft pavement. Currently we are switching to RosyAPMS from Sweco. Based on the forecasts out of MicroPaver and RosyAPMS regarding the Pavement Condition Index, we define our investment program for the refurbishment. In RosyAPMS there will be a calculation module available as well.

Question: If a pavement section is very close to the minimum PCI level, what happens then?

Answer: - We use thresholds for the runways and taxiways (PCI > 70) and the aprons (PCI > 50. The major maintenance is based on PCI values, son when PCI is bellow 70 for runways. The way do it is we base ourseleves on this prediction model when the thresholds will be reached and then we use that for the 6 years plan. But we also have to update after august with the new visual inspections are available but we did a prediction until 2030 internally, based on the prediction model. This is based on the microPAVER model, now we use ROSY but it should be the same because it's the same data. Then the year before, we were checking what the model is saying about the areas to be repaired, then we have to go outside and get a better view on those areas to make sure is correct or not, maybe do some HWD measurements to make sure if its necessary or not. We go outside we do, first a visual inspection ourselves, if we see a lot of cracks we drill some cores into the section to see if the cracks are only on the section or deeper. We do some extra cores to look how the material is behaving and if we have doubts about the structural strength we also use HWD test.

So the main trigger is the PCI of the pavement section. But we also consider the age of the pavement since the last construction or major maintenance was done. If we have for example an area where the PCI is low and we know age is only 4 years, then we have to go out and have look.

Question: What data you input to microPAVER and ROSY?

Answer: the data is the visual inspections based on the ASTM standard. Is a visual inspection with all the types of distresses, etc.

Now the ispection is done to all the pavements, and the aPMS gives PCI values for each section, and based on this data we do visual inspection every 3 years.

The main trigger is the PCI and age, so PCI is getting to low and age is getting to old so the risk is increasing that the pavement will decrease to fast and create safety risks then we have to execute those works. Next step is we have to execute the runway here, so we have to define what works have to be executed and based on that we do the phasing, and then to translate the works needed to the phasing we take the operational impact into account. So theres no doubt about it, it has to be executed because of safety reasons, the only thing to discuss is which time of year, which regime and what phases, but is not discussable not doing the repairs. We also take into account the operational impact and the environmental impact. The operations and environment they are not blocking issues for the execution itself, they only regulate the time for doing the works and phasing of the works.

I asked in 2015 can you give me all movements of traffic for ruwnays, taxiways and aprons and they only gave me for runways. But in the tower they have better data. The traffic is a copy of 2015, so its not linked to real time data.

So for example, now we dont have the A380 now but maybe next year. then you could simulate the effect on the pavements if this aircraft is included.

Question: Do you also take into account friction levels for decisions?

Answer: Yes, the friction levels are used for rubber removal. Friction levels are calculated two times per year, after rubber is removed or after the surface is renewed. The friction is only calculated for the runways, according to the methodology given by ICAO in Annex 14, attachment A, section 7.

Question: Do you also take into account roughness for decisions?

Answer: Until now we haven't had any problems with roughness, so we don't take roughness into account. However we calculate the roughness with the Boeing Bump index every time after a surface has been renewed.

Second interview:

Question: How often is the PCI calculated?

Answer: The PCI is calculated every 3 years for the whole pavement network.

Question: Do you have the PCN values for all the sections in the network?

Answer: The PCN is calculated every time after the renewal of a pavement or every ten years. For the runways and taxiways the PCN of all the sections is available. For the aprons around 90% of all the sections is known.

Question: Do you use traffic forecasts for PCN predictions?

Answer: We don't predict the PCN at the moment.

Question: Let's suppose we have identified the sections and the measures needed for those sections. How do you define which projects are more important?

Answer: This is done based on the condition of the pavement section considering PCI, overloads on PCN, and friction, but also on the amount of traffic that the pavement has, because the more trafficked the area, the faster deterioration will occur: these areas get priority.

Question: Is there an index like deterioration rate or expected PCI vs real PCI?

Answer: We have a forecast of the PCI for all pavement sections for the next 15 years. With this forecast we can compare the real PCI with the expected PCI and then we know if the pavement is behaving as supposed to or is deteriorating faster.

Question: What criteria do you use to select the best alternative for each pavement sections?

Answer: To select the best alternatives we consider the execution time, durability and cost of the alternative. The higher the operational importance of the section the higher the value will be given to execution time and durability. The lower the operational importance, the more the cost will be taken into account. So when the operational importance of a pavement section is very high, costs are not very important, but execution time and durability are.

Heathrow Airport

For this case study an interview was done to the interviewee. As a follow up of this interview a questionnaire was sent and answered also by him.

Interviewee 4

Question: How are M&R pojects chosen for the maintenance plan?

Answer: In Heathrow we have 5 year maintenance plans. The decision of what projects will be included in the plan is determined by the PCI. Everything that is below the acceptable PCI level needs to be repaired. Other criterion considered for including projects in the plan is if there is a change of norm, for example if a taxiway changes from code E to code F as it is happening now, the project is included in the plan.

The main criterion used for airside maintenance is the PCI, when a runway is below 85% is not acceptable and then a major repair is needed. On the taxiways the PCI acceptable level changes depending on the level of traffic. For the aprons is 60%. We also consider how the pavement behaves in terms of PCI. We have an initial plan based on the expected life according to PCI, and based on how it evolves this plan is modified if necessary.

We divide the runways in three zones, the touchdown zones, the shoulders and the centre part of the runway. The PCI required for the shoulders is lower because aircrafts do not circulate there. The PCI for the exit roads is different than for the runways and all have different PCIs depending on the amount of traffic for each exit or taxiway.

Question: What about the structural condition of the pavements?

Answer: Other failures occur and cannot be planned based on PCI. These type of failures are determined based on how many times the pavement has been repaired. For example we have a section, the connection of taxiway H with taxiway Alpha, the zone on the exit of the runway. This section fails frequently, however the PCIs are acceptable. The problem is that PCI is only superficial, but we know we have deep problems in the pavement structure. We know the asphalt there is placed over a concrete slab, and the slab is placed over a very bad material and a phenomenon called mud pumping occurs frequently. There is mud under the slabs and every time an aircraft crosses, the mud goes up through the joints and moves the slab, this starts to crack and eventually will break. The PCI will not show the problem until the crack is visible, however many times this is too late because the slab is already broken and then we have to change it. We've done many maintenance treatments on this section and we know is a vulnerable zone. So the criterion we take into account is the amount of money that has been invested on maintenance and rehabilitation, and when the amount is much higher than normal then there is something wrong with that zone. These zones are monitored much more frequently, and any sign of a problem must be identified as soon as possible. For example if after a rain a crack appears, or suddenly we see a lot of mud on the corner is because it came from below. We do daily inspections to this zone and still we do a lot of reactive maintenance here.

Question: How often do you calculate the PCI?

Answer: The PCI calculation is outsourced to a company called Jacobs, they use their own software. They determine the PCI for each pavement section using vehicles.

We divide the airport in 3 zones. Each year we do one zone, this means that the PCI for all the zones at the airport are calculated every 3 years. The runways are completely renewed every 10 years, and additional local repairs are done every time is needed. The runways are very deteriorated, especially the southern runway. The ground condition is not ideal, causing many reflective cracking.

The airport is very congested, currently the airport is operating at 98-99% capacity, so all the pavements are very busy. We have 2 runways that are operating from 4 a.m. until midnight, one flight after another. We cannot close a pavement for M&R; we have to do all the works within the window time available at night, so 4-5 hours maximum.

Question: Is friction considered for pavement management decision making?

Answer: We can not do repairs specifically for friction because we cannot close a runway every time we want. We cannot do surface replacements as we should because we cannot close the runways, that would mean closing half of the airport. We do measure friction but the only we can do is rubber removal, we do it twice a year, nothing else. For us the main problem is that we only have 2 runways and we work at 98% capacity. Another problem is that by doing rubber removal, we damage the grooving of the runways and this is a problem for water drainage.

Question: Is the PCN considered in the pavement management decision making?

Answer: We don't use the PCN in the decision making process. We do not plan M&R depending on the PCN but we plan based on the pavements that we know will fail. We cannot afford to repair all the pavements we would like to repair but only the ones we are certain are going to fail. If we do a study with PCN probably many more pavement sections would appear to require M&R but we cannot do it. The main problems are that the airport is very busy, and as a consequence we have to do a lot of corrective maintenance.

Question: Do you consider roughness in the decision making process?

Answer: For roughness we have our own specifications, our own norms based on the British normative. We measure roughness but values have never been under acceptable levels so we don't take it into account. We repair the runways every 10 years and we've never had problems with roughness.

Question: How do you prioritize the pavement sections in order to include them in the maintenance plan?

Answer: Besides the condition of the pavement, to select projects in the maintenance plan we consider the importance of the pavement. The most important pavements for us are the runways, and both runways are equally important. Then the taxiways, the most important taxiways are the code F because these handle the heaviest aircrafts. If a code F taxiway fails then we cannot deviate it to a code E. The other criterion is the traffic on these taxiways; we know that the taxiways connecting terminals T5 and T3 are more important because these terminals are very congested. Another aspect that we take into account is the age of the pavement. We know that very probably old pavements will fail more frequently than new pavements. The main criterion however is the traffic we have for a specific section.

Questionnaire sent to Interviewee 4

PCI questions:

1. Do you know the name of the system used by Jacobs for calculating the PCI? is it MicroPaver?

   Yes, Jacobs are using Micropaver to calculate PCI.

2. Is the PCI forecasted?

   Yes, we forecast it for a 20 Years Plan.

3. How long is it forecasted?

   As above, 20 years plan.

4. Please fill in the following table:

PCI Intervention Thresholds			
	Unsatisfactory	Degraded	Adequate
Runway (incl links) & Runway Hold	0-70	70-85	85-100
Taxiway	0-55	55-70	70-100
Stand & Runway Shoulder	0-40	40-55	55-100

Friction questions:

5. Is the friction calculated for the complete runway?

   Yes, the friction is calculated by the Airside Operations Team with their own machinery. Friction is calculated as per CAP168 Regulation.

FOD questions:

6. PAVER gives an index for FOD, Is the FOD a criterion considered for identifying pavement sections to be repaired?

   No, FOD is not used for any maintenance criteria. FOD is detected with a ground radar and removed by the Reactive Team or the Airside Team.

7. What index is used for FOD?
   No index is used for FOD in the Maintenance Team.

Prioritization questions:

Imagine 2 taxiways. It is known that both taxiways are below minimum acceptable PCIs values. Additionally the following information is known:

Taxiway	**PCI**	**CODE**	**Amount of movements**
1	50	F	50.000
2	40	E	50.000

8. If funds are not enough to repair the 2 imaginary taxiways and one has to be chosen for repair which taxiway would be chosen? Why? What else would you need to know to improve your decision?
   This decision would depend on location of the taxiway, as we have several areas where we can divert the traffic to other taxiways. For the same location we would prioritize Taxiway 1 as due to our traffic configuration we will be getting more code F aircrafts and it is more difficult to relocate them than code E ones.
9. How are priorities established for aprons, remote holdings, stands?

It depends on location. Heathrow is operating above 95% of its capacity so our criteria depends on locations more than typology. Our stands are very busy and works depend on availability and peak time criteria.

10. How are priorities established between aprons and taxiways? How are priorities defined if for example the PCI of a very important apron is below the minimum and a taxiway code E is also below the minimum? Which one would be chosen for immediate repair?

    Runways are always at top of our list. As I said before, if both PCI values are low we would then focus location wise, giving priority to that asset that is more restrictive in terms of traffic diversions and so.

Traffic movements questions

11. Is the traffic known for each pavement section? (Please consider a section as it was described in the note above this questionnaire). If not, is it known for each branch?

    Yes, traffic is known for each pavement.

12. Is the historic traffic known for each pavement section? (Please consider a section as it was described in the note above this questionnaire). If not, is it known for each branch?

    Yes, traffic is known for each pavement section.

Appendix 3 – Standard Subgrade Support conditions for rigid and flexible pavements.

Standard subgrade support conditions for rigid pavements. (FAA, 2014)

Subgrade Strength Category	Subgrade Support k-Value pci (MN/m3)	Represents pci (MN/m3)	Code Designation
High	552.6 (150)	k ≥ 442 (≥120)	A
Medium	294.7 (80)	221<k<442 (60<k<120)	B
Low	147.4 (40)	92<k≤221 (25<k≤60)	C
Ultra Low	73.7 (20)	k≤92 (≤25)	D

Standard subgrade support conditions for flexible pavements. (FAA, 2014)

Subgrade Strength Category	Subgrade Support CBR-Value	Represents	Code Designation
High	15	CBR ≥ 13	A
Medium	10	8<CBR<13	B
Low	6	4<CBR≤8	C
Ultra Low	3	CBR≤4	D

Appendix 4 – ACN database

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
Generic	SWL-50	22,68	45,5	44,6	44,9	44,9	45,3	45,3	45,3	45,3
Generic	S-30	13,608	8	9,6	11,3	11,8	9,3	9,7	10	10,2
Generic	S-45	20,412	13,7	16,1	17,5	18,3	14,9	15,4	15,8	16,1
Generic	S-50	22,68	16,9	18,3	19,5	20,5	16,9	17,4	17,8	18,2
Generic	S-60	27,216	20,3	22,6	23,7	24,8	21,1	21,6	22,1	22,4
Generic	S-75	34,019	27,4	29,8	30,2	31,3	27,7	28,2	28,7	29
Generic	D-50	22,68	8,9	11	12,9	15,2	11	12,1	13	13,8
Generic	D-75	34,019	16,9	19	21,8	24	19,4	20,8	22	23
Generic	D-100	45,359	25	26,9	30,2	32,6	28	29,7	31,1	32,3
Generic	D-150	68,039	37,4	39,3	44,5	48,5	41,3	43,8	46,1	47,9
Generic	D-200	90,718	51,1	54,7	60,4	65,2	58,6	61,5	64,2	66,4
Generic	2D-100	45,359	10,6	11,5	13,9	17,4	10,2	12	14,6	16,9
Generic	2D-150	68,039	18,4	20,6	24,4	29,9	18,6	22,1	26	29,9
Generic	2D-200	90,718	26,8	30,7	35,3	43,1	28,1	33	38,8	43,6
Generic	2D-300	136,078	41,5	47,8	55,5	67,7	42,4	51,8	60,1	67,3
Generic	2D-400	181,437	57,1	65,7	76,8	92,7	60,7	72	82,8	91,9
Airbus	A300-B2 SB	142,9	38	42,2	51,2	66	38	45,4	53,8	61,4
Airbus	A300-B2 STD	142,9	37,5	41,5	50,2	65,4	37,1	44,4	52,7	60,3
Airbus	A300-B4 STD	165,9	46,3	51,6	62,8	79,7	48,5	57,3	66,9	75,5
Airbus	A300-B4LB	165,9	43,2	48	58,4	75,8	40,7	49,2	59	68,2
Airbus	A300-600 STD	172,6	48,8	55,1	67,4	84,9	50	59,8	70,3	79,5
Airbus	A300-600 LB	172,6	46,9	52	63	81,2	46,3	55,3	65,4	74,8
Airbus	A310-200	142,9	37,1	41,1	49,5	64,8	37,3	44,4	52,5	60
Airbus	A310-300	142,9	37,7	41,8	50,5	65,8	37,5	44,8	53,1	60,7
Airbus	A318-100 st	56,4	25,8	26,8	29,6	34,8	27,3	29,5	31,6	33,4
Airbus	A318-100 opt	68,4	32,9	33,9	37,5	43,2	36,1	38,5	40,7	42,6
Airbus	A319-100 std	64,4	31,9	32,8	36,4	42,1	34,7	37,1	39,3	41,2
Airbus	A319-100 opt	68,4	34,2	35,4	38,9	44,6	38,5	40,7	42,9	44,7
Airbus	A320-100	68,4	35,3	36,6	40,3	46,1	39,8	42,1	44,3	46,2
Airbus	A320-200 Twub std	73,9	38,5	40	44,4	50,2	43,5	46	48,4	50,4

			ACN values							
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
Airbus	A320 Twin opt	78,4	41	42,9	47,3	53,1	46,7	49,3	51,7	53,7
Airbus	A320 Bogie	73,9	18,3	20	23,8	32,5	19	22,7	26,8	30,6
Airbus	A321-100 std	83,4	45,2	47,5	53,1	58,9	51,2	54,1	56,8	59
Airbus	A321-100 opt	85,4	46,7	49,2	54,7	60,5	53,1	56	58,7	60,9
Airbus	A321-200 std	89,4	49,4	52	57,6	63,2	56,5	59,4	62,1	64,3
Airbus	A321-200 opt	93,9	52,2	55,1	61	66,6	60,1	63	65,8	68
Airbus	A330-200 std	230,9	57	61,9	71,6	96,8	53,3	61,2	72,6	84,7
Airbus	A330-200 opt	233,9	57,9	62,9	72,9	98,6	54,1	62,2	73,8	86,2
Airbus	A330-200 236,9t	236,9	57,8	62,7	72,7	98,3	54	62,1	73,7	86
Airbus	A330-200 238,9t	238,9	57,8	62,7	72,7	98,3	53,9	62	73,6	86
Airbus	A330-200 FR 233,9t	233,9	57,8	62,8	72,7	98,4	54	62,1	73,7	86
Airbus	A330-200FP 227,9t	227,9	56,1	60,7	70,1	94,8	52,4	60	71,2	83,1
Airbus	A330-300 std	230,9	57,7	62,7	72,6	98,2	53,9	62	73,6	85,9
Airbus	A330-300 opt	233,9	59	63,7	74	100,1	55,2	63,5	75,3	87,7
Airbus	A330-300 235,9t	235,9	58,8	63,5	73,7	99,7	55,1	63,3	75	87,5
Airbus	A340-200 std	257,9	52,8	56,9	65,7	88,9	48,1	55,2	65,7	77,1
Airbus	A340-200 opt	260,9	53,5	57,7	66,7	90,2	48,7	55,9	66,6	78,2
Airbus	A340-300 std	275,9	57,2	62,1	71,9	97,2	53,5	61,4	72,9	85,1
Airbus	A340-300 opt	277,4	57,1	61,9	71,7	96,9	53,3	61,2	72,7	84,9
Airbus	A340-500 369,2t	369,2	63,7	68,8	70,1	108	61,7	70,7	83,3	96,3
Airbus	A340-500 373,2t	373,2	64,8	70	81,7	110	62,7	72	84,8	98
Airbus	A340-500 375,2t	375,2	64,9	70,1	81,8	110,2	62,7	72,1	84,9	98,2
Airbus	A340-500 HGW 381,2t	381,2	64,6	69,8	81,5	109,7	62,5	71,8	84,6	97,8
Airbus	A340-500 HGW 373,2t	373,2	63,2	68,2	79,3	107	61,2	70,1	82,5	95,4
Airbus	A340-600 366,2t	366,2	63,7	68,8	80,1	108	61,6	70,7	83,2	96,3
Airbus	A340-600 369,2t	369,2	64,4	69,5	81,1	109,2	62,3	71,5	84,2	97,4
Airbus	A340-600HGW 381,2t	381,2	64,6	69,9	81,5	109,8	62,5	71,8	84,6	97,8
Airbus	A340-600HGW 366,2	366,2	62,2	67,1	77,8	105,1	60,2	68,9	81,1	93,8
Airbus	A350-900 Preliminary	268,9	65,3	69,5	78,9	108,6	63,1	70,2	81,7	94,8
Airbus	A380 (WLG) 562t	562	58,5	63,8	75,5	102,5	56,4	66	78,4	90,5

			ACN values							
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
Airbus	A380 (WLG) 512t	512	52	56,4	65,7	90,1	50,2	58,2	68,9	79,8
Airbus	A380 (WLG) 571t	571	59	64,5	76,6	103,6	57	66,7	79,2	91,4
Airbus	A380 (WLG) 492t	492	49,5	53,5	62	85,2	47,7	55,1	65,2	75,6
Airbus	A380e (WLG) 575t	575	59,6	65,1	77,1	104,6	57,5	67,4	80	92,3
Airbus	A380 (BLG) 562t	562	56,1	62	75,1	105,7	54,8	68	88,5	110,2
Airbus	A380(BLG) 512t	512	49,2	54,5	65,1	92,1	48,6	59	76,4	95,7
Airbus	A380(BLG) 571t	571	56,7	62,7	75,9	106,8	55,4	68,7	89,6	111,4
Airbus	A380 (BLG) 492	492	46,7	51,6	61,3	86,7	46,2	55,6	71,7	90
Airbus	A380e (BLG) 575t	575	57,3	63,3	76,8	107,9	55,9	69,5	90,6	112,6
Boeing	B707-320C	152,4	40,9	45,8	55,5	70,8	40,6	48,7	57,7	65,8
Boeing	B720B	106,6	26,5	28,8	35,7	47	25	30,5	36,9	42,6
Boeing	B717-200 HGW	55,3	30,8	32,5	36,5	39,5	34,7	36,5	38,2	39,6
Boeing	B727-100C Alternate	77,1	41,6	43,4	49,2	54,4	45,6	48,5	51,2	53,4
Boeing	Adv. B727-200 Basic	84	45,8	48,3	55	60,1	49,3	52,7	55,8	58,3
Boeing	Adv. B727-200 Option	95,254	52	55,2	62,1	66,9	58	61,4	64,4	66,8
Boeing	B737-100	50,3	24,9	25,7	28,9	33,1	27,2	29,1	30,8	32,3
Boeing	Adv. B737-200	58,3	30	31,1	35,2	39,3	34	35,9	37,8	39,3
Boeing	Adv. B737-200 LP	53,3	22,4	26,5	29,9	35,1	24,8	27,4	29,8	31,7
Boeing	B737-300	63,5	33	34,8	38,8	42,8	38,2	40,1	42	43,5
Boeing	B737-400	68,3	37	39,3	44	47,9	42,3	44,5	46,6	48,3
Boeing	B737-500	60,78	31,9	33,3	37,4	41,4	36,5	38,5	40,3	41,8
Boeing	B737-600	65,8	33,5	35	38,6	43,7	38,4	40,5	42,5	44,2
Boeing	B737-700	70,3	36,3	38,1	42,1	47,2	41,6	43,9	46	47,7
Boeing	B737-800	79,2	42,8	45,3	50,3	55,2	49,2	51,7	54,1	56,1
Boeing	B737-900 ER	85,4	47,9	50,8	56	60,8	55,6	58,2	60,6	62,6
Boeing	B737 BBJ2	79,2	42,8	45,2	50,3	55,2	49,1	51,7	54	56
Boeing	B747-100 SF	334,8	42,8	46,5	55	74,1	43,7	51,1	60	68,5
Boeing	B747-200B Combi Mixed	379,2	48,1	53,3	54,8	85,6	46,6	55,8	66,6	76,6
Boeing	B747-300 Combi Mixed	379,2	48,1	53,3	64,8	85,6	46,6	55,8	66,6	76,6
Boeing	B747-400	397,8	53,2	59,3	72,6	94,2	52,6	63	74,6	85,3

ACN values											
Aircrafts			Flexible pavements CBR				Rigid pavements k value				
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20	
Boeing	B747-400ER	414,1	56,7	63,4	77,8	99,8	59,1	69,8	81,7	92,5	
Boeing	B747-8	449	63,5	70,9	88,5	111,7	64,9	77,2	90,6	102,6	
Boeing	B747-8F	449	63,2	70,6	88,1	111,2	64,7	76,8	90,2	102,1	
Boeing	B747-SP	318,9	37,9	41,5	49,1	66,9	37,8	44,6	52,9	60,7	
Boeing	B757-200	116,1	29,7	33	40,3	52,9	30,6	36,7	43,3	49,2	
Boeing	B757-300	122,9	32,9	36,6	45,1	58,1	34,8	41,4	48,5	54,7	
Boeing	B767-200	143,8	34,5	37,5	43,8	60,4	33,2	39	46,5	54	
Boeing	B767-200 ER	179,6	44,9	49,6	59,8	80,2	43,4	51,9	62	71,4	
Boeing	B767-300 ER	187,3	48,8	53,9	65,8	86,7	48,1	57,4	68,1	78,1	
Boeing	B767-400 ER	204,6	56,7	63	78,6	100,1	57,8	68,8	80,8	91,7	
Boeing	B777-200 Baseline	243,6	39,3	43,8	52,7	74,7	37,9	47,4	62,3	77,9	
Boeing	B777-200 ER	298	49,1	55,4	68	94,8	49,7	63,6	82,6	101,2	
Boeing	B777-200 LR	348,7	61,9	69,3	86,7	117,2	63,8	82,8	106,3	128	
Boeing	B777-300 Baseline	300,3	52,6	58,8	72,5	100,2	53,8	68,9	88,9	108,2	
Boeing	B777-300 ER	352,4	63,8	71,3	89,3	120,3	66,1	85,7	109,7	131,9	
Boeing	B787-8	228,4	60	66,1	81,2	106,3	60,6	71,6	84,3	96	
Boeing	B787-9 (preliminary)	251,7	66	72,6	87,5	117,5	64,8	75,9	89,9	103,4	
McDonnell	DC3	11,4	3,9	5,5	7,5	9,2	6	6,5	6,9	7,2	
McDonnell	DC4	33,113	12,3	14,1	16,5	20,4	13,2	14,9	16,6	17,9	
McDonnell	DC8-43	144,2	40	45,4	54,2	67,6	38,7	48,8	57,2	64,7	
McDonnell	DC8-63/73	162,4	48,3	55	65,7	81,4	50,5	59,9	69,8	78,4	
McDonnell	DC9-32	49,4	26,4	27,8	31,5	34,3	29,6	31,3	32,8	34,1	
McDonnell	DC9-51	55,3	30,6	32,4	36,5	39,3	34,9	36,7	38,4	39,7	
McDonnell	DC10-10	207,7	51,5	56,1	65,9	90,9	48	56,4	67,5	78,6	
McDonnell	DC10-30/40	264,4	52,3	57,4	68	93,7	47,3	56,2	67,9	79,6	
McDonnell	MD11ER	287,1	61,6	67,8	81,5	109,7	58,8	69,6	83	95,9	
McDonnell	MD83	73	42,4	45,9	50	53,1	49,1	51,3	53,2	54,8	
McDonnell	MD90-30 ER	76,4	55,2	52,2	48,2	44,3	57,1	55,5	53,5	51,2	
Other com	An-124	398	40,2	46,2	58,8	82,6	35,6	47,4	71,1	98,1	
Other com	An-225	600	47,1	54,8	71,3	101,8	41,1	56,6	83,7	120,1	

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
Other com	BAe146	40,6	19,4	20,6	23,5	27,1	21,2	22,9	24,4	25,7
Other com	BAC 1-11 400	39,7	22,1	23,9	26,7	28,6	24,8	26,2	27,5	28,5
Other com	BAC 1-11 475	44,7	19,2	24,1	27,5	31,1	22,6	24,8	26,8	28,3
Other com	Caravelle 10	52	14,2	15,9	18,2	21,5	15,5	17,8	20,5	23,1
Other com	Caravele 12	56	16	17,9	20,1	23,7	17	19,6	22,8	25,5
Other com	Canadair CL 44	95,7	29,1	32,9	37,2	44,5	28,4	34,1	40,6	45,4
Other com	CV 880M	87,7	24,5	28,1	33	40,6	24,6	30,4	35,9	40,3
Other com	CV 990	115,7	36,6	42	48,8	59,4	38,9	46,5	54,1	59,9
Other com	Dash 7	19,9	9,5	10,7	12,3	13,7	11,2	12	12,6	13,2
Other com	F27 Frienship Mk500	19,8	7,9	9,8	11,6	13,4	9,9	10,9	11	12,3
Other com	F28 Friendship Mk1000LPT	29,5	11,4	14,1	16,3	19,3	13,7	15,1	16,4	17,4
Other com	F28 Friendship Mk1000HTP	19,5	13	15	17,2	19,7	15	16,3	17,4	18,4
Other com	Fokker 50 HTTP	20,8	8,2	10	11,5	13,9	10	11	11,9	12,6
Other com	Fokker 100	44,7	24,7	26,4	29,8	32,2	27,7	29,3	30,8	31,9
Other com	HS125	11,3	5,4	5,9	6,8	7,6	6,5	6,9	7,2	7,5
Other com	HS748	21,1	7,7	9,5	10,9	13	9,6	10,5	11,3	11,9
Other com	IL62	162,6	44,1	49,9	59	73,1	41,5	49,6	59,7	68,6
Other com	IL76T	171	18,1	21,1	26,1	35	24,9	25,6	28,2	32,5
Other com	IL86	211,5	31,7	33,8	40,3	56,3	26	31	38,4	46,3
Other com	L-100-20	70,67	27,1	30,8	32,9	38,4	30,2	32,7	35,5	38,1
Other com	L-1011-1	196	48,2	52,1	60,5	82,7	44,5	51,7	61,7	72,2
Other com	Trident 1E	61,2	20,8	22,6	25,1	29,6	31,8	34,2	36,5	38,4
Other com	TU134A	49	11,1	12	14,6	19,2	10,8	12,7	15,8	18,4
Other com	TU154B	98	15,3	17,3	21,7	28,9	17,5	23,8	30,4	36,2
Other com	VC10-1150	151,9	40,9	45,6	55,8	70,8	35,9	44,2	54,9	64,2
General A\	Single wheel 2	0,9	0,4	0,6	1	1,4	0,9	1	1,1	0,9
General A\	Single wheel 5	2,3	1,6	2,3	3,2	3,9	2,7	2,9	3	3
General A\	Single wheel 10	4,5	3,8	5,1	6,7	7,9	5,4	5,8	6,1	6,3
General A\	Single wheel 12,5	5,7	2,3	3	4	4,7	3,3	3,5	3,7	3,7
General A\	Single wheel 15	6,8	2,7	3,7	4,8	5,6	3,9	4,2	4,4	4,5

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
General Av	Single wheel 20	9	5,3	6,4	7,5	7,9	6,3	6,5	6,7	6,8
General Av	Single wheel 25	11,3	8,3	9,3	9,9	10,3	8,8	9	9,2	9,3
General Av	Single wheel 30	13,6	11,2	12	12,2	12,6	11,4	11,6	11,7	11,8
General Av	Single wheel 35	15,9	13	14	14,2	14,6	13,3	13,5	13,6	13,7
General Av	Single wheel 40	18,1	14,9	16	16,2	16,7	15,2	15,4	15,6	15,7
General Av	Dual Wheel 15	6,8	2	2,8	3,8	4,5	3,2	3,6	3,8	4
General Av	Dual Wheel 20	9,1	3,2	4,3	5,2	6,1	4,6	5	5,4	5,6
General Av	Dual Wheel 25	11,3	4,4	5,2	6,2	7,5	5,5	6	6,5	6,8
General Av	Dual Wheel 30	13,6	5,6	6,9	8	9,2	7,1	7,7	8,2	8,6
General Av	Dual Wheel 35	15,9	7,1	8,5	9,7	11	8,8	9,4	10	10,4
General Av	Dual Wheel 40	18,1	8,4	10,3	11,4	12,7	10,3	11	11,7	12,2
General Av	Aztec-D	2,4	0,8	1,2	1,6	1,9	1,4	1,5	1,5	1,4
General Av	Baron-E-55	2,5	1,1	1,4	1,8	2,1	1,6	1,6	1,7	1,5
General Av	BeechJet-400	7	4,7	5,5	6	6,3	5,3	5,4	5,5	5,5
General Av	BeechJet-400A	7,4	5,5	6,1	6,4	6,7	5,9	6	6,1	6,1
General Av	Bonanza-F-33A	1,5	0,5	0,7	1	1,3	0,9	0,9	1	0,8
General Av	Canadair-CL-215	15	14,2	14	14,1	14,1	14,1	14,1	14,1	14,1
General Av	Centurion-210	1,9	0,7	1	1,3	1,5	1,1	1,2	1,3	1,1
General Av	Challenger-CL-604	21,8	11,6	12,4	14,1	15,5	13,5	14,2	14,9	15,4
General Av	Chancellor-414	2,8	1,4	1,9	2,2	2,4	1,9	1,9	2	1,9
General Av	Chk.Arrow-PA-28-200	1,1	0,5	0,6	0,8	0,9	0,7	0,7	0,8	0,6
General Av	Chk.Six-PA-32	15	0,6	0,8	1,1	1,3	0,9	1	1	0,8
General Av	Citation-525	4,8	3,5	3,9	4,1	4,3	3,7	3,8	3,9	3,8
General Av	Citation-550B	6,8	5,7	6,1	6,1	6,3	5,8	5,9	5,9	5,9
General Av	Citation-V	7,5	6,3	6,7	6,7	6,9	6,4	6,5	6,5	6,5
General Av	Citation-VI/VII	10,5	6,3	6,8	7,4	7,7	7,6	7,9	8,1	8,2
General Av	Citation-X	16,3	9,9	10,8	11,5	12	11,9	12,3	12,6	12,8
General Av	Conquest-441	4,5	3,4	3,6	3,9	4,1	3,5	3,6	3,6	3,5
General Av	DC-3	12,2	4,2	5,9	8,1	10	6,4	7	7,4	7,8
General Av	Falcon-50	17,6	10,3	11,1	12,1	12,8	12,6	13	13,3	13,6

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
General Av	Falcon-900	20,6	12,2	13	14,3	15,1	14	14,6	15,1	15,5
General Av	Falcon-2000	15,9	9	9,6	10,6	11,4	11	11,4	11,7	12
General Av	Fokker-F-28-1000	30,1	13,1	15,6	17,5	20,5	15,3	16,6	17,9	18,9
General Av	Fokker-F-28-2000	29,5	12,8	15,2	17	20	14,9	16,2	17,5	18,5
General Av	Fokker-F-28-4000	33,1	15,5	17,6	20,1	22,8	17,6	19,1	20,4	21,4
General Av	GrnCaravan-CE-208B	4	2,3	2,8	3,3	3,4	2,8	2,9	3	2,9
General Av	Gulftream-G-II	29,9	18,4	19,9	21,2	22,2	21,2	22	22,7	23,2
General Av	Gulftream-G-III	31,8	20,2	21,7	22,8	23,7	23,3	24,1	24,7	25,3
General Av	Gulftream-G-IV	34	22,2	23,6	24,6	25,4	25,5	26,3	26,9	27,5
General Av	Gulftream-G-V	41,2	25,8	27,9	29,4	30,6	30	31	31,9	32,6
General Av	Hawker-800	12,5	6,5	7	8	8,8	7,7	8,1	8,5	8,8
General Av	Hawker-800XP	12,8	6,7	7,2	8,2	9	7,9	8,3	8,7	9
General Av	KingAir-B-100	5,2	1,3	1,9	2,5	3,2	2,2	2,5	2,7	2,8
General Av	KingAir-C-90	4,4	2	2,6	3,3	3,7	2,8	2,9	3,1	3
General Av	Learjet-35A/65A	8,2	4,3	4,4	5	5,6	5,2	5,4	5,6	5,7
General Av	Learjet-55	9,8	5,3	5,6	6,3	6,9	6,6	6,9	7,1	7,2
General Av	Malibu-PA-46-350P	1,9	0,8	1,1	1,4	1,6	1,2	1,2	1,3	1,1
General Av	Navajo-C	3	1,5	2	2,4	2,5	2	2,1	2,2	2
General Av	RegionalJet-200	21,5	14,6	15,3	15,8	16,2	16,8	17,2	17,5	17,8
General Av	regionalJet-700	32,9	17,9	19	21,3	23,3	21,1	22,1	23	23,8
General Av	Sabreliner-40	8,6	8,3	8,1	8,1	8,1	8,3	8,3	8,2	8,2
General Av	Sabreliner-60	9,2	9,2	8,8	8,8	8,8	9,2	9,2	9,1	9
General Av	Sabreliner-65	10,9	9,9	10	10,1	10,2	9,9	10	10	10
General Av	Sabreliner-80	10,7	6	6,4	7,1	7,7	7,4	7,6	7,9	8
General Av	Sarat.PA-32R-301	1,6	0,5	0,7	1,1	1,3	0,9	1	1	0,8
General Av	Seneca-II	2,1	0,9	1,2	1,5	1,7	1,3	1,4	1,4	1,3
General Av	Shorts-330-200	10,4	6,3	7,6	8,7	9,2	7,3	7,6	7,8	7,9
General Av	Shorts-360	12,4	7,4	8,9	10,3	10,9	8,6	8,9	9,2	9,4
General Av	Skyhawk-172	1,2	0,5	0,6	0,8	1	0,7	0,8	0,8	0,6
General Av	Skylane-1-82	1,4	0,6	0,8	1	1,2	0,9	0,9	1	0,8

ACN values										
Aircrafts			Flexible pavements CBR				Rigid pavements k value			
Brand	Model	MTOW (to	High 15	Medium 10	Low 6	Ultra low 3	High 150	Medium 80	Low 40	Ultra low 20
General A	Stationair-206	1,6	0,7	0,9	1,2	1,4	1	1,1	1,1	0,9
General A	SuperKingAir-300	6,4	4,2	3,5	3,1	2,6	3,4	3,6	3,9	3,9
General A	SuperKingAir-350	6,8	2,8	3,4	3,8	4,6	3,7	3,9	4,2	4,3
General A	SuperKingAir-B200	5,7	2,3	2,7	3	3,7	3	3,2	3,4	3,5
Military	A400M TLL1	131,4	18,5	19,9	24	32,9	16,2	20,7	28,2	36,4
Military	A400M TLL2	115,4	15,8	16,8	19,9	27,3	13,9	17,2	23	29,9
Military	A400M LH	141,4	20,3	21,9	26,6	36,4	16,9	23,2	31,6	40,6
Military	A400M LN1	137,9	19,6	21,2	25,7	35,2	17,2	22,3	30,4	39,7
Military	C-5	348,8	25	27,7	34,2	47,9	24,2	31,5	34,8	39,2
Military	C-17A	265,4	42,8	47,7	56,8	74,2	43,6	48	56,5	70,1
Military	C-123	27,2	19,8	22,2	23,6	24,7	20,6	21,2	21,7	22,1
Military	C-130	70,3	26,7	30,2	32,3	37,6	29,7	32,2	34,9	37,5
Military	C-141	156,5	46,8	53,8	65,7	80,1	50,1	59,6	69,1	77,1
Military	KC-10	264,4	54,8	60,4	72,1	98,8	49,7	59,3	71,7	84
Military	P-3	64,4	37,8	41	44,4	47	43,7	45,6	47,3	48,7

Appendix 5 – Pairwise comparisons

Pairwise comparison of operational importance sub-criteria

a. Comparison matrix

Sub-criteria	Functionality of the pavement	Usage indicator
Functionality of the pavement	1	1
Usage indicator	1	1
Sum	2	2

d. Output

Sub-criteria	Weights
Functionality of the pavement	0,50
Usage indicator	0,50

Pairwise comparison of PCI sub-criteria

a. Comparison matrix

Sub-criteria	Comparison with service elvels	Comparison with expected value
Comparison with service elvels	1	2
Comparison with expected value	0,5	1
Sum	1,5	3

d. Output

Sub-criteria	Weights
Comparison with service elvels	0,67
Comparison with expected value	0,33

Pairwise comparison of ACN-PCN sub criteria (simple option)

a. Comparison matrix

Sub-criterion	% difference between ACN-PCN	% movements with overload
% difference between ACN-PCN	1	3
% movements with overload	0,33	1
Sum	1,33	4

d. Output

Sub-criteria	Weights
% difference between ACN-PCN	0,75
% movements with overload	0,25

Pairwise comparison of pavement functionality

a. Comparison matrix

Ratings	Runway	Taxiway	Apron
Runway	1,0	4,0	8,0
Taxiway	0,3	1,0	4,0
Apron	0,1	0,3	1,0
Sum	1,4	5,3	13,0

d. Output

Ratings	Priority
Runway	0,70
Taxiway	0,23
Apron	0,07

Appendix 6 – Input data for Brussels example

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Alpha 1	1	1	TAXIWAY	F	100	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	2	2	TAXIWAY	F	100	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	3	3	TAXIWAY	F	71	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 1	4	4	TAXIWAY	F	73	55	80/F/A/W/T	80	A	High 15	NA	C-130	747	1935
Alpha 3	2	5	TAXIWAY	F	58	55	106/F/A/W/T	106	A	High 15	NA	C-130	600	1518
Alpha 3	3	6	TAXIWAY	F	85	55	106/F/A/W/T	106	A	High 15	NA	C-130	600	1518
Alpha 5	2	7	TAXIWAY	F	96	55	66/F/A/W/U	66	A	High 15	NA	C-130	99	436
Alpha 5	3	8	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	C-130	99	436
Alpha 6	1	9	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 6	2	10	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 6	3	11	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	1189	2365
Alpha 7	1	12	TAXIWAY	R	100	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	2	13	TAXIWAY	R	100	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	3	14	TAXIWAY	R	43	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	4	15	TAXIWAY	R	64	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Alpha 7	5	16	TAXIWAY	R	14	55	120/R/A/W/T	120	A	NA	High 150	B747-400	265	655
Apron 01N	2	17	APRON	R	87	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	76902
Apron 01N	3	18	APRON	R	76	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	76902
Apron 01N	4	19	APRON	R	100	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	76902
Apron 01N	5	20	APRON	R	84	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	76902
Apron 01N	6	21	APRON	R	98	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	76902
Apron 01S	3	22	APRON	R	66	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	53245
Apron 01S	4	23	APRON	R	80	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	53245
Apron 01S	5	24	APRON	R	83	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	53245
Apron 01S	6	25	APRON	R	94	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	53245
Apron 01S	7	26	APRON	R	77	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	53245
Apron 02N	3	27	APRON	R	92	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	23091
Apron 02N	4	28	APRON	R	97	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	23091
Apron 02N	5	29	APRON	R	74	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	23091
Apron 02N	6	30	APRON	R	77	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	23091
Apron 02N	7	31	APRON	R	82	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	23091
Apron 02S	3	32	APRON	R	79	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	38122

Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	ACN-PCN simple option Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Apron 02S	4	33	APRON	R	85	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	38122
Apron 02S	5	34	APRON	R	87	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	38122
Apron 02S	6	35	APRON	R	86	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	38122
Apron 03	2	36	APRON	R	84	55	68/R/B/W/T	68	B	NA	Medium 80	A319-100 std	500	2073
Apron 03	3	37	APRON	R	82	55	68/R/B/W/T	68	B	NA	Medium 80	A319-100 std	500	2073
Apron 03	4	38	APRON	R	67	55	68/R/B/W/T	68	B	NA	Medium 80	A319-100 std	500	2073
Apron 03	5	39	APRON	R	100	55	68/R/B/W/T	68	B	NA	Medium 80	A319-100 std	500	2073
Apron 04	2	40	APRON	R	88	55	63/R/D/W/T	63	D	NA	Ultra low 20	A319-100 std	500	4272
Apron 09	1	41	APRON	R	100	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 09	2	42	APRON	R	78	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 09	3	43	APRON	R	46	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 09	4	44	APRON	R	100	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 09	5	45	APRON	R	73	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 09	6	46	APRON	R	70	55	117/R/B/W/T	117	B	NA	Medium 80	A319-100 std	500	3011
Apron 40	1	47	APRON	R	63	55	68/R/C/W/T	68	C	NA	Low 40	A319-100 std	50	150
Apron 40	2	48	APRON	R	64	55	68/R/C/W/T	68	C	NA	Low 40	A319-100 std	50	150
Apron 50	2	49	APRON	R	100	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	38122
Apron 50	4	50	APRON	R	75	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	38122
Apron 51	2	51	APRON	R	73	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	2073
Apron 52	2	52	APRON	R	60	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	2073
Apron 53	2	53	APRON	R	31	55	72/R/A/W/T	72	A	NA	High 150	A319-100 std	500	2073
Apron 54	2	54	APRON	R	50	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	2073
Apron 55	2	55	APRON	R	30	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	4272
Apron 56	1	56	APRON	R	37	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Apron 56	2	57	APRON	R	25	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Apron 56	3	58	APRON	R	68	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Apron 56	4	59	APRON	R	100	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Apron 60	3	60	APRON	R	75	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Apron 60	4	61	APRON	R	65	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	500	3011
Bravo 1	1	62	TAXIWAY	F	69	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	15928,15	67797,70
Bravo 1	2	63	TAXIWAY	F	81	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	15928,15	67797,70
Bravo 1	3	64	TAXIWAY	F	78	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	15928,15	67797,70

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Bravo 1	4	65	TAXIWAY	F	87	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	15928,15	67797,70
Bravo 3	1	66	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	1164	6792
Bravo 3	2	67	TAXIWAY	F	69	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	1164	6792
Bravo 3	3	68	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	1164	6792
Bravo 3	4	69	TAXIWAY	F	82	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	1164	6792
Bravo 5	1	70	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	402	3017,00
Bravo 5	2	71	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	402	3017,00
Bravo 5	3	72	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	402	3017,00
Bravo 5	4	73	TAXIWAY	F	95	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	402	3017,00
Bravo 6	1	74	TAXIWAY	F	93	55	92/F/A/W/T	92	A	High 15	NA	A319-100 std	613	3638,00
Bravo 6	2	75	TAXIWAY	F	28	55	92/F/A/W/T	92	A	High 15	NA	A319-100 std	613	3638,00
Bravo 6	3	76	TAXIWAY	F	100	55	92/F/A/W/T	92	A	High 15	NA	A319-100 std	613	3638,00
Bravo 6	4	77	TAXIWAY	F	65	55	92/F/A/W/T	92	A	High 15	NA	A319-100 std	613	3638,00
Bravo 7	1	78	TAXIWAY	F	84	55	93/F/A/W/T	93	A	High 15	NA	A319-100 std	6103	18647,00
Bravo 7	2	79	TAXIWAY	F	45	55	93/F/A/W/T	93	A	High 15	NA	A319-100 std	6103	18647,00
Bravo 7	3	80	TAXIWAY	F	100	55	93/F/A/W/T	93	A	High 15	NA	A319-100 std	6103	18647,00
Bravo 7	4	81	TAXIWAY	F	71	55	93/F/A/W/T	93	A	High 15	NA	A319-100 std	6103	18647,00
Bravo 8	1	82	TAXIWAY	F	78	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	454	5230,00
Bravo 8	2	83	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	454	5230,00
Bravo 8	3	84	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	454	5230,00
Bravo 8	4	85	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	454	5230,00
Bravo 9	1	86	TAXIWAY	F	92	55	83/F/A/W/T	83	A	High 15	NA	A319-100 std	33	1212,00
Bravo 9	2	87	TAXIWAY	F	82	55	83/F/A/W/T	83	A	High 15	NA	A319-100 std	33	1212,00
Bravo 9	3	88	TAXIWAY	F	100	55	83/F/A/W/T	83	A	High 15	NA	A319-100 std	33	1212,00
Bravo 9	4	89	TAXIWAY	F	58	55	83/F/A/W/T	83	A	High 15	NA	A319-100 std	33	1212,00
Charlie 1	1	90	TAXIWAY	F	100	55	61/F/C/W/T	61	C	Low 6	NA	A319-100 std	30	274,00
Charlie 1	2	91	TAXIWAY	F	100	55	61/F/C/W/T	61	C	Low 6	NA	A319-100 std	30	274,00
Charlie 2	1	92	TAXIWAY	F	77	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	924	4462,00
Charlie 2	2	93	TAXIWAY	F	96	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	924	4462,00
Charlie 3	1	94	TAXIWAY	F	98	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	5	36,00
Charlie 3	2	95	TAXIWAY	F	95	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	5	36,00
Charlie 4	1	96	TAXIWAY	F	61	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	9935	43093,00

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Charlie 4	2	97	TAXIWAY	F	98	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	9935	43093,00
Charlie 4	3	98	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	9935	43093,00
Charlie 4	4	99	TAXIWAY	F	46	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	9935	43093,00
Charlie 5	1	100	TAXIWAY	F	74	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	1640	14700,00
Charlie 5	2	101	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	1640	14700,00
Charlie 6	1	102	TAXIWAY	F	57	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	170	7570,00
Charlie 6	2	103	TAXIWAY	F	95	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	170	7570,00
Delta 2	1	104	TAXIWAY	F	63	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Delta 2	2	105	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Delta 2	3	106	TAXIWAY	F	99	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Delta 2	4	107	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Delta 2	5	108	TAXIWAY	F	81	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Delta 2	6	109	TAXIWAY	F	98	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	131	595,00
Echo 1	1	110	TAXIWAY	F	61	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	158	1461,00
Echo 1	2	111	TAXIWAY	F	93	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	158	1461,00
Echo 3	1	112	TAXIWAY	F	79	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	10519	44997,00
Echo 3	2	113	TAXIWAY	F	88	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	10519	44997,00
Echo 3	3	114	TAXIWAY	F	95	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	10519	44997,00
Echo 3	4	115	TAXIWAY	F	93	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	10519	44997,00
Echo 4	1	116	TAXIWAY	F	52	55	84/F/A/W/T	84	A	High 15	NA	A319-100 std	770	5659,00
Echo 4	2	117	TAXIWAY	F	62	55	84/F/A/W/T	84	A	High 15	NA	A319-100 std	770	5659,00
Echo 4	3	118	TAXIWAY	F	89	55	84/F/A/W/T	84	A	High 15	NA	A319-100 std	770	5659,00
Echo 4	4	119	TAXIWAY	F	75	55	84/F/A/W/T	84	A	High 15	NA	A319-100 std	770	5659,00
Echo 5	1	120	TAXIWAY	F	60	55	75/F/A/W/T	75	A	High 15	NA	A319-100 std	2322	12790,00
Echo 5	2	121	TAXIWAY	F	17	55	75/F/A/W/T	75	A	High 15	NA	A319-100 std	2322	12790,00
Echo 5	3	122	TAXIWAY	F	82	55	75/F/A/W/T	75	A	High 15	NA	A319-100 std	2322	12790,00
Echo 5	4	123	TAXIWAY	F	90	55	75/F/A/W/T	75	A	High 15	NA	A319-100 std	2322	12790,00
Echo 6	1	124	TAXIWAY	F	63	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1686	11651,00
Echo 6	2	125	TAXIWAY	F	67	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1686	11651,00
Echo 6	3	126	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1686	11651,00
Echo 7	1	127	TAXIWAY	F	83	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	2810,85	11964,30
Fox 2	1	128	TAXIWAY	F	63	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	256	1380,00

												ACN-PCN simple option		
Branch ID	**Section ID**	**Pavement section count**	**Pavement Functionality**	**Pavement type**	**Actual PCI**	**Expected PCI**	**PCN**	**PCN value**	**Subgrade code**	**CBR**	**k value**	**Critical Aircraft**	**Amount of movements of critical aircraft**	**Total amount of aircraft movements**
Fox 2	3	130	TAXIWAY	F	79	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	256	1380,00
Fox 2	4	131	TAXIWAY	F	67	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	256	1380,00
Fox 3	1	132	TAXIWAY	F	91	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	693	3197,00
Fox 3	2	133	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	693	3197,00
Fox 3	3	134	TAXIWAY	F	100	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	693	3197,00
Fox 3	4	135	TAXIWAY	F	33	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	693	3197,00
Fox 4	1	136	TAXIWAY	F	79	55	70/F/A/W/T	70	A	High 15	NA	A330-300 std	1268	6103,00
Fox 4	2	137	TAXIWAY	F	91	55	70/F/A/W/T	70	A	High 15	NA	A330-300 std	1268	6103,00
Fox 4	3	138	TAXIWAY	F	91	55	70/F/A/W/T	70	A	High 15	NA	A330-300 std	1268	6103,00
Fox 4	4	139	TAXIWAY	F	96	55	70/F/A/W/T	70	A	High 15	NA	A330-300 std	1268	6103,00
Fox 5	1	140	TAXIWAY	F	87	55	95/F/A/W/T	95	A	High 15	NA	A330-300 std	781	3817,00
Fox 5	2	141	TAXIWAY	F	100	55	95/F/A/W/T	95	A	High 15	NA	A330-300 std	781	3817,00
Fox 5	3	142	TAXIWAY	F	80	55	95/F/A/W/T	95	A	High 15	NA	A330-300 std	781	3817,00
Fox 5	4	143	TAXIWAY	F	100	55	95/F/A/W/T	95	A	High 15	NA	A330-300 std	781	3817,00
Inner 02	1	144	TAXIWAY	F	83	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	669	5257,00
Inner 02	2	145	TAXIWAY	F	73	55	66/F/A/W/U	66	A	High 15	NA	A319-100 std	669	5257,00
Inner 03	1	146	TAXIWAY	F	100	55	97/F/A/W/T	97	A	High 15	NA	B737-800	7700	27775,00
Inner 03	2	147	TAXIWAY	F	93	55	97/F/A/W/T	97	A	High 15	NA	B737-800	7700	27775,00
Inner 04	1	148	TAXIWAY	F	90	55	85/F/A/W/T	85	A	High 15	NA	A319-100 std	19211	57532,00
Inner 04	2	149	TAXIWAY	F	72	55	85/F/A/W/T	85	A	High 15	NA	A319-100 std	19211	57532,00
Inner 05	1	150	TAXIWAY	F	82	55	69/F/A/W/T	69	A	High 15	NA	A319-100 std	15076	49945,00
Inner 05	2	151	TAXIWAY	F	74	55	69/F/A/W/T	69	A	High 15	NA	A319-100 std	15076	49945,00
Inner 06	1	152	TAXIWAY	F	93	55	69/F/A/W/T	69	A	High 15	NA	A319-100 std	9574	30325,00
Inner 06	2	153	TAXIWAY	F	83	55	69/F/A/W/T	69	A	High 15	NA	A319-100 std	9574	30325,00
Inner 07	1	154	TAXIWAY	F	69	55	100/F/A/W/T	100	A	High 15	NA	A319-100 std	2926	15822,00
Inner 07	2	155	TAXIWAY	F	51	55	100/F/A/W/T	100	A	High 15	NA	A319-100 std	2926	15822,00
Inner 08	1	156	TAXIWAY	F	79	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	1846	54793,00
Inner 08	2	157	TAXIWAY	F	70	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	1846	54793,00
Inner 08	3	158	TAXIWAY	F	70	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	1846	54793,00
Inner 09	1	159	TAXIWAY	F	66	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	2171	61725,00
Inner 09	2	160	TAXIWAY	F	93	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	2171	61725,00
Inner 09	3	161	TAXIWAY	F	60	55	65/F/A/W/T	65	A	High 15	NA	A330-300 std	2171	61725,00

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Inner 10	1	162	TAXIWAY	R	90	55	120/R/A/W/T	120	A	NA	High 150	A330-300 std	1493	20927,00
Inner 10	2	163	TAXIWAY	R	96	55	120/R/A/W/T	120	A	NA	High 150	A330-300 std	1493	20927,00
Juliet	1	164	TAXIWAY	F	81	55	116/F/A/W/T	116	A	High 15	NA	A300-600 STD	2282	17743,00
Juliet	2	165	TAXIWAY	F	43	55	116/F/A/W/T	116	A	High 15	NA	A300-600 STD	2282	17743,00
Juliet	3	166	TAXIWAY	F	73	55	116/F/A/W/T	116	A	High 15	NA	A300-600 STD	2282	17743,00
Juliet	4	167	TAXIWAY	F	43	55	116/F/A/W/T	116	A	High 15	NA	A300-600 STD	2282	17743,00
Nov 1	1	168	TAXIWAY	R	89	55	117/R/B/W/T	117	B	NA	Medium 80	B747-400	573	1720,00
Nov 2	1	169	TAXIWAY	R	100	55	117/R/B/W/T	117	B	NA	Medium 80	B747-400	1253	2437,00
Nov 2	2	170	TAXIWAY	R	54	55	117/R/B/W/T	117	B	NA	Medium 80	B747-400	1253	2437,00
Nov 4	3	171	TAXIWAY	F	100	55	39/F/A/W/T	39	A	High 15	NA	A340-300 std	17	93,00
Nov 4	2	172	TAXIWAY	F	100	55	39/F/A/W/T	39	A	High 15	NA	A340-300 std	17	93,00
Nov 5	2	173	TAXIWAY	F	83	55	34/F/A/W/T	34	A	High 15	NA	C-130	101	363,00
Nov 6	3	174	TAXIWAY	F	82	55	104/F/A/W/T	104	A	High 15	NA	C-130	1522	4330,00
Nov 6	4	175	TAXIWAY	F	23	55	104/F/A/W/T	104	A	High 15	NA	C-130	1522	4330,00
Outer 01	1	176	TAXIWAY	F	100	55	65/F/A/W/T	65	A	High 15	NA	B737-300	175	1383,00
Outer 01	2	177	TAXIWAY	F	94	55	65/F/A/W/T	65	A	High 15	NA	B737-300	175	1383,00
Outer 02	1	178	TAXIWAY	F	97	55	79/F/A/W/T	79	A	High 15	NA	B747-400	252	1813,00
Outer 02	2	179	TAXIWAY	F	96	55	79/F/A/W/T	79	A	High 15	NA	B747-400	252	1813,00
Outer 03	1	180	TAXIWAY	F	91	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	4986	23276,00
Outer 03	2	181	TAXIWAY	F	90	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	4986	23276,00
Outer 04	1	182	TAXIWAY	F	87	55	63/F/A/W/T	63	A	High 15	NA	A319-100 std	4655	24342,00
Outer 04	2	183	TAXIWAY	F	100	55	63/F/A/W/T	63	A	High 15	NA	A319-100 std	4655	24342,00
Outer 05	1	184	TAXIWAY	F	91	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	6422	29410,00
Outer 05	2	185	TAXIWAY	F	97	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	6422	29410,00
Outer 05	3	186	TAXIWAY	F	88	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	6422	29410,00
Outer 06	1	187	TAXIWAY	F	97	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	5184	23443,00
Outer 06	2	188	TAXIWAY	F	56	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	5184	23443,00
Outer 07	1	189	TAXIWAY	F	45	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	6427	36262,00
Outer 07	2	190	TAXIWAY	F	65	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	6427	36262,00
Outer 08	1	191	TAXIWAY	F	85	55	82/F/A/W/T	82	A	High 15	NA	A330-300 std	779	19240,00
Outer 08	2	192	TAXIWAY	F	61	55	82/F/A/W/T	82	A	High 15	NA	A330-300 std	779	19240,00
Outer 09	1	193	TAXIWAY	F	80	55	82/F/A/W/T	82	A	High 15	NA	A330-300 std	910	15397,00

												ACN-PCN simple option		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	PCN	PCN value	Subgrade code	CBR	k value	Critical Aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements
Outer 09	2	194	TAXIWAY	F	62	55	82/F/A/W/T	82	A	High 15	NA	A330-300 std	910	15397,00
Outer 09	3	195	TAXIWAY	F	79	55	82/F/A/W/T	82	A	High 15	NA	A330-300 std	910	15397,00
Outer 10	1	196	TAXIWAY	F	88	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	780	11877,00
Outer 10	2	197	TAXIWAY	F	76	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	780	11877,00
Bravo 10	1	198	TAXIWAY	F	86	55	120/F/A/W/T	120	A	High 15	NA	B747-400	727	1694,00
Bravo 10	2	199	TAXIWAY	F	51	55	120/F/A/W/T	120	A	High 15	NA	B747-400	727	1694,00
Bravo 10	3	200	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	727	1694,00
Bravo 10	4	201	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	B747-400	727	1694,00
Papa 9	1	202	TAXIWAY	F	96	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1428	8119,00
Papa 9	2	203	TAXIWAY	F	100	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1428	8119,00
Papa 9	3	204	TAXIWAY	F	95	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1428	8119,00
Papa 9	4	205	TAXIWAY	F	86	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	1428	8119,00
Romeo 1	1	206	TAXIWAY	F	93	55	48/F/A/W/T	48	A	High 15	NA	A319-100 std	24	1144,00
Romeo 1	2	207	TAXIWAY	F	51	55	48/F/A/W/T	48	A	High 15	NA	A319-100 std	24	1144,00
Romeo 1	3	208	TAXIWAY	F	56	55	48/F/A/W/T	48	A	High 15	NA	A319-100 std	24	1144,00
Romeo 2	1	209	TAXIWAY	R	100	55	66/R/A/W/U	66	A	NA	High 150	A300-600 STD	622	17425,00
Romeo 2	2	210	TAXIWAY	R	92	55	66/R/A/W/U	66	A	NA	High 150	A300-600 STD	622	17425,00
Romeo 4	2	211	TAXIWAY	R	84	55	77/R/A/W/T	77	A	NA	High 150	A319-100 std	10849	56686,00
RW 01-19	1	212	RUNWAY	F	80	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	2	213	RUNWAY	F	96	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	3	214	RUNWAY	F	89	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	4	215	RUNWAY	F	71	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	5	216	RUNWAY	F	58	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	6	217	RUNWAY	F	62	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	7	218	RUNWAY	F	53	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW 01-19	8	219	RUNWAY	F	71	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	397	24425
RW07L25R	1	220	RUNWAY	F	100	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223
RW07L25R	2	221	RUNWAY	F	14	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223
RW07L25R	3	222	RUNWAY	F	60	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223
RW07L25R	4	223	RUNWAY	F	40	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223
RW07L25R	5	224	RUNWAY	F	73	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223
RW07L25R	6	225	RUNWAY	F	76	70	80/F/A/W/T	80	A	High 15	NA	A330-300 std	2842	127223

												ACN-PCN simple option		
Branch ID	**Section ID**	**Pavement section count**	**Pavement Functionality**	**Pavement type**	**Actual PCI**	**Expected PCI**	**PCN**	**PCN value**	**Subgrade code**	**CBR**	**k value**	**Critical Aircraft**	**Amount of movements of critical aircraft**	**Total amount of aircraft movements**
RW07R25L	1	227	RUNWAY	F	85	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	2	228	RUNWAY	F	90	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	3	229	RUNWAY	F	60	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	4	230	RUNWAY	F	70	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	5	231	RUNWAY	F	39	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	6	232	RUNWAY	F	57	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
RW07R25L	7	233	RUNWAY	F	58	70	120/F/A/W/T	120	A	High 15	NA	A330-300 std	2433	77492
SIERRA	1	234	TAXIWAY	R	74	55	99/R/A/W/T	99	A	NA	High 150	A330-300 std	6422	37338,00
TANGO	1	235	TAXIWAY	R	83	55	66/R/A/W/U	66	A	NA	High 150	50-900 Prelimin	935	34858,00
UNIFORM	1	236	TAXIWAY	R	90	55	66/R/A/W/U	66	A	NA	High 150	A319-100 std	1557	9937,00
Victor 1	2	237	TAXIWAY	F	7	55	66/F/A/W/U	66	A	High 15	NA	B777-300 ER	1	20,00
Whisky 1	2	238	TAXIWAY	F	73	55	120/F/A/W/T	120	A	High 15	NA	A319-100 std	700	3251,00
Whisky 2	1	239	TAXIWAY	F	100	55	67/F/A/W/T	67	A	High 15	NA	A319-100 std	40	339,00
Whisky 2	2	240	TAXIWAY	F	100	55	67/F/A/W/T	67	A	High 15	NA	A319-100 std	40	339,00
Whisky 2	3	241	TAXIWAY	F	49	55	67/F/A/W/T	67	A	High 15	NA	A319-100 std	40	339,00
Whisky 2	4	242	TAXIWAY	F	100	55	67/F/A/W/T	67	A	High 15	NA	A319-100 std	40	339,00
Whisky 3	1	243	TAXIWAY	F	100	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	1270	6417,00
Whisky 3	2	244	TAXIWAY	F	100	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	1270	6417,00
Whisky 4	1	245	TAXIWAY	F	96	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	2051	9937,00
Whisky 4	2	246	TAXIWAY	F	98	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	2051	9937,00
Whisky 4	3	247	TAXIWAY	F	91	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	2051	9937,00
Whisky 4	4	248	TAXIWAY	F	94	55	67/F/A/W/T	67	A	High 15	NA	A330-300 std	2051	9937,00
Yankee	2	249	TAXIWAY	F	78	55	66/F/A/W/U	66	A	High 15	NA	B767-200 ER	41	263,00
Zulu	1	250	TAXIWAY	F	89	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00
Zulu	2	251	TAXIWAY	F	92	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00
Zulu	3	252	TAXIWAY	F	97	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00
Zulu	4	253	TAXIWAY	F	94	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00
Zulu	5	254	TAXIWAY	F	93	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00
Zulu	6	255	TAXIWAY	F	57	55	120/F/A/W/T	120	A	High 15	NA	A330-300 std	453	12344,00

Appendix 7 – Sheet: tool (complete)

					Functional Condition								
Pavement inventory					PCI							TOTAL	Total functional condition
							Comparison with service levels		Comparison with expected value				
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Alpha 1	1	1	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 1	2	2	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 1	3	3	TAXIWAY	Flexible	71	55	Above Trigger Level	0,02	1,29	Better than expected	0,02	0,02	0,02
Alpha 1	4	4	TAXIWAY	Flexible	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Alpha 3	2	5	TAXIWAY	Flexible	58	55	Below TL 6	0,15	1,05	Better than expected	0,02	0,11	0,11
Alpha 3	3	6	TAXIWAY	Flexible	85	55	Above Trigger Level	0,02	1,55	Better than expected	0,02	0,02	0,02
Alpha 5	2	7	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Alpha 5	3	8	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 6	1	9	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 6	2	10	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 6	3	11	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 7	1	12	TAXIWAY	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 7	2	13	TAXIWAY	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Alpha 7	3	14	TAXIWAY	Rigid	43	55	Below Minimum level	0,31	0,78	Below level 2	0,04	0,22	0,22
Alpha 7	4	15	TAXIWAY	Rigid	64	55	Below TL 3	0,05	1,16	Better than expected	0,02	0,04	0,04
Alpha 7	5	16	TAXIWAY	Rigid	14	55	Below Minimum level	0,31	0,25	Below level 6	0,15	0,26	0,26
Apron 01N	2	17	APRON	Rigid	87	55	Above Trigger Level	0,02	1,58	Better than expected	0,02	0,02	0,02
Apron 01N	3	18	APRON	Rigid	76	55	Above Trigger Level	0,02	1,38	Better than expected	0,02	0,02	0,02
Apron 01N	4	19	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 01N	5	20	APRON	Rigid	84	55	Above Trigger Level	0,02	1,53	Better than expected	0,02	0,02	0,02
Apron 01N	6	21	APRON	Rigid	98	55	Above Trigger Level	0,02	1,78	Better than expected	0,02	0,02	0,02
Apron 01S	3	22	APRON	Rigid	66	55	Above Trigger Level	0,02	1,20	Better than expected	0,02	0,02	0,02
Apron 01S	4	23	APRON	Rigid	80	55	Above Trigger Level	0,02	1,45	Better than expected	0,02	0,02	0,02
Apron 01S	5	24	APRON	Rigid	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
Apron 01S	6	25	APRON	Rigid	94	55	Above Trigger Level	0,02	1,71	Better than expected	0,02	0,02	0,02

					Functional Condition								
					PCI								Total functional condition
	Pavement inventory						Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Apron 01S	7	26	APRON	Rigid	77	55	Above Trigger Level	0,02	1,40	Better than expected	0,02	0,02	0,02
Apron 02N	3	27	APRON	Rigid	92	55	Above Trigger Level	0,02	1,67	Better than expected	0,02	0,02	0,02
Apron 02N	4	28	APRON	Rigid	97	55	Above Trigger Level	0,02	1,76	Better than expected	0,02	0,02	0,02
Apron 02N	5	29	APRON	Rigid	74	55	Above Trigger Level	0,02	1,35	Better than expected	0,02	0,02	0,02
Apron 02N	6	30	APRON	Rigid	77	55	Above Trigger Level	0,02	1,40	Better than expected	0,02	0,02	0,02
Apron 02N	7	31	APRON	Rigid	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Apron 02S	3	32	APRON	Rigid	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Apron 02S	4	33	APRON	Rigid	85	55	Above Trigger Level	0,02	1,55	Better than expected	0,02	0,02	0,02
Apron 02S	5	34	APRON	Rigid	87	55	Above Trigger Level	0,02	1,58	Better than expected	0,02	0,02	0,02
Apron 02S	6	35	APRON	Rigid	86	55	Above Trigger Level	0,02	1,56	Better than expected	0,02	0,02	0,02
Apron 03	2	36	APRON	Rigid	84	55	Above Trigger Level	0,02	1,53	Better than expected	0,02	0,02	0,02
Apron 03	3	37	APRON	Rigid	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Apron 03	4	38	APRON	Rigid	67	55	Above Trigger Level	0,02	1,22	Better than expected	0,02	0,02	0,02
Apron 03	5	39	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 04	2	40	APRON	Rigid	88	55	Above Trigger Level	0,02	1,60	Better than expected	0,02	0,02	0,02
Apron 09	1	41	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 09	2	42	APRON	Rigid	78	55	Above Trigger Level	0,02	1,42	Better than expected	0,02	0,02	0,02
Apron 09	3	43	APRON	Rigid	46	55	Below TL 5	0,11	0,84	Below level 2	0,04	0,08	0,08
Apron 09	4	44	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 09	5	45	APRON	Rigid	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Apron 09	6	46	APRON	Rigid	70	55	Above Trigger Level	0,02	1,27	Better than expected	0,02	0,02	0,02
Apron 40	1	47	APRON	Rigid	63	55	Above Trigger Level	0,02	1,15	Better than expected	0,02	0,02	0,02
Apron 40	2	48	APRON	Rigid	64	55	Above Trigger Level	0,02	1,16	Better than expected	0,02	0,02	0,02
Apron 50	2	49	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 50	4	50	APRON	Rigid	75	55	Above Trigger Level	0,02	1,36	Better than expected	0,02	0,02	0,02

					Functional Condition									
Pavement inventory					PCI							TOTAL	Total functional condition
							Comparison with service levels		Comparison with expected value				
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Apron 51	2	51	APRON	Rigid	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Apron 52	2	52	APRON	Rigid	60	55	Above Trigger Level	0,02	1,09	Better than expected	0,02	0,02	0,02
Apron 53	2	53	APRON	Rigid	31	55	Below Minimum level	0,31	0,56	Below level 4	0,08	0,23	0,23
Apron 54	2	54	APRON	Rigid	50	55	Below TL 3	0,05	0,91	Below level 1	0,03	0,04	0,04
Apron 55	2	55	APRON	Rigid	30	55	Below Minimum level	0,31	0,55	Below level 4	0,08	0,23	0,23
Apron 56	1	56	APRON	Rigid	37	55	Below Minimum level	0,31	0,67	Below level 3	0,05	0,22	0,22
Apron 56	2	57	APRON	Rigid	25	55	Below Minimum level	0,31	0,45	Below level 5	0,11	0,24	0,24
Apron 56	3	58	APRON	Rigid	68	55	Above Trigger Level	0,02	1,24	Better than expected	0,02	0,02	0,02
Apron 56	4	59	APRON	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Apron 60	3	60	APRON	Rigid	75	55	Above Trigger Level	0,02	1,36	Better than expected	0,02	0,02	0,02
Apron 60	4	61	APRON	Rigid	65	55	Above Trigger Level	0,02	1,18	Better than expected	0,02	0,02	0,02
Bravo 1	1	62	TAXIWAY	Flexible	69	55	Below TL 1	0,03	1,25	Better than expected	0,02	0,02	0,02
Bravo 1	2	63	TAXIWAY	Flexible	81	55	Above Trigger Level	0,02	1,47	Better than expected	0,02	0,02	0,02
Bravo 1	3	64	TAXIWAY	Flexible	78	55	Above Trigger Level	0,02	1,42	Better than expected	0,02	0,02	0,02
Bravo 1	4	65	TAXIWAY	Flexible	87	55	Above Trigger Level	0,02	1,58	Better than expected	0,02	0,02	0,02
Bravo 3	1	66	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 3	2	67	TAXIWAY	Flexible	69	55	Below TL 1	0,03	1,25	Better than expected	0,02	0,02	0,02
Bravo 3	3	68	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 3	4	69	TAXIWAY	Flexible	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Bravo 5	1	70	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 5	2	71	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 5	3	72	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 5	4	73	TAXIWAY	Flexible	95	55	Above Trigger Level	0,02	1,73	Better than expected	0,02	0,02	0,02
Bravo 6	1	74	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Bravo 6	2	75	TAXIWAY	Flexible	28	55	Below Minimum level	0,31	0,51	Below level 4	0,08	0,23	0,23

	Pavement inventory				Functional Condition								
					PCI								Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Bravo 6	3	76	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 6	4	77	TAXIWAY	Flexible	65	55	Below TL 3	0,05	1,18	Better than expected	0,02	0,04	0,04
Bravo 7	1	78	TAXIWAY	Flexible	84	55	Above Trigger Level	0,02	1,53	Better than expected	0,02	0,02	0,02
Bravo 7	2	79	TAXIWAY	Flexible	45	55	Below Minimum level	0,31	0,82	Below level 2	0,04	0,22	0,22
Bravo 7	3	80	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 7	4	81	TAXIWAY	Flexible	71	55	Above Trigger Level	0,02	1,29	Better than expected	0,02	0,02	0,02
Bravo 8	1	82	TAXIWAY	Flexible	78	55	Above Trigger Level	0,02	1,42	Better than expected	0,02	0,02	0,02
Bravo 8	2	83	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 8	3	84	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 8	4	85	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 9	1	86	TAXIWAY	Flexible	92	55	Above Trigger Level	0,02	1,67	Better than expected	0,02	0,02	0,02
Bravo 9	2	87	TAXIWAY	Flexible	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Bravo 9	3	88	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Bravo 9	4	89	TAXIWAY	Flexible	58	55	Below TL 6	0,15	1,05	Better than expected	0,02	0,11	0,11
Charlie 1	1	90	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Charlie 1	2	91	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Charlie 2	1	92	TAXIWAY	Flexible	77	55	Above Trigger Level	0,02	1,40	Better than expected	0,02	0,02	0,02
Charlie 2	2	93	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Charlie 3	1	94	TAXIWAY	Flexible	98	55	Above Trigger Level	0,02	1,78	Better than expected	0,02	0,02	0,02
Charlie 3	2	95	TAXIWAY	Flexible	95	55	Above Trigger Level	0,02	1,73	Better than expected	0,02	0,02	0,02
Charlie 4	1	96	TAXIWAY	Flexible	61	55	Below TL 5	0,11	1,11	Better than expected	0,02	0,08	0,08
Charlie 4	2	97	TAXIWAY	Flexible	98	55	Above Trigger Level	0,02	1,78	Better than expected	0,02	0,02	0,02
Charlie 4	3	98	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Charlie 4	4	99	TAXIWAY	Flexible	46	55	Below Minimum level	0,31	0,84	Below level 2	0,04	0,22	0,22
Charlie 5	1	100	TAXIWAY	Flexible	74	55	Above Trigger Level	0,02	1,35	Better than expected	0,02	0,02	0,02

					Functional Condition								
Pavement inventory					PCI								Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Charlie 5	2	101	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Charlie 6	1	102	TAXIWAY	Flexible	57	55	Below TL 7	0,22	1,04	Better than expected	0,02	0,15	0,15
Charlie 6	2	103	TAXIWAY	Flexible	95	55	Above Trigger Level	0,02	1,73	Better than expected	0,02	0,02	0,02
Delta 2	1	104	TAXIWAY	Flexible	63	55	Below TL 4	0,08	1,15	Better than expected	0,02	0,06	0,06
Delta 2	2	105	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Delta 2	3	106	TAXIWAY	Flexible	99	55	Above Trigger Level	0,02	1,80	Better than expected	0,02	0,02	0,02
Delta 2	4	107	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Delta 2	5	108	TAXIWAY	Flexible	81	55	Above Trigger Level	0,02	1,47	Better than expected	0,02	0,02	0,02
Delta 2	6	109	TAXIWAY	Flexible	98	55	Above Trigger Level	0,02	1,78	Better than expected	0,02	0,02	0,02
Echo 1	1	110	TAXIWAY	Flexible	61	55	Below TL 5	0,11	1,11	Better than expected	0,02	0,08	0,08
Echo 1	2	111	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Echo 3	1	112	TAXIWAY	Flexible	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Echo 3	2	113	TAXIWAY	Flexible	88	55	Above Trigger Level	0,02	1,60	Better than expected	0,02	0,02	0,02
Echo 3	3	114	TAXIWAY	Flexible	95	55	Above Trigger Level	0,02	1,73	Better than expected	0,02	0,02	0,02
Echo 3	4	115	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Echo 4	1	116	TAXIWAY	Flexible	52	55	Below Minimum level	0,31	0,95	Below level 1	0,03	0,21	0,21
Echo 4	2	117	TAXIWAY	Flexible	62	55	Below TL 4	0,08	1,13	Better than expected	0,02	0,06	0,06
Echo 4	3	118	TAXIWAY	Flexible	89	55	Above Trigger Level	0,02	1,62	Better than expected	0,02	0,02	0,02
Echo 4	4	119	TAXIWAY	Flexible	75	55	Above Trigger Level	0,02	1,36	Better than expected	0,02	0,02	0,02
Echo 5	1	120	TAXIWAY	Flexible	60	55	Below TL 5	0,11	1,09	Better than expected	0,02	0,08	0,08
Echo 5	2	121	TAXIWAY	Flexible	17	55	Below Minimum level	0,31	0,31	Below level 6	0,15	0,26	0,26
Echo 5	3	122	TAXIWAY	Flexible	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Echo 5	4	123	TAXIWAY	Flexible	90	55	Above Trigger Level	0,02	1,64	Better than expected	0,02	0,02	0,02
Echo 6	1	124	TAXIWAY	Flexible	63	55	Below TL 4	0,08	1,15	Better than expected	0,02	0,06	0,06
Echo 6	2	125	TAXIWAY	Flexible	67	55	Below TL 2	0,04	1,22	Better than expected	0,02	0,03	0,03

					Functional Condition								
	Pavement inventory				PCI								Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Echo 6	3	126	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Echo 7	1	127	TAXIWAY	Flexible	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
Fox 2	1	128	TAXIWAY	Flexible	63	55	Below TL 4	0,08	1,15	Better than expected	0,02	0,06	0,06
Fox 2	2	129	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Fox 2	3	130	TAXIWAY	Flexible	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Fox 2	4	131	TAXIWAY	Flexible	67	55	Below TL 2	0,04	1,22	Better than expected	0,02	0,03	0,03
Fox 3	1	132	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Fox 3	2	133	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Fox 3	3	134	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Fox 3	4	135	TAXIWAY	Flexible	33	55	Below Minimum level	0,31	0,60	Below level 4	0,08	0,23	0,23
Fox 4	1	136	TAXIWAY	Flexible	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Fox 4	2	137	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Fox 4	3	138	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Fox 4	4	139	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Fox 5	1	140	TAXIWAY	Flexible	87	55	Above Trigger Level	0,02	1,58	Better than expected	0,02	0,02	0,02
Fox 5	2	141	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Fox 5	3	142	TAXIWAY	Flexible	80	55	Above Trigger Level	0,02	1,45	Better than expected	0,02	0,02	0,02
Fox 5	4	143	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Inner 02	1	144	TAXIWAY	Flexible	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
Inner 02	2	145	TAXIWAY	Flexible	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Inner 03	1	146	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Inner 03	2	147	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Inner 04	1	148	TAXIWAY	Flexible	90	55	Above Trigger Level	0,02	1,64	Better than expected	0,02	0,02	0,02
Inner 04	2	149	TAXIWAY	Flexible	72	55	Above Trigger Level	0,02	1,31	Better than expected	0,02	0,02	0,02
Inner 05	1	150	TAXIWAY	Flexible	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02

					Functional Condition								
Pavement inventory					PCI								Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Inner 05	2	151	TAXIWAY	Flexible	74	55	Above Trigger Level	0,02	1,35	Better than expected	0,02	0,02	0,02
Inner 06	1	152	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Inner 06	2	153	TAXIWAY	Flexible	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
Inner 07	1	154	TAXIWAY	Flexible	69	55	Below TL 1	0,03	1,25	Better than expected	0,02	0,02	0,02
Inner 07	2	155	TAXIWAY	Flexible	51	55	Below Minimum level	0,31	0,93	Below level 1	0,03	0,21	0,21
Inner 08	1	156	TAXIWAY	Flexible	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Inner 08	2	157	TAXIWAY	Flexible	70	55	Above Trigger Level	0,02	1,27	Better than expected	0,02	0,02	0,02
Inner 08	3	158	TAXIWAY	Flexible	70	55	Above Trigger Level	0,02	1,27	Better than expected	0,02	0,02	0,02
Inner 09	1	159	TAXIWAY	Flexible	66	55	Below TL 2	0,04	1,20	Better than expected	0,02	0,03	0,03
Inner 09	2	160	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Inner 09	3	161	TAXIWAY	Flexible	60	55	Below TL 5	0,11	1,09	Better than expected	0,02	0,08	0,08
Inner 10	1	162	TAXIWAY	Rigid	90	55	Above Trigger Level	0,02	1,64	Better than expected	0,02	0,02	0,02
Inner 10	2	163	TAXIWAY	Rigid	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Juliet	1	164	TAXIWAY	Flexible	81	55	Above Trigger Level	0,02	1,47	Better than expected	0,02	0,02	0,02
Juliet	2	165	TAXIWAY	Flexible	43	55	Below Minimum level	0,31	0,78	Below level 2	0,04	0,22	0,22
Juliet	3	166	TAXIWAY	Flexible	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Juliet	4	167	TAXIWAY	Flexible	43	55	Below Minimum level	0,31	0,78	Below level 2	0,04	0,22	0,22
Nov 1	1	168	TAXIWAY	Rigid	89	55	Above Trigger Level	0,02	1,62	Better than expected	0,02	0,02	0,02
Nov 2	1	169	TAXIWAY	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Nov 2	2	170	TAXIWAY	Rigid	54	55	Below Minimum level	0,31	0,98	Below level 1	0,03	0,21	0,21
Nov 4	3	171	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Nov 4	2	172	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Nov 5	2	173	TAXIWAY	Flexible	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
Nov 6	3	174	TAXIWAY	Flexible	82	55	Above Trigger Level	0,02	1,49	Better than expected	0,02	0,02	0,02
Nov 6	4	175	TAXIWAY	Flexible	23	55	Below Minimum level	0,31	0,42	Below level 5	0,11	0,24	0,24

					Functional Condition								
Pavement inventory					PCI							TOTAL	Total functional condition
							Comparison with service levels		Comparison with expected value				
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Outer 01	1	176	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Outer 01	2	177	TAXIWAY	Flexible	94	55	Above Trigger Level	0,02	1,71	Better than expected	0,02	0,02	0,02
Outer 02	1	178	TAXIWAY	Flexible	97	55	Above Trigger Level	0,02	1,76	Better than expected	0,02	0,02	0,02
Outer 02	2	179	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Outer 03	1	180	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Outer 03	2	181	TAXIWAY	Flexible	90	55	Above Trigger Level	0,02	1,64	Better than expected	0,02	0,02	0,02
Outer 04	1	182	TAXIWAY	Flexible	87	55	Above Trigger Level	0,02	1,58	Better than expected	0,02	0,02	0,02
Outer 04	2	183	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Outer 05	1	184	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Outer 05	2	185	TAXIWAY	Flexible	97	55	Above Trigger Level	0,02	1,76	Better than expected	0,02	0,02	0,02
Outer 05	3	186	TAXIWAY	Flexible	88	55	Above Trigger Level	0,02	1,60	Better than expected	0,02	0,02	0,02
Outer 06	1	187	TAXIWAY	Flexible	97	55	Above Trigger Level	0,02	1,76	Better than expected	0,02	0,02	0,02
Outer 06	2	188	TAXIWAY	Flexible	56	55	Below TL 7	0,22	1,02	Better than expected	0,02	0,15	0,15
Outer 07	1	189	TAXIWAY	Flexible	45	55	Below Minimum level	0,31	0,82	Below level 2	0,04	0,22	0,22
Outer 07	2	190	TAXIWAY	Flexible	65	55	Below TL 3	0,05	1,18	Better than expected	0,02	0,04	0,04
Outer 08	1	191	TAXIWAY	Flexible	85	55	Above Trigger Level	0,02	1,55	Better than expected	0,02	0,02	0,02
Outer 08	2	192	TAXIWAY	Flexible	61	55	Below TL 5	0,11	1,11	Better than expected	0,02	0,08	0,08
Outer 09	1	193	TAXIWAY	Flexible	80	55	Above Trigger Level	0,02	1,45	Better than expected	0,02	0,02	0,02
Outer 09	2	194	TAXIWAY	Flexible	62	55	Below TL 4	0,08	1,13	Better than expected	0,02	0,06	0,06
Outer 09	3	195	TAXIWAY	Flexible	79	55	Above Trigger Level	0,02	1,44	Better than expected	0,02	0,02	0,02
Outer 10	1	196	TAXIWAY	Flexible	88	55	Above Trigger Level	0,02	1,60	Better than expected	0,02	0,02	0,02
Outer 10	2	197	TAXIWAY	Flexible	76	55	Above Trigger Level	0,02	1,38	Better than expected	0,02	0,02	0,02
Bravo 10	1	198	TAXIWAY	Flexible	86	55	Above Trigger Level	0,02	1,56	Better than expected	0,02	0,02	0,02
Bravo 10	2	199	TAXIWAY	Flexible	51	55	Below Minimum level	0,31	0,93	Below level 1	0,03	0,21	0,21
Bravo 10	3	200	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02

					Functional Condition								
	Pavement inventory				PCI								Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
Bravo 10	4	201	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Papa 9	1	202	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Papa 9	2	203	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Papa 9	3	204	TAXIWAY	Flexible	95	55	Above Trigger Level	0,02	1,73	Better than expected	0,02	0,02	0,02
Papa 9	4	205	TAXIWAY	Flexible	86	55	Above Trigger Level	0,02	1,56	Better than expected	0,02	0,02	0,02
Romeo 1	1	206	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02	0,02
Romeo 1	2	207	TAXIWAY	Flexible	51	55	Below Minimum level	0,31	0,93	Below level 1	0,03	0,21	0,21
Romeo 1	3	208	TAXIWAY	Flexible	56	55	Below TL 7	0,22	1,02	Better than expected	0,02	0,15	0,15
Romeo 2	1	209	TAXIWAY	Rigid	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Romeo 2	2	210	TAXIWAY	Rigid	92	55	Above Trigger Level	0,02	1,67	Better than expected	0,02	0,02	0,02
Romeo 4	2	211	TAXIWAY	Rigid	84	55	Above Trigger Level	0,02	1,53	Better than expected	0,02	0,02	0,02
RW 01-19	1	212	RUNWAY	Flexible	80	70	Above Trigger Level	0,02	1,14	Better than expected	0,02	0,02	0,02
RW 01-19	2	213	RUNWAY	Flexible	96	70	Above Trigger Level	0,02	1,37	Better than expected	0,02	0,02	0,02
RW 01-19	3	214	RUNWAY	Flexible	89	70	Above Trigger Level	0,02	1,27	Better than expected	0,02	0,02	0,02
RW 01-19	4	215	RUNWAY	Flexible	71	70	Above Trigger Level	0,02	1,01	Better than expected	0,02	0,02	0,02
RW 01-19	5	216	RUNWAY	Flexible	58	70	Below TL 6	0,15	0,83	Below level 2	0,04	0,12	0,12
RW 01-19	6	217	RUNWAY	Flexible	62	70	Below TL 4	0,08	0,89	Below level 1	0,03	0,06	0,06
RW 01-19	7	218	RUNWAY	Flexible	53	70	Below Minimum level	0,31	0,76	Below level 2	0,04	0,22	0,22
RW 01-19	8	219	RUNWAY	Flexible	71	70	Above Trigger Level	0,02	1,01	Better than expected	0,02	0,02	0,02
RW07L25R	1	220	RUNWAY	Flexible	100	70	Above Trigger Level	0,02	1,43	Better than expected	0,02	0,02	0,02
RW07L25R	2	221	RUNWAY	Flexible	14	70	Below Minimum level	0,31	0,20	Below level 7	0,22	0,28	0,28
RW07L25R	3	222	RUNWAY	Flexible	60	70	Below TL 5	0,11	0,86	Below level 2	0,04	0,08	0,08
RW07L25R	4	223	RUNWAY	Flexible	40	70	Below Minimum level	0,31	0,57	Below level 4	0,08	0,23	0,23
RW07L25R	5	224	RUNWAY	Flexible	73	70	Above Trigger Level	0,02	1,04	Better than expected	0,02	0,02	0,02
RW07L25R	6	225	RUNWAY	Flexible	76	70	Above Trigger Level	0,02	1,09	Better than expected	0,02	0,02	0,02

					Functional Condition								
					PCI								Total functional condition
	Pavement inventory						Comparison with service levels		Comparison with expected value			TOTAL	
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI	Priorities - Total functional condition
RW07L25R	7	226	RUNWAY	Flexible	73	70	Above Trigger Level	0,02	1,04	Better than expected	0,02	0,02	0,02
RW07R25L	1	227	RUNWAY	Flexible	85	70	Above Trigger Level	0,02	1,21	Better than expected	0,02	0,02	0,02
RW07R25L	2	228	RUNWAY	Flexible	90	70	Above Trigger Level	0,02	1,29	Better than expected	0,02	0,02	0,02
RW07R25L	3	229	RUNWAY	Flexible	60	70	Below TL 5	0,11	0,86	Below level 2	0,04	0,08	0,08
RW07R25L	4	230	RUNWAY	Flexible	70	70	Above Trigger Level	0,02	1,00	Better than expected	0,02	0,02	0,02
RW07R25L	5	231	RUNWAY	Flexible	39	70	Below Minimum level	0,31	0,56	Below level 4	0,08	0,23	0,23
RW07R25L	6	232	RUNWAY	Flexible	57	70	Below TL 7	0,22	0,81	Below level 2	0,04	0,16	0,16
RW07R25L	7	233	RUNWAY	Flexible	58	70	Below TL 6	0,15	0,83	Below level 2	0,04	0,12	0,12
SIERRA	1	234	TAXIWAY	Rigid	74	55	Above Trigger Level	0,02	1,35	Better than expected	0,02	0,02	0,02
TANGO	1	235	TAXIWAY	Rigid	83	55	Above Trigger Level	0,02	1,51	Better than expected	0,02	0,02	0,02
UNIFORM	1	236	TAXIWAY	Rigid	90	55	Above Trigger Level	0,02	1,64	Better than expected	0,02	0,02	0,02
Victor 1	2	237	TAXIWAY	Flexible	7	55	Below Minimum level	0,31	0,13	Below level 7	0,22	0,28	0,28
Whisky 1	2	238	TAXIWAY	Flexible	73	55	Above Trigger Level	0,02	1,33	Better than expected	0,02	0,02	0,02
Whisky 2	1	239	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Whisky 2	2	240	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Whisky 2	3	241	TAXIWAY	Flexible	49	55	Below Minimum level	0,31	0,89	Below level 1	0,03	0,21	0,21
Whisky 2	4	242	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Whisky 3	1	243	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Whisky 3	2	244	TAXIWAY	Flexible	100	55	Above Trigger Level	0,02	1,82	Better than expected	0,02	0,02	0,02
Whisky 4	1	245	TAXIWAY	Flexible	96	55	Above Trigger Level	0,02	1,75	Better than expected	0,02	0,02	0,02
Whisky 4	2	246	TAXIWAY	Flexible	98	55	Above Trigger Level	0,02	1,78	Better than expected	0,02	0,02	0,02
Whisky 4	3	247	TAXIWAY	Flexible	91	55	Above Trigger Level	0,02	1,65	Better than expected	0,02	0,02	0,02
Whisky 4	4	248	TAXIWAY	Flexible	94	55	Above Trigger Level	0,02	1,71	Better than expected	0,02	0,02	0,02
Yankee	2	249	TAXIWAY	Flexible	78	55	Above Trigger Level	0,02	1,42	Better than expected	0,02	0,02	0,02
Zulu	1	250	TAXIWAY	Flexible	89	55	Above Trigger Level	0,02	1,62	Better than expected	0,02	0,02	0,02

					Functional Condition									
	Pavement inventory				PCI									Total functional condition
							Comparison with service levels		Comparison with expected value			TOTAL		
Branch ID	Section ID	Pavement section count	Pavement Functionality	Pavement type	Actual PCI	Expected PCI	Rating	Priorities-Comparison with service levels	Actual PCI/Expected PCI	Rating	Priorities-comparison with expected value	Priorities-PCI		Priorities - Total functional condition
Zulu	2	251	TAXIWAY	Flexible	92	55	Above Trigger Level	0,02	1,67	Better than expected	0,02	0,02		0,02
Zulu	3	252	TAXIWAY	Flexible	97	55	Above Trigger Level	0,02	1,76	Better than expected	0,02	0,02		0,02
Zulu	4	253	TAXIWAY	Flexible	94	55	Above Trigger Level	0,02	1,71	Better than expected	0,02	0,02		0,02
Zulu	5	254	TAXIWAY	Flexible	93	55	Above Trigger Level	0,02	1,69	Better than expected	0,02	0,02		0,02
Zulu	6	255	TAXIWAY	Flexible	57	55	Below TL 7	0,22	1,04	Better than expected	0,02	0,15		0,15

		Structural Condition													
Pavement inventory		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities-% difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Alpha 1	1	80	High 15		C-130	26,7	747	1935	-66,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 1	2	80	High 15		C-130	26,7	747	1935	-66,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 1	3	80	High 15		C-130	26,7	747	1935	-66,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 1	4	80	High 15		C-130	26,7	747	1935	-66,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 3	2	106	High 15		C-130	26,7	600	1518	-74,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 3	3	106	High 15		C-130	26,7	600	1518	-74,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 5	2	66	High 15		C-130	26,7	99	436	-59,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 5	3	66	High 15		C-130	26,7	99	436	-59,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 6	1	120	High 15		B747-400	53,2	1189	2365	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 6	2	120	High 15		B747-400	53,2	1189	2365	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 6	3	120	High 15		B747-400	53,2	1189	2365	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 7	1	120		High 150	B747-400	52,6	265	655	-56,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 7	2	120		High 150	B747-400	52,6	265	655	-56,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 7	3	120		High 150	B747-400	52,6	265	655	-56,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 7	4	120		High 150	B747-400	52,6	265	655	-56,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Alpha 7	5	120		High 150	B747-400	52,6	265	655	-56,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01N	2	72		High 150	A319-100 std	34,7	500	76902	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01N	3	72		High 150	A319-100 std	34,7	500	76902	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01N	4	72		High 150	A319-100 std	34,7	500	76902	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01N	5	72		High 150	A319-100 std	34,7	500	76902	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01N	6	72		High 150	A319-100 std	34,7	500	76902	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01S	3	77		High 150	A319-100 std	34,7	500	53245	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01S	4	77		High 150	A319-100 std	34,7	500	53245	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01S	5	77		High 150	A319-100 std	34,7	500	53245	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 01S	6	77		High 150	A319-100 std	34,7	500	53245	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

Pavement inventory		ACN-PCN			ACN-PCN simple option											Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload				
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Apron 01S	7	77		High 150	A319-100 std	34,7	500	53245	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02N	3	77		High 150	A319-100 std	34,7	500	23091	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02N	4	77		High 150	A319-100 std	34,7	500	23091	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02N	5	77		High 150	A319-100 std	34,7	500	23091	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02N	6	77		High 150	A319-100 std	34,7	500	23091	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02N	7	77		High 150	A319-100 std	34,7	500	23091	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02S	3	77		High 150	A319-100 std	34,7	500	38122	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02S	4	77		High 150	A319-100 std	34,7	500	38122	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02S	5	77		High 150	A319-100 std	34,7	500	38122	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 02S	6	77		High 150	A319-100 std	34,7	500	38122	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 03	2	68		Medium 80	A319-100 std	37,1	500	2073	-45,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 03	3	68		Medium 80	A319-100 std	37,1	500	2073	-45,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 03	4	68		Medium 80	A319-100 std	37,1	500	2073	-45,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 03	5	68		Medium 80	A319-100 std	37,1	500	2073	-45,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 04	2	63		Ultra low 20	A319-100 std	41,2	500	4272	-34,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	1	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	2	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	3	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	4	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	5	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 09	6	117		Medium 80	A319-100 std	37,1	500	3011	-68,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 40	1	68		Low 40	A319-100 std	39,3	50	150	-42,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 40	2	68		Low 40	A319-100 std	39,3	50	150	-42,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 50	2	72		High 150	A319-100 std	34,7	500	38122	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 50	4	72		High 150	A319-100 std	34,7	500	38122	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
Pavement inventory		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Apron 51	2	72		High 150	A319-100 std	34,7	500	2073	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 52	2	72		High 150	A319-100 std	34,7	500	2073	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 53	2	72		High 150	A319-100 std	34,7	500	2073	-51,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 54	2	77		High 150	A319-100 std	34,7	500	2073	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 55	2	77		High 150	A319-100 std	34,7	500	4272	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 56	1	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 56	2	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 56	3	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 56	4	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 60	3	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Apron 60	4	77		High 150	A319-100 std	34,7	500	3011	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 1	1	120	High 15		A319-100 std	31,9	15928	67798	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 1	2	120	High 15		A319-100 std	31,9	15928	67798	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 1	3	120	High 15		A319-100 std	31,9	15928	67798	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 1	4	120	High 15		A319-100 std	31,9	15928	67798	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 3	1	66	High 15		A319-100 std	31,9	1164	6792	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 3	2	66	High 15		A319-100 std	31,9	1164	6792	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 3	3	66	High 15		A319-100 std	31,9	1164	6792	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 3	4	66	High 15		A319-100 std	31,9	1164	6792	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 5	1	66	High 15		A319-100 std	31,9	402	3017	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 5	2	66	High 15		A319-100 std	31,9	402	3017	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 5	3	66	High 15		A319-100 std	31,9	402	3017	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 5	4	66	High 15		A319-100 std	31,9	402	3017	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 6	1	92	High 15		A319-100 std	31,9	613	3638	-65,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 6	2	92	High 15		A319-100 std	31,9	613	3638	-65,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

		Structural Condition													
Pavement inventory		**ACN-PCN**			**ACN-PCN simple option**										**Total structural condition S.O.**
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities-% difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Bravo 6	3	92	High 15		A319-100 std	31,9	613	3638	-65,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 6	4	92	High 15		A319-100 std	31,9	613	3638	-65,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 7	1	93	High 15		A319-100 std	31,9	6103	18647	-65,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 7	2	93	High 15		A319-100 std	31,9	6103	18647	-65,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 7	3	93	High 15		A319-100 std	31,9	6103	18647	-65,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 7	4	93	High 15		A319-100 std	31,9	6103	18647	-65,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 8	1	120	High 15		A319-100 std	31,9	454	5230	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 8	2	120	High 15		A319-100 std	31,9	454	5230	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 8	3	120	High 15		A319-100 std	31,9	454	5230	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 8	4	120	High 15		A319-100 std	31,9	454	5230	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 9	1	83	High 15		A319-100 std	31,9	33	1212	-61,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 9	2	83	High 15		A319-100 std	31,9	33	1212	-61,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 9	3	83	High 15		A319-100 std	31,9	33	1212	-61,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 9	4	83	High 15		A319-100 std	31,9	33	1212	-61,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 1	1	61	Low 6		A319-100 std	36,4	30	274	-40,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 1	2	61	Low 6		A319-100 std	36,4	30	274	-40,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 2	1	120	High 15		A319-100 std	31,9	924	4462	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 2	2	120	High 15		A319-100 std	31,9	924	4462	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 3	1	120	High 15		A319-100 std	31,9	5	36	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 3	2	120	High 15		A319-100 std	31,9	5	36	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 4	1	120	High 15		A319-100 std	31,9	9935	43093	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 4	2	120	High 15		A319-100 std	31,9	9935	43093	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 4	3	120	High 15		A319-100 std	31,9	9935	43093	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 4	4	120	High 15		A319-100 std	31,9	9935	43093	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 5	1	120	High 15		A330-300 std	57,7	1640	14700	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

Pavement inventory		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities-% difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Charlie 5	2	120	High 15		A330-300 std	57,7	1640	14700	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 6	1	120	High 15		A330-300 std	57,7	170	7570	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Charlie 6	2	120	High 15		A330-300 std	57,7	170	7570	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	1	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	2	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	3	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	4	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	5	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Delta 2	6	120	High 15		A319-100 std	31,9	131	595	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 1	1	66	High 15		A319-100 std	31,9	158	1461	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 1	2	66	High 15		A319-100 std	31,9	158	1461	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 3	1	66	High 15		A319-100 std	31,9	10519	44997	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 3	2	66	High 15		A319-100 std	31,9	10519	44997	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 3	3	66	High 15		A319-100 std	31,9	10519	44997	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 3	4	66	High 15		A319-100 std	31,9	10519	44997	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 4	1	84	High 15		A319-100 std	31,9	770	5659	-62,0%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 4	2	84	High 15		A319-100 std	31,9	770	5659	-62,0%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 4	3	84	High 15		A319-100 std	31,9	770	5659	-62,0%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 4	4	84	High 15		A319-100 std	31,9	770	5659	-62,0%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 5	1	75	High 15		A319-100 std	31,9	2322	12790	-57,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 5	2	75	High 15		A319-100 std	31,9	2322	12790	-57,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 5	3	75	High 15		A319-100 std	31,9	2322	12790	-57,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 5	4	75	High 15		A319-100 std	31,9	2322	12790	-57,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 6	1	120	High 15		A319-100 std	31,9	1686	11651	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 6	2	120	High 15		A319-100 std	31,9	1686	11651	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

Pavement inventory		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Echo 6	3	120	High 15		A319-100 std	31,9	1686	11651	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Echo 7	1	120	High 15		A319-100 std	31,9	2811	11964	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 2	1	66	High 15		A319-100 std	31,9	256	1380	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 2	2	66	High 15		A319-100 std	31,9	256	1380	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 2	3	66	High 15		A319-100 std	31,9	256	1380	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 2	4	66	High 15		A319-100 std	31,9	256	1380	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 3	1	66	High 15		A319-100 std	31,9	693	3197	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 3	2	66	High 15		A319-100 std	31,9	693	3197	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 3	3	66	High 15		A319-100 std	31,9	693	3197	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 3	4	66	High 15		A319-100 std	31,9	693	3197	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 4	1	70	High 15		A330-300 std	57,7	1268	6103	-17,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 4	2	70	High 15		A330-300 std	57,7	1268	6103	-17,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 4	3	70	High 15		A330-300 std	57,7	1268	6103	-17,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 4	4	70	High 15		A330-300 std	57,7	1268	6103	-17,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 5	1	95	High 15		A330-300 std	57,7	781	3817	-39,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 5	2	95	High 15		A330-300 std	57,7	781	3817	-39,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 5	3	95	High 15		A330-300 std	57,7	781	3817	-39,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Fox 5	4	95	High 15		A330-300 std	57,7	781	3817	-39,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 02	1	66	High 15		A319-100 std	31,9	669	5257	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 02	2	66	High 15		A319-100 std	31,9	669	5257	-51,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 03	1	97	High 15		B737-800	42,8	7700	27775	-55,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 03	2	97	High 15		B737-800	42,8	7700	27775	-55,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 04	1	85	High 15		A319-100 std	31,9	19211	57532	-62,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 04	2	85	High 15		A319-100 std	31,9	19211	57532	-62,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 05	1	69	High 15		A319-100 std	31,9	15076	49945	-53,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

		Structural Condition													
Pavement inventory		**ACN-PCN**			**ACN-PCN simple option**										**Total structural condition S.O.**
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Inner 05	2	69	High 15		A319-100 std	31,9	15076	49945	-53,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 06	1	69	High 15		A319-100 std	31,9	9574	30325	-53,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 06	2	69	High 15		A319-100 std	31,9	9574	30325	-53,8%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 07	1	100	High 15		A319-100 std	31,9	2926	15822	-68,1%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 07	2	100	High 15		A319-100 std	31,9	2926	15822	-68,1%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 08	1	65	High 15		A330-300 std	57,7	1846	54793	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 08	2	65	High 15		A330-300 std	57,7	1846	54793	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 08	3	65	High 15		A330-300 std	57,7	1846	54793	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 09	1	65	High 15		A330-300 std	57,7	2171	61725	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 09	2	65	High 15		A330-300 std	57,7	2171	61725	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 09	3	65	High 15		A330-300 std	57,7	2171	61725	-11,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 10	1	120		High 150	A330-300 std	53,9	1493	20927	-55,1%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Inner 10	2	120		High 150	A330-300 std	53,9	1493	20927	-55,1%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Juliet	1	116	High 15		A300-600 STD	48,8	2282	17743	-57,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Juliet	2	116	High 15		A300-600 STD	48,8	2282	17743	-57,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Juliet	3	116	High 15		A300-600 STD	48,8	2282	17743	-57,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Juliet	4	116	High 15		A300-600 STD	48,8	2282	17743	-57,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 1	1	117		Medium 80	B747-400	63	573	1720	-46,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 2	1	117		Medium 80	B747-400	63	1253	2437	-46,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 2	2	117		Medium 80	B747-400	63	1253	2437	-46,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 4	3	39	High 15		A340-300 std	57,2	17	93	46,7%	Excessive overload	0,503	18,3%	Excessive # of movements	0,503	0,503
Nov 4	2	39	High 15		A340-300 std	57,2	17	93	46,7%	Excessive overload	0,503	18,3%	Excessive # of movements	0,503	0,503
Nov 5	2	34	High 15		C-130	26,7	101	363	-21,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 6	3	104	High 15		C-130	26,7	1522	4330	-74,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Nov 6	4	104	High 15		C-130	26,7	1522	4330	-74,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

Pavement inventory		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Outer 01	1	65	High 15		B737-300	33	175	1383	-49,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 01	2	65	High 15		B737-300	33	175	1383	-49,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 02	1	79	High 15		B747-400	53,2	252	1813	-32,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 02	2	79	High 15		B747-400	53,2	252	1813	-32,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 03	1	120	High 15		A319-100 std	31,9	4986	23276	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 03	2	120	High 15		A319-100 std	31,9	4986	23276	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 04	1	63	High 15		A319-100 std	31,9	4655	24342	-49,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 04	2	63	High 15		A319-100 std	31,9	4655	24342	-49,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 05	1	120	High 15		A319-100 std	31,9	6422	29410	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 05	2	120	High 15		A319-100 std	31,9	6422	29410	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 05	3	120	High 15		A319-100 std	31,9	6422	29410	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 06	1	120	High 15		A319-100 std	31,9	5184	23443	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 06	2	120	High 15		A319-100 std	31,9	5184	23443	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 07	1	120	High 15		A319-100 std	31,9	6427	36262	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 07	2	120	High 15		A319-100 std	31,9	6427	36262	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 08	1	82	High 15		A330-300 std	57,7	779	19240	-29,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 08	2	82	High 15		A330-300 std	57,7	779	19240	-29,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 09	1	82	High 15		A330-300 std	57,7	910	15397	-29,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 09	2	82	High 15		A330-300 std	57,7	910	15397	-29,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 09	3	82	High 15		A330-300 std	57,7	910	15397	-29,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 10	1	120	High 15		A330-300 std	57,7	780	11877	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Outer 10	2	120	High 15		A330-300 std	57,7	780	11877	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 10	1	120	High 15		B747-400	53,2	727	1694	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 10	2	120	High 15		B747-400	53,2	727	1694	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Bravo 10	3	120	High 15		B747-400	53,2	727	1694	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Pavement inventory		Structural Condition													
		ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN						% movements with overload				
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Bravo 10	4	120	High 15		B747-400	53,2	727	1694	-55,7%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Papa 9	1	120	High 15		A319-100 std	31,9	1428	8119	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Papa 9	2	120	High 15		A319-100 std	31,9	1428	8119	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Papa 9	3	120	High 15		A319-100 std	31,9	1428	8119	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Papa 9	4	120	High 15		A319-100 std	31,9	1428	8119	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 1	1	48	High 15		A319-100 std	31,9	24	1144	-33,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 1	2	48	High 15		A319-100 std	31,9	24	1144	-33,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 1	3	48	High 15		A319-100 std	31,9	24	1144	-33,5%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 2	1	66		High 150	A300-600 STD	50	622	17425	-24,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 2	2	66		High 150	A300-600 STD	50	622	17425	-24,2%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Romeo 4	2	77		High 150	A319-100 std	34,7	10849	56686	-54,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	1	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	2	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	3	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	4	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	5	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	6	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	7	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW 01-19	8	120	High 15		A330-300 std	57,7	397	24425	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	1	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	2	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	3	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	4	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	5	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07L25R	6	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

		Structural Condition													
	Pavement inventory	ACN-PCN			ACN-PCN simple option										Total structural condition S.O.
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
RW07L25R	7	80	High 15		A330-300 std	57,7	2842	127223	-27,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	1	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	2	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	3	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	4	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	5	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	6	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
RW07R25L	7	120	High 15		A330-300 std	57,7	2433	77492	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
SIERRA	1	99		High 150	A330-300 std	53,9	6422	37338	-45,6%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
TANGO	1	66		High 150	0-900 Prelimir	63,1	935	34858	-4,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
UNIFORM	1	66		High 150	A319-100 std	34,7	1557	9937	-47,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Victor 1	2	66	High 15		B777-300 ER	63,8	1	20	-3,3%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 1	2	120	High 15		A319-100 std	31,9	700	3251	-73,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 2	1	67	High 15		A319-100 std	31,9	40	339	-52,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 2	2	67	High 15		A319-100 std	31,9	40	339	-52,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 2	3	67	High 15		A319-100 std	31,9	40	339	-52,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 2	4	67	High 15		A319-100 std	31,9	40	339	-52,4%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 3	1	67	High 15		A330-300 std	57,7	1270	6417	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 3	2	67	High 15		A330-300 std	57,7	1270	6417	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 4	1	67	High 15		A330-300 std	57,7	2051	9937	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 4	2	67	High 15		A330-300 std	57,7	2051	9937	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 4	3	67	High 15		A330-300 std	57,7	2051	9937	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Whisky 4	4	67	High 15		A330-300 std	57,7	2051	9937	-13,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Yankee	2	66	High 15		B767-200 ER	44,9	41	263	-32,0%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Zulu	1	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Structural Condition

Pavement inventory		**ACN-PCN**			**ACN-PCN simple option**										**Total structural condition S.O.**
		Data required for both options			% difference between ACN-PCN							% movements with overload			
Branch ID	Section ID	PCN	CBR	k value	Critical Aircraft	ACN of critical aircraft	Amount of movements of critical aircraft	Total amount of aircraft movements	% ACN-PCN difference	Rating	Priorities- % difference ACN-PCN	% movements with overload	Rating	Priorities - % movements with overload	Priorities - Total structural condition S.O.
Zulu	2	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Zulu	3	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Zulu	4	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Zulu	5	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035
Zulu	6	120	High 15		A330-300 std	57,7	453	12344	-51,9%	No overload	0,035	0,0%	No exceedene of movements	0,035	0,035

Pavement inventory		Operational importance										Total operational importance	Total priority
		Functionality of the pavement	TOTAL	Usage Indicator							TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Prioities - Usage indicator	Priorities - Total operational importance	Total Priority
Alpha 1	1	TAXIWAY	0,23	1935	0	1935,00	0	67797,7	0,02854	Use intensity L9	0,02	0,12	0,06
Alpha 1	2	TAXIWAY	0,23	1935	0	1935,00	0	67797,7	0,02854	Use intensity L9	0,02	0,12	0,06
Alpha 1	3	TAXIWAY	0,23	1935	0	1935,00	0	67797,7	0,02854	Use intensity L9	0,02	0,12	0,06
Alpha 1	4	TAXIWAY	0,23	1935	0	1935,00	0	67797,7	0,02854	Use intensity L9	0,02	0,12	0,06
Alpha 3	2	TAXIWAY	0,23	1518	0	1518,00	0	67797,7	0,02239	Use intensity L9	0,02	0,12	0,09
Alpha 3	3	TAXIWAY	0,23	1518	0	1518,00	0	67797,7	0,02239	Use intensity L9	0,02	0,12	0,06
Alpha 5	2	TAXIWAY	0,23	436	0	436,00	0	67797,7	0,00643	Use intensity L9	0,02	0,12	0,06
Alpha 5	3	TAXIWAY	0,23	436	0	436,00	0	67797,7	0,00643	Use intensity L9	0,02	0,12	0,06
Alpha 6	1	TAXIWAY	0,23	2365	0	2365,00	0	67797,7	0,03488	Use intensity L9	0,02	0,12	0,06
Alpha 6	2	TAXIWAY	0,23	2365	0	2365,00	0	67797,7	0,03488	Use intensity L9	0,02	0,12	0,06
Alpha 6	3	TAXIWAY	0,23	2365	0	2365,00	0	67797,7	0,03488	Use intensity L9	0,02	0,12	0,06
Alpha 7	1	TAXIWAY	0,23	655	0	655,00	0	67797,7	0,00966	Use intensity L9	0,02	0,12	0,06
Alpha 7	2	TAXIWAY	0,23	655	0	655,00	0	67797,7	0,00966	Use intensity L9	0,02	0,12	0,06
Alpha 7	3	TAXIWAY	0,23	655	0	655,00	0	67797,7	0,00966	Use intensity L9	0,02	0,12	0,12
Alpha 7	4	TAXIWAY	0,23	655	0	655,00	0	67797,7	0,00966	Use intensity L9	0,02	0,12	0,07
Alpha 7	5	TAXIWAY	0,23	655	0	655,00	0	67797,7	0,00966	Use intensity L9	0,02	0,12	0,14
Apron 01N	2	APRON	0,07	76902	0	0,00	76902	76902	1	Use intensity L1	0,31	0,19	0,08
Apron 01N	3	APRON	0,07	76902	0	0,00	76902	76902	1	Use intensity L1	0,31	0,19	0,08
Apron 01N	4	APRON	0,07	76902	0	0,00	76902	76902	1	Use intensity L1	0,31	0,19	0,08
Apron 01N	5	APRON	0,07	76902	0	0,00	76902	76902	1	Use intensity L1	0,31	0,19	0,08
Apron 01N	6	APRON	0,07	76902	0	0,00	76902	76902	1	Use intensity L1	0,31	0,19	0,08
Apron 01S	3	APRON	0,07	53245	0	0,00	53245	76902	0,69237	Use intensity L3	0,15	0,11	0,06
Apron 01S	4	APRON	0,07	53245	0	0,00	53245	76902	0,69237	Use intensity L3	0,15	0,11	0,06
Apron 01S	5	APRON	0,07	53245	0	0,00	53245	76902	0,69237	Use intensity L3	0,15	0,11	0,06
Apron 01S	6	APRON	0,07	53245	0	0,00	53245	76902	0,69237	Use intensity L3	0,15	0,11	0,06

Operational importance

Pavement inventory		Functionality of the pavement		Usage Indicator								Total operational importance	Total priority
			TOTAL								TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Prioities - Usage indicator	Priorities - Total operational importance	Total Priority
Apron 01S	7	APRON	0,07	53245	0	0,00	53245	76902	0,69237	Use intensity L3	0,15	0,11	0,06
Apron 02N	3	APRON	0,07	23091	0	0,00	23091	76902	0,30027	Use intensity L7	0,04	0,05	0,04
Apron 02N	4	APRON	0,07	23091	0	0,00	23091	76902	0,30027	Use intensity L7	0,04	0,05	0,04
Apron 02N	5	APRON	0,07	23091	0	0,00	23091	76902	0,30027	Use intensity L7	0,04	0,05	0,04
Apron 02N	6	APRON	0,07	23091	0	0,00	23091	76902	0,30027	Use intensity L7	0,04	0,05	0,04
Apron 02N	7	APRON	0,07	23091	0	0,00	23091	76902	0,30027	Use intensity L7	0,04	0,05	0,04
Apron 02S	3	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04
Apron 02S	4	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04
Apron 02S	5	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04
Apron 02S	6	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04
Apron 03	2	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 03	3	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 03	4	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 03	5	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 04	2	APRON	0,07	4272	0	0,00	4272	76902	0,05555	Use intensity L9	0,02	0,05	0,03
Apron 09	1	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 09	2	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 09	3	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,06
Apron 09	4	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 09	5	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 09	6	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 40	1	APRON	0,07	150	0	0,00	150	76902	0,00195	Use intensity L9	0,02	0,05	0,03
Apron 40	2	APRON	0,07	150	0	0,00	150	76902	0,00195	Use intensity L9	0,02	0,05	0,03
Apron 50	2	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04
Apron 50	4	APRON	0,07	38122	0	0,00	38122	76902	0,49572	Use intensity L5	0,08	0,07	0,04

Pavement inventory		Operational importance										Total operational importance	Total priority
		Functionality of the pavement	TOTAL	Usage Indicator							TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Apron 51	2	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 52	2	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,03
Apron 53	2	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,10
Apron 54	2	APRON	0,07	2073	0	0,00	2073	76902	0,02696	Use intensity L9	0,02	0,05	0,04
Apron 55	2	APRON	0,07	4272	0	0,00	4272	76902	0,05555	Use intensity L9	0,02	0,05	0,10
Apron 56	1	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,10
Apron 56	2	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,11
Apron 56	3	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 56	4	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 60	3	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Apron 60	4	APRON	0,07	3011	0	0,00	3011	76902	0,03915	Use intensity L9	0,02	0,05	0,03
Bravo 1	1	TAXIWAY	0,23	67798	0	67797,70	0	67797,7	1	Use intensity L1	0,31	0,27	0,11
Bravo 1	2	TAXIWAY	0,23	67798	0	67797,70	0	67797,7	1	Use intensity L1	0,31	0,27	0,11
Bravo 1	3	TAXIWAY	0,23	67798	0	67797,70	0	67797,7	1	Use intensity L1	0,31	0,27	0,11
Bravo 1	4	TAXIWAY	0,23	67798	0	67797,70	0	67797,7	1	Use intensity L1	0,31	0,27	0,11
Bravo 3	1	TAXIWAY	0,23	6792	0	6792,00	0	67797,7	0,10018	Use intensity L9	0,02	0,12	0,06
Bravo 3	2	TAXIWAY	0,23	6792	0	6792,00	0	67797,7	0,10018	Use intensity L9	0,02	0,12	0,06
Bravo 3	3	TAXIWAY	0,23	6792	0	6792,00	0	67797,7	0,10018	Use intensity L9	0,02	0,12	0,06
Bravo 3	4	TAXIWAY	0,23	6792	0	6792,00	0	67797,7	0,10018	Use intensity L9	0,02	0,12	0,06
Bravo 5	1	TAXIWAY	0,23	3017	0	3017,00	0	67797,7	0,0445	Use intensity L9	0,02	0,12	0,06
Bravo 5	2	TAXIWAY	0,23	3017	0	3017,00	0	67797,7	0,0445	Use intensity L9	0,02	0,12	0,06
Bravo 5	3	TAXIWAY	0,23	3017	0	3017,00	0	67797,7	0,0445	Use intensity L9	0,02	0,12	0,06
Bravo 5	4	TAXIWAY	0,23	3017	0	3017,00	0	67797,7	0,0445	Use intensity L9	0,02	0,12	0,06
Bravo 6	1	TAXIWAY	0,23	3638	0	3638,00	0	67797,7	0,05366	Use intensity L9	0,02	0,12	0,06
Bravo 6	2	TAXIWAY	0,23	3638	0	3638,00	0	67797,7	0,05366	Use intensity L9	0,02	0,12	0,13

		Operational importance										Total operational importance	Total priority
Pavement inventory		Functionality of the pavement	TOTAL	Usage Indicator							TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Bravo 6	3	TAXIWAY	0,23	3638	0	3638,00	0	67797,7	0,05366	Use intensity L9	0,02	0,12	0,06
Bravo 6	4	TAXIWAY	0,23	3638	0	3638,00	0	67797,7	0,05366	Use intensity L9	0,02	0,12	0,07
Bravo 7	1	TAXIWAY	0,23	18647	0	18647,00	0	67797,7	0,27504	Use intensity L7	0,04	0,13	0,06
Bravo 7	2	TAXIWAY	0,23	18647	0	18647,00	0	67797,7	0,27504	Use intensity L7	0,04	0,13	0,13
Bravo 7	3	TAXIWAY	0,23	18647	0	18647,00	0	67797,7	0,27504	Use intensity L7	0,04	0,13	0,06
Bravo 7	4	TAXIWAY	0,23	18647	0	18647,00	0	67797,7	0,27504	Use intensity L7	0,04	0,13	0,06
Bravo 8	1	TAXIWAY	0,23	5230	0	5230,00	0	67797,7	0,07714	Use intensity L9	0,02	0,12	0,06
Bravo 8	2	TAXIWAY	0,23	5230	0	5230,00	0	67797,7	0,07714	Use intensity L9	0,02	0,12	0,06
Bravo 8	3	TAXIWAY	0,23	5230	0	5230,00	0	67797,7	0,07714	Use intensity L9	0,02	0,12	0,06
Bravo 8	4	TAXIWAY	0,23	5230	0	5230,00	0	67797,7	0,07714	Use intensity L9	0,02	0,12	0,06
Bravo 9	1	TAXIWAY	0,23	1212	0	1212,00	0	67797,7	0,01788	Use intensity L9	0,02	0,12	0,06
Bravo 9	2	TAXIWAY	0,23	1212	0	1212,00	0	67797,7	0,01788	Use intensity L9	0,02	0,12	0,06
Bravo 9	3	TAXIWAY	0,23	1212	0	1212,00	0	67797,7	0,01788	Use intensity L9	0,02	0,12	0,06
Bravo 9	4	TAXIWAY	0,23	1212	0	1212,00	0	67797,7	0,01788	Use intensity L9	0,02	0,12	0,09
Charlie 1	1	TAXIWAY	0,23	274	0	274,00	0	67797,7	0,00404	Use intensity L9	0,02	0,12	0,06
Charlie 1	2	TAXIWAY	0,23	274	0	274,00	0	67797,7	0,00404	Use intensity L9	0,02	0,12	0,06
Charlie 2	1	TAXIWAY	0,23	4462	0	4462,00	0	67797,7	0,06581	Use intensity L9	0,02	0,12	0,06
Charlie 2	2	TAXIWAY	0,23	4462	0	4462,00	0	67797,7	0,06581	Use intensity L9	0,02	0,12	0,06
Charlie 3	1	TAXIWAY	0,23	36	0	36,00	0	67797,7	0,00053	Use intensity L9	0,02	0,12	0,06
Charlie 3	2	TAXIWAY	0,23	36	0	36,00	0	67797,7	0,00053	Use intensity L9	0,02	0,12	0,06
Charlie 4	1	TAXIWAY	0,23	43093	0	43093,00	0	67797,7	0,63561	Use intensity L4	0,11	0,17	0,09
Charlie 4	2	TAXIWAY	0,23	43093	0	43093,00	0	67797,7	0,63561	Use intensity L4	0,11	0,17	0,07
Charlie 4	3	TAXIWAY	0,23	43093	0	43093,00	0	67797,7	0,63561	Use intensity L4	0,11	0,17	0,07
Charlie 4	4	TAXIWAY	0,23	43093	0	43093,00	0	67797,7	0,63561	Use intensity L4	0,11	0,17	0,14
Charlie 5	1	TAXIWAY	0,23	14700	0	14700,00	0	67797,7	0,21682	Use intensity L8	0,03	0,13	0,06

		Operational importance										Total operational importance	Total priority
Pavement inventory		Functionality of the pavement	TOTAL	Usage Indicator							TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Prioities - Usage indicator	Priorities - Total operational importance	Total Priority
Charlie 5	2	TAXIWAY	0,23	14700	0	14700,00	0	67797,7	0,21682	Use intensity L8	0,03	0,13	0,06
Charlie 6	1	TAXIWAY	0,23	7570	0	7570,00	0	67797,7	0,11166	Use intensity L8	0,03	0,13	0,10
Charlie 6	2	TAXIWAY	0,23	7570	0	7570,00	0	67797,7	0,11166	Use intensity L8	0,03	0,13	0,06
Delta 2	1	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,07
Delta 2	2	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,06
Delta 2	3	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,06
Delta 2	4	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,06
Delta 2	5	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,06
Delta 2	6	TAXIWAY	0,23	595	0	595,00	0	67797,7	0,00878	Use intensity L9	0,02	0,12	0,06
Echo 1	1	TAXIWAY	0,23	1461	0	1461,00	0	67797,7	0,02155	Use intensity L9	0,02	0,12	0,08
Echo 1	2	TAXIWAY	0,23	1461	0	1461,00	0	67797,7	0,02155	Use intensity L9	0,02	0,12	0,06
Echo 3	1	TAXIWAY	0,23	44997	0	44997,00	0	67797,7	0,6637	Use intensity L4	0,11	0,17	0,07
Echo 3	2	TAXIWAY	0,23	44997	0	44997,00	0	67797,7	0,6637	Use intensity L4	0,11	0,17	0,07
Echo 3	3	TAXIWAY	0,23	44997	0	44997,00	0	67797,7	0,6637	Use intensity L4	0,11	0,17	0,07
Echo 3	4	TAXIWAY	0,23	44997	0	44997,00	0	67797,7	0,6637	Use intensity L4	0,11	0,17	0,07
Echo 4	1	TAXIWAY	0,23	5659	0	5659,00	0	67797,7	0,08347	Use intensity L9	0,02	0,12	0,12
Echo 4	2	TAXIWAY	0,23	5659	0	5659,00	0	67797,7	0,08347	Use intensity L9	0,02	0,12	0,07
Echo 4	3	TAXIWAY	0,23	5659	0	5659,00	0	67797,7	0,08347	Use intensity L9	0,02	0,12	0,06
Echo 4	4	TAXIWAY	0,23	5659	0	5659,00	0	67797,7	0,08347	Use intensity L9	0,02	0,12	0,06
Echo 5	1	TAXIWAY	0,23	12790	0	12790,00	0	67797,7	0,18865	Use intensity L8	0,03	0,13	0,08
Echo 5	2	TAXIWAY	0,23	12790	0	12790,00	0	67797,7	0,18865	Use intensity L8	0,03	0,13	0,14
Echo 5	3	TAXIWAY	0,23	12790	0	12790,00	0	67797,7	0,18865	Use intensity L8	0,03	0,13	0,06
Echo 5	4	TAXIWAY	0,23	12790	0	12790,00	0	67797,7	0,18865	Use intensity L8	0,03	0,13	0,06
Echo 6	1	TAXIWAY	0,23	11651	0	11651,00	0	67797,7	0,17185	Use intensity L8	0,03	0,13	0,07
Echo 6	2	TAXIWAY	0,23	11651	0	11651,00	0	67797,7	0,17185	Use intensity L8	0,03	0,13	0,06

Operational importance

Pavement inventory		Functionality of the pavement	Functionality of the pavement TOTAL	Usage Indicator							Usage Indicator TOTAL	Total operational importance	Total priority
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Prioities - Usage indicator	Priorities - Total operational importance	Total Priority
Echo 6	3	TAXIWAY	0,23	11651	0	11651,00	0	67797,7	0,17185	Use intensity L8	0,03	0,13	0,06
Echo 7	1	TAXIWAY	0,23	11964	0	11964,30	0	67797,7	0,17647	Use intensity L8	0,03	0,13	0,06
Fox 2	1	TAXIWAY	0,23	1380	0	1380,00	0	67797,7	0,02035	Use intensity L9	0,02	0,12	0,07
Fox 2	2	TAXIWAY	0,23	1380	0	1380,00	0	67797,7	0,02035	Use intensity L9	0,02	0,12	0,06
Fox 2	3	TAXIWAY	0,23	1380	0	1380,00	0	67797,7	0,02035	Use intensity L9	0,02	0,12	0,06
Fox 2	4	TAXIWAY	0,23	1380	0	1380,00	0	67797,7	0,02035	Use intensity L9	0,02	0,12	0,06
Fox 3	1	TAXIWAY	0,23	3197	0	3197,00	0	67797,7	0,04715	Use intensity L9	0,02	0,12	0,06
Fox 3	2	TAXIWAY	0,23	3197	0	3197,00	0	67797,7	0,04715	Use intensity L9	0,02	0,12	0,06
Fox 3	3	TAXIWAY	0,23	3197	0	3197,00	0	67797,7	0,04715	Use intensity L9	0,02	0,12	0,06
Fox 3	4	TAXIWAY	0,23	3197	0	3197,00	0	67797,7	0,04715	Use intensity L9	0,02	0,12	0,13
Fox 4	1	TAXIWAY	0,23	6103	0	6103,00	0	67797,7	0,09002	Use intensity L9	0,02	0,12	0,06
Fox 4	2	TAXIWAY	0,23	6103	0	6103,00	0	67797,7	0,09002	Use intensity L9	0,02	0,12	0,06
Fox 4	3	TAXIWAY	0,23	6103	0	6103,00	0	67797,7	0,09002	Use intensity L9	0,02	0,12	0,06
Fox 4	4	TAXIWAY	0,23	6103	0	6103,00	0	67797,7	0,09002	Use intensity L9	0,02	0,12	0,06
Fox 5	1	TAXIWAY	0,23	3817	0	3817,00	0	67797,7	0,0563	Use intensity L9	0,02	0,12	0,06
Fox 5	2	TAXIWAY	0,23	3817	0	3817,00	0	67797,7	0,0563	Use intensity L9	0,02	0,12	0,06
Fox 5	3	TAXIWAY	0,23	3817	0	3817,00	0	67797,7	0,0563	Use intensity L9	0,02	0,12	0,06
Fox 5	4	TAXIWAY	0,23	3817	0	3817,00	0	67797,7	0,0563	Use intensity L9	0,02	0,12	0,06
Inner 02	1	TAXIWAY	0,23	5257	0	5257,00	0	67797,7	0,07754	Use intensity L9	0,02	0,12	0,06
Inner 02	2	TAXIWAY	0,23	5257	0	5257,00	0	67797,7	0,07754	Use intensity L9	0,02	0,12	0,06
Inner 03	1	TAXIWAY	0,23	27775	0	27775,00	0	67797,7	0,40967	Use intensity L6	0,05	0,14	0,06
Inner 03	2	TAXIWAY	0,23	27775	0	27775,00	0	67797,7	0,40967	Use intensity L6	0,05	0,14	0,06
Inner 04	1	TAXIWAY	0,23	57532	0	57532,00	0	67797,7	0,84858	Use intensity L2	0,22	0,22	0,09
Inner 04	2	TAXIWAY	0,23	57532	0	57532,00	0	67797,7	0,84858	Use intensity L2	0,22	0,22	0,09
Inner 05	1	TAXIWAY	0,23	49945	0	49945,00	0	67797,7	0,73668	Use intensity L3	0,15	0,19	0,08

		Operational importance											Total operational importance	Total priority
Pavement inventory		Functionality of the pavement		Usage Indicator										
			TOTAL								TOTAL			
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Pirioities - Usage indicator	Priorities - Total operational importance	Total Priority
Inner 05	2	TAXIWAY	0,23	49945	0	49945,00	0	67797,7	0,73668	Use intensity L3	0,15	0,19	0,08
Inner 06	1	TAXIWAY	0,23	30325	0	30325,00	0	67797,7	0,44729	Use intensity L5	0,08	0,15	0,07
Inner 06	2	TAXIWAY	0,23	30325	0	30325,00	0	67797,7	0,44729	Use intensity L5	0,08	0,15	0,07
Inner 07	1	TAXIWAY	0,23	15822	0	15822,00	0	67797,7	0,23337	Use intensity L7	0,04	0,13	0,06
Inner 07	2	TAXIWAY	0,23	15822	0	15822,00	0	67797,7	0,23337	Use intensity L7	0,04	0,13	0,13
Inner 08	1	TAXIWAY	0,23	54793	0	54793,00	0	67797,7	0,80818	Use intensity L2	0,22	0,22	0,09
Inner 08	2	TAXIWAY	0,23	54793	0	54793,00	0	67797,7	0,80818	Use intensity L2	0,22	0,22	0,09
Inner 08	3	TAXIWAY	0,23	54793	0	54793,00	0	67797,7	0,80818	Use intensity L2	0,22	0,22	0,09
Inner 09	1	TAXIWAY	0,23	61725	0	61725,00	0	67797,7	0,91043	Use intensity L1	0,31	0,27	0,11
Inner 09	2	TAXIWAY	0,23	61725	0	61725,00	0	67797,7	0,91043	Use intensity L1	0,31	0,27	0,11
Inner 09	3	TAXIWAY	0,23	61725	0	61725,00	0	67797,7	0,91043	Use intensity L1	0,31	0,27	0,13
Inner 10	1	TAXIWAY	0,23	20927	0	20927,00	0	67797,7	0,30867	Use intensity L7	0,04	0,13	0,06
Inner 10	2	TAXIWAY	0,23	20927	0	20927,00	0	67797,7	0,30867	Use intensity L7	0,04	0,13	0,06
Juliet	1	TAXIWAY	0,23	17743	0	17743,00	0	67797,7	0,26171	Use intensity L7	0,04	0,13	0,06
Juliet	2	TAXIWAY	0,23	17743	0	17743,00	0	67797,7	0,26171	Use intensity L7	0,04	0,13	0,13
Juliet	3	TAXIWAY	0,23	17743	0	17743,00	0	67797,7	0,26171	Use intensity L7	0,04	0,13	0,06
Juliet	4	TAXIWAY	0,23	17743	0	17743,00	0	67797,7	0,26171	Use intensity L7	0,04	0,13	0,13
Nov 1	1	TAXIWAY	0,23	1720	0	1720,00	0	67797,7	0,02537	Use intensity L9	0,02	0,12	0,06
Nov 2	1	TAXIWAY	0,23	2437	0	2437,00	0	67797,7	0,03595	Use intensity L9	0,02	0,12	0,06
Nov 2	2	TAXIWAY	0,23	2437	0	2437,00	0	67797,7	0,03595	Use intensity L9	0,02	0,12	0,12
Nov 4	3	TAXIWAY	0,23	93	0	93,00	0	67797,7	0,00137	Use intensity L9	0,02	0,12	0,21
Nov 4	2	TAXIWAY	0,23	93	0	93,00	0	67797,7	0,00137	Use intensity L9	0,02	0,12	0,21
Nov 5	2	TAXIWAY	0,23	363	0	363,00	0	67797,7	0,00535	Use intensity L9	0,02	0,12	0,06
Nov 6	3	TAXIWAY	0,23	4330	0	4330,00	0	67797,7	0,06387	Use intensity L9	0,02	0,12	0,06
Nov 6	4	TAXIWAY	0,23	4330	0	4330,00	0	67797,7	0,06387	Use intensity L9	0,02	0,12	0,13

		Operational importance										Total operational importance	Total priority
Pavement inventory		Functionality of the pavement		Usage Indicator									
			TOTAL								TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Prioirities - Usage indicator	Priorities - Total operational importance	Total Priority
Outer 01	1	TAXIWAY	0,23	1383	0	1383,00	0	67797,7	0,0204	Use intensity L9	0,02	0,12	0,06
Outer 01	2	TAXIWAY	0,23	1383	0	1383,00	0	67797,7	0,0204	Use intensity L9	0,02	0,12	0,06
Outer 02	1	TAXIWAY	0,23	1813	0	1813,00	0	67797,7	0,02674	Use intensity L9	0,02	0,12	0,06
Outer 02	2	TAXIWAY	0,23	1813	0	1813,00	0	67797,7	0,02674	Use intensity L9	0,02	0,12	0,06
Outer 03	1	TAXIWAY	0,23	23276	0	23276,00	0	67797,7	0,34332	Use intensity L6	0,05	0,14	0,06
Outer 03	2	TAXIWAY	0,23	23276	0	23276,00	0	67797,7	0,34332	Use intensity L6	0,05	0,14	0,06
Outer 04	1	TAXIWAY	0,23	24342	0	24342,00	0	67797,7	0,35904	Use intensity L6	0,05	0,14	0,06
Outer 04	2	TAXIWAY	0,23	24342	0	24342,00	0	67797,7	0,35904	Use intensity L6	0,05	0,14	0,06
Outer 05	1	TAXIWAY	0,23	29410	0	29410,00	0	67797,7	0,43379	Use intensity L6	0,05	0,14	0,06
Outer 05	2	TAXIWAY	0,23	29410	0	29410,00	0	67797,7	0,43379	Use intensity L6	0,05	0,14	0,06
Outer 05	3	TAXIWAY	0,23	29410	0	29410,00	0	67797,7	0,43379	Use intensity L6	0,05	0,14	0,06
Outer 06	1	TAXIWAY	0,23	23443	0	23443,00	0	67797,7	0,34578	Use intensity L6	0,05	0,14	0,06
Outer 06	2	TAXIWAY	0,23	23443	0	23443,00	0	67797,7	0,34578	Use intensity L6	0,05	0,14	0,11
Outer 07	1	TAXIWAY	0,23	36262	0	36262,00	0	67797,7	0,53486	Use intensity L5	0,08	0,15	0,13
Outer 07	2	TAXIWAY	0,23	36262	0	36262,00	0	67797,7	0,53486	Use intensity L5	0,08	0,15	0,08
Outer 08	1	TAXIWAY	0,23	19240	0	19240,00	0	67797,7	0,28379	Use intensity L7	0,04	0,13	0,06
Outer 08	2	TAXIWAY	0,23	19240	0	19240,00	0	67797,7	0,28379	Use intensity L7	0,04	0,13	0,08
Outer 09	1	TAXIWAY	0,23	15397	0	15397,00	0	67797,7	0,2271	Use intensity L7	0,04	0,13	0,06
Outer 09	2	TAXIWAY	0,23	15397	0	15397,00	0	67797,7	0,2271	Use intensity L7	0,04	0,13	0,07
Outer 09	3	TAXIWAY	0,23	15397	0	15397,00	0	67797,7	0,2271	Use intensity L7	0,04	0,13	0,06
Outer 10	1	TAXIWAY	0,23	11877	0	11877,00	0	67797,7	0,17518	Use intensity L8	0,03	0,13	0,06
Outer 10	2	TAXIWAY	0,23	11877	0	11877,00	0	67797,7	0,17518	Use intensity L8	0,03	0,13	0,06
Bravo 10	1	TAXIWAY	0,23	1694	0	1694,00	0	67797,7	0,02499	Use intensity L9	0,02	0,12	0,06
Bravo 10	2	TAXIWAY	0,23	1694	0	1694,00	0	67797,7	0,02499	Use intensity L9	0,02	0,12	0,12
Bravo 10	3	TAXIWAY	0,23	1694	0	1694,00	0	67797,7	0,02499	Use intensity L9	0,02	0,12	0,06

		Operational importance											
Pavement inventory		Functionality of the pavement		Usage Indicator								Total operational importance	Total priority
			TOTAL								TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Bravo 10	4	TAXIWAY	0,23	1694	0	1694,00	0	67797,7	0,02499	Use intensity L9	0,02	0,12	0,06
Papa 9	1	TAXIWAY	0,23	8119	0	8119,00	0	67797,7	0,11975	Use intensity L8	0,03	0,13	0,06
Papa 9	2	TAXIWAY	0,23	8119	0	8119,00	0	67797,7	0,11975	Use intensity L8	0,03	0,13	0,06
Papa 9	3	TAXIWAY	0,23	8119	0	8119,00	0	67797,7	0,11975	Use intensity L8	0,03	0,13	0,06
Papa 9	4	TAXIWAY	0,23	8119	0	8119,00	0	67797,7	0,11975	Use intensity L8	0,03	0,13	0,06
Romeo 1	1	TAXIWAY	0,23	1144	0	1144,00	0	67797,7	0,01687	Use intensity L9	0,02	0,12	0,06
Romeo 1	2	TAXIWAY	0,23	1144	0	1144,00	0	67797,7	0,01687	Use intensity L9	0,02	0,12	0,12
Romeo 1	3	TAXIWAY	0,23	1144	0	1144,00	0	67797,7	0,01687	Use intensity L9	0,02	0,12	0,10
Romeo 2	1	TAXIWAY	0,23	17425	0	17425,00	0	67797,7	0,25701	Use intensity L7	0,04	0,13	0,06
Romeo 2	2	TAXIWAY	0,23	17425	0	17425,00	0	67797,7	0,25701	Use intensity L7	0,04	0,13	0,06
Romeo 4	2	TAXIWAY	0,23	56686	0	56686,00	0	67797,7	0,83611	Use intensity L2	0,22	0,22	0,09
RW 01-19	1	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,14
RW 01-19	2	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,14
RW 01-19	3	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,14
RW 01-19	4	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,14
RW 01-19	5	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,17
RW 01-19	6	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,15
RW 01-19	7	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,21
RW 01-19	8	RUNWAY	0,70	24425	24425	0,00	0	127223	0,19199	Use intensity L8	0,03	0,36	0,14
RW07L25R	1	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,19
RW07L25R	2	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,27
RW07L25R	3	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,21
RW07L25R	4	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,26
RW07L25R	5	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,19
RW07L25R	6	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,19

Operational importance

Pavement inventory: Branch ID	Pavement inventory: Section ID	Functionality of the pavement: Functionality of the pavement	Functionality of the pavement: TOTAL: Priorities - Functionality of the pavement	Usage Indicator: # of operations	Usage Indicator: # of ops for runways	Usage Indicator: # of ops for taxiways	Usage Indicator: # of ops for aprons	Usage Indicator: of operations on section with same	Usage Indicator: Usage indicator	Usage Indicator: Rating	Usage Indicator: TOTAL: Priroities - Usage indicator	Total operational importance: Priorities - Total operational importance	Total priority: Total Priority
RW07L25R	7	RUNWAY	0,70	127223	127223	0,00	0	127223	1	Use intensity L1	0,31	0,50	0,19
RW07R25L	1	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,15
RW07R25L	2	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,15
RW07R25L	3	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,17
RW07R25L	4	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,15
RW07R25L	5	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,22
RW07R25L	6	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,20
RW07R25L	7	RUNWAY	0,70	77492	77492	0,00	0	127223	0,6091	Use intensity L4	0,11	0,41	0,19
SIERRA	1	TAXIWAY	0,23	37338	0	37338,00	0	67797,7	0,55073	Use intensity L5	0,08	0,15	0,07
TANGO	1	TAXIWAY	0,23	34858	0	34858,00	0	67797,7	0,51415	Use intensity L5	0,08	0,15	0,07
UNIFORM	1	TAXIWAY	0,23	9937	0	9937,00	0	67797,7	0,14657	Use intensity L8	0,03	0,13	0,06
Victor 1	2	TAXIWAY	0,23	20	0	20,00	0	67797,7	0,00029	Use intensity L9	0,02	0,12	0,14
Whisky 1	2	TAXIWAY	0,23	3251	0	3251,00	0	67797,7	0,04795	Use intensity L9	0,02	0,12	0,06
Whisky 2	1	TAXIWAY	0,23	339	0	339,00	0	67797,7	0,005	Use intensity L9	0,02	0,12	0,06
Whisky 2	2	TAXIWAY	0,23	339	0	339,00	0	67797,7	0,005	Use intensity L9	0,02	0,12	0,06
Whisky 2	3	TAXIWAY	0,23	339	0	339,00	0	67797,7	0,005	Use intensity L9	0,02	0,12	0,12
Whisky 2	4	TAXIWAY	0,23	339	0	339,00	0	67797,7	0,005	Use intensity L9	0,02	0,12	0,06
Whisky 3	1	TAXIWAY	0,23	6417	0	6417,00	0	67797,7	0,09465	Use intensity L9	0,02	0,12	0,06
Whisky 3	2	TAXIWAY	0,23	6417	0	6417,00	0	67797,7	0,09465	Use intensity L9	0,02	0,12	0,06
Whisky 4	1	TAXIWAY	0,23	9937	0	9937,00	0	67797,7	0,14657	Use intensity L8	0,03	0,13	0,06
Whisky 4	2	TAXIWAY	0,23	9937	0	9937,00	0	67797,7	0,14657	Use intensity L8	0,03	0,13	0,06
Whisky 4	3	TAXIWAY	0,23	9937	0	9937,00	0	67797,7	0,14657	Use intensity L8	0,03	0,13	0,06
Whisky 4	4	TAXIWAY	0,23	9937	0	9937,00	0	67797,7	0,14657	Use intensity L8	0,03	0,13	0,06
Yankee	2	TAXIWAY	0,23	263	0	263,00	0	67797,7	0,00388	Use intensity L9	0,02	0,12	0,06
Zulu	1	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13	0,06

Pavement inventory		Operational importance											Total operational importance	Total priority
		Functionality of the pavement		Usage Indicator										
			TOTAL									TOTAL		
Branch ID	Section ID	Functionality of the pavement	Priorities - Functionality of the pavement	# of operations	# of ops for runways	# of ops for taxiways	# of ops for aprons	of operations on section with same	Usage indicator	Rating	Priroities - Usage indicator	Priorities - Total operational importance		Total Priority
Zulu	2	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13		0,06
Zulu	3	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13		0,06
Zulu	4	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13		0,06
Zulu	5	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13		0,06
Zulu	6	TAXIWAY	0,23	12344	0	12344,00	0	67797,7	0,18207	Use intensity L8	0,03	0,13		0,10

Appendix 8 – Sheet: Tool (priorities only)

Branch and section	Pavement section count	Functional Evaluation			Structural Evaluation			Operational Importance			Total Priority
		Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities-% difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	
Alpha 1-1	1	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 1-2	2	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 1-3	3	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 1-4	4	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 3-2	5	0,154	0,019	0,109	0,035	0,035	0,035	0,227	0,019	0,123	0,089
Alpha 3-3	6	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 5-2	7	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 5-3	8	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 6-1	9	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 6-2	10	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 6-3	11	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 7-1	12	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 7-2	13	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Alpha 7-3	14	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,019	0,123	0,125
Alpha 7-4	15	0,053	0,019	0,042	0,035	0,035	0,035	0,227	0,019	0,123	0,066
Alpha 7-5	16	0,307	0,154	0,256	0,035	0,035	0,035	0,227	0,019	0,123	0,138
Apron 01N-2	17	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,307	0,189	0,081
Apron 01N-3	18	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,307	0,189	0,081
Apron 01N-4	19	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,307	0,189	0,081
Apron 01N-5	20	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,307	0,189	0,081
Apron 01N-6	21	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,307	0,189	0,081
Apron 01S-3	22	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,154	0,113	0,056
Apron 01S-4	23	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,154	0,113	0,056
Apron 01S-5	24	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,154	0,113	0,056
Apron 01S-6	25	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,154	0,113	0,056
Apron 01S-7	26	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,154	0,113	0,056
Apron 02N-3	27	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,037	0,054	0,036
Apron 02N-4	28	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,037	0,054	0,036

		Functional Evaluation			Structural Evaluation			Operational Importance			
Branch and section	Pavement section count	Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Apron 02N-5	29	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,037	0,054	0,036
Apron 02N-6	30	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,037	0,054	0,036
Apron 02N-7	31	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,037	0,054	0,036
Apron 02S-3	32	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 02S-4	33	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 02S-5	34	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 02S-6	35	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 03-2	36	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 03-3	37	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 03-4	38	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 03-5	39	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 04-2	40	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 09-1	41	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 09-2	42	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 09-3	43	0,109	0,037	0,085	0,035	0,035	0,035	0,072	0,019	0,045	0,055
Apron 09-4	44	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 09-5	45	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 09-6	46	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 40-1	47	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 40-2	48	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 50-2	49	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 50-4	50	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,076	0,074	0,043
Apron 51-2	51	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 52-2	52	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 53-2	53	0,307	0,076	0,230	0,035	0,035	0,035	0,072	0,019	0,045	0,103
Apron 54-2	54	0,053	0,026	0,044	0,035	0,035	0,035	0,072	0,019	0,045	0,041
Apron 55-2	55	0,307	0,076	0,230	0,035	0,035	0,035	0,072	0,019	0,045	0,103
Apron 56-1	56	0,307	0,053	0,222	0,035	0,035	0,035	0,072	0,019	0,045	0,101
Apron 56-2	57	0,307	0,109	0,241	0,035	0,035	0,035	0,072	0,019	0,045	0,107

		Functional Evaluation			Structural Evaluation			Operational Importance			
Branch and section	Pavement section count	Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Apron 56-3	58	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 56-4	59	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 60-3	60	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Apron 60-4	61	0,019	0,019	0,019	0,035	0,035	0,035	0,072	0,019	0,045	0,033
Bravo 1-1	62	0,026	0,019	0,024	0,035	0,035	0,035	0,227	0,307	0,267	0,108
Bravo 1-2	63	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 1-3	64	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 1-4	65	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Bravo 3-1	66	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 3-2	67	0,026	0,019	0,024	0,035	0,035	0,035	0,227	0,019	0,123	0,060
Bravo 3-3	68	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 3-4	69	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 5-1	70	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 5-2	71	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 5-3	72	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 5-4	73	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 6-1	74	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 6-2	75	0,307	0,076	0,230	0,035	0,035	0,035	0,227	0,019	0,123	0,129
Bravo 6-3	76	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 6-4	77	0,053	0,019	0,042	0,035	0,035	0,035	0,227	0,019	0,123	0,066
Bravo 7-1	78	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Bravo 7-2	79	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,037	0,132	0,128
Bravo 7-3	80	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Bravo 7-4	81	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Bravo 8-1	82	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 8-2	83	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 8-3	84	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 8-4	85	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 9-1	86	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059

		Functional Evaluation			Structural Evaluation			Operational Importance			
Branch and section	Pavement section count	Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Bravo 9-2	87	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 9-3	88	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 9-4	89	0,154	0,019	0,109	0,035	0,035	0,035	0,227	0,019	0,123	0,089
Charlie 1-1	90	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 1-2	91	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 2-1	92	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 2-2	93	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 3-1	94	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 3-2	95	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Charlie 4-1	96	0,109	0,019	0,079	0,035	0,035	0,035	0,227	0,109	0,168	0,094
Charlie 4-2	97	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074
Charlie 4-3	98	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074
Charlie 4-4	99	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,109	0,168	0,140
Charlie 5-1	100	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Charlie 5-2	101	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Charlie 6-1	102	0,218	0,019	0,152	0,035	0,035	0,035	0,227	0,026	0,126	0,104
Charlie 6-2	103	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Delta 2-1	104	0,076	0,019	0,057	0,035	0,035	0,035	0,227	0,019	0,123	0,072
Delta 2-2	105	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Delta 2-3	106	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Delta 2-4	107	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Delta 2-5	108	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Delta 2-6	109	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Echo 1-1	110	0,109	0,019	0,079	0,035	0,035	0,035	0,227	0,019	0,123	0,079
Echo 1-2	111	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Echo 3-1	112	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074
Echo 3-2	113	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074
Echo 3-3	114	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074
Echo 3-4	115	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,109	0,168	0,074

Branch and section	Pavement section count	Functional Evaluation			Structural Evaluation			Operational Importance			Total Priority
		Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	
Echo 4-1	116	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,019	0,123	0,124
Echo 4-2	117	0,076	0,019	0,057	0,035	0,035	0,035	0,227	0,019	0,123	0,072
Echo 4-3	118	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Echo 4-4	119	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Echo 5-1	120	0,109	0,019	0,079	0,035	0,035	0,035	0,227	0,026	0,126	0,080
Echo 5-2	121	0,307	0,154	0,256	0,035	0,035	0,035	0,227	0,026	0,126	0,139
Echo 5-3	122	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Echo 5-4	123	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Echo 6-1	124	0,076	0,019	0,057	0,035	0,035	0,035	0,227	0,026	0,126	0,073
Echo 6-2	125	0,037	0,019	0,031	0,035	0,035	0,035	0,227	0,026	0,126	0,064
Echo 6-3	126	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Echo 7-1	127	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Fox 2-1	128	0,076	0,019	0,057	0,035	0,035	0,035	0,227	0,019	0,123	0,072
Fox 2-2	129	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 2-3	130	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 2-4	131	0,037	0,019	0,031	0,035	0,035	0,035	0,227	0,019	0,123	0,063
Fox 3-1	132	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 3-2	133	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 3-3	134	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 3-4	135	0,307	0,076	0,230	0,035	0,035	0,035	0,227	0,019	0,123	0,129
Fox 4-1	136	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 4-2	137	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 4-3	138	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 4-4	139	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 5-1	140	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 5-2	141	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 5-3	142	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Fox 5-4	143	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Inner 02-1	144	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059

		Functional Evaluation			Structural Evaluation			Operational Importance			
Branch and section	Pavement section count	Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Inner 02-2	145	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Inner 03-1	146	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Inner 03-2	147	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Inner 04-1	148	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
Inner 04-2	149	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
Inner 05-1	150	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,154	0,190	0,081
Inner 05-2	151	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,154	0,190	0,081
Inner 06-1	152	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,076	0,152	0,068
Inner 06-2	153	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,076	0,152	0,068
Inner 07-1	154	0,026	0,019	0,024	0,035	0,035	0,035	0,227	0,037	0,132	0,063
Inner 07-2	155	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,037	0,132	0,127
Inner 08-1	156	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
Inner 08-2	157	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
Inner 08-3	158	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
Inner 09-1	159	0,037	0,019	0,031	0,035	0,035	0,035	0,227	0,307	0,267	0,111
Inner 09-2	160	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,307	0,267	0,107
Inner 09-3	161	0,109	0,019	0,079	0,035	0,035	0,035	0,227	0,307	0,267	0,127
Inner 10-1	162	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Inner 10-2	163	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Juliet-1	164	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Juliet-2	165	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,037	0,132	0,128
Juliet-3	166	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Juliet-4	167	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,037	0,132	0,128
Nov 1-1	168	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Nov 2-1	169	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Nov 2-2	170	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,019	0,123	0,124
Nov 4-3	171	0,019	0,019	0,019	0,503	0,503	0,503	0,227	0,019	0,123	0,215
Nov 4-2	172	0,019	0,019	0,019	0,503	0,503	0,503	0,227	0,019	0,123	0,215
Nov 5-2	173	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059

Branch and section	Pavement section count	Functional Evaluation Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Structural Evaluation Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Operational Importance Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Nov 6-3	174	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Nov 6-4	175	0,307	0,109	0,241	0,035	0,035	0,035	0,227	0,019	0,123	0,133
Outer 01-1	176	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Outer 01-2	177	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Outer 02-1	178	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Outer 02-2	179	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Outer 03-1	180	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 03-2	181	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 04-1	182	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 04-2	183	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 05-1	184	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 05-2	185	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 05-3	186	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 06-1	187	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,053	0,140	0,065
Outer 06-2	188	0,218	0,019	0,152	0,035	0,035	0,035	0,227	0,053	0,140	0,109
Outer 07-1	189	0,307	0,037	0,217	0,035	0,035	0,035	0,227	0,076	0,152	0,134
Outer 07-2	190	0,053	0,019	0,042	0,035	0,035	0,035	0,227	0,076	0,152	0,076
Outer 08-1	191	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Outer 08-2	192	0,109	0,019	0,079	0,035	0,035	0,035	0,227	0,037	0,132	0,082
Outer 09-1	193	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Outer 09-2	194	0,076	0,019	0,057	0,035	0,035	0,035	0,227	0,037	0,132	0,075
Outer 09-3	195	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Outer 10-1	196	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Outer 10-2	197	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Bravo 10-1	198	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 10-2	199	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,019	0,123	0,124
Bravo 10-3	200	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Bravo 10-4	201	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Papa 9-1	202	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060

Branch and section	Pavement section count	Functional Evaluation Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Structural Evaluation Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Operational Importance Priorities - Functionality of the pavement	Priroities - Usage indicator	Priorities - Total operational importance	Total Priority
Papa 9-2	203	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Papa 9-3	204	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Papa 9-4	205	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Romeo 1-1	206	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Romeo 1-2	207	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,019	0,123	0,124
Romeo 1-3	208	0,218	0,019	0,152	0,035	0,035	0,035	0,227	0,019	0,123	0,103
Romeo 2-1	209	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Romeo 2-2	210	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,037	0,132	0,062
Romeo 4-2	211	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,218	0,222	0,092
RW 01-19-1	212	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,026	0,364	0,139
RW 01-19-2	213	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,026	0,364	0,139
RW 01-19-3	214	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,026	0,364	0,139
RW 01-19-4	215	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,026	0,364	0,139
RW 01-19-5	216	0,154	0,037	0,115	0,035	0,035	0,035	0,702	0,026	0,364	0,171
RW 01-19-6	217	0,076	0,026	0,060	0,035	0,035	0,035	0,702	0,026	0,364	0,153
RW 01-19-7	218	0,307	0,037	0,217	0,035	0,035	0,035	0,702	0,026	0,364	0,205
RW 01-19-8	219	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,026	0,364	0,139
RW07L25R-1	220	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,307	0,504	0,186
RW07L25R-2	221	0,307	0,218	0,277	0,035	0,035	0,035	0,702	0,307	0,504	0,272
RW07L25R-3	222	0,109	0,037	0,085	0,035	0,035	0,035	0,702	0,307	0,504	0,208
RW07L25R-4	223	0,307	0,076	0,230	0,035	0,035	0,035	0,702	0,307	0,504	0,256
RW07L25R-5	224	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,307	0,504	0,186
RW07L25R-6	225	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,307	0,504	0,186
RW07L25R-7	226	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,307	0,504	0,186
RW07R25L-1	227	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,109	0,405	0,153
RW07R25L-2	228	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,109	0,405	0,153
RW07R25L-3	229	0,109	0,037	0,085	0,035	0,035	0,035	0,702	0,109	0,405	0,175
RW07R25L-4	230	0,019	0,019	0,019	0,035	0,035	0,035	0,702	0,109	0,405	0,153
RW07R25L-5	231	0,307	0,076	0,230	0,035	0,035	0,035	0,702	0,109	0,405	0,223

Branch and section	Pavement section count	Functional Evaluation			Structural Evaluation			Operational Importance			Total Priority
		Priorities- Comparison with service levels	Priorities- comparison with expected value	Priorities - Total functional condition	Priorities- % difference ACN-PCN	Priorities - % movements with overload	Priorities - Total structural condition S.O.	Priorities - Functionality of the pavement	Prioities - Usage indicator	Priorities - Total operational importance	
RW07R25L-6	232	0,218	0,037	0,158	0,035	0,035	0,035	0,702	0,109	0,405	0,199
RW07R25L-7	233	0,154	0,037	0,115	0,035	0,035	0,035	0,702	0,109	0,405	0,185
SIERRA-1	234	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,076	0,152	0,068
TANGO-1	235	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,076	0,152	0,068
UNIFORM-1	236	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Victor 1-2	237	0,307	0,218	0,277	0,035	0,035	0,035	0,227	0,019	0,123	0,145
Whisky 1-2	238	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 2-1	239	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 2-2	240	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 2-3	241	0,307	0,026	0,213	0,035	0,035	0,035	0,227	0,019	0,123	0,124
Whisky 2-4	242	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 3-1	243	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 3-2	244	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Whisky 4-1	245	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Whisky 4-2	246	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Whisky 4-3	247	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Whisky 4-4	248	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Yankee-2	249	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,019	0,123	0,059
Zulu-1	250	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Zulu-2	251	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Zulu-3	252	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Zulu-4	253	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Zulu-5	254	0,019	0,019	0,019	0,035	0,035	0,035	0,227	0,026	0,126	0,060
Zulu-6	255	0,218	0,019	0,152	0,035	0,035	0,035	0,227	0,026	0,126	0,104

Appendix 9 – Data visualisation

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Alpha 1-1	0,019	0,035	0,123	0,059
Alpha 1-2	0,019	0,035	0,123	0,059
Alpha 1-3	0,019	0,035	0,123	0,059
Alpha 1-4	0,019	0,035	0,123	0,059
Alpha 3-2	0,109	0,035	0,123	0,089
Alpha 3-3	0,019	0,035	0,123	0,059
Alpha 5-2	0,019	0,035	0,123	0,059
Alpha 5-3	0,019	0,035	0,123	0,059
Alpha 6-1	0,019	0,035	0,123	0,059
Alpha 6-2	0,019	0,035	0,123	0,059
Alpha 6-3	0,019	0,035	0,123	0,059
Alpha 7-1	0,019	0,035	0,123	0,059
Alpha 7-2	0,019	0,035	0,123	0,059
Alpha 7-3	0,217	0,035	0,123	0,125
Alpha 7-4	0,042	0,035	0,123	0,066
Alpha 7-5	0,256	0,035	0,123	0,138
Apron 01N-2	0,019	0,035	0,189	0,081
Apron 01N-3	0,019	0,035	0,189	0,081
Apron 01N-4	0,019	0,035	0,189	0,081
Apron 01N-5	0,019	0,035	0,189	0,081
Apron 01N-6	0,019	0,035	0,189	0,081
Apron 01S-3	0,019	0,035	0,113	0,056
Apron 01S-4	0,019	0,035	0,113	0,056
Apron 01S-5	0,019	0,035	0,113	0,056
Apron 01S-6	0,019	0,035	0,113	0,056
Apron 01S-7	0,019	0,035	0,113	0,056
Apron 02N-3	0,019	0,035	0,054	0,036
Apron 02N-4	0,019	0,035	0,054	0,036
Apron 02N-5	0,019	0,035	0,054	0,036
Apron 02N-6	0,019	0,035	0,054	0,036
Apron 02N-7	0,019	0,035	0,054	0,036
Apron 02S-3	0,019	0,035	0,074	0,043
Apron 02S-4	0,019	0,035	0,074	0,043

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Apron 02S-5	0,019	0,035	0,074	0,043
Apron 02S-6	0,019	0,035	0,074	0,043
Apron 03-2	0,019	0,035	0,045	0,033
Apron 03-3	0,019	0,035	0,045	0,033
Apron 03-4	0,019	0,035	0,045	0,033
Apron 03-5	0,019	0,035	0,045	0,033
Apron 04-2	0,019	0,035	0,045	0,033
Apron 09-1	0,019	0,035	0,045	0,033
Apron 09-2	0,019	0,035	0,045	0,033
Apron 09-3	0,085	0,035	0,045	0,055
Apron 09-4	0,019	0,035	0,045	0,033
Apron 09-5	0,019	0,035	0,045	0,033
Apron 09-6	0,019	0,035	0,045	0,033
Apron 40-1	0,019	0,035	0,045	0,033
Apron 40-2	0,019	0,035	0,045	0,033
Apron 50-2	0,019	0,035	0,074	0,043
Apron 50-4	0,019	0,035	0,074	0,043
Apron 51-2	0,019	0,035	0,045	0,033
Apron 52-2	0,019	0,035	0,045	0,033
Apron 53-2	0,230	0,035	0,045	0,103
Apron 54-2	0,044	0,035	0,045	0,041
Apron 55-2	0,230	0,035	0,045	0,103
Apron 56-1	0,222	0,035	0,045	0,101
Apron 56-2	0,241	0,035	0,045	0,107
Apron 56-3	0,019	0,035	0,045	0,033
Apron 56-4	0,019	0,035	0,045	0,033
Apron 60-3	0,019	0,035	0,045	0,033
Apron 60-4	0,019	0,035	0,045	0,033
Bravo 10-1	0,019	0,035	0,123	0,059
Bravo 10-2	0,213	0,035	0,123	0,124
Bravo 10-3	0,019	0,035	0,123	0,059
Bravo 10-4	0,019	0,035	0,123	0,059
Bravo 1-1	0,024	0,035	0,267	0,108

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Bravo 1-2	0,019	0,035	0,267	0,107
Bravo 1-3	0,019	0,035	0,267	0,107
Bravo 1-4	0,019	0,035	0,267	0,107
Bravo 3-1	0,019	0,035	0,123	0,059
Bravo 3-2	0,024	0,035	0,123	0,060
Bravo 3-3	0,019	0,035	0,123	0,059
Bravo 3-4	0,019	0,035	0,123	0,059
Bravo 5-1	0,019	0,035	0,123	0,059
Bravo 5-2	0,019	0,035	0,123	0,059
Bravo 5-3	0,019	0,035	0,123	0,059
Bravo 5-4	0,019	0,035	0,123	0,059
Bravo 6-1	0,019	0,035	0,123	0,059
Bravo 6-2	0,230	0,035	0,123	0,129
Bravo 6-3	0,019	0,035	0,123	0,059
Bravo 6-4	0,042	0,035	0,123	0,066
Bravo 7-1	0,019	0,035	0,132	0,062
Bravo 7-2	0,217	0,035	0,132	0,128
Bravo 7-3	0,019	0,035	0,132	0,062
Bravo 7-4	0,019	0,035	0,132	0,062
Bravo 8-1	0,019	0,035	0,123	0,059
Bravo 8-2	0,019	0,035	0,123	0,059
Bravo 8-3	0,019	0,035	0,123	0,059
Bravo 8-4	0,019	0,035	0,123	0,059
Bravo 9-1	0,019	0,035	0,123	0,059
Bravo 9-2	0,019	0,035	0,123	0,059
Bravo 9-3	0,019	0,035	0,123	0,059
Bravo 9-4	0,109	0,035	0,123	0,089
Charlie 1-1	0,019	0,035	0,123	0,059
Charlie 1-2	0,019	0,035	0,123	0,059
Charlie 2-1	0,019	0,035	0,123	0,059
Charlie 2-2	0,019	0,035	0,123	0,059
Charlie 3-1	0,019	0,035	0,123	0,059
Charlie 3-2	0,019	0,035	0,123	0,059

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Charlie 2-1	0,019	0,035	0,123	0,059
Charlie 2-2	0,019	0,035	0,123	0,059
Charlie 3-1	0,019	0,035	0,123	0,059
Charlie 3-2	0,019	0,035	0,123	0,059
Charlie 4-1	0,079	0,035	0,168	0,094
Charlie 4-2	0,019	0,035	0,168	0,074
Charlie 4-3	0,019	0,035	0,168	0,074
Charlie 4-4	0,217	0,035	0,168	0,140
Charlie 5-1	0,019	0,035	0,126	0,060
Charlie 5-2	0,019	0,035	0,126	0,060
Charlie 6-1	0,152	0,035	0,126	0,104
Charlie 6-2	0,019	0,035	0,126	0,060
Delta 2-1	0,057	0,035	0,123	0,072
Delta 2-2	0,019	0,035	0,123	0,059
Delta 2-3	0,019	0,035	0,123	0,059
Delta 2-4	0,019	0,035	0,123	0,059
Delta 2-5	0,019	0,035	0,123	0,059
Delta 2-6	0,019	0,035	0,123	0,059
Echo 1-1	0,079	0,035	0,123	0,079
Echo 1-2	0,019	0,035	0,123	0,059
Echo 3-1	0,019	0,035	0,168	0,074
Echo 3-2	0,019	0,035	0,168	0,074
Echo 3-3	0,019	0,035	0,168	0,074
Echo 3-4	0,019	0,035	0,168	0,074
Echo 4-1	0,213	0,035	0,123	0,124
Echo 4-2	0,057	0,035	0,123	0,072
Echo 4-3	0,019	0,035	0,123	0,059
Echo 4-4	0,019	0,035	0,123	0,059
Echo 5-1	0,079	0,035	0,126	0,080
Echo 5-2	0,256	0,035	0,126	0,139
Echo 5-3	0,019	0,035	0,126	0,060
Echo 5-4	0,019	0,035	0,126	0,060
Echo 6-1	0,057	0,035	0,126	0,073

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Echo 6-2	0,031	0,035	0,126	0,064
Echo 6-3	0,019	0,035	0,126	0,060
Echo 7-1	0,019	0,035	0,126	0,060
Fox 2-1	0,057	0,035	0,123	0,072
Fox 2-2	0,019	0,035	0,123	0,059
Fox 2-3	0,019	0,035	0,123	0,059
Fox 2-4	0,031	0,035	0,123	0,063
Fox 3-1	0,019	0,035	0,123	0,059
Fox 3-2	0,019	0,035	0,123	0,059
Fox 3-3	0,019	0,035	0,123	0,059
Fox 3-4	0,230	0,035	0,123	0,129
Fox 4-1	0,019	0,035	0,123	0,059
Fox 4-2	0,019	0,035	0,123	0,059
Fox 4-3	0,019	0,035	0,123	0,059
Fox 4-4	0,019	0,035	0,123	0,059
Fox 5-1	0,019	0,035	0,123	0,059
Fox 5-2	0,019	0,035	0,123	0,059
Fox 5-3	0,019	0,035	0,123	0,059
Fox 5-4	0,019	0,035	0,123	0,059
Inner 02-1	0,019	0,035	0,123	0,059
Inner 02-2	0,019	0,035	0,123	0,059
Inner 03-1	0,019	0,035	0,140	0,065
Inner 03-2	0,019	0,035	0,140	0,065
Inner 04-1	0,019	0,035	0,222	0,092
Inner 04-2	0,019	0,035	0,222	0,092
Inner 05-1	0,019	0,035	0,190	0,081
Inner 05-2	0,019	0,035	0,190	0,081
Inner 06-1	0,019	0,035	0,152	0,068
Inner 06-2	0,019	0,035	0,152	0,068
Inner 07-1	0,024	0,035	0,132	0,063
Inner 07-2	0,213	0,035	0,132	0,127
Inner 08-1	0,019	0,035	0,222	0,092
Inner 08-2	0,019	0,035	0,222	0,092

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Inner 08-3	0,019	0,035	0,222	0,092
Inner 09-1	0,031	0,035	0,267	0,111
Inner 09-2	0,019	0,035	0,267	0,107
Inner 09-3	0,079	0,035	0,267	0,127
Inner 10-1	0,019	0,035	0,132	0,062
Inner 10-2	0,019	0,035	0,132	0,062
Juliet-1	0,019	0,035	0,132	0,062
Juliet-2	0,217	0,035	0,132	0,128
Juliet-3	0,019	0,035	0,132	0,062
Juliet-4	0,217	0,035	0,132	0,128
Nov 1-1	0,019	0,035	0,123	0,059
Nov 2-1	0,019	0,035	0,123	0,059
Nov 2-2	0,213	0,035	0,123	0,124
Nov 4-2	0,019	0,503	0,123	0,215
Nov 4-3	0,019	0,503	0,123	0,215
Nov 5-2	0,019	0,035	0,123	0,059
Nov 6-3	0,019	0,035	0,123	0,059
Nov 6-4	0,241	0,035	0,123	0,133
Outer 01-1	0,019	0,035	0,123	0,059
Outer 01-2	0,019	0,035	0,123	0,059
Outer 02-1	0,019	0,035	0,123	0,059
Outer 02-2	0,019	0,035	0,123	0,059
Outer 03-1	0,019	0,035	0,140	0,065
Outer 03-2	0,019	0,035	0,140	0,065
Outer 04-1	0,019	0,035	0,140	0,065
Outer 04-2	0,019	0,035	0,140	0,065
Outer 05-1	0,019	0,035	0,140	0,065
Outer 05-2	0,019	0,035	0,140	0,065
Outer 05-3	0,019	0,035	0,140	0,065
Outer 06-1	0,019	0,035	0,140	0,065
Outer 06-2	0,152	0,035	0,140	0,109
Outer 07-1	0,217	0,035	0,152	0,134
Outer 07-2	0,042	0,035	0,152	0,076

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
Outer 08-1	0,019	0,035	0,132	0,062
Outer 08-2	0,079	0,035	0,132	0,082
Outer 09-1	0,019	0,035	0,132	0,062
Outer 09-2	0,057	0,035	0,132	0,075
Outer 09-3	0,019	0,035	0,132	0,062
Outer 10-1	0,019	0,035	0,126	0,060
Outer 10-2	0,019	0,035	0,126	0,060
Papa 9-1	0,019	0,035	0,126	0,060
Papa 9-2	0,019	0,035	0,126	0,060
Papa 9-3	0,019	0,035	0,126	0,060
Papa 9-4	0,019	0,035	0,126	0,060
Romeo 1-1	0,019	0,035	0,123	0,059
Romeo 1-2	0,213	0,035	0,123	0,124
Romeo 1-3	0,152	0,035	0,123	0,103
Romeo 2-1	0,019	0,035	0,132	0,062
Romeo 2-2	0,019	0,035	0,132	0,062
Romeo 4-2	0,019	0,035	0,222	0,092
RW 01-19-1	0,019	0,035	0,364	0,139
RW 01-19-2	0,019	0,035	0,364	0,139
RW 01-19-3	0,019	0,035	0,364	0,139
RW 01-19-4	0,019	0,035	0,364	0,139
RW 01-19-5	0,115	0,035	0,364	0,171
RW 01-19-6	0,060	0,035	0,364	0,153
RW 01-19-7	0,217	0,035	0,364	0,205
RW 01-19-8	0,019	0,035	0,364	0,139
RW07L25R-1	0,019	0,035	0,504	0,186
RW07L25R-2	0,277	0,035	0,504	0,272
RW07L25R-3	0,085	0,035	0,504	0,208
RW07L25R-4	0,230	0,035	0,504	0,256
RW07L25R-5	0,019	0,035	0,504	0,186
RW07L25R-6	0,019	0,035	0,504	0,186
RW07L25R-7	0,019	0,035	0,504	0,186
RW07R25L-1	0,019	0,035	0,405	0,153

Pavement section	Priorities - Total functional condition	Priorities - Total structural condition	Priorities - Total operational importance	Sum of Total Priority
RW07R25L-2	0,019	0,035	0,405	0,153
RW07R25L-3	0,085	0,035	0,405	0,175
RW07R25L-4	0,019	0,035	0,405	0,153
RW07R25L-5	0,230	0,035	0,405	0,223
RW07R25L-6	0,158	0,035	0,405	0,199
RW07R25L-7	0,115	0,035	0,405	0,185
SIERRA-1	0,019	0,035	0,152	0,068
TANGO-1	0,019	0,035	0,152	0,068
UNIFORM-1	0,019	0,035	0,126	0,060
Victor 1-2	0,277	0,035	0,123	0,145
Whisky 1-2	0,019	0,035	0,123	0,059
Whisky 2-1	0,019	0,035	0,123	0,059
Whisky 2-2	0,019	0,035	0,123	0,059
Whisky 2-3	0,213	0,035	0,123	0,124
Whisky 2-4	0,019	0,035	0,123	0,059
Whisky 3-1	0,019	0,035	0,123	0,059
Whisky 3-2	0,019	0,035	0,123	0,059
Whisky 4-1	0,019	0,035	0,126	0,060
Whisky 4-2	0,019	0,035	0,126	0,060
Whisky 4-3	0,019	0,035	0,126	0,060
Whisky 4-4	0,019	0,035	0,126	0,060
Yankee-2	0,019	0,035	0,123	0,059
Zulu-1	0,019	0,035	0,126	0,060
Zulu-2	0,019	0,035	0,126	0,060
Zulu-3	0,019	0,035	0,126	0,060
Zulu-4	0,019	0,035	0,126	0,060
Zulu-5	0,019	0,035	0,126	0,060
Zulu-6	0,152	0,035	0,126	0,104