



german
cooperation

DEUTSCHE ZUSAMMENARBEIT

Implemented by:

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



MAINTENANCE AND REPAIR MANUAL for Grassroots Sports Grounds

GERMAN
DEVELOPMENT
COOPERATION
**SPORT FOR
DEVELOPMENT**



Deutsche
Sporthochschule Köln
German Sport University Cologne

Published by the
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

‘Sport for Development in Africa’ (S4DA) Regional Project
Dag-Hammarskjöld-Weg 1–5
65760 Eschborn, Germany

T +49 6196 79-0
F +49 6196 79-11 15

Sport-for-Development-in-Africa@giz.de
www.giz.de/Sport-for-Development-in-Africa

As at
October 2017

GIZ is responsible for the content of this publication.

On behalf of the
German Federal Ministry for Economic Cooperation and Development (BMZ).

Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH began to work through the 'Sport for Development in Africa' (S4DA) Regional Project in 2014 to establish sport as a means of achieving development objectives in selected African countries.

S4DA aims at creating access for children and young persons to development opportunities through sport. It focuses on the creation of access to infrastructure and the sustainable implementation of sport-pedagogical exercises. S4DA is active in Ethiopia, Kenya, Mozambique, Namibia and Togo, and – to a lesser extent – the project supports activities also in other African countries. S4DA makes a significant contribution to the initiative 'More Space for Sport – 1,000 Chances for Africa' which was launched by the BMZ.

The present manual has been developed by S4DA in close cooperation with local consultants. It integrates knowledge on specific local needs and topics and can be used by both the S4DA team and partners. The following persons and institutions collaborated in the development of this manual, contributing to the content with their knowledge and expertise:

Expert Consultant

Tadesse Ayalew, Lecturer, Addis Ababa University, Ethiopia

'Sport for Development in Africa' (S4DA) Regional Project

Anja Arnemann

Hannes Bickel (Project Manager)

Dominik Birnbacher

Jörg Le Blanc

Melany Neff

Addisalem Nega

Printed by

Druckreif, Frankfurt am Main

Design and layout

EYES-OPEN, Berlin

Photos

Cover: Football field at Don Bosco Boys Town Technical Training Center Karen in Nairobi, Kenya | GIZ/Ray Ochieng

Back: Basketball court at Bela Rosa, Namibia | GIZ/Tina Krueger

GIZ/Addisalem Nega – pages: 13, 14 upper picture, 15 upper picture, 16 lower picture, 17 lower picture, 22, 23, 24, 34–39, 45, 46, 53, 54, 62

GIZ/Ahadu Gebru – pages: 15 lower picture, 16 upper picture

GIZ/Anteneh Afework – pages: 4/5, 14 lower picture

GIZ/Heidi Beha – pages: 19, 61

GIZ/Mulugeta Gebrekidan – page: 33

SOS Childrens Villages Rwanda – pages: 12, 19

GIZ/Stefan Oosthuizen – page: 17 upper picture

TABLE OF CONTENTS

INTRODUCTION.....	6
PART I – MAINTENANCE AND REPAIR OF GRASSROOTS SPORTS GROUNDS – GENERAL CONSIDERATIONS	11
1. TYPES AND DESCRIPTION OF GRASSROOTS SPORTS GROUNDS AND SURFACES	13
1.1 TYPES OF S4DA’S STANDARD GRASSROOTS SPORTS GROUNDS	14
1.2 S4DA’S GRASSROOTS SPORTS GROUNDS SURFACE FINISH TYPES.....	18
2. MAINTENANCE AND REPAIR - BENEFITS AND RESOURCES NEEDED	19
2.1 GENERAL RESOURCES FOR MAINTENANCE AND REPAIR ACTIVITIES.....	20
2.2 TYPICAL DEFECTS OF GRASSROOTS SPORTS GROUNDS	22
3. MAINTENANCE AND REPAIR SCHEDULE	24
PART II – PRACTICAL MAINTENANCE AND REPAIR RECOMMENDATIONS ACCORDING TO SURFACE FINISHES	31
TURF SURFACES	33
1. TYPICALLY OCCURRING DEFECTS.....	34
2. MAINTENANCE OF TURF SURFACE GRASSROOTS SPORTS GROUNDS.....	35
3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS.....	40
4. INSPECTION CHECKLIST FOR TURF SURFACE GRASSROOTS SPORTS GROUNDS.....	41
CONCRETE SURFACES	45
1. TYPICALLY OCCURRING DEFECTS.....	46
2. MAINTENANCE OF CONCRETE SURFACE GRASSROOTS SPORTS GROUNDS.....	46
3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS.....	47
4. INSPECTION CHECKLIST FOR CONCRETE SURFACE GRASSROOTS SPORTS GROUNDS ..	48



GRAVEL SURFACES.....	53
1. TYPICALLY OCCURRING DEFECTS.....	54
2. MAINTENANCE OF GRAVEL SURFACE GRASSROOTS SPORTS GROUNDS	54
3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT & TOOLS.....	55
4. INSPECTION CHECKLIST FOR GRAVEL SURFACE GRASSROOTS SPORTS GROUNDS ...	55
SAND SURFACES.....	61
1. TYPICALLY OCCURRING DEFECTS.....	62
2. MAINTENANCE OF SAND SURFACE GRASSROOTS SPORTS GROUNDS.....	62
3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS.....	63
4. INSPECTION CHECKLIST FOR SAND SURFACE GRASSROOTS SPORTS GROUNDS.....	63
GLOSSARY OF TERMS.....	68
FURTHER SOURCES OF INFORMATION	70

INTRODUCTION

Welcome to the **Maintenance and Repair Manual for Grassroots Sports Grounds**. Its aim is to assist Maintenance Managers in analysing the status of sports grounds, taking the necessary steps to prevent possible defects, repairing damages when necessary and maintaining sports grounds functional for a long time. The manual has been developed by the ‘Sport for Development in Africa’ (S4DA) Regional Project of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

S4DA seeks to promote sport as a tool for positive youth development, education and the adoption of a healthy lifestyle. Therefore, it facilitates sports grounds rehabilitation and construction as well as local capacity development. This includes the training of sports coaches and other stakeholders who implement programmes and the development of strategies for sustainability regarding both the physical maintenance of sports grounds and the delivery of ‘Sport for Development’ (S4D) activities. In this process, social, cultural and economic factors in partner countries must be taken into account. Ultimately, local partners should be enabled to continue to train coaches and to maintain sports grounds and equipment on their own.

S4DA makes a significant contribution to the BMZ’s ‘More Space for Sport – 1,000 Chances for Africa’ initiative, launched in 2014 by the Federal Minister Dr Gerd Müller as part of the endeavours to build a broad and effective alliance for Africa between sport, civil society and the private sector.

The multi-state project S4DA operates in Ethiopia, Kenya, Namibia, Mozambique and Togo, and also supports individual measures on a smaller scale in other Africa countries. Its aim is to rehabilitate or newly build 100 sports grounds in different African countries with diverse climatic conditions, therefore S4DA developed a clear and flexible construction standard for grassroots sports grounds with different surface finishes. The

present manual offers a guideline for maintaining grassroots sports grounds throughout Africa, including those of partner organisations and those built by S4DA.

The manual explores all relevant elements for the maintenance and repair of grassroots sports grounds.

PART I describes what needs to be done to keep grassroots sports grounds operational. It

- ➔ 1 addresses common maintenance and repair requirements, describing the different types of sports grounds and finish surfaces supported by S4DA,
- ➔ 2 explains benefits of maintenance and repair activities by giving an overview of resources needed,
- ➔ 3 offers a simplified maintenance and repair schedule which Maintenance Managers can use to plan their work in a coherent manner, thus saving time and costs.

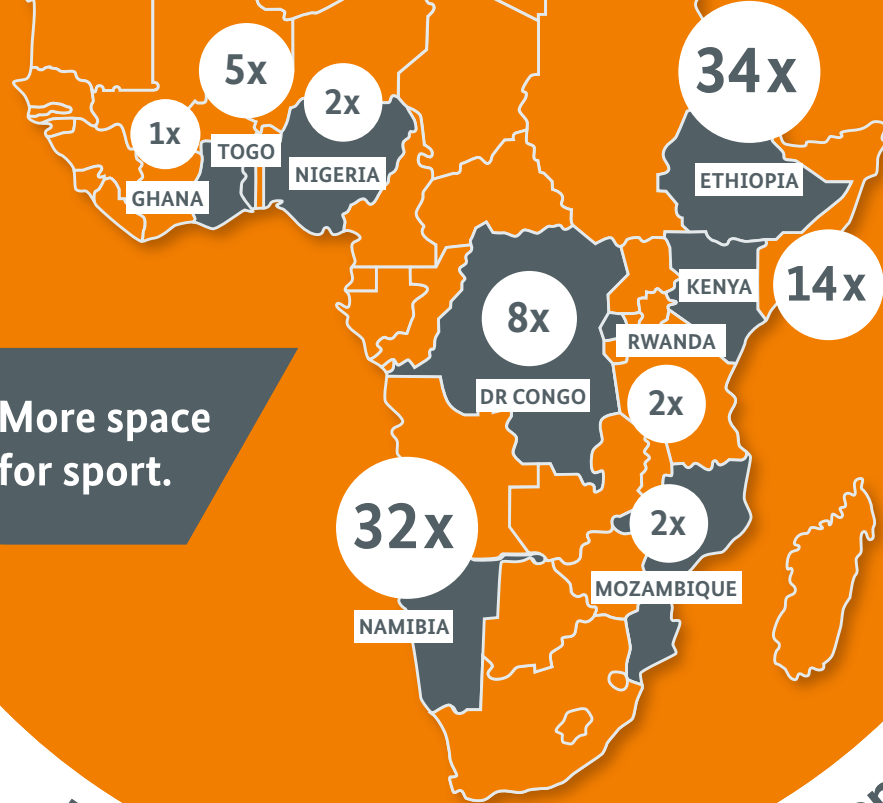
PART II focuses on the different grassroots sports grounds surface finishes:

- ➔ **TURF**
- ➔ **CONCRETE**
- ➔ **GRAVEL**
- ➔ **SAND**

Their specific maintenance and repair requirements, listing recommended tools, materials and equipment as well as a detailed checklist which helps to identify maintenance and repair needs and offers guidance and practical recommendations on maintenance and repair activities.

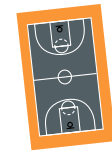
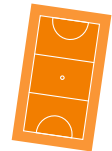
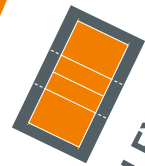
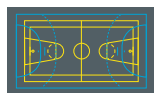
SPORT FOR DEVELOPMENT IN AFRICA

Urban & rural areas in different climate zones.



More space for sport.

Types of sports grounds with turf, concrete, gravel or sand surface.





The goal:

100,000

children and young people benefit from 100 sports grounds.

Sports grounds with concepts!

STANDARDS
For construction.
For maintenance.
For repair.

CAPACITY DEVELOPMENT

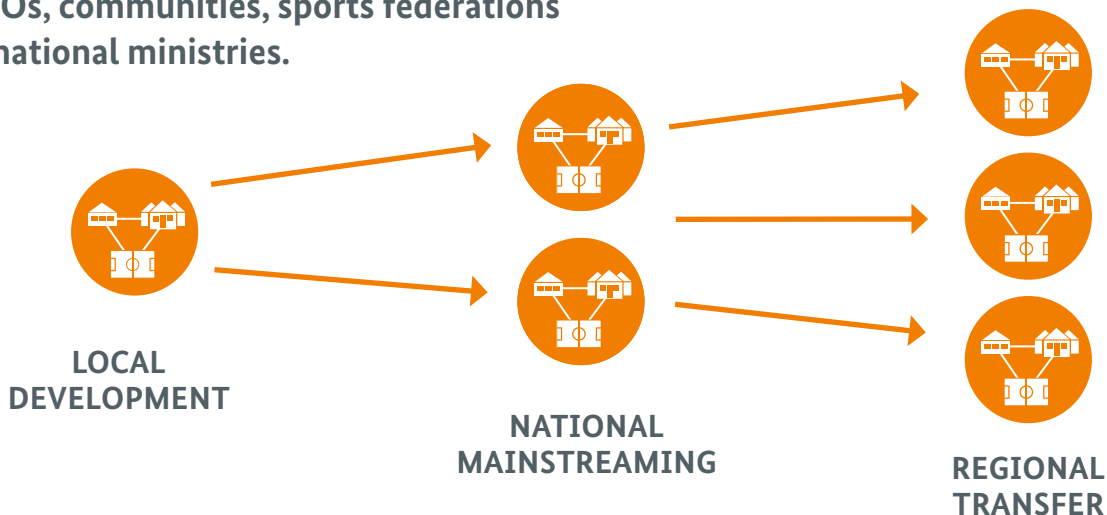
For S4D coaches.
For S4D instructors.
For local partners.

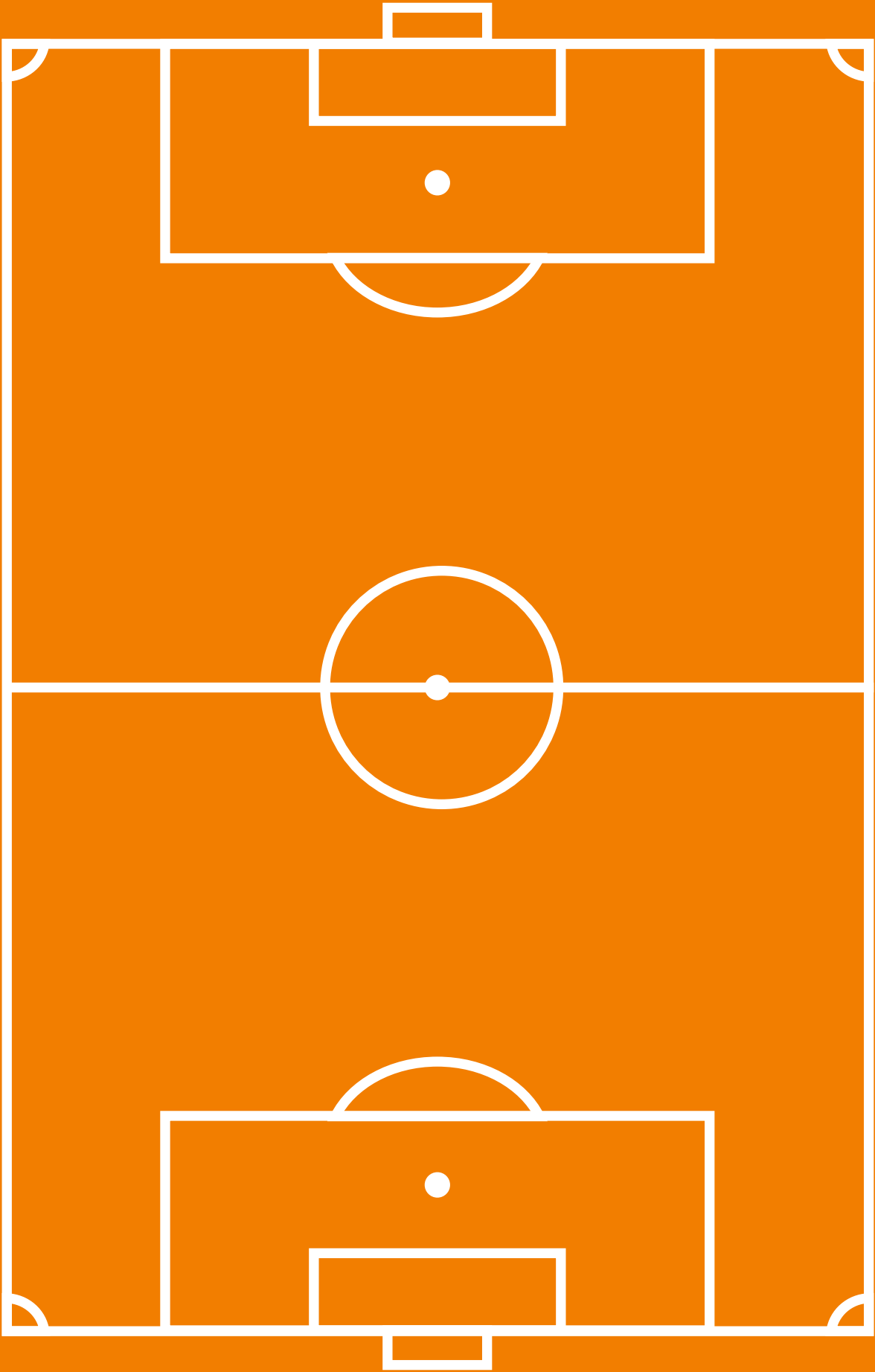
ADJUSTED METHODS



Up-scaling

Sustainability and broad outreach through embedding S4D in schools, NGOs, communities, sports federations or national ministries.





PART

I

PART I

MAINTENANCE AND REPAIR OF GRASSROOTS SPORTS GROUNDS – GENERAL CONSIDERATIONS

Grassroots sports grounds are relatively easy to maintain. Unlike buildings, they require only a small amount of items to be checked. Furthermore, they are built with local materials which are accessible and fairly inexpensive. Finally, most maintenance and repair tasks do not require a highly specialised knowledge and can be carried out by a person familiar with general maintenance and repair procedures.

Every sports ground is special: it has a specific surface finish and has to withstand not only a specific “load” but also different weather conditions. Despite all differences, there are also several common maintenance and repair needs to sports grounds.

Damages and defects often affect the sports grounds surfaces, installations, drainage systems and line markings first. Being aware of common maintenance and repair needs and planning for regular checks and controls, helps to prevent further damages to appear and to keep sports ground functional for the longest time possible.

1 TYPES AND DESCRIPTION OF GRASSROOTS SPORTS GROUNDS AND SURFACES



Basketball court at SOS Children's Villages in Kigali, Rwanda.

Working in diverse climatic and geographical contexts, S4DA has to be able both to guarantee a (high) quality of the sports grounds and to adapt to specific local requirements. Therefore, S4DA developed a standard design for grassroots sports grounds, which ensures a consistent high quality of different types of sports grounds, notwithstanding their specific location. This standard design allows for a flexible adjustment of sports grounds constructions according to specific local situations, considering different sizes and alternative surface finishes. In addition to the climatic factor, the availability of materials, location and cost limitation influence the final grassroots sports grounds design.

The following list gives an overview of the sports grounds that are included in S4DA's standard design.

1.1. TYPES OF S4DA'S STANDARD GRASSROOTS SPORTS GROUNDS

A sports ground is an outdoor or indoor playing area for various sports. Specific playing areas are usually addressed as fields or courts. The term 'sports ground', however, refers to all kinds of playing areas. For the purpose of this manual, it will be used for: football fields; volleyball courts; beach volleyball courts; basketball courts; handball courts; multipurpose courts; netball courts.

FOOTBALL FIELDS



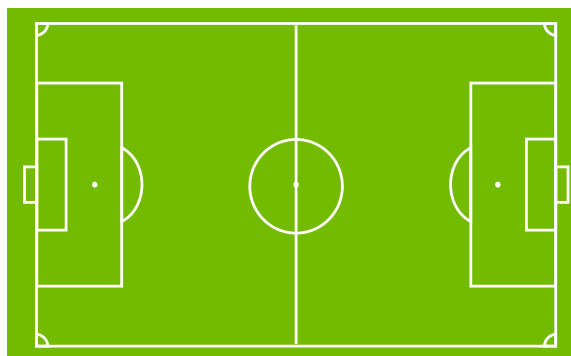
Football field with turf surface at Tegbare-Id College in Addis Ababa, Ethiopia.

Shape: rectangular with line markings as defined by the rules of the game

Surface: turf, concrete, gravel and sand

Required installations: two goals, one in the centre of either of the shorter/smaller sides of the field

Size: varies, with 100 m x 64 m being the minimum size for international games



VOLLEYBALL COURTS



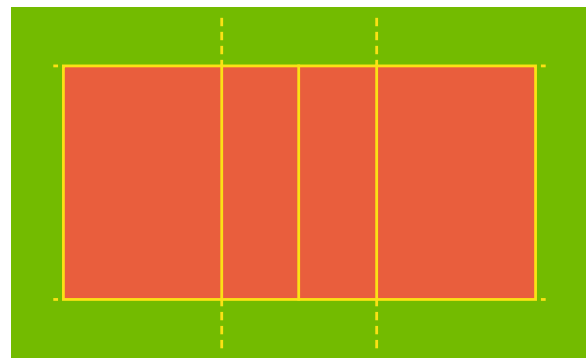
Volleyball court at Valombola Vocational Training Center in Ongwediva, Namibia.

Shape: rectangular with line markings as defined by the rules of the game

Surface: turf, concrete, gravel or asphalt

Required installations: a net dividing the court

Size: 16 m x 8 m



BEACH VOLLEYBALL COURTS



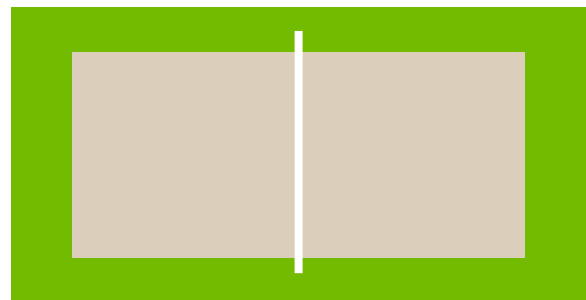
Beach Volleyball court at Don Bosco Mondo e. V. in Adwa, Ethiopia.

Shape: similar to the normal volleyball court, with rope used for line markings

Surface: sand

Required installations: a net dividing the court

Size: varies between 16 m x 8 m and 18 m x 9 m



BASKETBALL COURTS



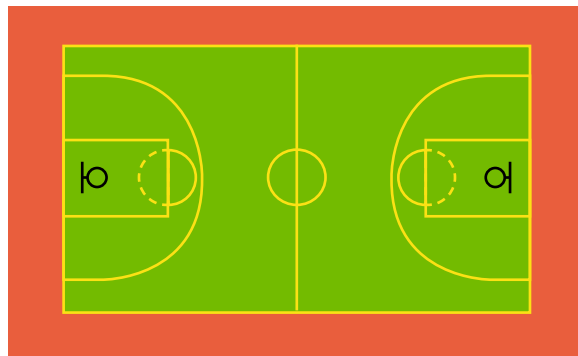
Basketball court at Multipurpose Youth Resource Center in Ehnana, Namibia.

Shape: rectangular with line markings as defined by the rules of the game

Surface: wood, concrete, gravel or asphalt

Required installations: two nets with backboards, one in the centre of either of the shorter/smaller sides of the court.

Size: 28 m x 15 m



HANDBALL COURTS



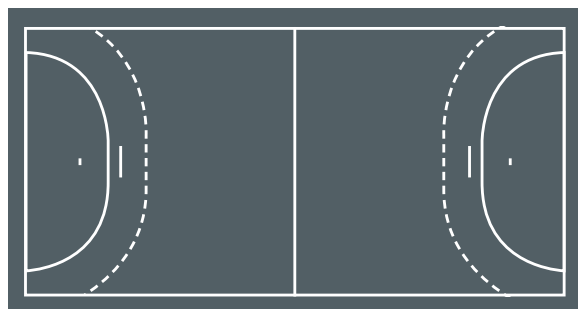
Handball court at Delachen secondary school Addis Ababa, Ethiopia.

Shape: rectangular with line markings as defined by the rules of the game

Surface: wood, concrete or gravel

Required installations: two goals, each in the centre of the two shorter/smaller sides of the court.

Size: 40 m x 20 m



NETBALL COURTS



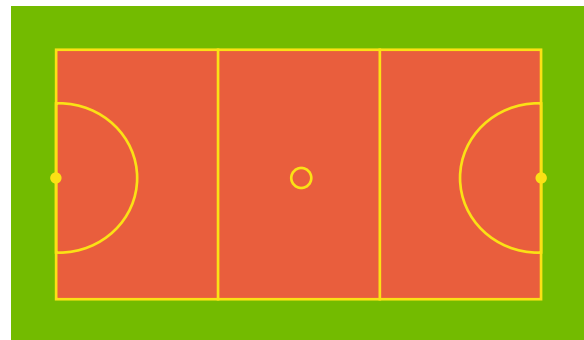
Netball court at Valombola Vocational Training Center in Ongwediva, Namibia.

Shape: rectangular with line markings as defined by the rules of the game

Surface: wood, concrete, or gravel

Required installations: two goal rings, one in the centre of the two shorter/smaller sides of the court

Size: 30.5 m x 15.25 m



MULTIPURPOSE COURTS

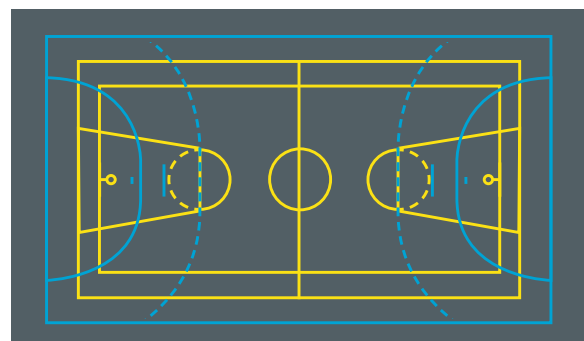


Multipurpose court at Tegbare-Id College in Addis Ababa, Ethiopia.

Shape: rectangular with line markings in different colours to differentiate between the different sports

Surface: can be made of almost any type of surface depending on the different sports it is being used for

Size: 40 m x 20 m



1.2. S4DA'S GRASSROOTS SPORTS GROUNDS SURFACE FINISH TYPES

The S4DA Regional Project has developed a range of standard designs for the major sports grounds' surface finishes: turf, concrete, gravel and sand. The table below shows which types of surface finish S4DA has designated for each type of sports ground.

TYPE OF SPORTS GROUND	TYPE OF SURFACE FINISH			
	TURF	CONCRETE	GRAVEL	SAND
1. FOOTBALL FIELDS	●	●	●	●
2. VOLLEYBALL COURTS	●	●	●	
3. BEACH VOLLEYBALL COURTS				●
4. BASKETBALL COURTS		●	●	
5. HANDBALL COURTS		●	●	
6. NETBALL COURTS		●	●	
7. MULTIPURPOSE COURTS		●		

2 MAINTENANCE AND REPAIR – BENEFITS AND RESOURCES NEEDED



Football field at Don Bosco Youth Centre in Lome, Togo.

All sports grounds, regardless of their surface, require occasional repair and regular maintenance works to extend their functional lifetime. Maintenance reduces the risk of future damage, while repair helps to improve surfaces or installations that have already been impaired.

Maintenance and repair works cannot indefinitely prevent problems, but they help to minimise damage and, thus, costs. Basic maintenance and repair works on sports grounds are not limited to a regular schedule of trash removal, spot cleaning and sweeping, or the removal of weeds – it is about the sustainability of sports grounds for long term usage, protecting the environment and increasing the durability of surfaces and installations.

Although these basic works barely scratch the surface of possible preventive maintenance techniques, they will go a long way towards providing safe and playable surfaces for participants.

The following paragraphs give an overview of the resources that are commonly needed for carrying out maintenance and repair activities, address typically occurring defects on sports grounds and their basic installations. Part II explores specific requirements as well as recommended solutions for the different types of surfaces.

2.1. GENERAL RESOURCES FOR MAINTENANCE AND REPAIR ACTIVITIES

Maintaining sports grounds requires diverse types of equipment, materials, knowledge and labour forces. These resources depend on factors such as

- the required quality standard for the sports ground
- the specific defects that must be corrected
- the availability of maintenance personnel, and finally
- the maintenance budget.

The Maintenance Manager needs to consider all these factors when assessing the necessary resources for the maintenance of a specific sports ground.

Maintenance and repair activities require a budget. If this is not easily available or not secured, organisations can explore opportunities such as renting out the sports ground to other clubs or local actors, offering available space for advertisement, or applying for financial support from institutions like municipalities or non-governmental organisations.

Being dedicated to maintenance and repair requirements and solutions, this manual cannot explore existing opportunities for allocating resources to maintenance and repair in detail. However, S4DA encourages all organisations to explore local opportunities so as to ensure a sustainable income for maintenance and repair.

■ MAINTENANCE AND REPAIR UTILITIES

Utilities are infrastructure services such as electricity, gas, water/sewage and communications services. The provision of these utilities is essential for effective maintenance operations.

■ MAINTENANCE AND REPAIR PERSONNEL

The maintenance and repair of sports grounds requires sufficient personnel, trained and qualified to efficiently carry out the necessary measures. Which personnel is needed depends on the type and severity of defects, the type of equipment and technology available, and the possibility to hire external technical service providers.

A Maintenance Manager is the key person for any maintenance and repair activity. Ideally, he or she is a good 'all-rounder', proficient in general maintenance and repair processes and able to identify and single-handedly resolve the most frequently occurring problems. He or she is responsible for identifying defects as well as for planning the adequate maintenance and repair activities.

This includes calculating maintenance and repair costs, deciding on whether or not external contractors are needed and, if so, coordinating and supervising them.

To remedy larger defects, he or she may need support from other professionals, such as:

- **gardeners:** for landscaping and greenery works, especially on turf surfaces.
- **building workers:** skilled personnel for all construction activities, especially for drainage systems, concrete surfaces and metal works.
- **General labourers:** labourers for supporting the building workers in any of maintenance and repair activity.

Ideally, supporting maintenance and repair personnel have formal training and experience in gardening, metal-work, painting, building works, sanitary and electrical works. Qualified support personnel can be found, for instance, at technical colleges or at vocational schools with a background on construction or gardening.

2.2. TYPICAL DEFECTS OF GRASSROOTS SPORTS GROUNDS

All sports grounds – notwithstanding their specific surface – have several common maintenance and repair needs. These include the maintenance of sports grounds installations, the drainage system and the line marking.

■ TYPICALLY OCCURRING DEFECTS OF GRASSROOTS SPORTS GROUND INSTALLATIONS

The main reasons for the deterioration of grassroots sports ground installations such as goal posts and basketball backstop units are high utilisation, external and environmental impacts. While the latter typically induce slow deterioration, external impacts, e.g. the passing or parking of cars or even vandalism, can immediately cause serious damage. The most commonly occurring defects on sports grounds installations include:

- distorted and loosely anchored goal posts and basketball backstop units
- inadequately padded goal posts
- damaged or not securely tightened bolts, welding points, screws, and connections for the goal posts
- faded paint
- disintegrating fence installations
- corrosion of steel structures.



Typical bending, aging, fading out of colour; incorrect dimension and corrosion problems on goal and basketball post installations.

■ TYPICALLY OCCURRING DEFECTS OF DRAINAGE STRUCTURES

Excess water within and/or on top of sports ground surfaces can significantly disrupt the performance properties of the surface. Surface-water mainly accumulates by means of rain, mist and dew. Drainage systems provide remedy: they collect and transport the excess water away from the sports ground.

The most commonly occurring defects of drainage structures include:

- settlement along the surface
- erosion
- cracks, separation, or blowout of concrete lining
- accumulation of sediment or debris
- animal burrows
- obstructions due to excessive vegetation
- damage due to equipment or motor vehicles.



Accumulation of sediment or debris in drainage structures.

■ TYPICALLY OCCURRING DEFECTS OF LINE MARKINGS

Exposure to sun, wind and rain as well as high usage of the sports ground can cause line markings to fade.

The most commonly occurring causes of such defects include:

- environmental, natural and external factors
- over-usage of the sports ground
- lack of regular maintenance.



Faded line marking on Basketball court.

3

MAINTENANCE AND REPAIR SCHEDULE



Multipurpose court at Tegbare-Id College in Addis Ababa, Ethiopia.

In order to keep sports grounds intact and safe, it is crucial to stick to a maintenance and repair schedule. This helps you plan and implement the necessary works.

You can use the following template as a guideline to develop your own schedule, taking the specific needs of the sports ground(s) you look after, its programmes and closing times into account. Also, consider the climatic conditions of your country or region, and plan the activities according to the (beginning, middle or end of the) season.

The climatic conditions in most African countries call for a distinction between a wet and a dry season – the period of the year with the highest and the lowest precipitation. This is reflected in the template: It lists the major activities for each surface type and also the frequency of execution of the maintenance work according to the ‘wet’ or ‘dry season’.

The rainy season and its duration, however, varies from country to country, and the months of wet and dry season differ significantly between and within countries. In Ethiopia, for instance, the climate is tropical, and the rainy season covers the period from June to September. In other countries, such as Namibia, that period lasts from December to March and also varies between provinces. In Togo, the climate is tropical, with a dry winter season and a rainy season from April to October in the centre and from May to October in the north of the country. Along the coast, there is a significant decline in rainfall from July to September.

In some countries, there is more than one wet or dry season a year. In which case, the template should be adapted to reflect local climate conditions.

The schedule is designed to cover a four years period. Afterwards, it should be repeated accordingly.

1st Year

SCHEDULE FOR MAINTENANCE

	MAINTENANCE ACTIVITY ON	FIRST YEAR ACTIVITY		REMARK
		Dry season	Wet season	
		Frequency of Maintenance	Frequency of Maintenance	
TURF SURFACE	TURF SURFACE		1 x middle season	Mowing can be done anytime, depending on grass height.
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	Recommended after each big game.
	SCOREBOARD (if any)	1 x beginning season		
	DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.
CONCRETE SURFACE	CONCRETE SURFACE		1 x end season	
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	Recommended after each big game.
	SCOREBOARD (if any)	1 x beginning season		
	DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.
GRAVEL SURFACE	GRAVEL SURFACE		1 x end season	
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	Recommended after each big game.
	SCOREBOARD (if any)	1 x beginning season		
	DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.
SAND SURFACE	SAND SURFACE		1 x end season	
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	Recommended after each big game.
	SCOREBOARD (if any)	1 x beginning season		
	DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.

2nd Year

	MAINTENANCE ACTIVITY ON	SECOND YEAR ACTIVITY		REMARK
		Dry season	Wet season	
		Frequency of Maintenance	Frequency of Maintenance	
TURF SURFACE	TURF SURFACE		1 x middle season	Mowing can be done anytime, depending on grass height.
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)			
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	
CONCRETE SURFACE	CONCRETE SURFACE			
	FIELD MARKINGS			
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)			
DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.	
GRAVEL SURFACE	GRAVEL SURFACE			
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)			
DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.	
SAND SURFACE	SAND SURFACE			
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)			
DRAINAGE			Before each rainy season, drainage channels must be checked and cleaned.	

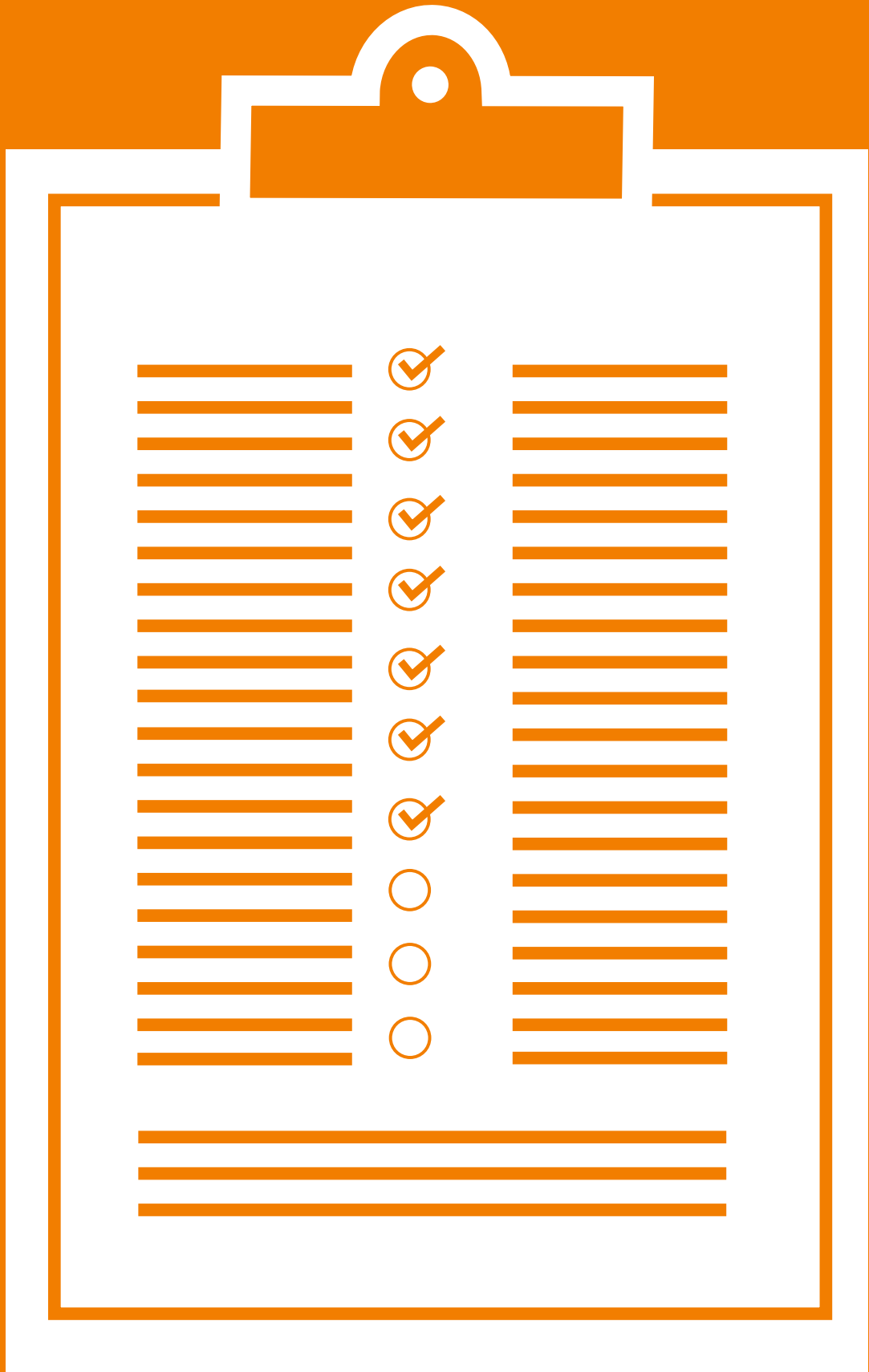
3rd Year

	MAINTENANCE ACTIVITY ON	THIRD YEAR ACTIVITY		REMARK
		Dry season	Wet season	
		Frequency of Maintenance	Frequency of Maintenance	
TURF SURFACE	TURF SURFACE		1 x middle season	Mowing can be done anytime, depending on grass height.
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	
CONCRETE SURFACE	CONCRETE SURFACE		1 x end season	
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	
GRAVEL SURFACE	GRAVEL SURFACE		1 x end season	
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	
SAND SURFACE	SAND SURFACE		1 x end season	
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS	1 x beginning season		
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)	1 x beginning season		
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)	1 x beginning season		
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	

4th Year

	MAINTENANCE ACTIVITY ON	FOURTH YEAR ACTIVITY		REMARK
		Dry season	Wet season	
		Frequency of Maintenance	Frequency of Maintenance	
TURF SURFACE	TURF SURFACE		1 x middle season	Mowing can be done anytime, depending on grass height.
	FIELD MARKINGS	1 x beginning season		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end of the season		Before each rainy season, drainage channels must be checked and cleaned.	
CONCRETE SURFACE	CONCRETE SURFACE			
	FIELD MARKINGS			
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.	
GRAVEL SURFACE	GRAVEL SURFACE			
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE	1 x end season		Before each rainy season, drainage channels must be checked and cleaned.	
SAND SURFACE	SAND SURFACE			
	FIELD MARKINGS	1 x during tournament		
	GOALS, POSTS AND NETS			
	TRANSITION AREAS	1 x beginning season		
	FENCING (If any)			
	LIGHTING (If any)	1 x beginning season		If broken, replace anytime. Otherwise, check the functionality and clean.
	FACILITY (If any)			
	SPORTS GROUND CLEANNESS	1 x beginning season	1 x beginning season	
	SCOREBOARD (if any)	1 x beginning season		
DRAINAGE			Before each rainy season, drainage channels must be checked and cleaned.	

Note: The cycle of maintenance continues every four year similarly



PART

III

PART II

PRACTICAL MAINTENANCE AND REPAIR RECOMMENDATIONS ACCORDING TO SURFACE FINISHES

This second part of the Manual addresses specific maintenance and repair recommendations for turf, concrete, gravel and sand surfaces. Each section contains information about the tools, materials and equipment required as well as a detailed inspection checklist which helps to identify maintenance and repair needs of specific grassroots sports grounds and gives helpful recommendations according to the specific surfaces.

Maintenance and repair activities seek to keep the sports grounds at the highest standard, safe and functional for use. However, Maintenance Managers do not always have access to the most adequate machinery or materials for correcting defects and keeping the sports grounds functional. Therefore, S4DA wants to encourage the Maintenance Manager to look for creative options, taking into account the local realities and opportunities as well as the maintenance and repair works budget. Line markings, for instance, can be temporarily refreshed with ashes from local bakeries; turf can be kept short by lightweight grass eating animals. Maintenance and repair of grassroots sports grounds, thus, requires finding the equilibrium between the highest standard and the local resources available.

TURF SURFACES



Football field at Tegbare-Id College in Addis Ababa, Ethiopia.

1. TYPICALLY OCCURRING DEFECTS

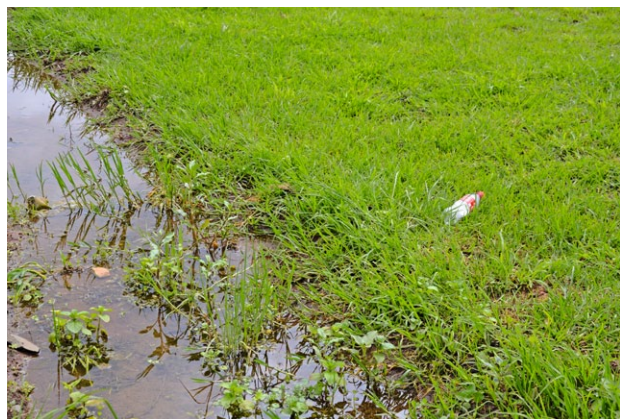
The most commonly occurring defects on turf surface finishes are:

- poor surface drainage
- poor surface levels
- poor grass establishment
- grass loss due to stress, disease, or weed invasion
- poor irrigation system
- uneven watering and fertilisers application.

The following pictures show these typical defects on turf sports grounds.



a) Poor drainage leading to loss of grass cover.



b) Poor surface levels, poor drainage and weed invasion.



c) Poor grass establishment.



d) Grass loss due to heat stress and disease.



e) Weed invasion affects consistency, pitch appearance and playing quality.



f) Uneven watering affecting grass density.



g) Uneven fertiliser application leading to poor appearance and uneven grass growth.

2. MAINTENANCE OF TURF SURFACE GRASSROOTS SPORTS GROUNDS

Upholding the original standard of a sports ground requires enduring commitment and regular maintenance. A minimum repair work helps to keep the sports ground intact and to increase its durability.

The essential maintenance operations required to preserve sports grounds with a turf surface finish include:



■ MOWING

Mowing is essential for keeping the grass at a height suitable for sports activities and increasing the turf's density. It can be conducted with walk-behind machines, tractors, or ride-on mowers. In all cases, it is essential to keep the following in mind:

- Cutting blades need to be properly set up and sharpened to give a good-quality cut.
- Mowing high and keeping the grass two to three inches long will encourage a dense turf with a well-developed root system. This increases the turf's drought tolerance and requires less fertiliser and water.
- To avoid root shock, don't remove more than one third of the grass blades at a time.
- Grass clippings should be left on the ground; thus valuable nutrients can be recycled into the soil.
- Mowing should be done regularly. Avoid mowing in the middle of the day, as this may result in an increased loss of moisture and nutrients, unless the grass is watered afterwards.
- It is advised to mow each time in different patterns. This helps the grass to grow upward, reduces soil compaction and wear of turf from the wheels of the mowing machine.



Simple mowing machine.

■ FERTILISER APPLICATION

Fertilisers provide essential nutrients to the turf, supporting its growth, helping it recover from any damages and improving pigmentation.

A good fertiliser must contain nitrogen, phosphorus and potassium. It is essential to keep the following in mind:

- Fertilisers can be applied in powdered, granular or liquid form. For powdered or granular fertilisers a rotary spreader is used, liquid ones require a sprayer.
- In general, it is recommended that turf sports grounds receive two complete fertiliser applications per year. Accurate and even application is essential.
- How often fertilisers need to be applied depends heavily on the type of grass. Consult the supplier for information about the recommended ratio of nitrogen, phosphorus and potassium.

Natural organic materials containing activated or processed sewage sludge, animal or vegetable tankage, manures, soybean meal, or cottonseed meal can serve as an alternative to expensive store bought fertilisers.

■ IRRIGATION

Irrigation is a fundamental management practice to maintain healthy turf conditions. Efficient irrigation will enhance drought tolerance and reduce the need for water during the dry season. Please keep the following in mind:

- Over-irrigation can make the turf susceptible to diseases, increase the potential for erosion and leaching, and lead to low tolerance for drought.
- Soil moisture should be monitored and taken into account when determining the frequency of irrigation. The moisture content can be easily identified by visual inspection. Two of the main visual indicators are:
 - A dull bluish-grey colour and curled leaves are symptoms of severe moisture stress.
 - If footprints are visible after walking over a turf and the leaves do not return to their original position, irrigation is required.
- The preferred equipment for irrigation is a sprinkler system. The use of a hose entails the risk of uneven watering.



Manual irrigation of sports ground at Tegbare-Id College in Addis Ababa, Ethiopia.

■ SAND APPLICATION AND TOP DRESSING

Top dressing is the application of material such as sand to turf as a means of improving surface levels. It facilitates drainage, provides a firmer playing surface and stabilises channels created by aeration. For sand application and top dressing keep the following in mind:

- In rather cool and humid climates, pure sand is normally used. However, if the sand is too fine, it tends to hold water and impede drainage. If it is too coarse, it may cause problems of stability and damage the mowing machines.
- In rather hot and dry climates, a mix of sand with soil or organic matter is normally used, as this can help water and nutrient retention.
- If resources are limited, sand and top dressing can be applied manually (e.g. using a shovel followed by a brush or drag mat to distribute the material). However, rotary and drop spreaders ensure a much more even application.



Sand sprayer.

■ SCARIFICATION

Scarification – the process of removing excess organic matter from the sward – is important for the maintenance of turf surfaces. It improves the firmness and traction properties of the grass, opens up the surface, and weakens unwanted coarser grass or over-seeding.

There is a wide range of scarifying equipment, from rake attachments and harrows to powered scarifiers with rotating blades that cut into the turf surface.



Simple Scarification tool.

■ BRUSHING AND REMOVAL OF SURFACE DEBRIS

Sports grounds are brushed so as to remove grass cuttings and other debris or to evenly distribute top dressing material over the surface. Brushing causes the grass to stand up and improve. Equipment can vary from drag brushes to powered suction units, and often rotary mowers are used.



Simple grass brushing tool.

■ AERATION

Aeration is performed to create a network of holes in the turf, thus improving water infiltration and air exchange, relieving compaction in the soil, promoting better root development, and removing fine material from the surface layer. Stabilising those holes with sandy materials improves the firmness of the sports ground.

There is an extensive range of aeration equipment available on the market, ranging from – in the simplest case – hand forks to advanced powered equipment such as drum-type aerators, punch-action machines, drills and machines that inject compressed air.

■ LINE MARKING

The process of line marking is an essential part of the sports ground preparation. Only with well-defined, correctly located lines that conform to the rules of the game can a sports ground be used.

The Maintenance Manager can choose from a wide range of marking compounds available on the market. For safety reasons, marking compounds need to be approved for use.



Line marking Equipment.

■ WEEDS, DISEASES AND PESTS

Turf can be subject to invasion by weeds and damaged by disease or pests. The selection of the correct grass and good management practices can help to minimise these problems. Some weed types can be removed by hand, others – especially those with underground plant material – require treatment with herbicide, fungicide or pesticide.

Where such treatment becomes necessary, the problem must first be correctly identified. Note, however, that there are strict regulations concerning the use and application of herbicides, fungicides and pesticides on turf, which must be complied with at all times. The application rate is very important, thus most products must be applied with a properly calibrated sprayer.

■ MAINTENANCE PERIOD OF TURF SURFACES

In order to build a strong, healthy grass cover, it is essential that at the end of the playing season, a period is set aside to maintain the sports ground. This will typically include aeration, scarification, top dressing, fertiliser application, as well as localised sprigging or returning. Normally, a six to ten week break is necessary to produce a good-quality surface for the start of the next playing season. It is important that all usage is suspended during this period.

3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS

To carry out maintenance and repair works correctly, specific equipment is required. For turf finish surfaces, the following materials and tools are recommended.



4. INSPECTION CHECKLIST FOR TURF SURFACE GRASSROOTS SPORTS GROUNDS

The following checklist helps to identify maintenance and repair needs on turf sports grounds. When a need is identified, the list provides detailed recommendations and solutions.






















By using the checklist accordingly, Maintenance Managers will also ensure the health and safety of the players and protect them from injuries resulting from insufficient maintenance.

‘SPORT FOR DEVELOPMENT IN AFRICA’ (S4DA) REGIONAL PROJECT

PLAYING SURFACE – TURF
SPORTS GROUND SAFETY AND MAINTENANCE
CHECKLIST

SPORTS GROUND INFORMATION	
DATE:	REMARKS:
LOCATION:	
FIELD NAME:	
FIELD USAGE:	
INSPECTOR:	
SIGNATURE:	
GENERAL NOTE	
<p>Maintenance of a sports ground requires a regular inspection to identify the conditions of the sports ground and the actions to be taken. The frequency of inspection for sports ground can vary according to the intensity of its use – but the frequency of inspections should not be less than once a month.</p> <p>For each line of activity mark the smiley with 'x' to indicate the attention needed in each area:</p> <p>☺ means: with good condition and no need for maintenance or repair.</p> <p>☹ means: with fair condition but still function but might need action.</p> <p>☹ means: with poor condition, needing maintenance, repair and/or replacement.</p> <p>When repairs are needed, write a comment about each problem area and note the scheduled and actual repair date. Please skip the section, if it does not apply to your sports ground. The following sections shall be checked by the inspector to decide on repair works. The inspector shall fill the document properly and take the appropriate action.</p>	

PLAYING SURFACE – TURF




NO.	ACTIVITY	EVALUATION
1	Inspect sports ground for signs of erosion, rills or gullies:	  
	<ul style="list-style-type: none"> ● Repair erosion after storms, winds, or heavy exhaustion of the sports ground. ● Replace eroded soil. ● Rake, seed, and provide soil amendments (mulch or compost) to re-establish grass growth. ● Provide lime and a one-time fertiliser application if needed. 	
2	Inspect turf for areas of standing water:	  
	<ul style="list-style-type: none"> ● After rainstorms or irrigation, make sure the turf is thoroughly dry before playing. Do not allow water to puddle. ● If water keeps accumulating, correction works may be required. 	
3	Inspect grass for signs of dryness, stress indicating colour and scarcity:	  
	<ul style="list-style-type: none"> ● Consider correction measures such as additional seeding and sand soil spreading. ● Ensure proper watering and irrigation. ● Apply fertilisers. 	
4	Inspect the level and slope of the sports ground:	  
	<ul style="list-style-type: none"> ● Refill the surface with new material. ● Compact with appropriate machines. ● Keep the slope to the drainage direction. 	
5	Inspect and check the blow-outs on the sports ground:	  
	<ul style="list-style-type: none"> ● Maintain and repair the pitch with new grass or proper watering. ● Add topsoil to bare areas especially on centre and goal areas. 	
6	Inspect the field and forebay for presence of undesirable vegetation:	  
	<ul style="list-style-type: none"> ● Remove vegetation that threatens the function or integrity of the field and forebay such as woody vegetation that may cause dying of grass. ● Remove vegetation that threatens the function or integrity of the structure. 	
7	Inspect for areas of unhealthy grass cover, bare areas, or dying grass:	  
	<ul style="list-style-type: none"> ● Reseed and add topsoil to bare areas. ● Make sure that the mowing height is maintained between 2 and 6 cm. ● Consider testing the soil for nutrients deficiency or acidity. If pH adjustment and/or fertilisation is needed, apply lime and/or one-time fertiliser accordingly. ● Consider optimising irrigation, if possible. ● If compaction is a concern, consider aeration. However, this procedure should only be performed in times of the year when grass is actively growing. ● If the problem persists, determine the source (e.g., soil, drainage) and take appropriate corrective actions. 	

FIELD MARKINGS			
NO.	ACTIVITY	EVALUATION	
8	Inspect the status of field markings:		
	<ul style="list-style-type: none"> ● If markings are fading, apply new paint or lime. ● Mark the line(s) correctly and respect colour codes. 		
GOALS, POSTS AND NETS			
9	Inspect the status of goals, posts, boards and nets:		
	<ul style="list-style-type: none"> ● On corroded areas, apply anti-corrosion coating. ● Apply paint to refurbish posts, crossbars and boards. ● Maintain or, if necessary, replace nets. ● Adjust posts and strengthen their foundation. ● Level post areas if the concrete foundation is exposed. 		
OUT OF BOUNDS/TRANSITION AREAS			
10	Inspect the status of the boundaries or transition areas:		
	<ul style="list-style-type: none"> ● Make sure that there are no disruptive materials or works on transition areas. ● Inspect vegetative cover, which should be maintained at 70 percent. Reseed and add topsoil to bare areas. 		
FENCING (if any)			
11	Inspect the status of the fence:		
	<ul style="list-style-type: none"> ● Make sure the posts are firmly rooted in the ground. ● Inspect the top and bottom of the fence and enforce its structural integrity. ● Apply anti-corrosion coating if needed. 		
LIGHTING (if any)			
12	Inspect and check the status of the power mast, light installations and power connections:		
	<ul style="list-style-type: none"> ● Maintain cables, switches, poles, light fixtures. ● Make sure that posts are firmly rooted in the ground. ● Adjust the light distribution so that the area can be fully illuminated. 		
FACILITY (if any)			
13	Inspect and check the status of the facility:		
	<ul style="list-style-type: none"> ● Make sure the whole facility complies with health and safety regulations. ● Install and maintain instruction boards. ● Remove unnecessary materials. ● Procure and store spare parts and repair material like bolts, paint and brushes. ● Prepare emergency telephone numbers. ● Remove hazardous, poisonous and sharp edge materials. 		













SPORTS GROUND CLEANNESS

NO.	ACTIVITY	EVALUATION
14	Inspect and check the status of cleanness of the field:	  
	<ul style="list-style-type: none"> ● Regularly sweep or blow leaves, pine leaves, dirt and other refuse from the surface. Pollution and debris can lead to premature deterioration of the sports ground. ● After a tournament, arrange group cleaning programmes. ● Distribute at least six garbage bins across the sports ground. 	

SCOREBOARD (if any)

15	Inspect and check the status of scoreboard:	  
	<ul style="list-style-type: none"> ● If the signalling material is worn out, replace it. 	

DRAINAGE

16	Inspect for signs of poor drainage:	  
	<ul style="list-style-type: none"> ● If there is standing water, dewater and discharge to an approved location; determine cause (e.g., compacted soil, significant erosion) and re-grade if necessary. Standing water can result in mosquito and pest problems. ● Runoff must enter the channel as steady flow. Consider installing a level spreader or similar device if none is in place and there are signs of erosion from concentrated flow. ● Check inlet and outlet pipes for damage or plugging, repair or replace damaged piping if needed. ● If plugged, remove material; identify and mitigate the source of sediment or debris. 	
17	Inspect for trash, debris, and sediment:	  
	<ul style="list-style-type: none"> ● Remove and properly dispose of trash, debris or sediment that has the potential to block drainage. ● Remove sediment from within the channel area when it accumulates to a depth of 3 to 6 cm. Re-establish vegetation and re-grade if necessary. 	
18	Inspect for signs of erosion, rills or gullies:	  
	<ul style="list-style-type: none"> ● Repair eroded areas. ● Replace eroded soil, restore compacted fill, filter fabric, and rock riprap (if any). ● If vegetation needs be re-established, rake, seed, and provide suitable soil amendments (mulch or compost); apply lime and one-time fertiliser as appropriate. Sod may require erosion protection until repaired areas have stabilised. ● If erosion is a recurring problem, consult a design professional. 	
19	Inspect for undesirable vegetation:	  
	<ul style="list-style-type: none"> ● Remove woody vegetation that can impede water run-off. ● Remove vegetation that threatens the function or integrity of the structure. 	

CONCRETE SURFACES



Netball court at Valombola Vocational Training Center in Ongwediva, Namibia.

1. TYPICALLY OCCURRING DEFECTS

The most commonly occurring defects on concrete surface finishes are:

- cracks due to weather and natural problems
- deterioration of the surface
- exposure of gravel and reinforcement bars
- settlement problem
- unwanted vegetation.



a) *Unwanted vegetation around the sports ground due to lack of regular cleaning and mowing .*



b) *Weathered and cracked surface conditions and lack of proper cleaning and maintenance.*

2. MAINTENANCE OF CONCRETE SURFACE GRASSROOTS SPORTS GROUNDS

Maintenance and repair work for sports grounds with a concrete surface finish include repainting line marking with anti-slip colour coatings, as well as surface repairs to any damaged areas. It also includes regular maintenance such as brushing, removing debris and applying chemical treatments to prevent the growth of moss and algae, which can contaminate the surface and lead to a loss of drainage.

If repairs are not carried out timely, the court might need to be resurfaced in the future which would be a lot more expensive than minor maintenance and repair works.

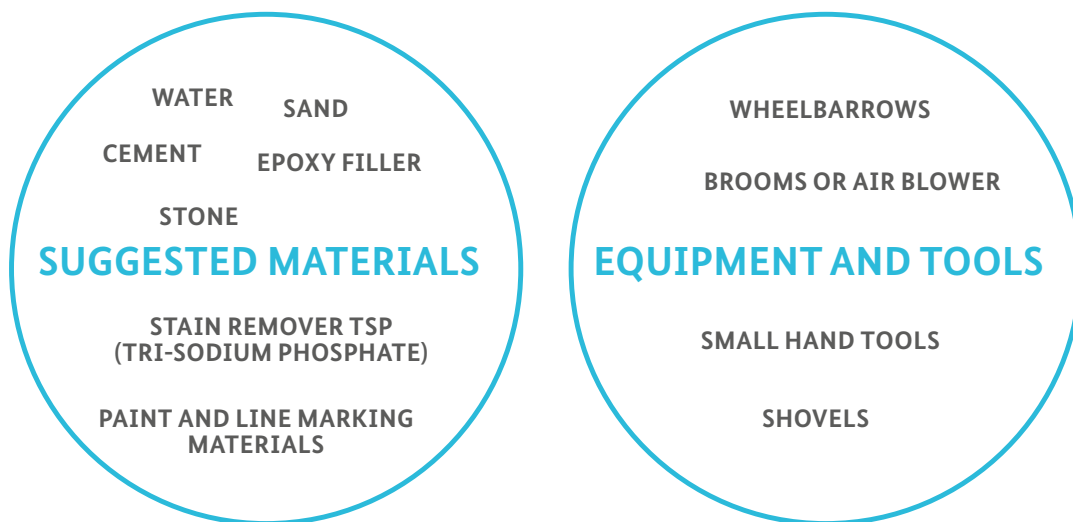
A wide variety of special products for patching concrete is available. These include both organic and inorganic materials such as epoxies, methacrylate, magnesium phosphate cements and gypsum-based cements. In order to prevent further damage, it is necessary to restrict the use of impervious materials (e.g. epoxies). Covering large areas, can trap vapour coming up from below and moisture.

Sports grounds with a concrete surface finish require little, but regular maintenance to keep the surface in prime condition. Examples of suitable care activities are:

- Sweep or blow leaves, dirt, bird droppings and other unwanted materials from the surface with a broom or air blower about once a week.
- Wear proper shoes, like non-marking flat soled basketball shoes, and make sure that shoes are clean while playing.
- Do an annual pressure washing to remove mildew, dirt etc.
- Remove tough stains by using TSP (tri-sodium phosphate).
- Seal cracks on the surface of the court in order to prevent water from permeating the concrete.

3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS

To carry out maintenance and repair works correctly, specific equipment is required. For concrete finish surfaces, the following materials and tools are recommended.



4. INSPECTION CHECKLIST FOR CONCRETE SURFACE GRASSROOTS SPORTS GROUNDS

The following checklist helps to identify maintenance and repair needs on concrete sports grounds. When a need is identified, the list provides detailed recommendations and solutions. By using the checklist accordingly, Maintenance Managers will also ensure the health and safety of the players and protect them from injuries resulting from insufficient maintenance.

'SPORT FOR DEVELOPMENT IN AFRICA' (S4DA) REGIONAL PROJECT

PLAYING SURFACE – CONCRETE

SPORTS GROUND SAFETY AND MAINTENANCE

CHECKLIST




SPORTS GROUND INFORMATION

DATE:	REMARKS:
LOCATION:	
FIELD NAME:	
FIELD USAGE:	
INSPECTOR:	
SIGNATURE:	

GENERAL NOTE
















Maintenance of a sports ground requires a regular inspection to identify the conditions of the sports ground and the actions to be taken. The frequency of inspection for sports ground can vary according to the intensity of its use – but the frequency of inspections should not be less than once a month.

For each line of activity mark the smiley with 'x' to indicate the attention needed in each area:













-  means: with good condition and no need for maintenance or repair.
-  means: with fair condition but still function but might need action.
-  means: with poor condition, needing maintenance, repair and/or replacement.

When repairs are needed, write a comment about each problem area and note the scheduled and actual repair date. Please skip the section, if it does not apply to your sports ground. The following sections shall be checked by the inspector to decide on repair works. The inspector shall fill the document properly and take the appropriate action.

PLAYING SURFACE – CONCRETE				
NO.	ACTIVITY	EVALUATION		
1	Inspect sports ground for evidence of cracks:			
	<ul style="list-style-type: none"> ● Repair cracks with filler materials. ● If shrinkage is affected, apply corrective measure or paint. 			
2	Inspect the area around the sports ground for undesirable vegetation:			
	<ul style="list-style-type: none"> ● Remove woody vegetation that can cause cracks and settlement. ● Remove vegetation that threatens the function or integrity of the structure. 			
3	Inspect sports ground for areas of standing water:			
	<ul style="list-style-type: none"> ● Dewater and discharge to an approved location. Correction works may be required. ● Determine cause of standing water and check drainage. Standing water can result in algae formation on the surface of the concrete. 			
4	Inspect the colour and texture of the surface:			
	<ul style="list-style-type: none"> ● Consider correction measures like additional paint or screed. 			
FIELD MARKINGS				
5	Inspect the status of field markings:			
	<ul style="list-style-type: none"> ● If markings are fading, apply new paint or lime. ● Mark the line(s) correctly and respect colour codes. 			
GOALS, POSTS AND NETS				
6	Inspect the status of goals, posts, boards and nets:			
	<ul style="list-style-type: none"> ● On corroded areas, apply anti-corrosion coating. ● Apply paint to refurbish posts, crossbars and boards. ● Maintain or, if necessary, replace nets. ● Adjust posts and strengthen their foundation. ● Level post areas if the concrete foundation is exposed. 			
OUT OF BOUNDS/TRANSITION AREAS				
7	Inspect the status of the boundaries or transition areas:			
	<ul style="list-style-type: none"> ● Make sure that there are no disruptive materials or works on transition areas. ● Inspect vegetative cover, which should be maintained at 70 percent. Reseed and add topsoil to bare areas. 			

FENCING (if any)			
NO.	ACTIVITY	EVALUATION	
8	Inspect the status of the fence:		
	<ul style="list-style-type: none"> ● Make sure the posts are firmly rooted in the ground. ● Inspect the top and bottom of the fence and enforce its structural integrity. ● Apply anti-corrosion coating if needed. 		
LIGHTING (if any)			
9	Inspect and check the status of the power mast, light installations and power connections:		
	<ul style="list-style-type: none"> ● Maintain cables, switches, poles, light fixtures. ● Make sure that posts are firmly rooted in the ground. ● Adjust the light distribution so that the area can be fully illuminated. 		
FACILITY (if any)			
10	Inspect and check the status of the facility:		
	<ul style="list-style-type: none"> ● Make sure the whole facility complies with health and safety regulations. ● Install and maintain instruction boards. ● Remove unnecessary materials. ● Procure and store spare parts and repair material like bolts, paint and brushes. ● Prepare emergency telephone numbers. ● Remove hazardous, poisonous and sharp edge materials. 		
SPORTS GROUND CLEANNESS			
11	Inspect and check the status of cleanness of the field:		
	<ul style="list-style-type: none"> ● Regularly sweep or blow leaves, pine leaves, dirt and other refuse from the surface. Pollution and debris can lead to premature deterioration of the sports ground. ● After a tournament, arrange group cleaning programmes. ● Distribute at least six garbage bins across the sports ground. 		
SCOREBOARD (if any)			
12	Inspect and check the status of scoreboard:		
	<ul style="list-style-type: none"> ● If the signalling material is worn out, replace it. 		

DRAINAGE

NO.	ACTIVITY	EVALUATION
13	Inspect for signs of poor drainage: <ul style="list-style-type: none"> ● If there is standing water, dewater and discharge to an approved location; determine cause (e.g., compacted soil, significant erosion) and re-grade if necessary. Standing water can result in mosquito and pest problems. ● Runoff must enter the channel as steady flow. Consider installing a level spreader or similar device if none is in place and there are signs of erosion from concentrated flow. ● Check inlet and outlet pipes for damage or plugging, repair or replace damaged piping if needed. ● If plugged, remove material; identify and mitigate the source of sediment or debris. 	  
14	Inspect for trash, debris, and sediment: <ul style="list-style-type: none"> ● Remove and properly dispose of trash, debris or sediment that has the potential to block drainage. ● Remove sediment from within the channel area when it accumulates to a depth of 3 to 6 cm. Re-establish vegetation and re-grade if necessary. 	  
15	Inspect for signs of erosion, rills or gullies: <ul style="list-style-type: none"> ● Repair eroded areas. ● Replace eroded soil, restore compacted fill, filter fabric, and rock riprap (if any). ● If vegetation needs be re-established, rake, seed, and provide suitable soil amendments (mulch or compost); apply lime and one-time fertiliser as appropriate. Sod may require erosion protection until repaired areas have stabilised. ● If erosion is a recurring problem, consult a design professional. 	  
16	Inspect for undesirable vegetation: <ul style="list-style-type: none"> ● Remove woody vegetation that can impede water run-off. ● Remove vegetation that threatens the function or integrity of the structure. 	  



GRAVEL SURFACES



Football field at Don Bosco Mekannisa School in Addis Ababa, Ethiopia.

1. TYPICALLY OCCURRING DEFECTS

The most commonly occurring defects on gravel surface finishes are:

- corrugation
- potholes
- erosion
- rutting
- degradation of soil.



Typical bush and grass invasion on gravel surface.

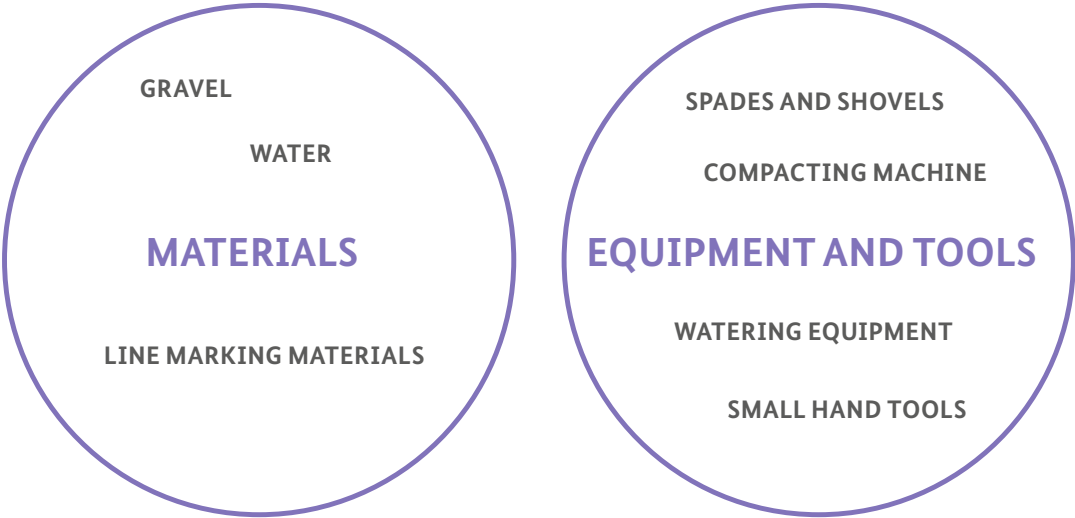
2. MAINTENANCE OF GRAVEL SURFACE GRASSROOTS SPORTS GROUNDS

There are special conditions, common in nearly all gravel surfaces, which need to be understood and addressed when maintaining of those surfaces. These concerns are unique to gravel surfaces, and practical solutions are recommended as follows:

- Cut and remove bushes and unnecessary grass or plants.
- Correct corrugation by cutting it out of the surfaces, reconstruct the location, carefully remix and compact fine and course materials with optimum moisture content in order to prevent it from recurring.
- Prevent potholes by maintaining adequate crown on the surfaces; temporarily repair potholes by filling them with aggregate.
- Correct rutting: Cut out potholes, fill the hole with additional granular material, then level and compact it in order to avoid recurring.

3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS

To carry out maintenance and repair works correctly, specific equipment is required. For gravel finish surfaces, the following materials and tools are recommended.



4. INSPECTION CHECKLIST FOR GRAVEL SURFACE GRASSROOTS SPORTS GROUNDS

The following checklist helps to identify maintenance and repair needs on gravel sports grounds. When a need is identified, the list provides detailed recommendations and solutions. By using the checklist accordingly, Maintenance Managers will also ensure the health and safety of the players and protect them from injuries resulting from insufficient maintenance.

PLAYING SURFACE – GRAVEL

SPORTS GROUND SAFETY AND MAINTENANCE

CHECKLIST




SPORTS GROUND INFORMATION

DATE:	REMARKS:
LOCATION:	
FIELD NAME:	
FIELD USAGE:	
INSPECTOR:	
SIGNATURE:	

GENERAL NOTE







Maintenance of a sports ground requires a regular inspection to identify the conditions of the sports ground and the actions to be taken. The frequency of inspection for sports ground can vary according to the intensity of its use – but the frequency of inspections should not be less than once a month.






















For each line of activity mark the smiley with 'x' to indicate the attention needed in each area:
















-  means: with good condition and no need for maintenance or repair.
-  means: with fair condition but still function but might need action.
-  means: with poor condition, needing maintenance, repair and/or replacement.







When repairs are needed, write a comment about each problem area and note the scheduled and actual repair date. Please skip the section, if it does not apply to your sports ground. The following sections shall be checked by the inspector to decide on repair works. The inspector shall fill the document properly and take the appropriate action.

PLAYING SURFACE – GRAVEL

NO.	ACTIVITY	EVALUATION
1	Inspect sports ground for signs of erosion, rills or gullies:	  
	<ul style="list-style-type: none"> ● Repair erosion after storms, winds, or heavy exhaustion of the sports ground. ● Replace eroded soil. 	
2	Inspect the level and slope of the sports ground:	  
	<ul style="list-style-type: none"> ● Apply corrective measure by refilling the surface with new materials. ● Compact with appropriate machines. ● Keep the slope to the drainage direction. 	

NO.	ACTIVITY	EVALUATION
3	Inspect sports ground for areas of standing water:	  
	<ul style="list-style-type: none"> ● Dewater and discharge to an approved location. Correction works may be required. ● Determine cause of standing water and check drainage. 	
4	Inspect the field and forebay for presence of undesirable vegetation:	  
	<ul style="list-style-type: none"> ● Remove vegetation that threatens the function or integrity of the structure. 	
FIELD MARKINGS		
5	Inspect the status of field markings:	  
	<ul style="list-style-type: none"> ● If markings are fading, apply new paint or lime. ● Mark the line(s) correctly and respect colour codes. 	
GOALS, POSTS AND NETS		
6	Inspect the status of goals, posts, boards and nets:	  
	<ul style="list-style-type: none"> ● On corroded areas, apply anti-corrosion coating. ● Apply paint to refurbish posts, crossbars and boards. ● Maintain or, if necessary, replace nets. ● Adjust posts and strengthen their foundation. ● Level post areas if the concrete foundation is exposed. 	
OUT OF BOUNDS/TRANSITION AREAS		
7	Inspect the status of the boundaries or transition areas:	  
	<ul style="list-style-type: none"> ● Make sure that there are no disruptive materials or works on transition areas. ● Inspect vegetative cover, which should be maintained at 70 percent. Reseed and add topsoil to bare areas. 	
FENCING (if any)		
8	Inspect the status of the fence:	  
	<ul style="list-style-type: none"> ● Make sure the posts are firmly rooted in the ground. ● Inspect the top and bottom of the fence and enforce its structural integrity. ● Apply anti-corrosion coating if needed. 	
LIGHTING (if any)		
9	Inspect and check the status of the power mast, light installations and power connections:	  
	<ul style="list-style-type: none"> ● Maintain cables, switches, poles, light fixtures. ● Make sure that posts are firmly rooted in the ground. ● Adjust the light distribution so that the area can be fully illuminated. 	

FACILITY (if any)				
NO.	ACTIVITY	EVALUATION		
10	Inspect and check the status of the facility:			
	<ul style="list-style-type: none"> ● Make sure the whole facility complies with health and safety regulations. ● Install and maintain instruction boards. ● Remove unnecessary materials. ● Procure and store spare parts and repair material like bolts, paint and brushes. ● Prepare emergency telephone numbers. ● Remove hazardous, poisonous and sharp edge materials. 			
SPORTS GROUND CLEANNESS				
11	Inspect and check the status of cleanness of the field:			
	<ul style="list-style-type: none"> ● Regularly sweep or blow leaves, pine leaves, dirt and other refuse from the surface. Pollution and debris can lead to premature deterioration of the sports ground. ● After a tournament, arrange group cleaning programmes. ● Distribute at least six garbage bins across the sports ground. 			
SCOREBOARD (if any)				
12	Inspect and check the status of scoreboard:			
	<ul style="list-style-type: none"> ● If the signalling material is worn out, replace it. 			
DRAINAGE				
13	Inspect for signs of poor drainage:			
	<ul style="list-style-type: none"> ● If there is standing water, dewater and discharge to an approved location; determine cause (e.g., compacted soil, significant erosion) and re-grade if necessary. Standing water can result in mosquito and pest problems. ● Runoff must enter the channel as steady flow. Consider installing a level spreader or similar device if none is in place and there are signs of erosion from concentrated flow. ● Check inlet and outlet pipes for damage or plugging, repair or replace damaged piping if needed. ● If plugged, remove material; identify and mitigate the source of sediment or debris. 			
14	Inspect for trash, debris, and sediment:			
	<ul style="list-style-type: none"> ● Remove and properly dispose of trash, debris or sediment that has the potential to block drainage. ● Remove sediment from within the channel area when it accumulates to a depth of 3 to 6 cm. Re-establish vegetation and re-grade if necessary. 			

NO.	ACTIVITY	EVALUATION		
15	Inspect for signs of erosion, rills or gullies:			
	<ul style="list-style-type: none"> ● Repair eroded areas. ● Replace eroded soil, restore compacted fill, filter fabric, and rock riprap (if any). ● If vegetation needs be re-established, rake, seed, and provide suitable soil amendments (mulch or compost); apply lime and one-time fertiliser as appropriate. Sod may require erosion protection until repaired areas have stabilised. ● If erosion is a recurring problem, consult a design professional. 			
16	Inspect for undesirable vegetation:			
	<ul style="list-style-type: none"> ● Remove woody vegetation that can impede water run-off. ● Remove vegetation that threatens the function or integrity of the structure. 			



SAND SURFACES



Football field at Don Bosco Youth Centre in Lomé, Togo.

1. TYPICALLY OCCURRING DEFECTS

Sports grounds with sand surfaces are relatively easy to maintain. However, wind and water deteriorates the quality of sand sports grounds. The most commonly occurring defects on sand surface finishes are:

- erosion
- uneven or degraded surfaces.

This deterioration makes the sports ground uncomfortable to play on, as depicted below.



Typical problems on sand surface.

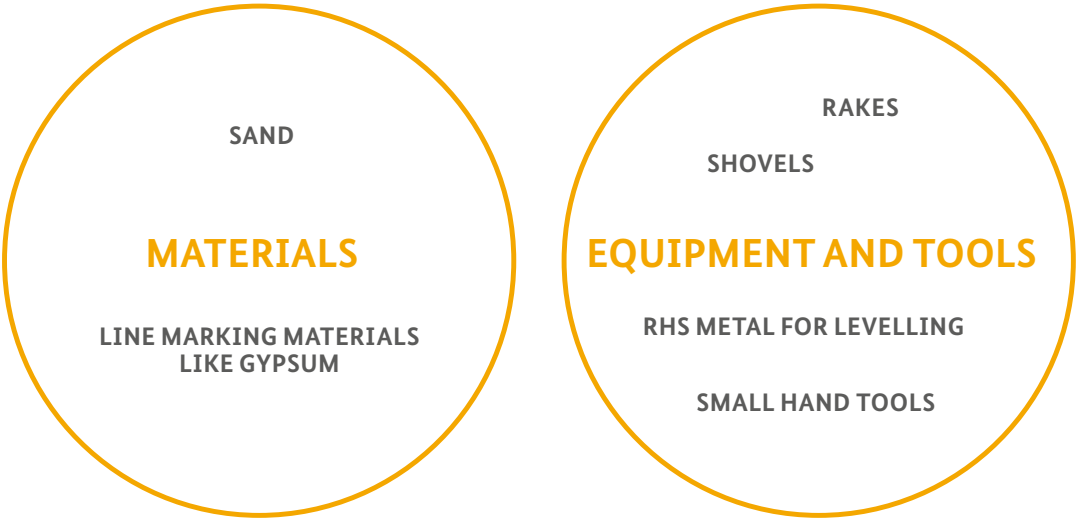
2. MAINTENANCE OF SAND SURFACE GRASSROOTS SPORTS GROUNDS

Sports grounds with a sand surface finish do not need the same intensity of care as sports grounds with a turf surface finish. However, a few maintenance activities must be performed regularly to keep the court in good condition. Sand seems to attract debris such as paper, cigarette butts and bottle caps. The following maintenance activities are required:

- Check the court daily; manually remove and dispose any debris that might have deposited.
- Regularly rake the sand to bring up any sharp objects and trash, and then manually remove it. Raking regularly will also help to keep the sand dry and soft.
- Even out irregularities in the sand with a rake and shovel.
- Clear trash, obstructions and any other debris around the court. If grass grows around the court, keep it mowed short.
- Check the padding on poles and other structures that players could run into. Repair or replace if necessary.
- Check for wear at points on wooden posts where net anchors are attached. Repair or replace worn posts.

3. MAINTENANCE AND REPAIR MATERIALS, EQUIPMENT AND TOOLS

To carry out maintenance and repair works correctly, specific equipment is required. For sand finish surfaces, the following materials and tools are recommended.



4. INSPECTION CHECKLIST FOR SAND SURFACE GRASSROOTS SPORTS GROUNDS

The following checklist helps to identify maintenance and repair needs on sand sports grounds. When a need is identified, the list provides detailed recommendations and solutions. By using the checklist accordingly, Maintenance Managers will also ensure the health and safety of the players and protect them from injuries resulting from insufficient maintenance.

PLAYING SURFACE – SAND

SPORTS GROUND SAFETY AND MAINTENANCE

CHECKLIST




SPORTS GROUND INFORMATION

DATE:	REMARKS:
LOCATION:	
FIELD NAME:	
FIELD USAGE:	
INSPECTOR:	
SIGNATURE:	

GENERAL NOTE




Maintenance of a sports ground requires a regular inspection to identify the conditions of the sports ground and the actions to be taken. The frequency of inspection for sports ground can vary according to the intensity of its use – but the frequency of inspections should not be less than once a month.






















For each line of activity mark the smiley with 'x' to indicate the attention needed in each area:

-  means: with good condition and no need for maintenance or repair.
-  means: with fair condition but still function but might need action.
-  means: with poor condition, needing maintenance, repair and/or replacement.







When repairs are needed, write a comment about each problem area and note the scheduled and actual repair date. Please skip the section, if it does not apply to your sports ground. The following sections shall be checked by the inspector to decide on repair works. The inspector shall fill the document properly and take the appropriate action.

PLAYING SURFACE – SAND

NO.	ACTIVITY	EVALUATION
1	Inspect sports ground for signs of soil erosion, rills or gullies:	  
	<ul style="list-style-type: none"> ● Repair erosion after storms, winds, or heavy exhaustion of the sports ground. ● Repair curb stone, if damaged. ● Replace eroded sand. ● Rake and provide sand amendments. 	

NO.	ACTIVITY	EVALUATION
2	Inspect sports ground for areas of standing water:	  
	<ul style="list-style-type: none"> ● Dewater and discharge to an approved location. Correction works may be required. ● Determine cause of standing water and check drainage. 	
3	Inspect the field and forebay for presence of undesirable vegetation:	  
	<ul style="list-style-type: none"> ● Remove vegetation that threatens the function or integrity of the structure. 	
FIELD MARKINGS		
4	Inspect the status of field markings:	  
	<ul style="list-style-type: none"> ● If markings are fading, apply new paint or lime. ● Mark the line(s) correctly and respect colour codes. 	
GOALS, POSTS AND NETS		
5	Inspect the status of goals, posts, boards and nets:	  
	<ul style="list-style-type: none"> ● On corroded areas, apply anti-corrosion coating. ● Apply paint to refurbish posts, crossbars and boards. ● Maintain or, if necessary, replace nets. ● Adjust posts and strengthen their foundation. ● Level post areas if the concrete foundation is exposed. 	
OUT OF BOUNDS/TRANSITION AREAS		
6	Inspect the status of the boundaries or transition areas:	  
	<ul style="list-style-type: none"> ● Make sure that there are no disruptive materials or works on transition areas. ● Inspect vegetative cover, which should be maintained at 70 percent. Reseed and add topsoil to bare areas. 	
FENCING (if any)		
7	Inspect the status of the fence:	  
	<ul style="list-style-type: none"> ● Make sure the posts are firmly rooted in the ground. ● Inspect the top and bottom of the fence and enforce its structural integrity. ● Apply anti-corrosion coating if needed. 	
LIGHTING (if any)		
8	Inspect and check the status of the power mast, light installations and power connections:	  
	<ul style="list-style-type: none"> ● Maintain cables, switches, poles, light fixtures. ● Make sure that posts are firmly rooted in the ground. ● Adjust the light distribution so that the area can be fully illuminated. 	

FACILITY (if any)			
NO.	ACTIVITY	EVALUATION	
9	Inspect and check the status of the facility:		
	<ul style="list-style-type: none"> ● Make sure the whole facility complies with health and safety regulations. ● Install and maintain instruction boards. ● Remove unnecessary materials. ● Procure and store spare parts and repair material like bolts, paint and brushes. ● Prepare emergency telephone numbers. ● Remove hazardous, poisonous and sharp edge materials. 		
SPORTS GROUND CLEANNESS			
10	Inspect and check the status of cleanness of the field:		
	<ul style="list-style-type: none"> ● Regularly sweep or blow leaves, pine leaves, dirt and other refuse from the surface. Pollution and debris can lead to premature deterioration of the sports ground. ● After a tournament, arrange group cleaning programmes. ● Distribute at least six garbage bins across the sports ground. 		
SCOREBOARD (if any)			
11	Inspect and check the status of scoreboard:		
	<ul style="list-style-type: none"> ● If the signalling material is worn out, replace it. 		
DRAINAGE			
12	Inspect for signs of poor drainage:		
	<ul style="list-style-type: none"> ● If there is standing water, dewater and discharge to an approved location; determine cause (e.g., compacted soil, significant erosion) and re-grade if necessary. Standing water can result in mosquito and pest problems. ● Runoff must enter the channel as steady flow. Consider installing a level spreader or similar device if none is in place and there are signs of erosion from concentrated flow. ● Check inlet and outlet pipes for damage or plugging, repair or replace damaged piping if needed. ● If plugged, remove material; identify and mitigate the source of sediment or debris. 		
13	Inspect for trash, debris, and sediment:		
	<ul style="list-style-type: none"> ● Remove and properly dispose of trash, debris or sediment that has the potential to block drainage. ● Remove sediment from within the channel area when it accumulates to a depth of 3 to 6 cm. Re-establish vegetation and re-grade if necessary. 		

NO.	ACTIVITY	EVALUATION		
14	Inspect for signs of erosion, rills or gullies:			
	<ul style="list-style-type: none"> ● Repair eroded areas. ● Replace eroded soil, restore compacted fill, filter fabric, and rock riprap (if any). ● If vegetation needs be re-established, rake, seed, and provide suitable soil amendments (mulch or compost); apply lime and one-time fertiliser as appropriate. Sod may require erosion protection until repaired areas have stabilised. ● If erosion is a recurring problem, consult a design professional. 			
15	Inspect for undesirable vegetation:			
	<ul style="list-style-type: none"> ● Remove woody vegetation that can impede water run-off. ● Remove vegetation that threatens the function or integrity of the structure. 			

GLOSSARY OF TERMS

TERMS	DESCRIPTION
Aeration	Operations carried out to improve turf by physical methods to increase drainage and air exchange and to encourage better root development.
Brush	A device consisting of bristles held in a suitable frame used to sweep the grass.
Disease	A pathological condition, usually resulting of a fungal infection and often associated with environmental stress, which affects the quality of the grass plant.
Drag mat	A flexible steel mat which is pulled along to work on top dressings, more particularly on undulating turf surfaces.
Drainage system	A network of drains to remove excess water from a sports ground.
Fertiliser analysis	The percentage of nitrogen, phosphorus, potassium and other plant nutrients found in a fertiliser.
Fungicide	Any chemical which controls or destroys the growth of a fungus.
Grass	Any of various plants having slender leaves characteristic of the grass family.
Gravel	Rock fragments or small pebbles typically 2 – 10 mm in diameter.
Irrigation	The controlled application of water to turf.
Line marker	Machine for marking lines on a sports ground.
Maintenance	The day-to-day or periodically scheduled work required preserving and maintaining a facility. Specifically, maintenance is the management of various sports grounds, drainage and mechanical equipment.
Mower	Grass-cutting machine.
Pest	Insects, grubs or other soil organisms that may cause damage to the grass plant.
Pesticide	Any substance or mixture of substances intended for preventing or controlling any unwanted species of plants and animals and which includes any substances intended for use as a plant growth regulator, defoliant or desiccant, including fungicides, herbicides and nematicides.
Pipe drain	Trench containing a drain pipe backfilled with a suitable type of gravel.
Rehabilitation	Repair of an area of turf by cultivating, re-levelling and reseeding, particularly carried out at the end of the playing season.
Repair	Short time and urgent activity to ensure the functionality of the sports ground and it also forms part of maintenance schedule.

Sand	Granular mineral materials ranging from 0.05 mm to 2 mm in diameter, regularly used on pitches because of their good drainage and other physical properties.
Sod	Strips of turf grasses usually with adhering soil used in vegetative planting (also called turf in some countries).
Sprig	Vegetative material (a stolon, rhizome, tiller or combination) used to establish turf usually for warm season grass species.
Turf	(1) The grass-covered surface of the ground growing within the upper soil layer. (2) Strips of turf grasses usually with adhering soil used in vegetative planting (also called sod in some countries).
Weeds	Unwanted grasses or broad-leafed plants whose negative values outweigh the positive values in a given situation.

FURTHER SOURCES OF INFORMATION

1. Blanchard, B; Mitchell, B. (coor.): *Turf Management for Municipal Athletics Field, a resources guide and planning tools for environmentally responsible Turf Management*, Massachusetts Department of Agricultural Resources, Second Edition, and 1999 Edition.
2. Cook, M. et all: *Field Maintenance A Basic Guide for Baseball & Softball Fields of All Levels*, 2012 Edition.
3. Duble, R.L.: *Sports Field Maintenance*, Texas Agricultural Extension Service.
4. Fédération Internationale de Football Association (FIFA): *Manager's Guide to Natural Grass Football Pitches*, Switzerland.
5. Football NSW: *Grass Field Maintenance. Guide to Sports Field Surface quality and maintenance*, November 2015.
6. Grassform Group: *Football Pitch Maintenance Guide*, <https://www.grassform.co.uk/wp-content/uploads/Football-Pitch-Maintenance-Guide-.pdf>, 2015.
7. International Association of Athletics Federation (IAAF): *Track and Field Facilities Manual*, 2008 Edition.
8. Reicher, Z., Hardebeck, G., Throssell, C.: *Building and Maintaining Soccer Fields in Indiana*.
9. School Facilities Maintenance Task Force; National Forum on education Statistics; Association of School Business Officials International: *Planning Guide for Maintaining School Facilities*, February 2003.
10. Shaw Sports Turf: *Maintenance Manual*, http://www.shawsportsturf.com/wp-content/uploads/2017/02/SST_Maintenance-Manual_11.15_web.pdf.
11. SportsTurf Manager Association: *A Guide to Synthetic and Natural Turf grass for Sports Fields. Selection, Construction and Maintenance Considerations*, Second Edition, 2008.
12. SportsTurf Manager Association: *Maintenance & performance guidelines for synthetic turf fields*, www.sportsturfonline.org, July 2013.
13. Talbot, T. (coord.): *Guidance Document for Sports ground surfaces*, Sport New Zealand, November 2012.
14. Zerle, L.: *The Texas A&M University System*, College Station, Texas.



“Sport moves
and
educates!”